OFFICE OF COMMUNICATIONS

Mobile call termination

Proposals for consultation

Consultation

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Contents

Section 1

Summary

1.1 Wholesale mobile voice call termination ("MCT") is the service necessary for a network operator to connect a caller with the intended mobile recipient of a call on a different network. If voice call termination, generally, was not available a network operator could only terminate calls to other customers on its own network. This service is referred to as wholesale because it is sold and purchased by network operators rather than retail customers.

1.2 Ofcom is reviewing the market(s) for supply of MCT to determine whether they are effectively competitive and, if not, what remedies should be imposed.

Background

1.3 Ofcom last conducted a review of markets for the supply of MCT during 2003/2004, and concluded that exercise on 1 June 2004 when it published the statement *Wholesale Mobile Voice Call Termination* (the "June 2004 Statement") in which it designated Vodafone, O2, T-Mobile, Orange and Hutchison 3G UK (together, "the five MNOs") as having Significant Market Power ("SMP"). Various conditions were imposed on the five MNOs, including charge controls which were imposed on only Vodafone, O2, T-Mobile and Orange (the "2G/3G MNOs"). Hutchison 3G UK ("H3G") subsequently appealed its SMP designation and the Competition Appeals Tribunal ("CAT") remitted the decision back to Ofcom to reconsider. The reassessment of H3G's SMP during the period to 31 March 2007 is being undertaken as an exercise distinct from the present market review. The charge controls imposed on the 2G/3G MNOs will expire on 31 March 2007.

1.4 The present market review was initiated on 7 June 2005 when Ofcom published a document *Wholesale mobile voice call termination – a preliminary consultation (*"the Preliminary Consultation"). That document was intended to initiate consideration of the issues.

1.5 On 30 March 2006, having considered responses to the Preliminary Consultation, Ofcom published a more detailed consultation document *Wholesale mobile voice call termination* – ("the March 2006 Consultation"). That consultation set out Ofcom's initial view that there are separate markets for MCT supplied by each of the five MNOs, and that the prima facie evidence indicates that each of these mobile operators has SMP in the market in which they supply MCT. Ofcom emphasised, however, that it had not yet concluded its analysis of whether any purchasers of MCT have countervailing buyer power ("CBP") such that would constrain a supplier's ability to exercise SMP.

1.6 The March 2006 Consultation also considered the detriments which may arise from the exercise of SMP in these markets; principally, that MCT charges may be excessive, and that excessive profits may not wholly be returned to consumers through reduced charges for other services or, if they are so returned to consumers, that the resulting price structures may be economically inefficient. Concern was expressed that excessive charges for MCT may result in a number of detrimental outcomes, including; under-consumption of fixed to mobile calls and other services originated on fixed networks; over-consumption of subsidised outgoing mobile services and mobile phones; inequitable outcomes in that some groups of consumers, such as heavy users of subsidised mobile goods and services, may

benefit to the detriment of other groups whose use of fixed to mobile calls is high relative to their consumption of subsidised mobile services.

1.7 The March 2006 Consultation explored a number of regulatory options for addressing those detriments. Ofcom indicated an initial view that, in the presence of SMP, some form of charge control might be appropriate and that there may be merit in applying a "technology-neutral" charge control to each MNO. For example, in the case of MNOs with both 2G and 3G networks a single control applying irrespective of which network is used to terminate a specific call. The March 2006 Consultation noted that as Ofcom had not yet concluded its cost modelling work it was unable also to express a view as to whether the same or different charge controls should be imposed on each of the five MNOs. Ofcom noted, however, that any distinctions between the controls imposed on different MNOs would need to be based on clear and unambiguous cost differences, otherwise controls risk distorting other markets, such as the retail markets for outgoing mobile services.

1.8 The March 2006 Consultation also proposed that Ofcom should ensure that any charge controls should not be so tight as to impact adversely prospects for investment, particularly in the light of uncertainty about future traffic levels on 2G and 3G networks. The document also noted the likely asymmetry of risks consequent on setting a charge control which, in light of subsequent market developments, is found to be above or below an MNO's efficiently incurred costs.

Ofcom's present view

1.9 Having considered responses to the March 2006 Consultation, having completed an analysis of CBP and having more fully completed the cost modelling work, Ofcom is setting out in the present consultation its proposed views that

- There are separate markets for wholesale mobile voice call termination in the UK by each of Vodafone, O2, Orange, T-Mobile and H3G.
- BT and other purchasers are unable to exercise CBP to the extent needed to constrain charges to the competitive level.
- Each of the five MNOs has SMP in the market for termination of voice calls on its network(s)
- Charge controls should be imposed on the supply of MCT by each of the five MNOs, and those controls should apply without distinction to voice call termination whether on 2G or 3G networks.
- The charge control should apply for 4 years from 31 March 2007
- Average charges of Vodafone, O2, Orange and T-Mobile should be reduced to 5.3 ppm (2006/7 prices) by the final year of the charge control period (1 April 2010 to 31 March 2011). This would remove the current differential charge control between providers who use 1800 MHz as opposed to 900 MHz spectrum. The reduction should be implemented in 4 equal (percentage) steps across the four years. However, Ofcom will re-evaluate the proposed final level of the charge and the glide path cap (in respect of each MNO separately) in the light of responses to this consultation exercise.
- Average charges of H3G should be reduced to 6.0 ppm (2006/7 prices) by the final year of the charge control (1 April 2010 to 31 March 2011). This level reflects

exogenous cost differences between H3G and the 2G/3G MNOs. The change to be implemented by one of three alternative paths (to be determined by Ofcom following consideration of responses to this consultation exercise); either (i) a glide path of four equal percentage changes to the 2010/11 level; (ii) an initial reduction to 8.5ppm (2006/7 prices) in the first year of the control (1 April 2007 to 31 March 2008) followed by three reductions each of equal percentage change across the next three years; or (iii) an immediate reduction to cost in 2007/08 falling to the cost level in 2010/11 over four years. The proposed level of the charge cap in the final year of the four year control will also be re-evaluated in the light of responses to this consultation exercise (and the size of the charge reduction in the first year under option (ii) may also be adjusted).

- Further conditions should be imposed requiring provision of voice call termination on fair and reasonable terms and conditions (including contract terms), prohibiting undue discrimination, and requiring charge and contract term transparency.

1.10 The Notification setting out the proposed market definition, SMP designations and SMP conditions, including draft charge control conditions, are attached at Annex 21.

Next steps

1.11 In accordance with the Communications Act, Ofcom is sending this proposal to the European Commission and to other National Regulatory Authorities ("NRAs"), as well as interested parties including the Secretary of State. Ofcom is inviting detailed comments on the issues raised in this consultation document by 22 November 2006.

1.12 After considering responses Ofcom expects to publish a concluding statement on this issue early in 2007.

Section 2

Introduction

Market reviews and regulation today

2.1 As provided for in the Framework Directive (Directive 2002/21/EC), the European Commission has adopted a Recommendation on relevant products and services markets ("the Recommendation")[1] which identifies markets within the electronic communications sector, the characteristics of which may be such as to justify the imposition of regulatory obligations. NRAs such as Ofcom are obliged to take the utmost account of the Recommendation when defining markets appropriate to national circumstances. If Ofcom considers a market reviewed is not effectively competitive, it must consider imposing remedies where appropriate on undertakings with SMP within that market. The Recommendation's Market 16 is the market for voice call termination on individual mobile networks.

2.2 Ofcom last conducted a full review of the market for mobile voice call termination during 2003/4. Ofcom concluded in the statement *Wholesale Mobile Voice Call Termination* published on 1 June 2004 ("the June 2004 Statement") that, as envisaged by the European Commission in its Recommendation, there are separate markets for mobile termination of voice calls on the network(s) of each of Vodafone, O2, T-Mobile, Orange and H3G ("the five MNOs") (plus Inquam which has since ceased to trade). Those markets were considered to include voice call termination on both 2G and 3G networks, but they excluded termination of data and SMS. The June 2004 Statement also found that each of the five MNOs (plus Inquam) had SMP in their respective market. The formal Notifications to each of the MNOs defined the markets as follows (H3G was referred to in that document as "3"):

- wholesale voice call termination provided by 3 (such termination being provided via 3's mobile network);
- wholesale voice call termination provided by Inquam (such termination being provided via Inquam's mobile network);
- wholesale voice call termination provided by O2 (such termination being provided via O2's 2G and 3G mobile network);
- wholesale voice call termination provided by Orange (such termination being provided via Orange's 2G and 3G mobile network);
- wholesale voice call termination provided by T-Mobile (such termination being provided via T-Mobile's 2G and 3G mobile network); and
- wholesale voice call termination provided by Vodafone (such termination being provided via Vodafone's 2G and 3G mobile network).

[1] *Recommendation on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services*.
http://europa.eu.int/information_society/topics/telecoms/regulatory/publiconsult/documents/relevant_markets/l_11420030508en00450049.pdf

2.3 As a consequence of those SMP designations, SMP conditions were imposed on all of the five MNOs (and on Inquam), but these varied between the MNOs. Vodafone, O2, T-Mobile and Orange (the "2G/3G MNOs") were made subject to charge controls on mobile to mobile and fixed to mobile 2G voice call termination (but not 3G termination). The Target Average Charge for Vodafone and O2, which operate networks at 900 MHz and 1800 MHz, was set at 5.63ppm and for T-Mobile and Orange, which operate networks at 1800 MHz, at 6.31 ppm. These Target Average Charges were also subject to a Weights Adjustment Factor which makes small adjustments for changes in traffic profiles. No charge control was imposed on any form of termination by H3G (or by Inquam).

2.4 The 2G/3G MNOs were also made subject to further conditions which prohibit undue discrimination in the supply of 2G voice call termination, require supply of 2G voice call termination on fair and reasonable terms and conditions, and require publication and notification of contracts and charges for 2G voice call termination.

2.5 The charge controls imposed on the 2G/3G MNOs in June 2004 were time-limited and unless extended would have expired at the end of March 2006. Following consultation with stakeholders[2], the charge control conditions were amended in December 2005 such that they will now expire at the end of March 2007 (*Wholesale Mobile Voice Call Termination – statement and notification extending the charge controls* published by Ofcom on 16 December 2005 – the "December 2005 Statement").[3]

2.6 H3G was made subject only to an obligation to notify 2G voice call termination volumes and total voice call termination volumes to Ofcom and to supply, 28 days before implementation, details of 2G charges (and charge changes) to those with whom it had entered into contracts for the supply of 2G voice call termination.

2.7 In summary, therefore, the SMP conditions imposed on the 2G/3G MNOs in June 2004, and which are in force today, are as follows;

- Requirement to provide network access on reasonable terms and conditions
- Requirement not to unduly discriminate
- Control of fixed to mobile interconnection charges
- Control of mobile to mobile interconnection charges
- Requirement to publish access contracts
- Requirement to notify charges

2.8 In respect of H3G, Ofcom imposed only one condition as follows;

- Requirement to publish charges and call volumes

2.9 In respect of Inquam, Ofcom imposed only one conditions as follows

[2] *Wholesale mobile voice call termination markets – a proposal to modify the charge control conditions* published by Ofcom on 7 June 2005 ("the June 2005 Extension Consultation") http://www.ofcom.org.uk/consult/condocs/wholesale/wholesale.pdf

[3] http://www.ofcom.org.uk/consult/condocs/wholesale/wmvct_statement/statement.pdf

- Requirement to notify charges

2.10 In July 2004 H3G challenged Ofcom's determination, attached to the June 2004 Statement, that H3G has SMP. On 29 November 2005 the Judgement of the Competition Appeals Tribunal ("the CAT")[4] found that Ofcom had erred in its determination as to the existence of significant market power because it did not carry out a full assessment of the extent to which BT had CBP. The CAT therefore required Ofcom to reconsider its determination of SMP taking into account the extent to which countervailing buyer power exists in BT. Ofcom is publishing today a reassessment of H3G's SMP in the period to 31 March 2007[5] ("the Reassessment of H3G's SMP").

Consultation relating to the present market review

Preliminary Consultation

2.11 In June 2005, in parallel with the proposal to extend the present charge controls for a further 12 months to 31 March 2007, Ofcom published a preliminary consultation document *Wholesale mobile voice call termination – a preliminary consultation (*"the Preliminary Consultation")[6] which was intended to initiate consideration of the issues which would need to be addressed during the next review of the MCT market, to be completed before the extended charge controls expire.

Second Consultation

2.12 Having considered responses to the Preliminary Consultation, Ofcom set out in a further consultation *Wholesale mobile voice call termination* published on 30 March 2006 ("the March 2006 Consultation")[7] its proposed views on market definition, the existence of SMP and appropriate remedies, intending that the document should move forward the discussion of future options for regulation after 31 March 2007. The document noted, however, that Ofcom had not yet concluded its analysis of CBP and, therefore, its views on SMP were limited to the prima facie evidence. The document's exploration of detriments arising from the exercise of SMP, and the nature of possible remedies to address SMP, was, therefore, conditioned by this qualification.

Consultation on the cost model

2.13 Throughout the process of developing a cost model, Ofcom has actively consulted key industry stakeholders (including the five MNOs as well as BT and UKCTA). This contact has been critical in terms of developing Ofcom's understanding of 3G network design and likely future demand scenarios as well as obtaining cost benchmarks for calibration of the new LRIC model. This process has taken place through a wide range of channels:

- **Information requests**: Mobile operators have submitted responses to several Ofcom data requests. These requests have focussed on obtaining accurate model inputs, realistic network dimensioning algorithms and calibration benchmarks for total Gross Book Value and operating costs.

[4] http://www.catribunal.org.uk/documents/Jdg1047H3G281105.pdf
[5] See Assessment of whether H3G holds a position of SMP in the market for wholesale mobile voice call termination on its network published by Ofcom on 13 September 2006 http://www.ofcom.org.uk/consult/condocs/h3gsmp/
[6] http://www.ofcom.org.uk/consult/condocs/termination/wholesaleprelim.pdf
[7] http://www.ofcom.org.uk/consult/condocs/mct/summary/mct.pdf

- **Workshops**: Ofcom has held three workshops with key industry stakeholders to discuss the structure, inputs and outputs of the model at various stages of development

- **Meetings:** A series of face-to-face meetings have been held with each of the mobile operators, BT and UKCTA. Generally these meetings have focussed on modelling implementation and key conceptual issues, as well as providing stakeholders with the opportunity to question Ofcom on all relevant issues.

Third consultation

2.14 Having considered responses to the March 2006 Consultation, and having completed an analysis of CBP, Ofcom is setting out in the present, third, consultation document its formal proposal in respect of market definition, SMP and appropriate remedies. Ofcom has commented on the responses to the March 2006 Consultation in the main body of the present consultation, and has summarised responses at Annex 20.

2.15 Before formally defining a market, designating an operator as having SMP, and imposing SMP conditions (where these measures would affect trade between member states) Ofcom is required by Article 7 of the European Framework Directive to make its draft measures accessible to the European Commission and to other NRAs, as well as interested parties. Ofcom is submitting the present consultation document to the European Commission and other NRAs. This does not, however, preclude Ofcom from reconsulting again, should it decide, in light of responses, that this is appropriate. Ofcom is also providing a copy to the Secretary of State.

Next steps

2.16 After considering responses to the present consultation Ofcom expects to publish a concluding statement and, where appropriate, publish formal notices identifying markets, making market power determinations in relation to those markets and setting appropriate SMP services conditions.

2.17 Ofcom is inviting detailed comments on the issues raised in the present consultation document by 22 November 2006. Information about how to respond is set out in Annex 1.

Commercial context

2.18 Annual retail revenues of the mobile industry are approximately £13 billion, and wholesale revenues around £3.6b. Annual revenue from MCT is of the order of £2.5 billion, which is equivalent to approximately 15% of revenue for the sector. Around two thirds of this revenue from mobile call termination (£1.5 billion) relates to calls between MNOs, and the remaining sum (£1 billion) to calls from fixed operators.

2.19 The 2G/3G MNOs each report having between 12 million and 18 million subscribers (the basis on which these figures are assessed may vary according to different churn management practices which, for a period of time, leave some non active subscriptions on an MNO's subscriber records). H3G reports that its current registered subscriber base is over 3.5 million. Volumes of voice call minutes terminated by each of the five MNOs are roughly proportionate to the volume of subscribers, although there is some material variation between MNOs.

2.20 Termination revenues are, of course, affected by the different charges levied for mobile termination; the unregulated charges levied by H3G (see Figure 2.1 below),

which average at about [✂], materially narrow the termination revenue gap between H3G and the 2G/3G MNOs despite the fact that H3G terminates for its subscriber base far fewer call minutes than each of the 2G/3G MNOs terminate for theirs.

2.21 In addition to receiving revenue for mobile voice call termination, each MNO also makes payments to other MNOs for voice call termination on their networks. Although, as might be expected, the flow of termination minutes between MNOs is broadly in balance, there are some MNOs which are material net providers of inter-MNO termination minutes (and, therefore, net receivers of inter-MNO revenue).

Profitability

2.22 Ofcom has performed a high level accounting review of the reported profitability of the MNOs. Ofcom recognises, however, that accounting returns may not of themselves provide a complete picture in relation to economic returns of the MNOs. Drawing robust conclusions from accounting data can be problematic where, for example,

- the industry is not in a steady state;
- the industry is subject to technological change;
- the industry tends to make investments with long payback periods
- asset valuations for accounting purposes are not representative of the assets' economic value.

2.23 These issues are relevant for the five MNOs. However, as explained below, it is Ofcom's view that the observed returns are not out of line with the Weighted Average Cost of Capital ("WACC") for the industry.

2.24 Accounting returns over a short period are unlikely to be representative of the long term return, particularly in capital intensive industries; for example, the MNOs have incurred the costs of building out their networks and of acquiring 3G spectrum in anticipation of returns over a long period. It is only after looking at the returns over the duration of the investment cycle that a full picture of the profitability can be assessed.

2.25 Specifically, for the MNOs, the assumptions regarding the treatment of the 3G spectrum costs will impact significantly on any measure of performance, whether it is in assessing the profit (which will be impacted by assumptions regarding amortisation) or the asset base (which will be impacted by assumptions regarding the appropriate valuation of the asset). 3G spectrum represented a substantial upfront cost to the MNOs. The amortisation of these costs a significant reported annual cost to the MNO's, yet the expected increase in revenues will occur in future years. The impact is therefore to increase the capital employed and depress annual profits in the short term.

2.26 In 2005, the five MNOs reported aggregate earnings before interest and tax of approximately £700m[8]. However, this was after deducting the amortisation of 3G spectrum costs and, significantly, includes the results of H3G, which has reported losses in the early years of its operations. The four 2G/3G MNOs all reported positive

[8] Based on results for the years ended 31 December 2004 or 31 March 2005.

earnings before interest and tax, and aggregate earnings before interest, tax, depreciation and amortisation were approximately £2.6bn.

2.27 Return on capital employed (ROCE) represents the efficiency with which capital is being used to generate revenue. ROCEs that consistently and significantly exceed a company's cost of capital could indicate that prices are higher than would be found in a competitive market. ROCE figures need to be treated with particular caution as they are dependent on assumptions regarding both the return and the capital employed figure. In respect of the capital employed figure, assumptions have to be made regarding assets on the balance sheet and, potentially, assets that do not appear on the balance sheet (including, for example some costs relating to customer acquisition). However, based on a measure of ROCE that excludes 3G spectrum costs, Ofcom has estimated that in recent years the industry as a whole has made a ROCE of around 17%, which exceeds Ofcom's estimates of the capital for the industry.

Termination charges

2.28 All 2G/3G MNOs now terminate some voice calls using their 3G network, and H3G continues to use national roaming to terminate some calls on O2's 2G network (see paragraph 2.30 below). However, the five MNOs' wholesale billing systems do not distinguish on a call by call basis between calls terminated on 2G and 3G networks (and a call may even switch between the two networks while in progress if the called party is moving). All MNOs charge the same charge for both forms of termination, although that charge varies by time of day and week. As explained in more detail in paragraph 2.31 below, the contractual charge is implicitly a blend of underlying 2G and 3G charges. The blended contractual charges for wholesale voice call termination levied by each of the five MNOs are set out in the left hand column of Figure 2.1 below

Blending of regulated 2G and unregulated 3G termination charges

2.29 Volumes of termination on 3G networks by the 2G/3G MNOs remain low. MNOs have asked that the proportion should not be published. An understanding of the order of magnitude can be gained by noting that no 2G/3G MNO has more than about 10% of its customers connected to 3G phones (the proportion of voice minutes terminated on 3G will be lower as calls to 3G phones which are outside the MNO's 3G coverage area will terminated using the 2G network). However volumes are growing.

2.30 H3G has in place two contracts for national roaming to provide coverage for voice, SMS and certain GPRS services when H3G customers are not somewhere they can connect to H3G's own 3G network. The proportion of calls which are received and made in this way has been falling and is expected to continue to do so as H3G further rolls out its network. H3G stated in March 2006 that its 3G network now provides 88% population coverage.

2.31 In the case of the 2G/3G MNOs, which are subject to a charge control, the contractual charges referred to in paragraph 2.28 above (and set out in the left hand column of Figure 2.1 below) reflect a blend of underlying regulated 2G and unregulated 3G charges weighted by volumes of each over a measurable period. All 2G/3G MNOs are either actively blending distinct charges for 2G and 3G termination or have proposed (to interconnected parties) revised blended termination charges which are based on distinct underlying charges for 2G and 3G termination (see paragraph 5.50 below). Figure 2.1 below sets out the underlying regulated 2G

charges alongside the contractual blended charges. It should be noted, however, that although the contractual charges are fixed commercially (subject to any future contract variation) and the underlying 2G maximum average charge is fixed by regulation, the assumed 3G charge within the blend can only be an estimate based on the MNO's forecasts of the ratio of 2G to 3G termination minutes within a contractual billing period.

Figure 2.1 Distinction between regulated 2G charges and contractual blended charges

	Contractual blended charge (day/eve/w.e) Figures implemented or proposed for 1 September 2006[9]			Underlying 2G charge (day/eve/w.e)		
Vodafone	8.22	3.34	2.74	7.91	3.22	2.66
O2	6.53	6.47	3.22	6.373	6.31	3.14
Orange	7.5	5.7312	5.7312	7.4	5.1464	5.1464
T-Mobile	9.5	4.181	4.181	9.092	4.0	4.0
H3G	15.62	10.78	2.51	Not applicable		

2.32 The ability to determine the level of unregulated 3G charges within the blend, enables 2G/3G MNOs to set blended charges at the level of their choice (subject to competition law and any commercial considerations). As the proportion of traffic terminated on 3G networks increases, so the blended charges, applicable to all forms of voice call termination, can be expected to rise (absent changes in the assumed underlying 3G charge).

Number porting

2.33 Technical arrangements, devised by the industry, for delivering calls to phones with ported numbers are such that the termination charge billed is that set by the MNO originally allocated the number, rather than that set by the MNO to whom the user currently subscribes. In total a little over 15% of mobile numbers currently in use have been ported from another MNO. This proportion can be expected to grow as mobile penetration plateaus and MNOs rely increasingly on competing for their rivals' subscribers to increase market share. The proportion of incoming call minutes terminated on ported-in numbers varies significantly between MNOs. This results in further adjustment to the overall average price per minute received by each MNO for call termination. The current impact of the number porting arrangements can be seen in Figure 2.2 below.

Overall impact of charge adjustments

2.34 In addition to the blending of underlying 2G and 3G charges and termination charges set by the original donor of a ported number, current regulation also requires 2G/3G MNOs to adjust the headline target average charge for 2G voice call termination to

[9] Some of the charges quoted remain the subject of contractual negotiation

reflect changes in traffic profiles. The Weights Adjustment Factor (WAF) forms part of the charge control conditions applicable to each of the 2G/3G MNOs and modifies the headline target average charge for each MNO (respectively 5.63 ppm for Vodafone and O2 and 6.31 ppm for Orange and T-Mobile) taking into account changes in the MNO's traffic profile by time of day/week.

2.35 The overall impact of these three different influences on the charge levied for mobile voice call termination is set out in Figure 2.2 below.

Figure 2.2 Adjustments to headline regulated charge

	Vodafone	O2	Orange	T-Mobile	H3G
Headline regulated average charge (2G)	5.63ppm	5.63ppm	6.31ppm	6.31ppm	Not regulated
Regulated 2G charge WAF adjusted	[✂]	[✂]	[✂]	[✂]	Not regulated
Effective rate incl ported numbers	[✂]	[✂]	[✂]	[✂]	[✂]
Average contractual blended charge (ex ported numbers[10]	[✂]	[✂]	[✂]	[✂]	[✂]

The European context

2.36 When Ofcom published the June 2004 Statement, the UK was the only NRA to have completed a review of this market under the new European regulatory regime. Subsequently, all EU NRAs (with one exception) which have formally notified their market definition for mobile call termination have, like Ofcom, adopted the Commission's technologically-neutral definition which does not distinguish separate markets for 2G and 3G termination[11]. The one exception, Cyprus, was invited[12] by the European Commission to reconsider its position or at least to monitor closely the market and to analyse 3G termination services as soon as these services become available (there are currently no 3G networks in Cyprus).

[10] Indicative figures based on charges proposed or implemented for 1 September 2006 (see Figure 2.1 above) and historic rather than forward looking traffic profiles

[11] See Commission's website at http://forum.europa.eu.int/Public/irc/infso/ecctf/library?l=/&vm=detailed&sb=Title

[12] See Commission's website http://forum.europa.eu.int/irc/DownLoad/khesAKJDmRGGikPF1r2U9ySwTZP1Z3m-fv1Cu-ylTHuU9qbGX3kMpf4n1-0Jd-d2ro21ETUp2UxVqIIDj3h0lF5/CY%20333-334%20decision%20EN%20public.pdf

2.37 All NRAs which have considered the issue so far, have also found that all MNOs have SMP (including, in some cases, MVNOs which have control over termination charges).

2.38 No NRA, other than Ofcom, however, has imposed different remedies in respect of 2G and 3G termination, and no NRA has set different charge caps to apply to 2G and 3G termination by the same MNO. It should be noted that in June 2004, when Ofcom imposed charge controls only on 2G voice call termination, no 2G MNO was using 3G networks to terminate voice calls. H3G, which was using its 3G network to terminate voice calls, still had less than 1% of the mobile subscribers in the UK. Consequently, Ofcom determined that there was insufficient evidence to conclude that regulation of 3G termination charges was a proportionate approach. Any adverse effects on consumers were likely to be small given H3G's very small subscriber base relative to the wider mobile sector. As noted above, all 2G/3G MNOs now terminate some voice calls on their 3G network and H3G's subscriber volumes have increased greatly.

2.39 All NRAs, other than Ofcom, have now either proposed or imposed SMP conditions on all MNOs, requiring that charges (including 3G charges) are fair and reasonable, cost oriented or in compliance with a specified charge control. The proposals recently published by the German NRA, that MCT charges should be "approved" by the NRA, take a slightly different form. Ofcom's decision in June 2004 not to impose any such controls on the MCT charges of H3G or on the charges for 3G MCT offered by 2G/3G MNOs is unique and, as noted above, reflects the very low level of 3G network rollout at the time.

2.40 In all jurisdictions (except the UK) where a new entrant 3G MNO is active, the NRA has sought to designate the new entrant as having SMP and has sought to control the new entrant's MCT charges requiring that MCT charges are fair and reasonable, cost oriented or in compliance with a specific charge control. Sister companies of H3G are active as recent entrants offering MCT in Austria, Denmark, Sweden, Italy and Ireland, as well as the UK. In many of these jurisdictions, however, these companies have challenged the proposals.

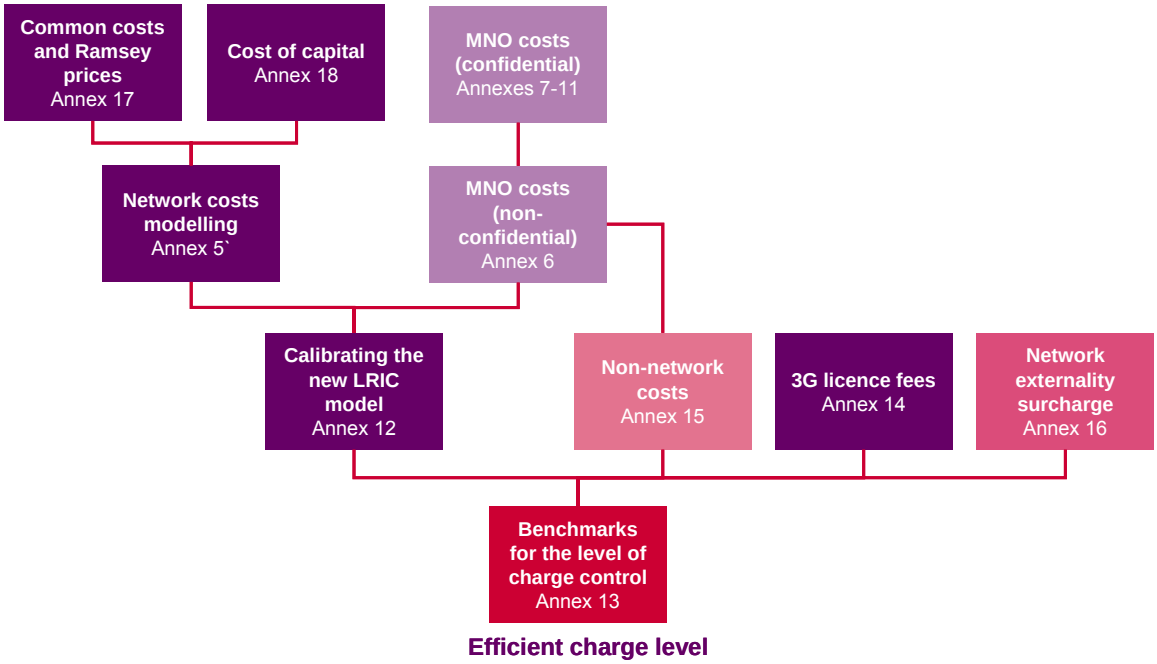
Structure of the consultation document

2.41 The rest of this consultation document sets out Ofcom's market analysis and regulatory proposals for MCT from 1 April 2007:

- **Section 3** sets out Ofcom's analysis of the relevant markets;
- **Sections 4 and 5** set out Ofcom's SMP analysis with Section 5 dealing specifically with the issue of countervailing buyer power;
- **Section 6** sets out Ofcom's duties and objectives in the review as a framework for developing Ofcom's regulatory proposals;
- **Section 7** sets out the benefits of regulation and discusses the different issues associated with unregulated MCT charges. **Annex 19** provides further detail of Ofcom's welfare analysis that is specifically referred to in this section;
- **Section 8** discusses the different regulatory remedies Ofcom has considered in this review;

- **Section 9** discusses in detail specific charge controls that Ofcom is proposing to impose. **Annexes 5-18** are concerned with Ofcom's estimation of the cost of MCT and inform the level of the charge controls that are proposed in Section 9. The diagram below sets out how these cost modelling annexes fit together in estimating the costs of MCT:

Figure 2.3 Cost modelling annexes



- **Section 10** summarises Ofcom's regulatory proposals and **Annex 21** sets out draft conditions based on the regulatory proposals; and lastly

- **Annex 20** sets out responses from stakeholders to the March 2006 consultation. These responses are discussed throughout the consultation document.

Section 3

Market definition

3.1 The service considered in this review is wholesale voice call termination on individual mobile networks ("MCT"). This is market 16 in the Commission's Recommendation.

3.2 Call termination is the service necessary for a network operator to connect a caller with the intended recipient of the call on a different network. If call termination was not available a network operator could only terminate calls to other customers on its own network. This service is referred to as wholesale because it is sold and purchased by network operators rather than retail customers.

3.3 The European Commission is reviewing the Recommendation and is consulting on a proposal, amongst others, that market 16 should be widened to include termination of SMS. SMS termination is not being considered within the present market review as Ofcom considers (discussed in paragraph 3.84-3.88 below) that it is a limited substitute for calling a mobile. Ofcom plans to review SMS termination separately next year.

3.4 This review considers only wholesale voice call termination on mobile networks in the UK. At present there are five suppliers of wholesale voice call termination on mobile networks in the UK. These are Vodafone O2, Orange, T-Mobile and H3G. These suppliers currently use 2G and 3G mobile networks. In the future it is possible that they may use other mobile network technologies to supply wholesale mobile voice call termination. Where these MNOs use other technologies to supply MCT, such MCT would be deemed to be included in the market defined by the present review. In the future, and potentially within the forward looking period of this review, it is also possible that there will be additional suppliers of wholesale voice call termination on mobile networks. Moreover, the programme of liberalisation of spectrum in the UK (including auctions of vacant spectrum bands) may result in the emergence of new mobile network operators and also, potentially, new providers of public wireless local access networks (WLANs). Ofcom will monitor such developments and, as recommended by MNOs responding to the March 2006 Consultation, will consider at what stage further markets should be defined and reviewed.

3.5 In the March 2006 Consultation Ofcom presented a proposed view that there are separate markets for mobile voice call termination supplied by each of the UK MNOs to other originating communications providers. Non confidential responses from fixed network operators BT and C&W agreed with this proposed view [✂]. In contrast, each of the 2G/3G MNOs argued that mobile voice call termination is part of a wider cluster market including outbound services. H3G argued that Ofcom had not undertaken sufficient analysis to reach its proposed conclusion, but made no specific alternative proposal of its own.

3.6 H3G also noted that, as Ofcom is defining individual markets for termination supplied by each MNO it should consider whether there is any difference in relation to the customers of each MNO. Ofcom agrees with this observation. Although the market conditions under which each of the five UK MNOs supplies MCT (including market shares and barriers to entry) are necessarily very similar, Ofcom has considered whether other factors which may vary between MNOs (including the views and behaviour of customers) are such that markets should be defined differently in respect of the MCT supplied by each of the MNOs.

Approach to product market definition

3.7 The narrowest possible market definition is wholesale voice call termination to a specific mobile number (or subscriber). In the rest of this section, a discussion of demand-side substitution, supply-side substitution and the existence of common pricing constraints is presented in order to see whether this narrow market definition should be expanded to include other products. This analysis is undertaken in relation to calling any of the MNOs' networks. Where there are specific issues relating to particular MNOs these are discussed, for example in relation to dual handset ownership which H3G has proposed is an important factor for it. Ofcom's approach to market definition follows that set out in the Commission's Guidelines on market analysis and assessment of significant market power.[13]

Demand-side substitution

3.8 To assess whether there are any demand-side substitutes that should be included in the relevant market, it is necessary to examine the effect on the profitability of a terminating operator of an increase in its termination charge. To perform this exercise Ofcom has assessed the effect on both retail consumers and wholesale customers.

Retail demand-side substitution

3.9 Demand for termination is a derived demand in that it comes from a fixed or mobile originating network operator on behalf of a customer who has originated a call. Therefore changes in termination charges may be expected to feed through to fixed and mobile retail prices for calls to mobiles.

3.10 In principle, the greater the degree of competition in retail fixed and mobile call origination and the greater the cost of termination within the fixed and mobile retail call cost stack, the more increases in termination charges will feed through to fixed and mobile retail prices respectively. Where retail operators offer a broad basket of retail services, and where competition (or regulation) drives out excess profits, there may be a diluting effect in the relationship between the marginal costs of calls to mobiles (which includes the wholesale mobile termination charge) and the retail price of calls to mobiles. The extent of pass-through of increased termination charges to retail prices could well be less than one-for-one, even for retail operators without SMP.

3.11 The extent of pass-through of changes in wholesale mobile termination charges to retail prices is important from the perspective of retail demand-side substitution. The lower the level of direct pass-through to retail prices, the less exposure retail customers have to changes in the wholesale termination charge. Therefore they have less incentive to switch to alternative ways to call and, hence, the less constraint their behaviour is likely to exert (via the derived demand from their operator, whether fixed or mobile) on a hypothetical monopolist of wholesale voice call termination.

3.12 Ofcom reported in the March 2006 Consultation that, overall, around two-thirds of recent reductions to termination charges have been passed through directly to retail prices for fixed originated calls to mobiles. However, as Ofcom acknowledged, the level of direct pass-through achieved by BT was much higher than that of other providers of fixed to mobile calls, thereby contributing significantly to the overall

[13] "Commission Guidelines on market analysis and assessment of significant market power under the Community regulatory framework for electronic communications networks and services" (See http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/c_165/c_16520020711en00060031.pdf)

average figure. Furthermore, as T-Mobile highlighted in its response to the March 2006 Consultation, BT's assurance, that it would pass through the great majority of reductions in MCT charges directly to the price of fixed to mobile calls, will expire at the end of 2007. To the extent that direct pass-through is materially less than 100%, the behaviour of retail customers, the called and calling parties, in response to a retail price increase in calls to mobiles arising from an increase in wholesale voice call termination charges may impose less competitive constraint on wholesale termination charges than would otherwise be the case. This issue of pass-through is discussed again in paragraphs 7.18 to 7.21 in relation to the detriments of excessive termination charges.

Behaviour of the called party in response to an increase in the retail price of calls to mobiles

3.13 There would be a constraint on termination charges if mobile subscribers chose their network on the basis of the prices of incoming calls and switched network as a result of an increase in these prices. If this were the case, this would support the MNOs' proposal that MCT is part of wider cluster market for mobile services in general. However, the calling party pays ('CPP') arrangement adopted in the UK telephony market has a notable impact on mobile subscribers' sensitivity to the price of incoming calls.

3.14 Under the CPP arrangement, the calling party (and not the called party) pays the total price of a retail call (unless partial or full receiving party pays ("RPP") arrangements apply, as happens in the UK with Freephone and special low cost call types). This means that the voice call termination charge is included in the originating network provider's (either fixed or mobile) cost base and is reflected in the retail price it sets for calls originating on its network. CPP leads to a disconnection between the person paying for a call (i.e. the calling party) and so, indirectly, for the termination charge and the person who makes the choice of the terminating network which sets the termination charge (i.e. the called party).

3.15 The overall effect of this arrangement in the retail market (i.e. the market for calls from fixed to mobiles and the market for calls from mobile to mobile) is that, while MNOs have an incentive to keep the price of those services paid for by mobile subscribers at a level to attract and retain customers, they do not have the incentive to keep the price of fixed and off-net calls to their subscribers low.

3.16 Nevertheless, it is still possible that mobile subscribers might respond to a rise in the termination charges of the MNO to whom they subscribe, by switching to a network with lower termination charges, if they expected and were concerned that the higher price of calling them would have an impact on their callers. For this to be true, Ofcom considers that the following conditions would have to be met:

- mobile subscribers should value incoming calls to such an extent that a sufficient reduction in these calls (see below) induced by a price increase, in turn induces subscribers to change network;
- callers must be sufficiently aware that they are calling a mobile and that they are calling a specific network;
- callers must be sufficiently aware of the price of calling that particular network; and

- callers must be sensitive to changes in the prices of calling the network they want to reach.

3.17 Ofcom considers that only if all four of the above conditions are met could the behaviour of mobile subscribers act as a competitive constraint on mobile termination charges; MNOs that increase charges would risk a loss of users on their networks. Mobile subscribers (in relation to the first bullet) are discussed below. Callers to mobiles (in relation to the second, third and fourth bullets) are discussed under 'Behaviour of the calling party in response to an increase in the price of calls to mobiles'.

3.18 In summary, for the reasons set out in the paragraphs which follow, Ofcom takes the view that the price of incoming calls is not considered by consumers to be an important factor in their choice of a mobile network. Consumer awareness of the price of calls to mobile phones is limited, especially in respect of the price of calls to each specific network. Therefore the behaviour of the called party in response to an increase in the price of calls to mobiles does not provide a sufficient competitive constraint on termination charges.

3.19 In assessing the behaviour of consumers, as set out in the following paragraphs, Ofcom has taken into account evidence from the following surveys (which are referred to and defined in the following paragraphs);

- Surveys referred to in the Competition Commission's 2003 report ("CC's 2003 Report")[14]

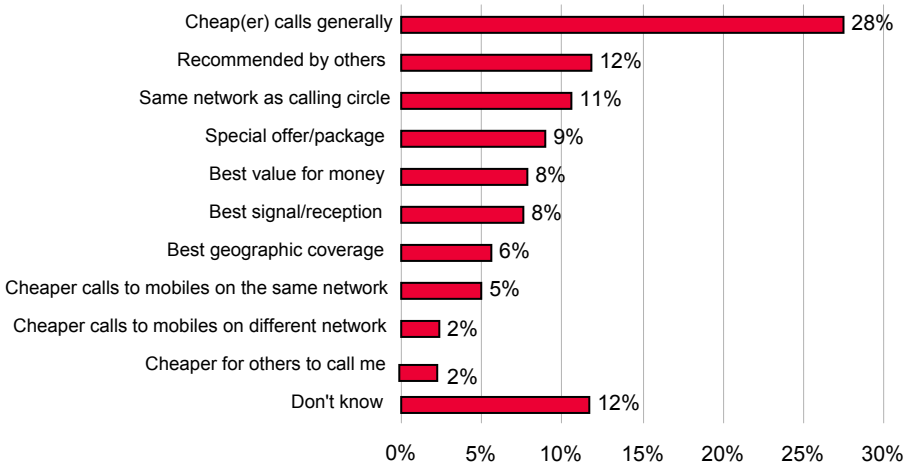
- Surveys of residential and SME consumers conducted for Ofcom during February 2005, and

- A survey of residential customers conducted for Ofcom in January 2006

3.20 Ofcom carried out a survey of residential and SME consumers during February 2005[15] ("the February 2005 survey"). In this survey it was found that when residential subscribers were asked what their considerations were when making their network choice, only one in fifty (2%) spontaneously said that they considered whether the network was cheaper for others to call. However, it is possible that the cost to others of calling them may have been taken into account when deciding to choose the same network as their calling circle (one in nine (11%) referred to this factor) and may also have been reflected in the consideration that calls within the same network may be cheaper (one in twenty (5%) noted this factor). Figure 3.1 below presents the full set of considerations indicated by residential consumers choosing their network provider themselves.

[14] Competition Commission's "Mobile phone charges inquiry", 2003 (see http://www.competition-commission.org.uk/inquiries/completed/2003/vodafone/index.htm)
[15] Findings from these surveys were presented in Annex 2 of Ofcom's consultation document "Wholesale mobile voice call termination markets – a proposal to modify the charge control conditions", 7 June 2005 (see http://www.ofcom.org.uk/consult/condocs/wholesale/wholesale.pdf)

Figure 3.1 Spontaneous considerations when choosing network



February 2005 survey, Base: Adults aged 16+, mobile phone users and choosing network provider themselves (1,413)

3.21 As shown in Figure 3.1 above, the most frequently mentioned factor in residential consumers' network choice was found to be "cheap(er) calls generally".

3.22 When specifically prompted as to whether the cost of others calling them was a consideration in their choice of network, overall only one in nine (11%) residential subscribers said they found out how much it would cost other people to call their network. Only one in ten (10%) said that the cost for other people to call them was a significant consideration.

3.23 The CC's 2003 Report (paragraphs 2.134 – 2.135) noted that the cost of incoming calls was not an important factor for consumers when choosing their mobile network. It ranked 10th out of the 14 factors suggested, the most important being "the price you pay to call others". In addition, just under two thirds (61%) of mobile users expressed more concern about the cost to them of calling others than the cost to others of reaching them. Only 9% were more concerned about the cost to others (paragraphs 2.133 to 2.135). At the time, these findings were consistent with surveys of residential customers commissioned by two of the MNOs and presented at the CC inquiry. O2's NOP survey found that for nearly three quarters (75%) of respondents the cost to other people of calling them on their mobile phone was an unimportant factor when they decided which mobile network to join. Under one fifth said that it was important. High proportions (85%) of both categories were unable to say why they took the view they did (paragraphs 2.133 to 2.135). An NOP survey commissioned by Vodafone showed that the price of outgoing calls was much more important to mobile users than the costs that others incurred to call them (paragraphs 2.133 to 2.135).

3.24 H3G in its response to the March 2006 Consultation argued that it is not sufficient for Ofcom to rely on market research relating to the views of the generality of mobile users as there may be material differences between the customers of different MNOs. [✂]

3.25 [✂]

3.26 [✂]

3.27 [✂]

3.28 [✂]

3.29 In Ofcom's view, the research evidence presented by H3G does not indicate that the ability of some H3G customers to receive calls on an alternative network is used in a manner which would constrain charges, even if in practice a significant proportion of inbound calls to those customers are terminated by a network other H3G's. The ability of a larger than average proportion of H3G's customers to receive calls on a mobile phone connected to another network may impact H3G's overall termination revenues (in that H3G does not receive payment for terminating those calls). However, it will not impose downward pressure on H3G's termination charges as the choice of terminating MNO, for most subscribers, is not influenced by termination charges. This is because the four factors set out in paragraph 3.16 do not all apply for most subscribers.

3.30 O2 in its response to the March 2006 Consultation, and in its response to the Preliminary Consultation, reported that O2 Germany's Genion service allows subscribers to be contacted on their mobile phone on either a geographic number or a mobile number. It is the Genion customer who decides which number(s) he provides to each contact. Callers using the mobile number are charged mobile call rates and those using the geographic number are charged lower geographic call rates. O2 explained that where the call is made to the mobile number, the called party incurs no charge to receive the call (i.e. as per the general situation in the UK), Where the call is made to the fixed number, here too the called party incurs no charge where the phone is within its 500 metre home zone. Where, however, the phone is beyond the home zone (and the call is made to the geographic number) the called party pays a supplement to receive the call.

3.31 O2 reported that, despite the possibility that the Genion customer may face charges to receive calls (where a call is made to the geographic number when the phone is beyond the home zone), Genion customers do provide contacts with their geographic number. [✂].

3.32 Ofcom notes with interest the data supplied in respect of O2 Germany, but observes that there is no comparable use of fixed/mobile services in the UK, although there are signs that such services are starting to be developed. Furthermore, given the results of its own market research, that the cost to others of calling them is not a primary criterion when selecting a supplier of mobile services, Ofcom does not agree with O2's view that the behaviour of O2's Genion customers in Germany means that subscribers in the UK are concerned about the cost of others calling them.

3.33 Overall it appears that the attitudes of the residential mobile subscribers of each of the five UK MNOs towards the cost of others calling them is not a major consideration in their choice of mobile network. Therefore these subscribers are unlikely to impose a competitive constraint on the termination charge by switching to networks with cheaper termination charges. Looking forward, and assuming that the CPP arrangements persist in the UK, it is difficult to see why mobile subscribers may become more sensitive to the cost of others calling them and begin to offer a competitive constraint to termination charges.

3.34 The existence of closed user groups i.e. groups of people whose members care about the cost to the other members of calling their mobile number, could ameliorate

the effect of the CPP arrangement and act as a constraint on voice call termination charges. However, for this constraint to be effective these groups should be numerous and not capable of being isolated through targeted tariffs that bypass the usual termination charges. As discussed above, the evidence available shows that few groups of people are sensitive to the cost of incoming calls. Moreover, those that are can be targeted with tariffs which bypass the usual termination charges (see paragraph 3.41 below). Therefore Ofcom takes the view that closed user groups do not provide a sufficient competitive constraint on termination charges.

3.35 The minority of subscribers who are concerned about the impact of high mobile termination charges on the behaviour of callers generally, may be able to mitigate the impact by using call diversion services, including personal numbering services ("PNS"). To a degree, such services enable the called party to decide how much callers should be charged for calling them (provided that, in some instances, the called party is willing to contribute to the cost of incoming calls). However, call diversion services are fundamentally more expensive than calls direct to mobile numbers because (a) their routing is indirect (calls to a personal number go to the PNS provider first, which then forwards them to the appropriate terminating network) and (b) they require access to some form of database which is used to determine the called party's preferences for termination. In any event, where calls are diverted to a mobile phone, the MNO's standard mobile termination charge is payable, either by the caller in the cost of the call or, in whole or in part, by the called party within the cost of the call diversion service.

3.36 Whether offered on a CPP or RPP basis, the higher cost suggests that it is unlikely that PNS could represent effective substitutes to calls to mobile phones for called and calling parties. This service may be attractive to those subscribers who are sensitive to the price payable by others to call them on their mobile. However, the MNOs will typically have already separated these subscribers from the generality of subscribers by offering them specially targeted tariffs (discussed at paragraph 3.41 below). Therefore, Ofcom believes that automatic call forwarding services do not currently generate significant pressure on the level of mobile voice termination charges.

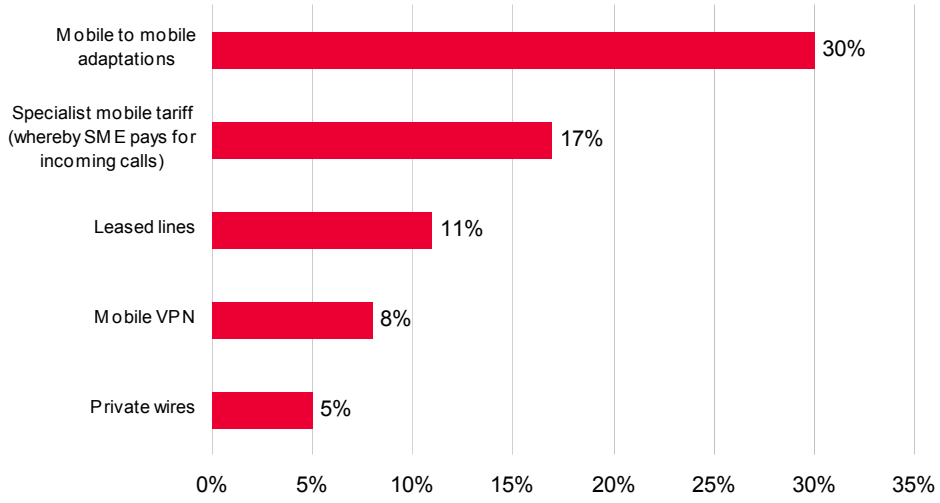
3.37 Business users, in particular small and medium sized enterprises ('SMEs') with up to 250 employees appear to be more concerned than residential users about the cost of calling their mobiles.

3.38 In the February 2005 survey, one in three (33%) SMEs[16] owning or renting mobile phones said that they chose the mobile network that was cheapest to call - and an additional fifth (18%) said that they would consider doing so in the future.

3.39 Also in the February 2005 survey, one half (53%) of SMEs indicated that they had taken additional steps to reduce the cost of calling their mobiles (see Figure 3.2 below).

[16] Base, UK SMEs owning/renting mobiles phones (585)

Figure 3.2 Steps taken to reduce cost (to other people) of calling their mobile phones, prompted (Proportion of SMEs taking steps)



February 2005 survey, Base: UK SMEs owning/renting mobile phones having taken steps to reduce the cost of calling their mobiles (255)

3.40 As mentioned above, closed user groups do not generate sufficient competitive pressure to constrain the level of termination charges because the MNOs can separate them from less sensitive customers by offering special arrangements that by-pass standard termination rates. By separating out some or all of the more price-sensitive customers, the MNOs limit the constraint on the termination charge from the more price-sensitive customers. This means that they face even less competitive pressure in setting charges for the other customers. The examples given in Figure 3.2 above e.g. Private wire, Mobile VPNs, Leased lines, Special tariffs and Mobile-to-mobile adaptations, are examples of such arrangements that segment the market in this way.

3.41 The costs of private wire services and mobile-to-mobile adaptations are such that it is likely that they will be introduced only where the savings from lower prices for calls to mobiles outweigh the costs of installing them. This, in turn, is likely to occur only where a sufficient proportion of the fixed line originated phone calls of the customer is directed to a single mobile network (such as, for example, mobile phones used by a business's own workforce). They are unlikely to be an effective substitute to standard fixed-to-mobile calls for residential consumers. However, as mentioned above, the main reason why their presence is unlikely to constrain termination charges for fixed-to-mobile calls generally is that they constitute a targeted tariff aimed at separating out the most price-sensitive customers. On-net pricing can also have the effect of separating more price sensitive callers from applying pressure on termination charges. This may result in subscribers seeking to subscribe to the same network to take advantage of cheaper on-net calls. Therefore, in general, targeted tariffs do not impose a competitive constraint on the prices which operators can charge for calls to less price sensitive customers.

3.42 If mobile users, generally, could receive their incoming calls on mobile networks other than the one to which they subscribe for making outbound calls, this could put some pressure on mobile voice termination charges. For this form of substitution to take place, the called party must be able to switch his handset between different

networks (or hold active mobile phones connected to more than one network). This is possible through the use of multiple SIM cards.

3.43 A subscriber can have a mobile phone with an internal multiple SIM card-holder that allows him to switch from one network to another. There are devices available in the UK market which allow customers to use different SIM cards in the same handset and switch between networks. However, to place some pressure on the MNO with high termination charges the subscriber should, by default, be on the network with cheap voice call termination charges and only switch to the other network to make cheap outbound calls. The process of switching networks is currently laborious and time-consuming as it requires manually switching by the user. In addition, it relies on the called party having the incentive to change network potentially every time he needs to make a call and to switch back again at the end of the call, so that the next inbound call will use the network with lower termination charges. It is doubtful that such an incentive currently exists given the CPP arrangement and customer behaviour described above. It is more likely that subscribers currently exploit the multiple SIM card opportunity mainly, if not exclusively, to take advantage of differences in the prices of outgoing calls.

3.44 As a variation on SIM card switching, subscribers could hold more than one mobile phone and provide the mobile number with the lowest incoming call price to those that call them. In this way mobile subscribers could combine their preference for cheaper outbound calls whilst at the same time ensuring that those that call them pay the lowest price.

3.45 In January 2006 Ofcom commissioned a survey of residential customers[17] ("the January 2006 survey") and found that of those personally using a mobile phone, approximately one in nine (12%) said they had more than one mobile phone number or more than one SIM card that they currently used. This is a relatively low proportion of mobile subscribers. Furthermore, when asked why they had more than one number or SIM card two fifths (44%) of these subscribers said it was to split business and personal calls with the next most popular reason being to split calls made to different mobile phone networks, approximately one in eight (12%) giving this response. No respondents suggested they had more than one mobile phone or SIM card in order to receive calls to a different number and thereby reduce the cost to others of calling them.

3.46 As noted earlier, the sample size of this particular survey was too small to provide a robust indication of whether the customers of H3G are more likely than others to use more than one number or SIM to reduce the cost to others of calling them, as H3G had suggested might be the case, in its response to the March 2006 Consultation.

3.47 [✂]

3.48 [✂]

3.49 In its response to the March 2006 Consultation, H3G argued that the key issue, in relation to market definition, is not why H3G customers choose to keep two phones but, rather, whether calls are received on that other network. Ofcom does not agree. The callers' ability to contact an H3G customer without using H3G's network will not impose a constraint on H3G's ability to levy excessive termination charges unless the behaviour of those callers can be expected to change as H3G's CTM charges

[17] The findings and questionnaire concerning Ofcom's January 2006 survey were set out in Annex 6 of the March 2006 Consultation.

change. If callers do not have the characteristics set out in paragraph 3.16 above, they may, for other reasons, contact H3G customers on an alternative network, but they will not impose a constraint on H3G's CTM charges. As such, this will have no bearing on Ofcom's market definition which relates to termination on individual networks.

3.50 In theory, an automatic mechanism to re-route calls can also be conceived of so that subscribers can choose which operator terminates their calls. Such a mechanism would instruct the called party's mobile phone to switch network automatically when a call is arriving. No such mechanism currently exists and, in Ofcom's view, the prospects for such a development are low during the period covered by this review (4 years from March 2007). This is due to significant technological difficulties and to the lack of incentives on the part of the called party to make use of a facility that reduces the cost of incoming calls. In addition, a further hurdle is posed by the need for MNOs to allow access to their handsets/SIM cards to install the necessary software (as well as allowing any necessary signalling to pass across the mobile network to control network selection). The MNOs have little incentive to co-operate in this way.

3.51 The main limitation of both manual and automatic SIM switching, and owning more than one mobile phone, is that all rely on the called party having an interest in reducing the cost to other persons of calling his mobile. It seems unlikely that mobile subscribers place pressure on the cost of calling them through owning multiple SIM cards or phones. At present these subscribers make up a small proportion of subscribers and are motivated by the same underlying incentives as most mobile subscribers, which is to take advantage of differences in the prices of outgoing calls or separate billing arrangements.

3.52 Having considered the behaviour of called parties in response to an increase in the price of calls to mobiles, Ofcom has concluded that, over the period of this review, the behaviour of called parties is unlikely to constrain MNOs' ability to set excessive wholesale termination charges.

Behaviour of the calling party in response to an increase in the retail price of calls to mobiles

3.53 As discussed in paragraph 3.11 above, the extent of pass-through of changes in wholesale termination charges to retail prices will affect the competitive constraint that callers to mobiles may impose on termination charges. If pass-through were significant, callers may impose a competitive constraint if callers react to an increase in the retail price for calling mobiles by employing other means of communication to reach mobile subscribers. This form of substitution could act as a competitive constraint on wholesale voice call termination charges. Whether it would act as a sufficient constraint would depend on the amount and nature of substitution that takes place. The MNOs' behaviour would be affected only if the behaviour of calling parties was sufficient to make the increase in the wholesale charges unprofitable. However, for callers to react to an increase in the price of calls to mobiles, it is Ofcom's view that three conditions need to be satisfied:

- callers must be sufficiently aware that they are calling a mobile and that they are calling a specific network;
- callers must be sufficiently aware of the price of calling that particular network; and

- callers must be sensitive to changes in the prices of calling the network they want to reach, i.e. an increase in the termination charge above the competitive level must cause consumers to adapt their behaviour to find an alternative satisfactory way of contacting the person they want to call.

3.54 Ofcom's view on these three criteria is that none of them is sufficiently met for calling parties to act as a competitive constraint on call termination charges. The reasons for this are discussed below.

3.55 Furthermore, different retail consumers face different retail costs of calling a mobile. For example a caller who has purchased a number of calls to mobiles as part of a bundled subscription package faces a different marginal cost of calling compared to a caller who has used up his bundled minutes or who purchased a subscription without inclusive minutes. It is likely that callers with bundled minutes would be less sensitive to changes in the price of calling and therefore impose less of a competitive constraint on wholesale termination charges. Ofcom considers this could mean that many callers are not particularly sensitive to increases in termination charges. Whether or not this is the case, Ofcom still considers that calling parties do not impose a competitive constraint on the charges for MCT for the reasons set out above.

3.56 In its response to the March 2006 Consultation, H3G noted Ofcom's market research which showed that callers are not generally aware of which network they are calling, even though a quarter of callers to mobiles claim to have more than one mobile number for one or more of the people they call. H3G proposed that as H3G is a new entrant entering a saturated market it is relevant to consider whether new customers retain a handset from their old network to receive calls. As explained above, it is Ofcom's view that what is relevant is whether callers who have the ability to choose between more than one mobile network on which to deliver a call, are aware which network(s) they are calling, are aware of any difference in the cost of phoning those different networks (given the varying extent of pass-through and the existence of call bundles) and are sufficiently sensitive to price that an increase in H3G's MCT charge above the competitive level would cause them to use an alternative means of contacting the called party.

Awareness of calling a mobile and awareness of calling a specific mobile network

3.57 In Ofcom's January 2006 survey residential consumers with a fixed or mobile phone were asked how often they know whether they are calling a mobile phone number. Overall the majority (84%) of consumers claimed to always or mostly know when they are calling a mobile.

3.58 In the January 2006 survey Ofcom found that of all consumers making calls to mobiles two fifths (42%) claimed never to know which mobile network they are calling or were unable to give an opinion. In addition, one quarter (23%) claimed rarely to know, one in six (16%) sometimes know and only one fifth (19%) mostly or always know which mobile network they are calling.

3.59 These results are consistent with previous survey evidence. In the February 2005 survey Ofcom found that, of mobile phone users which know they are calling a mobile, two fifths (44%) claimed never to know which network they are calling, a quarter (24%) occasionally know, one fifth (18%) usually know and only one in ten (10%) always know.

3.60 The CC in its 2003 report collected evidence on consumer awareness of the identity of the particular mobile network they are calling. The CC's own market research (paragraph 2.136) indicated that on average just under a third (28%) of mobile users said they knew whether they were calling a mobile phone on the same network as themselves. Callers appear to have limited knowledge of which specific network they are connecting to when making a call to a mobile. Over time, this awareness does not appear to have improved significantly.

3.61 It appears that there is a lack of knowledge of mobile number ranges and how these are assigned to the different MNOs. In addition, the number portability arrangements render it difficult for callers to find out which network they are calling (and thus what the relevant cost is) unless they have a repeated calling relationship with the person they are calling.

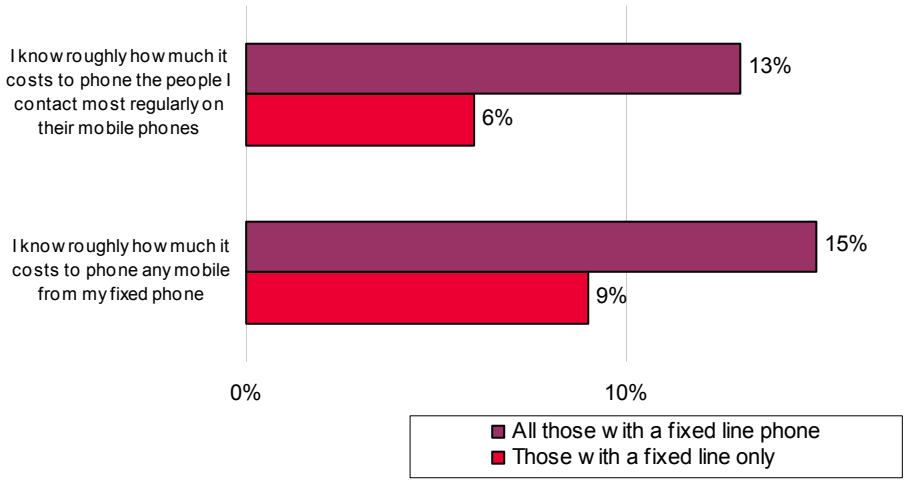
3.62 Looking forward over the period to 2011, it is Ofcom's view that there is no compelling evidence which might suggest that callers' awareness of which mobile network they are calling will improve significantly.

Awareness of relative and actual prices

3.63 Awareness of the cost of making calls to other mobile phones appears to be limited. In Ofcom's February 2005 survey it was found that fewer than one quarter (22%) of mobile phone users claimed to know the approximate cost of calling a mobile on the same network as them. This proportion dropped to one in seven (14%) for calls to mobiles on a different network. Of note is that the proportion who claimed to know how much it costs to phone the people whom they contact most regularly on their mobile phones was similarly low (16%).

3.64 Awareness is low amongst callers making a call to a mobile phone from a fixed line. Figure 3.3 below highlights the survey results for these callers - one in seven (15%) of consumers with a fixed line phone in their household reported that they knew roughly how much it would cost to call a mobile phone.

Figure 3.3 Awareness of the cost of calling mobile phones from your own landline



February 2005 survey, Base: All those with a fixed line phone (2,158), Those with a fixed line only – i.e. no mobile phone (461)

3.65 The data from Ofcom's February 2005 survey is broadly consistent with the results of earlier surveys. The CC referred to this issue in their 2003 report (paragraphs 2.136 to 2.141), which suggested that a large number of callers had little knowledge of the actual prices or the relative levels of charges for calling each network. The CC concluded that these findings overall:

> "…reveal a degree of awareness on the part of consumers which is insufficient to enable them to make an appreciable impact on prices or to drive termination charges down to competitive levels" (paragraph 2.141).

3.66 Ofcom's February 2005 survey reveals that callers do not appear to be significantly aware of the cost of calling a mobile from a mobile or a fixed line. The CC's conclusion accords with more recent market research. As discussed in paragraph 3.55 above, the practice of bundling inclusive minutes as part of tariff packages means that some callers face a very low marginal cost of calling. Going forward, it is Ofcom's view that there are no reasons to believe that this awareness will improve significantly over the period to 2011.

Callers' sensitivity to changes in the prices of calling a specific network - adapting behaviour

3.67 Even if, contrary to the evidence currently available, awareness of prices was to grow significantly, competitive pressure will only be exerted on wholesale mobile termination charge if callers are willing to adapt their behaviour through substitution, so that MNOs lose profits on mobile termination if they attempt to raise termination charges.

3.68 There is a range of potential options available to a caller as a substitute for contacting a specific recipient (by calling them on their mobile number). These include:

- mobile-to-fixed call as a substitute for mobile-to-mobile off-net call;
- mobile-to-mobile call as a substitute for fixed-to-mobile call;
- on-net mobile-to-mobile call as a substitute for mobile-to-mobile off-net call;
- SMS as a substitute for mobile-to-mobile call;
- voice over Internet Protocol calls; and
- call-back arrangement.

3.69 Each of these forms of substitution is discussed below in terms of their suitability as a satisfactory means of calling a mobile. There are numerous other means of communicating with an individual, such as other computer messenger services or email. However, Ofcom does not believe that these are significant alternative substitutes for most callers. This is because they are only feasible substitutes for most callers when both caller and called party have access to the required technology at the same time in order for these forms of contact to offer immediate, real time communication.

Mobile-to-fixed call as a substitute for mobile-to-mobile off-net call

3.70 Following an increase in the wholesale termination charge and, to the extent that this increases the cost of calling another mobile, a calling party may switch to calling the intended party on a fixed number. However, it is unlikely that a call to a fixed line can represent a satisfactory substitute for calling someone on a mobile network in a sufficient number of instances to act as a constraint on the charges for MCT. In particular, a call to a fixed line is not a viable alternative if the called party is, or is thought to be, away from their fixed line phone, since immediacy of contact is an important feature of calls to mobiles.

3.71 In its response to the March 2006 Consultation, H3G commented that this view of the importance of the immediacy of contact with respect to calls to mobiles ignores the fact that significant numbers of calls to mobiles go to voice mail and that this is an accepted feature of calling a mobile. In Ofcom's view, the use of voicemail does not remove this advantage of calling a mobile, as callers may still have a reasonable expectation that they will be called back before the called party returns to the location of his fixed phone.

3.72 Ofcom's view is consistent with evidence from Ofcom's January 2006 survey. Callers were asked to imagine themselves away from their home and calling someone on their mobile phone. While just under one third (31%) of callers said that in the last month they had tried calling people on the recipient's fixed phone first (before trying their mobile) in order to reduce the cost of these calls, a lower proportion (14%) reported that, on at least one occasion in the last month, they had waited to call the recipient on their fixed phone rather than calling them on their mobile.

3.73 In its response to the March 2006 Consultation, H3G proposed that Ofcom should consider whether this evidence of some callers first attempting to reach a called party on a fixed line, and calling the mobile only when the call to the fixed line is not answered, could indicate that the two types of calls are in the same market. In Ofcom's view, however, this market research indicates, on the contrary, that calls to fixed lines are not adequate substitutes for calls to mobiles where the called party is away from his fixed phone and the caller values immediacy, or near immediacy, of contact. Ofcom recognises, as H3G noted in its response to the March 2006 Consultation, that fixed-mobile converged products may proliferate over the coming years. Ofcom also recognises that this may have an impact on the volume of calls terminated on mobile networks, as such products typically have access to intelligent routing of calls which takes account of the called party's proximity to the various networks available to terminate the call. In Ofcom's view, however, efficient substitution of fixed termination for mobile termination is unlikely to constrain MCT charges, as the significantly higher cost of mobile termination (relative to fixed termination) means that providers of fixed-mobile converged services are unlikely to be persuaded to use mobile termination where fixed termination offers the same utility, even if mobile termination is priced at cost.

Mobile-to-mobile call as a substitute for fixed-to-mobile call

3.74 After an increase in termination charges and in the cost of calling a mobile, a caller who previously used a fixed line to make a call to a mobile may continue to call the desired party's mobile number, but from a mobile phone rather than from a fixed one. Ofcom's January 2006 survey found that just under one fifth (18%) of callers reported having used their mobile, rather than their fixed phone, to call a mobile when at home during the last month because they had inclusive minutes to use up and this would reduce the cost of calling.

3.75 The ability of this form of substitution to constrain voice call termination charges depends on its effect on the profits from termination services for the network operator. The terminating MNO controls the termination charge for a call originated from a fixed or mobile operator and therefore is able effectively to control the impact such substitution might have on its profits

3.76 Mobile-to-mobile on-net call retail prices do not involve a payment to another operator for mobile termination and are generally set at lower levels than off-net calls and so tend to generate lower revenues per minute for the MNOs. In Ofcom's view, for on-net calls to be a viable alternative to fixed-to-mobile calls:

- the caller must know the mobile network they are calling; and
- the caller must be on the same network as the call recipient.

3.77 As discussed in paragraph 3.62 above, awareness of the specific network being called is limited. In addition, mobile subscribers are split between five MNOs, hence, the probability of the caller being able to reach the desired call recipient with an on-net call is substantially less than 100%. The probability that a call remains on-net will broadly reflect the market share of the mobile operator in the outgoing retail market. The fact some groups of customers which frequently call each other congregate on the same network may increase this probability. Ofcom's January 2006 survey revealed that one in seven (14%) callers to mobiles claimed to have called from their mobile rather than their fixed phone in the last month because they knew that the person they are calling is on the same network as them.

3.78 However, if a caller knows that they make calls to one network more often than to the others, this could influence the choice of network as subscribers seek to benefit from the lower prices charged for on-net calls. In that case, calling mobile-to-mobile on-net might be an effective substitute for a call from a fixed phone. However, this substitution is unlikely to constrain termination charges because one of the effects of MNOs' tariffs is that they tend to separate the more price sensitive subscribers from the others, e.g. by attracting them with low on-net prices on which the effects of a high termination charge is bypassed. This limits the constraint that the more price-sensitive subscribers impose on the termination charge paid on off-net and fixed-to-mobile calls. This issue was examined in more detail, in paragraph 3.34 above, in the context of closed user groups.

On-net mobile-to-mobile call as a substitute for mobile-to-mobile off-net call

3.79 Termination charges for off-net calls could be constrained by substitution to on-net calls. This would require the calling party to be on the same network as the called party or to use more than one network to originate or terminate their calls e.g. by having more than one mobile subscription – in the form of multiple SIM cards or handsets and/or having more than one number on which to contact the called party.

3.80 As noted in paragraph 3.43 above, the use of multiple SIM cards is problematic for callers because the process of switching cards (to make different calls) is laborious and time-consuming. In addition, MNOs often lock handsets to the SIM that is originally sold with the handset so that it can only be used on their network. Those factors, and limited consumer awareness of the higher cost of off-net calls - only one in seven (14%) of residential mobile subscribers in Ofcom's February 2005 survey said they knew how much it cost to phone another mobile on a different network - mean that it may be some considerable time before multiple SIM devices generate any significant competitive pressure on voice call termination charges.

3.81 As discussed in paragraph 3.45 above, Ofcom's January 2006 survey found that of those with a mobile phone, approximately one in nine (12%) claimed to have more than one mobile phone number or more than one SIM card that they currently use. [✂].

3.82 In the January 2006 survey it was revealed that one quarter (26%) of callers to mobile claimed to have more than one mobile number for one or more of the people who they call. This offers another opportunity for callers to mobiles to make an on-net call instead of an off-net call if they know which of the mobile numbers is associated with their own network. As already discussed, callers do not have much awareness of which network they are calling. Moreover, the January 2006 survey revealed that two fifths (39%) of mobile subscribers claiming to have more than one number or SIM reported that they were connected to the same network.

3.83 Overall, Ofcom considers that substitution of off-net calls by on-net calls is unlikely to provide a competitive constraint on termination charges and could even reduce, rather than increase, the constraint on the general level of voice call termination charges. That is because MNOs, by offering lower on-net call prices, can segment the market by type of customer and separate the more price-sensitive customers from the others who are less price-sensitive. They can then set high termination charges for others (i.e. off-net termination charges). Thus, Ofcom is of the view that the nature and extent of this type of call substitution is not sufficient to act as a competitive constraint on termination charges.

SMS as a substitute for fixed or mobile-to-mobile call

3.84 Short message services ("SMS") enable parties to exchange text messages between mobile phones. SMS may also be received on and/or sent from some fixed network phones, and text is sometimes converted to a synthesised voice message.

3.85 Ofcom does not consider that SMS is a substitute for calling a mobile. SMS can only be relatively short, because the number of characters allowed in a text message is limited to 160 characters (although some phones now enable the user to link together more than one SMS message). Also, SMS are not sent in real time because, unlike mobile voice calls, SMS are transferred between networks on a store and forward basis, rather than on a 'real time' basis. Therefore, SMS do not guarantee the opportunity for immediate conversation and interaction offered by voice calls.

3.86 Evidence from Ofcom's January 2006 survey suggests that some callers do view SMS as a substitute for calling a mobile in order to save money. When asked whether callers had sought to reduce the cost of calling a mobile by sending an SMS instead of calling, just over half (52%) said they had done this in the last month when they were away from their home. When calling from their home the proportion claiming to substitute to SMS in the last month was lower at around two fifths (43%).

3.87 Nevertheless, whether or not SMS is a retail substitute for fixed or mobile-to-mobile calls is only relevant if this substitution can have an impact on the terminating MNO's profitability. SMS termination is offered by the same MNO which provides voice termination and, therefore, the terminating MNO could set charges for SMS termination in such a way as to avoid any competitive pressure on its charges for voice termination.

3.88 The Recommendation (referenced at the beginning of this section) currently does not envisage that SMS termination is in the same market as mobile voice call

termination, and Ofcom proposes to adopt the same approach on the basis that the functionality offered by SMS means that it is a limited substitute for voice calls.

Voice over Internet Protocol calls

3.89 The future impact of VoIP calls during the period of this review to 2011 is not clear. VoIP calls could, in theory, represent an effective substitute, but whether this applies competitive pressure on termination charges depends on whether it is possible to make a VoIP call to a mobile subscriber without incurring a termination charge controlled by the terminating operator. If this is possible, it is conceivable that callers could substitute to this alternative way of contacting a mobile subscriber, thereby providing a competitive constraint on the mobile termination charge. VoIP on fixed networks allows callers to speak via PC broadband connections at very low individual direct call cost, and for this type of call no termination charge is levied. Whether VoIP on mobiles would similarly be cheaper than conventional voice calls will depend on the charging arrangements set by the MNOs.

3.90 An individual making a VoIP call only pays to be on-line (which does not include a termination charge) and the target of the call (if he answers the call) similarly only pays to be connected. In a VoIP call both the called and the calling parties pay for the facility to receive/make the call. This is a quite different arrangement to traditional CPP and the concept of a wholesale termination charge no longer exists.

3.91 Such a RPP arrangement changes the incentives on the called party and is likely to affect his behaviour, although it is still unclear in what specific manner. For example, it is possible that a called party may not accept VoIP calls because he would have, in part, to pay for them, thereby forcing the calling party to reach him via a standard voice call to his mobile. In this case, VoIP calls would not impose competitive pressure on the level of the termination charges. There is less incentive from a receiver's perspective to accept a VoIP call as opposed to a circuit-switched call, as he pays for the former (partial RPP) but not the latter (CPP).

3.92 The constraining effect of VoIP calls to mobiles may also be undermined by the MNOs' behaviour. It is the MNO to which the called party subscribes that sets both the voice termination charges and the price for the Internet connection. That MNO also determines the quality of service (i.e. data delay and bit errors). Hence, it may be feasible to adjust network data quality parameters such that it is acceptable for web browsing and e-mail, but not for voice calls.

3.93 It is possible today to originate a call to any mobile phone using VoIP. However, where such calls are addressed to a mobile (or geographic) PSTN phone number the call is terminated using the MNO's voice channel and a standard voice call termination charge is payable. As a consequence, no competitive pressure is applied to mobile termination charges.

3.94 However, it is also technically possible to use VoIP to make and receive end-to-end calls on "smart" mobile phones (i.e. phones which incorporate appropriate operating software). In these instances, IP addresses are used to identify the parties to the call. Such calls would typically be carried on the MNO's data channel and users would be charged at the MNOs' data rates; no voice call termination charges would be payable. The ability to make calls in this way, bypassing voice call termination charges, is dependent on the user having the ability to install appropriate software on his mobile phone. It is also dependent on users being able to access, from their mobile phones, the Internet providers which offer VoIP services. There is much debate within the industry as to the extent to which, in future, smart mobile phone

users will be able to access such sites. It is also unclear whether MNOs will develop the ability to price discriminate according to the nature of the data carried (e.g. VoIP). At least one MNO has already advised customers using its data services that these are not intended to be used to convey voice calls and that contractual terms may be enforced requiring customers to cease using data services in this way.

3.95 At the moment the future of VoIP calls to mobile numbers is unclear. If these types of call were to become prevalent they could act as a constraint on mobile termination charges associated with traditional circuit switched calls to mobiles. However, at this stage there is insufficient clarity about the likely prevalence and billing arrangements associated with these types of calls in the future for Ofcom to take the view that they are likely to impose a significant constraint on termination charges over the period to 2011. However, if VoIP calls were to become a real substitute for traditional circuit switched calls to mobiles and the billing arrangements for these calls displayed RPP characteristics Ofcom could examine again the impact of these types of calls on the market. The possible future impact of VoIP was discussed in more detail in Section 6 of the March 2006 Consultation, and responses to that consultation have not changed Ofcom's view.

Call-back arrangement

3.96 Call-back refers to a situation where the direction of a call is 'reversed' and the calling party is called back by the called party, either in an ad hoc manner or through a commercial scheme. Call-back could render an increase in termination charges unprofitable only if the profitability of outgoing calls is lower than that of incoming calls, and call-back is carried out in sufficient volume.

3.97 Ofcom has no compelling evidence of any commercial operators currently offering call-back on calls to mobiles within the UK, such that the practice of ad-hoc call-back might have a constraining effect on voice call termination charges.

3.98 It is possible that during the period to 2011 MNOs could introduce a call-back service to offer an alternative to callers to their subscribers. However, Ofcom believes that this form of call-back could not be relied upon, in the period to 2011, to act as a viable constraint on mobile voice termination charges. Firstly, from a caller's and called party's perspective call-back is not as convenient as normal call. Secondly, MNOs have no incentive to introduce a service of a price and a quality such that it could act as an effective substitute for its own monopoly service. In any event, the inconvenience of call-back services, compared with direct calls, is likely to limit the extent to which they may constrain mobile termination charges.

Initial conclusions on retail demand-side substitution

3.99 Ofcom considers that there are currently no effective retail demand-side substitutes that, taken individually or acting together, could constrain mobile termination charges to the competitive level. Looking forward over the period to 2011, it is Ofcom's view that there is no clear prospect for changes in the behaviour of mobile subscribers or callers that will impose a competitive constraint on mobile termination. Perhaps the most likely source of competitive pressure may come from VoIP calls to mobiles which, because of the potential difference in billing arrangements, may provide a satisfactory and attractive substitute for making a traditional call to a mobile number. However, as discussed above, it is unclear how VoIP will develop in the mobile sector.

Wholesale demand-side substitution

3.100 At the wholesale level the very nature of mobile termination means that substitution of wholesale voice call termination on an MNO's network with wholesale voice call termination on a different MNO's network cannot provide any direct constraint on termination charges. An operator wishing to offer calls to a specific mobile number of a customer of a specific MNO must purchase termination from that MNO or it will not be able to terminate the calls. Looking forward to 2011, it is Ofcom's view that there are no prospects for termination to be provided, in relation to calling a specific subscriber, other than by the subscriber's MNO.

Initial conclusions on wholesale demand-side substitution

3.101 For the reasons listed above, Ofcom considers that at present there are no effective demand-side substitutes for voice call termination to specific subscribers of a particular MNO. On a forward looking basis to 2011, Ofcom believes that there is no compelling evidence which indicates that this will change.

Supply-side substitution

3.102 Supply-side substitution occurs when, in response to a rise in the price of a product, suppliers of other products would switch into supplying the product whose price has risen and render the price increase unprofitable for the hypothetical monopolist. Supply-side substitution can be examined both at the retail and wholesale level.

Retail supply-side substitution

3.103 For retail supply-side substitution to impose a constraint on the level of mobile voice termination charges, there would have to be operators which do not currently provide calls to mobiles that can switch into such provision and thus undermine a price set above the competitive level. In order to have such an effect, the new provider(s) would have to be able to provide a service which did not rely on the provision of termination from the MNO to which the called party subscribes. At present, Ofcom takes the view that it is not feasible to offer retail calls to mobile without being reliant on the MNO to which the called party subscribes to terminate such calls.

Wholesale supply-side substitution

3.104 For wholesale supply-side substitution to be an effective constraint on mobile voice termination charges, there have to be other firms that could switch into the provision of wholesale voice call termination to a specific subscriber of an MNO's network with relative ease in response to an increase in termination charges.

MNOs other than the one to which the called party subscribes

3.105 Supply-side substitution in the wholesale market could come most easily from other MNOs, which have the necessary network infrastructure and expertise to terminate mobile calls. However, having a mobile network is not, on its own, sufficient for an MNO to be able to terminate calls to a subscriber of a rival network. For this to happen, the mobile phone should be capable of automatically moving from its home network on to that of the alternative MNO on which the call would then be terminated. Ofcom takes the view that at present the lack of access to handsets/SIM details and the technical difficulties in taking control of the handset constitute an effective barrier to an MNO providing voice termination to subscribers of another MNO. On a forward

looking basis to 2011, Ofcom believes that there is no compelling evidence which indicates that this will change.

New mobile network operators, Local Area Networks over short-range radio technologies and Wireless Local Area Networks (WLANs)

3.106 Operators running WLANs could conceivably enter the market for mobile call termination in competition with MNOs and, thus, put pressure on the level of mobile voice termination charges. Ofcom believes that, at present, there are significant technical obstacles that would have to be overcome before such a service could become viable for mobile users. For example, WLAN operators cannot currently offer the same coverage as the MNOs' networks because of the limited range of reception enabled by their equipment, and technical difficulties, in terms of taking control of the called party's mobile phone, will arise. In any event, a further limitation of this scenario, and the scenario of other MNOs offering competing termination services to an extent which would constrain charges, is that it relies on the called party being responsive to the price of inbound calls, such that they would be prepared to incur some cost to reduce the cost to the person calling his mobile (for example by acquiring a multiple SIM handset). At present, the evidence presented in this section suggests that mobile subscribers do not take into consideration to any great extent the price of inbound calls when making their purchasing decisions. Therefore Ofcom takes the view that all of these obstacles would prevent new mobile network operators and WLAN operators from being able to supply voice call termination in competition with each existing MNO.

Mobile Virtual Network Operators

3.107 An MVNO is a firm that provides mobile telephony services to its customers, but does so by using part of an MNO's network. Ofcom understands that, at present, all calls to UK MVNOs' subscribers are routed directly to the host MNO's network and originating operators pay this MNO a terminating charge set by that host MNO. Where an operator has its own allocation of mobile numbers it would be able to control the termination charge for calls made to these numbers. However for the reasons given in the preceding paragraph in respect of providers of WLAN services, in Ofcom's view it is unlikely that such MVNOs could apply competitive pressure to wholesale termination charges set by other MNOs as they are unable to compete to supply termination services, other than the termination of calls to their own customers.

3.108 More broadly, Ofcom is aware that MVNOs with control over wholesale termination charges, and new entrants using alternative technologies, are likely to face similar incentives as MNOs when setting termination charges to the own networks. This is because calling parties and originating operators have no choice but to use that provider's wholesale termination services to deliver calls. For example BT has its own mobile number range, and Ofcom understands that it intends to use these numbers in the future when supplying mobile services, such as BT Fusion. BT has published a charge for terminating calls to this number range and Ofcom understands that, unlike arrangements put in place by other MVNOs, BT will control the level of that charge and will collect termination charges from originating operators. Completion of each call, variously on a host MNO's network or otherwise, will be a matter between BT and the various agencies which may be used to complete the call. Ofcom understands from BT that this number range has not yet been used and, therefore, the termination arrangements described have not yet been put into practice.

3.109 Responses to the March 2006 Consultation from O2, T-Mobile, H3G and Orange each argued that Ofcom should take steps now to develop its regulatory approach in relation to the termination services of new entrants which, as T-Mobile noted, may potentially utilise a variety of technologies. Orange warned that failure to consider all potential developments could be discriminatory, and O2 warned that failure to address these issues now will result in subsequent interconnection disputes. [✂]

3.110 Ofcom shares the concern of these respondents and fully intends that a consistent and non discriminatory approach to regulation of such new entrants should be applied. Ofcom will continue to monitor the market and, in light of developments, will consider what, if any, steps to take, including whether it is appropriate to conduct a further market review in order to define appropriately new markets for mobile termination provided by other operators and to consider whether such providers have SMP in those markets and if so what regulatory remedies are appropriate.

Initial conclusion on supply-side substitution

3.111 For the reasons mentioned in paragraphs 3.102 to 3.110 above, Ofcom considers there are no effective supply-side substitutes for voice call termination to the subscribers of a specific MNO.

Common pricing constraint(s)

Aggregating for all termination provided by an MNO

3.112 On the basis of the initial conclusions reached above, there are no demand-side or supply-side substitutes that should be included in the relevant markets. Accordingly, the appropriate market definition might appear to be wholesale voice call termination to a specified telephone number (or subscriber). However, Ofcom considers that it would be wrong to narrow the market definition to this extent, because MNOs currently do not price discriminate between termination charges for calls made to all the different subscribers on their networks.

3.113 MNOs can separate the more price-sensitive customers by offering them arrangements that bypass the MCT charge and so take such sales outside the scope of the market, e.g. through a private wire service (or use of on-net calls). These issues have been discussed in the preceding paragraphs on demand-side substitution. However, the MNOs do not currently charge different prices for termination depending on which one of their subscribers is being called. Thus, a common pricing constraint applies to voice call termination to all subscribers on one network. This implies that, if an MNO wishes to lower termination charges for calls to one subscriber, it must in practice lower termination charges for calls to all its subscribers, effectively equalising the competitive pressures placed on all the networks' termination charges. As a result, Ofcom is of the view that the relevant market includes wholesale mobile voice termination to all subscribers of an MNO for which a termination charge is paid.

3.114 However, the current mobile number portability arrangements, put in place by the industry, have led to the situation in which an MNO effectively charges a different termination charge for calls to those customers that have ported their number from a different network ('donor network'). In these instances, the termination charge is equal to the donor network's termination charge. Therefore wholesale termination for calls to 'ported number subscribers' are not strictly included in the common pricing constraint. There are two possible approaches for the treatment of calls to subscribers who have ported their number:

- Wholesale voice call termination for calls to ported number subscribers could be included in the same market as the donor network operator; or

- Wholesale voice call termination for calls to ported number subscribers could be included in the same market as the network operator to which the subscriber currently subscribes.

3.115 If the first of these options were followed the situation would arise in which an MNO is supplying a service to its subscribers but the service is included in the market of a different MNO. If the second were followed the rationale for inclusion in the market would not be the common pricing constraint (discussed above). Ofcom proposes to include calls to ported number subscribers in the same market as the network operator to which the subscriber currently subscribes. If Ofcom were to impose remedies on termination charges it would be unusual to impose them on an MNO when it does not supply the service to which the remedy applies. Ofcom recognises that if the current share of calls to ported number subscribers, compared to all calls to mobiles, were to increase in the future this could give rise to anomalous incentives for MNOs as donor operators would be setting the charge for termination supplied by a different operator. Ofcom is currently separately considering its views on the existing MNP arrangements (see paragraph 9.67 below). Should these arrangements change to allow MNOs to set the termination charge for all their own subscribers this would not affect Ofcom's market definition: Ofcom's market definition relates to the supplier of termination rather than the MNO who sets the level of charges.

Cluster market for mobile services including termination

3.116 Termination could be considered as part of a cluster market incorporating all mobile services due to a wider common pricing constraint. This is the view presented, or referred to, by each of the 2G/3G MNOs in their responses to the March 2006 Consultation. If mobile subscribers purchased a bundle of services from MNOs that included voice call termination together with other retail services, even if each element of the bundle were not a demand-side substitute for any of the others, the fact that they are all consumed and supplied together would link them. This is because under these circumstances, MNOs would be competing for customers not on the price of each single service, but on the overall price of the bundle, and the various services would be subject to a common pricing constraint.

3.117 In these circumstances, an MNO would not be able to raise voice call termination charges, while keeping prices for the other services in the bundle at the same level, without seeing its customers switch to another network in response to the increase in the overall price of the bundle. The MNO would, therefore, be able to raise termination charges only if, at the same time, it reduced prices for other services, so as to maintain at the same level the overall price of the bundle. If this was true, an MNO could be constrained in its ability to increase charges for voice call termination although the extent of such constraint would depend upon the level of competition in relation to the provision of the overall bundle. However, as discussed in paragraph 3.33 above, the evidence supports the conclusion that few mobile subscribers consider the prices of incoming calls as well as the prices of outgoing calls, when choosing their mobile network. At present, the MCT charge levied by a subscriber's network is not part of the bundle of services on which MNOs compete for subscribers. Therefore, Ofcom takes the view that the appropriate market definition is not that of a cluster market for all mobile services.

Two-sided markets

3.118 Ofcom noted in the March 2006 Consultation that MCT can be viewed in the context of a two-sided market in which there are two types of retail customer; called parties and callers. Vodafone and T-Mobile in their responses to the March 2006 Consultation argued that if Ofcom considered its analysis of mobile call termination from this perspective there are important issues related to the competitive constraints faced by MNOs in setting termination charges that need to be taken into account. Vodafone noted that there are two key features of such markets:

- the interdependence of prices on the two sides of the market. Any change to the price on one side will change the price on the other side e.g. if prices on one side are increased they will fall on the other side.

- the absence of a direct relationship between the price of a service on one side of the market and the incremental cost of serving that side of the market.

3.119 In Vodafone's view these principles affect Ofcom's market analysis in two fundamental ways. First, competition in call origination is relevant to the assessment of call termination. Second, two sided markets often have skewed pricing structures where prices on one side may subsidise prices on the other. This affects the analysis of the competitive price level that may efficiently be above cost.

3.120 Ofcom disagrees with the implications of Vodafone's view, as the competitive constraints on the two sides are fundamentally different; MNOs do not effectively compete against each other in termination charges whereas they do compete on outbound prices. This is different from many other instances of two sided markets. Ofcom acknowledges that the waterbed effect means some excess profits from termination are competed away in the more competitive retail mobile. This is discussed in paragraph 7.7 below. However, the level of competition in call origination does not impose any competitive constraint on call termination charges rather it implies MNOs may not retain excess profits they earn from setting excessive call termination charges. Furthermore, Ofcom also acknowledges that the efficient structure of prices across a MNO's activities may involve certain services being priced above cost whilst others being subsidised accordingly[18]. This is discussed later in Annex 16 in relation to Ofcom's estimate of the externality surcharge. However, in the absence of competitive constraints on call termination charges, MNOs are incentivised to set prices above the competitive price level (that may already be above cost), i.e. because of the fundamental difference in competitive conditions on the two sides of the market, MNOs' incentives are misaligned with incentives to set efficient prices. In Ofcom's view, its analysis already takes full account of the principles of a two sided market as manifest in the specific circumstances of MCT, and these principles do not highlight any additional competitive constraints on termination charges that have not been discussed already earlier in this Section.

[18] In a recent paper by Hausman and Wright, "Two Sided Markets with Substitution: Mobile Termination", June 2006 (see http://econ-www.mit.edu/faculty/download_pdf.php?id=1366), the authors explore the circumstances under which an unregulated termination charge may actually be lower than the welfare maximising price. They find that the level of substitution between fixed to mobile and mobile to mobile (on-net) calls is important as this may drive fixed subscribers to become mobile subscribers if termination charges are too high. Ofcom considers that this form of substitution is not significant to the extent that it can be expected to constrain mobile termination charges.

Operators that have both a 2G and a 3G network

3.121 O2, Orange, T-Mobile and Vodafone have both 2G and 3G networks. Therefore it is necessary to consider whether or not this has any impact on market definition.

3.122 At present MNOs charge one price to originating operators for termination. MNOs cannot directly control which network they use to terminate calls to their subscribers on a call by call basis. This is determined by the subscriber's handset. Dual mode (2G/3G) phones cannot standby to receive calls in both modes simultaneously. Therefore they are programmed to default to the 3G mode where 3G coverage exists as, otherwise, the user would be unable to make and receive advanced 3G services. Therefore, whenever a dual mode phone is within 3G coverage any incoming voice call must be terminated on the MNO's 3G network. All calls to 2G-only phones and all calls to dual mode phones which are outside the 3G coverage area are terminated using the MNO's 2G network. It is possible that MNOs may develop the technology that will provide them with discretion in deciding on which network to terminate a call and therefore may introduce different charges for originating operators for termination supplied using a 2G or 3G network. However Ofcom has no compelling evidence that this is likely to happen in the next four years.

Demand-side substitution

3.123 Subscribers to the 3G services of these operators are given a dual mode handset that works on both 2G and 3G networks and will receive voice calls on both networks. However, as noted above, the network on which the call is terminated is dictated by the terminating operator, currently with reference to the availability of 3G coverage. Neither the originating operator nor the calling party is able to affect this choice, and neither is likely even to be aware of whether the 2G or the 3G network has been used for termination.

3.124 Since callers are unable to choose the network on which calls terminate, voice call termination on the 2G network does not appear to be a demand side substitute if charges for termination of calls to 3G subscribers were raised above the competitive level. Equally, voice call termination on the 3G network does not appear to be a demand side substitute if charges for termination of calls to 2G subscribers were raised above the competitive level.

Supply-side substitution

3.125 The fact that the two networks are run by the same operator also indicates that termination on the 2G network will not be a supply-side substitute for termination of calls to 3G subscribers. The fact that an MNO can offer termination on its 2G network for calls to its 3G subscribers will not impose any additional constraint on the level of the charges for termination on its 3G network. An MNO will not undercut its own charges. For the same reason, termination on the 3G network is not a supply-side substitute for termination of calls to 2G subscribers.

Common pricing to originating operators

3.126 MNOs with both a 2G and a 3G network present a single price to originating operators for purchase of voice call termination to its subscribers. MNOs use both networks to terminate calls. As discussed above, currently this is not an active decision on a call by call basis, although this may change in future. This pricing policy means that the same charge is paid for voice call termination whether it is delivered using the 2G network or the 3G network. The key issue in this context is that

originating operators pay the same price whether voice call termination is on a 2G or 3G network.

3.127 Ofcom notes that it might be feasible for MNOs to set different charges for each of 2G and 3G termination and to levy such charges depending on the network used for termination. Technology could be developed for such a purpose. There would, however, be some practical problems to be addressed, such as whether upgrades to billing systems would be needed and that originating operators may not know which network had been used for termination. In the absence of compelling evidence to the contrary, Ofcom considers it reasonable to assume that MNOs (absent regulation) would continue to levy the same or a blended charge for termination irrespective of whether they use their 2G or 3G network to connect the call. Ofcom, therefore, includes voice call termination on the 2G and 3G networks of the same MNO in the same market.

Geographic market definition

3.128 MNOs charge the same price for termination to a UK mobile number (or subscriber) wherever the call is made from and wherever the called party receives the call throughout the UK. Therefore there is a common pricing constraint, implying that the geographic market is UK-wide.

H3G and national roaming

3.129 H3G provides voice termination over its 3G network where it has coverage. Out of coverage, H3G uses termination on the 2G network of another MNO ('national roaming partner'). H3G effectively uses the supply of wholesale termination services by another MNO as an input into its own supply of termination services to originating operators. H3G does not currently charge a different price for termination which is carried purely over its 3G network or which utilises its national roaming partner's network as an intermediate step. Therefore, H3G controls the termination of all voice calls to its network. Ofcom is therefore of the view that the most appropriate market definition in this case is wholesale voice call termination provided by H3G.

Overall proposed conclusions on market definition

3.130 On the basis of the analysis and of the evidence discussed above, Ofcom holds the view that (to summarise):

- No adequate wholesale demand or supply side substitutes for termination of calls to the subscribers of a specific MNO currently appear to exist. Current technology does not allow the termination of a call to a mobile other than on the network of the MNO to which the called party subscribes. In Ofcom's view, there is no compelling evidence to suggest that this will change during the period of the review to 2011.

- At the retail level, there are no effective alternatives for callers that could act as a constraint on termination charges. In addition, callers continue to appear to have limited awareness of the cost of calling mobiles. It is only a relatively small proportion of mobile subscribers that are likely to show a higher sensitivity to the price of incoming calls. However the MNOs have to a large degree separated these subscribers by offering them special tariffs, thus preventing this group from putting any effective pressure on termination charges.

- Technological conditions (as discussed by respondents) and the behaviour of called and calling parties may, over time, change sufficiently to alter the analysis but Ofcom believes that there is currently no compelling evidence to suggest that that such change will occur during the period to 2011 covered by this review.

- The market is not as narrow as calls to individual subscribers or numbers of a given MNO, because it appears that when a termination charge is paid there is no discrimination between the termination charge for calls to subscribers of a given network (with the exception of ported numbers). Therefore a common pricing constraint makes it appropriate to widen the product market to include all wholesale voice call termination provided by each MNO.

3.131 As a consequence, Ofcom proposes that there are five separate markets as follows:

- Wholesale mobile voice call termination provided to other Communications Providers by O2 in the UK

- Wholesale mobile voice call termination provided to other Communications Providers by Orange in the UK

- Wholesale mobile voice call termination provided to other Communications Providers by T-Mobile in the UK

- Wholesale mobile voice call termination provided to other Communications Providers by Vodafone in the UK

- Wholesale mobile voice call termination provided to other Communications Providers by H3G in the UK.

***Question 1**: Do you agree with Ofcom's market definitions?*

Section 4

Market power

4.1 This section sets out Ofcom's proposed conclusion that each of five MNOs has significant market power (SMP) as defined in section 78 of the Act in the market for wholesale mobile voice call termination provided to other Communications Providers in the UK, which has been identified in Section 3.

Definition of SMP

4.2 Under the EU Directives and section 78 of the Act, SMP has been defined so that it is equivalent to the competition law concept of dominance. Article 14(2) of the Framework Directive states that:

> "An undertaking shall be deemed to have significant market power if, either individually or jointly with others, it enjoys a position equivalent to dominance, that is to say a position of economic strength affording it the power to behave to an appreciable extent independently of competitors, customers and ultimately consumers."

4.3 Further, Article 14(3) of the Framework Directive states that:

> "Where an undertaking has significant market power on a specific market, it may also be deemed to have significant market power on a closely related market, where the links between the two markets are such as to allow the market power held in one market to be leveraged into the other market, thereby strengthening the market power of the undertaking".

4.4 Therefore, in the relevant market, one or more undertakings may be designated as having SMP (single or collective dominance) where any undertaking, or undertakings, enjoys a position of dominance. Also, an undertaking may be designated as having SMP where it could leverage its market power from a closely related market into the relevant market, thereby strengthening its market power in the relevant market.

4.5 In assessing SMP it is important to conduct the analysis under the assumption that no regulatory intervention currently or potentially exists in the relevant market. This is because the outcome of the SMP assessment is to test whether or not any regulatory intervention is required. In the UK, mobile voice call termination has been subject to regulation since 1999. Therefore assessing SMP in this market requires consideration of a hypothetical market where regulation (or the threat of regulation) does not exist.

The criteria for assessing SMP

4.6 The Commission has issued Guidelines on market analysis and the assessment of SMP (the 'Commission's Guidelines')[19]. Oftel (the previous UK NRA) produced

[19] "Commission Guidelines on market analysis and assessment of significant market power under the Community regulatory framework for electronic communications networks and services" (See http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/c_165/c_16520020711en00060031.pdf)

additional guidelines on the criteria to assess effective competition[20]. In assessing whether an undertaking has SMP, this review takes the utmost account of the Commission's Guidelines as Ofcom is required to do when considering whether to make a market power determination under section 79 of the Act, as well as considering the application of the Oftel equivalent guidelines.

4.7 Specifically, the Commission's Guidelines state that:

> "NRAs will assess whether the competition is effective. A finding that effective competition exists on a relevant market is equivalent to a finding that no operator enjoys a single or joint dominant position on that market." [Paragraph19]

4.8 The Commission's Guidelines go on to state that:

> "NRAs will conduct a forward looking structural evaluation of the relevant market, based on existing market conditions. NRAs should determine whether the market is prospectively competitive, and thus whether any lack of effective competition is durable, by taking into account expected or foreseeable market developments over the course of a reasonable period. The actual period used should reflect the specific characteristics of the market and the expected timing for the next review of the relevant market by the NRA. NRAs should take past data into account in their analysis when such data are relevant to the developments in that market in the foreseeable future." [Paragraph 20]

4.9 Given the market definitions set out in Section 3, SMP cannot be held by more than one MNO in each market. Therefore this SMP assessment focuses on single firm dominance.

4.10 In the Commission's Guidelines, the Commission discusses market shares as being an indicator of market power

> "…Market shares are often used as a proxy for market power. Although a high market share alone is not sufficient to establish the possession of significant market power (dominance), it is unlikely that a firm without a significant share of the relevant market would be in a dominant position. Thus, undertakings with market shares of no more than 25 % are not likely to enjoy a (single) dominant position on the market concerned. In the Commission's decision making practice, single dominance concerns normally arise in the case of undertakings with market shares of over 40 %, although the Commission may in some cases have concerns about dominance even with lower market shares, as dominance may occur without the existence of a large market share. According to established case-law, very large market shares — in excess of 50 % — are in themselves, save in exceptional circumstances, evidence of the existence of a dominant position…" [Paragraph 75]

4.11 However, the Commission notes further that

[20] Oftel's market review guidelines; criteria for the assessment of significant market power published August 2002

> "It is important to stress that the existence of a dominant position cannot be established on the sole basis of large market shares. As mentioned above, the existence of high market shares simply means that the operator concerned might be in a dominant position. Therefore, NRAs should undertake a thorough and overall analysis of the economic characteristics of the relevant market before coming to a conclusion as to the existence of significant market power. In that regard, the following criteria can also be used to measure the power of an undertaking to behave to an appreciable extent independently of its competitors, customers and consumers. These criteria include amongst others:
>
> - overall size of the undertaking,
>
> - control of infrastructure not easily duplicated,
>
> - technological advantages or superiority,
>
> - absence of or low countervailing buying power,
>
> - easy or privileged access to capital markets/financial resources,
>
> - product/services diversification (e.g. bundled products or services),
>
> - economies of scale,
>
> - economies of scope,
>
> - vertical integration,
>
> - a highly developed distribution and sales network,
>
> - absence of potential competition,
>
> - barriers to expansion.
>
> A dominant position can derive from a combination of the above criteria, which taken separately may not necessarily be determinative. "[Paragraphs 78-79]

4.12 The European Regulators' Group ("ERG") has issued a working paper on SMP[21] that builds upon the Commission's Guidelines. In this paper further criteria are explicitly considered:

- Excessive pricing;
- Ease of market entry;
- Cost and barriers to switching;
- Evidence of previous anti competitive behaviour;

[21] "Revised ERG Working paper on the SMP concept for the new regulatory framework", October 2004 (See http://www.erg.eu.int/doc/publications/public_hearing_concept_smp/erg0309rev1_smp_working_doc.pdf)

- Active competition on other parameters;
- Existence of standards/conventions;
- Customers' ability to access and use information;
- Price trends and pricing behaviour; and
- International benchmarking.

4.13 This section of the consultation document considers the relevance of all these criteria in the assessment of SMP in the context of this market review.

Assessment of SMP against relevant criteria

4.14 This assessment first discusses the following relevant criteria for this market review, namely:

- Market shares;
- Absence of potential competition; the ease of market entry and the related criteria concerning the control of infrastructure not easily duplicated, and
- Absence of countervailing buying power and the related criteria concerning the overall and costs and barriers to switching.

4.15 There then follows a discussion of why the other criteria (including evidence of excessive pricing) listed in the Commission's and the ERG's guidance may be considered less relevant or material to the assessment of SMP in the relevant markets.

4.16 The criteria are set against a forward looking analysis of the markets starting from 1 April 2007 (when the current charge controls on 2G termination by 2G/3G MNOs expire) looking forward over the period to 2011. As discussed in Section 3, Ofcom considers that there are no compelling factors which would indicate that the market definition will change during the period to 2011.

Market shares

4.17 All five MNOs have had (since launch of their voice services) a 100% share of terminating voice calls on their own respective networks, both when measured by volume of calls and by revenues. This applies to calls terminated over each operator's 2G and 3G network. This means that each MNO is, in effect, currently a monopolist in the supply of termination for voice calls to its customers. As discussed in Section 3, MNOs do not control the charge for all the calls they terminate due to the current number portability arrangements. Nevertheless it is Ofcom's view that porting has no impact on SMP in these markets as these arrangements do not constrain MNOs' ability to set MCT charges in respect of non ported numbers.

4.18 There has been no change in these 100% market shares and these market shares will not change during the period to 2011 (given the market definition). The probability of competitive entry in the relevant markets is very low, for the reasons explained in paragraph 4.22 below in relation to ease of market entry.

4.19 H3G currently relies on O2's 2G network to terminate calls to its subscribers where its own 3G network does not offer coverage for a particular subscriber, and has announced that it has also awarded a contract to Orange for the provision of similar facilities. Calling parties and originating operators have no choice but to use H3G to terminate those calls (even if H3G uses O2 or potentially another MNO's network). Therefore, H3G has 100% of the market for voice termination to its subscribers. Whether or not H3G ultimately rolls out its own 3G network to offer its subscribers sufficient service coverage and therefore no longer requires the use of another MNO's 2G network does not affect the proposed conclusions of this analysis of SMP.

4.20 In Ofcom's view, these 100% market shares would imply, absent investigation of other factors, that each MNO has prima facie SMP in the market for termination of voice calls on its network(s).

Absence of potential competition, ease of market entry and control of infrastructure not easily duplicated

4.21 The threat of potential entry can prevent firms from raising prices above competitive levels and, for example, could lead a firm with a 100% market share to behave in a way that would be consistent with higher levels of competition existing in the market than its market share might suggest. However, this threat becomes weak when there are barriers to entry.

4.22 In this market, the infrastructure required to enable other providers to offer termination on a specific network apart from the provider of that network is not available. Nevertheless, in the Preliminary Consultation and the March 2006 Consultation Ofcom noted that at any time each mobile phone is generally within the coverage area of 4 or 5 different mobile networks. In theory, it might be technically possible for originating operators to choose which network terminates its calls, but this would be likely to require substantial technical changes and co-operation. As noted in paragraph 8.10 below, responses to the March 2006 Consultation all agreed that such competitive termination is unlikely to be practicable or cost efficient in the foreseeable future. For the reasons set out in 8.10, it is Ofcom's view that mandated technical change to enable competitive termination is neither currently feasible nor likely, in the medium term, to pass a cost-benefit analysis. Market led change of this kind is also highly unlikely to arise for the same reasons, and also because change would be reliant on the co-operation of the MNOs which currently enjoy 100% market shares.

4.23 Therefore actual competitive entry, or the threat thereof, does not provide competitive pressure on the MNOs. Moreover, as noted in paragraphs 3.104 and 3.105 above, even if a new mobile network operator were to start supplying mobile services, this would not undermine the SMP of existing MNOs due to the lack of competition between MNOs in supplying wholesale mobile termination on their respective networks.

4.24 In Ofcom's view, the absence of potential competition and the absolute barriers to entry reinforce the prima facie indicators, in respect of 100% market shares, that each MNO may have SMP in the market for termination of voice calls on its network(s).

Countervailing buyer power, cost and barriers to switching

4.25 Countervailing buyer power (CBP) exists when a particular purchaser (or group of purchasers) of a good or service is sufficiently important to its supplier to influence the price charged for that good or service.

4.26 CBP is not an absolute concept but, rather, refers to the relative strength of the buyer in its negotiations with the prospective seller for the good or service in question. In considering whether an undertaking has SMP, it is not sufficient just for the buyer to have some CBP but, rather, it is necessary that the buyer can exert sufficient CBP such that the seller is unable to act independently of competitors, customers and consumers, resulting in prices that are not excessive (constrained to a level consistent with a competitive outcome). The seller can then be described as facing sufficient CBP.

4.27 Given the prima facie evidence of SMP deriving from 100% market shares, the absence of potential competition and the absolute barriers to entry, Ofcom considers that the analysis of CBP may be of central importance in assessing whether some or all of the MNOs have SMP in the market for termination of voice call that they supply to other operators. This analysis is presented in detail in Section 5. In summary Ofcom does not find that MNOs face sufficient CBP to offset their prima facie position of holding SMP.

Other criteria for assessing SMP

4.28 The following paragraphs (which include quotations taken from the *Revised ERG Working paper on the SMP concept for the new regulatory framework*) consider the remaining criteria listed earlier, explaining why Ofcom considers these less relevant to this assessment of SMP in the relevant markets.

4.29 Excessive pricing – "the ability to price at a level that keeps profits persistently and significantly above the competitive level is an important indicator for market power." Evidence of excessive pricing can support a finding of SMP. It is not, however, a prerequisite to a finding of SMP. In the last market review Ofcom noted that 2G termination charges appeared to have been substantially above a reasonable estimate of each MNO's costs for a number of years (despite formal and informal regulation)[22]. In the case of 3G mobile termination, the cost modelling, as set out in Section 9 below, indicates that the 3G charges presently levied by H3G, and the implicit 3G charges of the 2G/3G MNOs are significantly above Ofcom's proposed view of the appropriate charges for MCT that is subject to consultation. Ofcom will reconsider the relevance of this criterion in light of responses to the consultation.

4.30 Overall size of the undertaking – "the potential advantages, and the sustainability of those advantages, that may arise from the large size of an undertaking relative to its competitors". As discussed at paragraph 4.17 there is only one supplier of MCT in each of the markets defined in Section 3. Therefore the size of these suppliers relative to its competitors in each market is not a relevant factor.

4.31 Technological advantages or superiority – "Such advantages may represent a barrier to entry as well as an advantage over existing competitors due to lower production

[22] See paragraphs 3.17 – 3.31 of Ofcom's *Proposals for the identification and analysis of markets, determination of market power and setting of SMP conditions*, December 2003 ("the December 2003 Consultation"), http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/mct_consultation/

costs or product differentiation". This criterion is not considered relevant in this market because the presence of absolute barriers to entry indicates that each MNO offering voice termination faces no existing or potential competitors. Hence, no comparison between technologies is relevant.

4.32 Easy or privileged access to capital markets/financial resources – "Easy or privileged access to capital markets may represent a barrier to entry as well as an advantage over existing competitors." This criterion is not considered relevant in this market, because the presence of absolute barriers to entry indicates that each MNO offering voice termination faces no existing or potential competitors. Therefore, the cost of capital an MNO faces cannot give it any special advantage in this market.

4.33 Product/services diversification (e.g. bundled products or services) – "Generally speaking there is a positive relation between product/services diversification and market power, which is due to the fact that increased differentiation in general will also hamper switching between suppliers if these are able to differentiate their products from their competitors and if others are not able to imitate the differentiation." This criterion is not considered relevant because each MNO sells termination to originating operators who request it on a stand-alone basis and it is not bundled with other services. In any case, the limited extent that callers to mobile subscribers have been found to exercise demand-side substitution confirms that calls to mobiles are a much differentiated service from other forms of communication. Moreover, the actual buyers of voice call termination, namely other operators, have no demand-side alternatives.

4.34 Economies of scale – "Economies of scale arise when increasing production causes average costs (per unit of output) to fall…. If this is the case, economies of scale can act as a barrier to entry as well as an advantage over existing competitors". This criterion is not considered relevant in this market because the presence of absolute barriers to entry indicates that each MNO offering voice termination faces no existing or potential competitors and, therefore, cost-advantages are not relevant in the markets defined in Section 3.

4.35 Economies of scope – "Economies of scope exist where average costs for one product are lower as a result of it being produced jointly with other products by the same firm. …If the existence of economies of scope requires entrants to enter in more then one market simultaneously, this may require additional expertise, more capital etc, which may sum up to higher costs, thus hampering ease of market entry." This criterion is not considered relevant because the presence of absolute barriers to entry indicates that each MNO offering voice termination faces no existing or potential competitors.

4.36 Vertical integration – "Vertical integration while normally efficient can strengthen dominance by making new market entry harder due to control of upstream or downstream markets. As such, vertical integration may give an advantage to the integrated firm (over its competitors), as access to sales and supply markets might be more easily attainable for the integrated firm. Vertical integration makes it also possible to lever market power into upstream or downstream markets." The MNOs are vertically integrated in the sense that they own both the upstream infrastructure that enables the provision of wholesale termination and other wholesale access and origination services whilst at the same time they are also downstream suppliers of retail services. However, the relevant question in this context is whether the position of any MNO in the retail market allows it to leverage market power into wholesale mobile call termination. This is not the case for two reasons. First, no MNO has been determined as having SMP in the downstream retail market. (See Oftel's

consideration of the retail market for mobile outbound services, which formed part of its *Review of wholesale mobile access and call origination* - October 2003) [23]. Second, for the reasons set out above, one MNO is not in competition with another MNO with respect to mobile voice termination to their customers.

4.37 A highly developed distribution and sales network – "Well-developed distribution systems are costly to replicate and maintain, and may even be incapable of duplication. They may represent a barrier to entry as well as an advantage over existing competitors". Ofcom does not consider this criterion relevant because the service in question is acquired only by purchasers at the wholesale level (other MNOs and fixed operators) and does not require a specialised or complex distribution network.

4.38 Barriers to expansion – "There may be more active competition where there are lower barriers to growth and expansion." This criterion is not considered relevant, because the presence of absolute barriers to entry implies that competition in the market for MCT is not likely to extend beyond the MNO in question and thus the existence of barriers to expansion becomes irrelevant

4.39 Evidence of previous anti-competitive behaviour – "Effectively competitive markets lack collusion among suppliers and anti-competitive behaviour." Evidence of previous anti-competitive behaviour such as predatory pricing and other market foreclosure behaviour can be an indication that a market is not effectively competitive. Ofcom is not aware of relevant evidence of anti competitive behaviour in these markets.

4.40 Active competition on other parameters – The ERG proposes that market power can be obtained by successfully differentiating products, either vertically (on the basis of quality) or horizontally (on the basis of diversity). This criterion is not considered relevant in this market because mobile voice call termination does not seem to offer much scope for vertical or horizontal product differentiation. In addition, the presence of absolute barriers to entry implies that competition in the market is not likely to extend beyond the existing players and, thus, diversification, even if possible, is not relevant for the period covered by this review.

4.41 Existence of standards/conventions – "Useful background information not only for market delineation but also for the assessment of product homogeneity/heterogeneity, the existence of market barriers for potential entrants and for the assessment of dominance can be obtained by considering the existence and consequences of standards and conventions. The extent of technical standardization may determine the potential for product differentiation as well as the ease of market entry (availability of a certain technology; compatibility with other firms' products/technologies). Conventions like the calling-party pays principle or standard international roaming agreements have to be taken into account in order to be able to correctly interpret the other indicators mentioned in this document and/or to understand the source of market failure and competition problems." As discussed in Section 3, the CPP arrangement plays an important role in conditioning mobile subscribers' preferences and behaviour. It is a central component of the analysis leading to Ofcom's proposed conclusion on market definition and market power.

4.42 Customers' ability to access and use information – The ERG proposes that limited access to information on terms and conditions (especially prices), or access to

[23] It is possible to consider the impact of excessive high wholesale termination charges levied by all MNOs on a new entrant to the mobile retail market. The new entrant would face relatively higher costs given the size of their network and the resulting disproportionate number of off-net calls.

information that is difficult to use, may reduce the capacity of consumers to act upon differences between providers. As a result firms acquire independence of action from consumers and competition. This criterion does not refer to the ability of consumers to switch between providers, but to the capacity of first time buyers to make an informed choice. Wholesale customers appear to have all the relevant information to make an informed choice. However, they have no choice between providers, since each MNO is a monopolist in the provision of voice termination to its subscribers.

4.43 Since termination charges are an input to the retail price for calling mobile phones, the behaviour of retail consumers may have an impact on the MNOs' ability to set high termination charges. The information available to retail customers must, therefore, be considered. Better knowledge on their part about the price of calling each specific network may indirectly force MNOs to compete on the level of termination charges. The extent to which callers can apply pressure indirectly on mobile termination charges was discussed in detail in Section 3. A number of links (not just better awareness of the cost of calling mobiles) would have to be satisfied so that the behaviour of callers to mobiles could constrain termination charges. For this reason, Ofcom considers that the extent to which consumers can access information on the cost of incoming calls and how easy this is to understand and use, considered as part of the market definition exercise in Section 3, does not play a part separately in the assessment of market power. With regard to the called parties, there is evidence that, as a consequence of the pricing arrangements, they are not sufficiently concerned about the cost of incoming calls when choosing their network.

4.44 Price trends and pricing behaviour – "Pricing patterns substantially determine the welfare of customers, and thereby overall welfare. The degree of competition in a relevant market (and its dynamic) might be observed through time series of price movements (possibly linked to international benchmarks), the reactions on price setting of single providers and prevailing differences in prices over time (for homogenous products). If for example competitors cut their prices whereas a particular undertaking (or group of undertakings) leaves its prices unchanged, economic theory would conclude that this should lead to a loss in sales to this (group of) undertaking(s). If therefore a (group of) undertaking(s) can sustain its (their) prices permanently at a higher level, this can be seen as an indication that this (group of) undertaking(s) is free to behave independently from its rivals. Further insights can be gained by an extension of the observation period, which may reveal whether a certain undertaking (group of undertakings) is forced to react to its competitors' price cuts with a lag. The shorter the lag and the sharper the price response in reaction to price cuts of rivals, the fiercer competition can be assumed to be. Pricing patterns might therefore provide important additional information on the effectiveness of competition and might be taken into account as pricing is central to economic conduct". Given the analysis of markets in section 3 above, prices are not subject to effective competition. Therefore it is not possible to observe any competitor response to the changes in price of its rivals and make inferences about the level of competition. Furthermore, charge controls have acted as the binding constraint on MNOs' pricing. In the case of H3G, its MCT charges have been constant since first set. (As is noted in paragraph 9.88 below, according to Ofcom's analysis of costs that is subject to consultation these charges are above cost.) The impact of other external competitive pressures has not imposed pressure on MNOs to reduce their prices below the charge controls.

4.45 International benchmarking – The ERG proposes that, for many of the criteria listed above, additional valuable information can be obtained by investigating benchmarks from comparable economies. International benchmarking can be a useful indication of the level of competitive prices and therefore allow inference of excessive pricing.

Across the EU mobile termination is subject to regulation and specific price controls. This affects the interpretation of benchmark charges from outside the UK. According to data collated by ERG, those termination charges in the UK which are subject to price control regulation are lower than termination charges in some other EU countries. However, since termination charges in the UK are subject to a price control on a LRIC basis whereas in other EU countries different regulation and cost benchmarks apply, such a comparison should be treated with caution. Therefore, Ofcom is not relying on such benchmarks.

4.46 In this case international benchmarks for termination charges are also difficult to rely upon without significant understanding of key country differences in costs related to for example, geography, topology and underlying equipment and labour costs.

Proposed conclusions on SMP

4.47 The definition of the relevant market has led Ofcom to reach a proposed conclusion that there is a separate market for termination on each MNO's network(s) and that this will be maintained for the period to 2011.

4.48 As explained above, this means that each MNO is, in effect, a monopolist in the supply of termination to its own networks. Ofcom proposes that each MNO has SMP in the market for terminating calls over its own network. This is because:

- It is only the terminating MNO that can terminate calls to its subscribers, and each MNO therefore has 100% market share in the market for wholesale termination that it supplies to other operators;
- Ofcom does not foresee any changes to the current CPP arrangements nor the introduction of new or developing technologies that will allow another provider to offer termination on another mobile network, other than the MNO providing that network;
- This combination of current and enduring high market share and absolute barriers to entry provides a strong presumption of market power.
- Ofcom does not believe that fixed and mobile originating operators are able to exercise sufficient CBP to overcome the terminating MNO's position (i.e. to prevent terminating MNOs charging excessively for MCT). This matter is addressed in more detail in Section 5 below.

***Question 2**: Do you agree that each of the five MNOs has SMP in the market for wholesale mobile voice call termination provided by it to other Communications Providers in the UK?*

Section 5

Assessment of countervailing buyer power

5.1 Given the prima facie evidence of SMP set out in Section 4, the question of whether each MNO providing MCT has SMP depends on the extent to which its position of SMP may be off-set by the buyer power of purchasers of MCT.

5.2 Buyer power is not an absolute concept but, rather, refers to the relative strength of the buyer in its negotiations with the prospective seller for the good or service in question. CBP exists when a particular purchaser (or group of purchasers) of a good or service is sufficiently important to its supplier to influence the price charged for that good or service. The Commission notes in its Explanatory Memorandum ('EC Memorandum') to its Recommendation on Market Definition that:

> "A market definition for call termination on each mobile network would imply that currently each mobile network operator is a single supplier on each market. However, whether every operator then has market power still depends on whether there is any countervailing buyer power, which would render any non-transitory price increase un-profitable." [24]

5.3 Ofcom considers that in this context, the test to assess whether CBP is sufficient to rebut a presumption of SMP is an analysis of whether CBP could constrain MNOs' MCT charges to the competitive level. Any charge above that level would imply that CBP is not sufficient and would therefore imply that MNOs have SMP.

5.4 This section sets out Ofcom's assessment of the extent to which a terminating MNO may face CBP from the different potential buyers of wholesale mobile termination. This section sets out:

- The criteria that Ofcom considers is relevant in assessing the existence and extent of CBP;
- The relevant regulatory factors that Ofcom considers should appropriately be taken into account in assessing CBP;
- A description of different purchasers of termination and key issues to be taken into account; and
- Assessment of CBP in relation to purchasers and sellers in the relevant markets.

Criteria for assessing countervailing buyer power

5.5 The European regulatory framework for communications services, together with European and UK competition law, recognise CBP as a relevant factor in assessing

[24] Page 34, Explanatory Memorandum to the Commission Recommendation on Relevant Product and Service Markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services. (See http://europa.eu.int/information_society/policy/ecomm/doc/info_centre/recomm_guidelines/relevant_markets/en1_2003_497.pdf)

the degree of market power an undertaking may enjoy, and in particular whether that undertaking has SMP or may be dominant in the relevant market.

5.6 In the EC Memorandum the Commission sets out that even a 100% market share in itself does not automatically imply that the undertaking in question has SMP. This is because an undertaking's ability to behave independently of customers, competitors and consumers depends, among other things, on the ability of its customers to influence its pricing decisions. In this respect the EC Memorandum notes that a market definition of call termination on individual networks:

> "…does not automatically mean that every network operator has significant market power; this depends on the degree of any countervailing buyer power and other factors potentially limiting that market power."[25]

5.7 The OFT has also set out relevant guidance,[26] which states that the strength of buyers and the structure of the buyers' side of the market may constrain the market power of a seller. The OFT Guidance notes that the relevant consideration in assessing the impact of buyer power on the ability of the seller to set a price is whether a buyer would have choice, or, in other words, the benefit of an 'outside option'.

5.8 The OFT Guidance notes that the analysis of buyer power requires an understanding of the way that buyers interact with suppliers. Buyer power can be thought of as the degree of bargaining strength in negotiations. Analysis of buyer power normally becomes relevant only where there are a few relatively important buyers in terms of share of supply as opposed to a large number of buyers who are price takers. The OFT sets out a number of conditions which might imply that an undertaking's bargaining power could be enhanced:

> "the buyer is well informed about alternative sources of supply and could readily, and at little cost to itself, switch substantial purchases from one supplier to another while continuing to meet its needs;
>
> the buyer could commence production of the item itself or 'sponsor' new entry by another supplier (e.g. through a long-term contract) relatively quickly and without incurring substantial sunk costs;
>
> the buyer is an important outlet for the seller (i.e. the seller would be willing to cede better terms to the buyer in order to retain the opportunity to sell to that buyer);
>
> the buyer can intensify competition among suppliers through establishing a procurement auction or purchasing through a competitive tender (see Part 4)…"[27]

5.9 A further criterion is considered by the ERG, namely factors determining whether the buyer is price sensitive.[28]

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[25] Ibid. page 20
[26] Assessment of market power, understanding competition law, OFT, 2004. (Seehttp://www.oft.gov.uk/NR/rdonlyres/A92F91BC-B556-4724-8D2B-7002F6CDEA65/0/oft415.pdf)
[27] Ibid. page 24
[28] "Revised ERG Working paper on the SMP concept for the new regulatory framework", October 2004, (See

> "The higher the portion of the costs for a service in relation to their total expenditure and the better informed, the more sensitive consumers are as to the price and quality of the service and the more ready they might be to switch suppliers or to reduce demand."[29]

5.10 Finally, in the context of wholesale mobile voice call termination, there is a further relevant factor, namely whether or not reciprocity exists in negotiations between parties. Telephone networks generally negotiate termination charges with each other on a bilateral basis. This is because customers on one network would look unfavourably on a situation where they were able to make calls to customers on another network, but were unable to receive calls from them.

5.11 This section continues with a discussion of the regulatory factors that are relevant to Ofcom's analysis of CBP, sets out a description of the different buyers of MCT and sets out Ofcom's assessment of purchasers' CBP based on the following criteria below as discussed in paragraphs 5.5 – 5.10 above:

- The purchaser as an important outlet for the seller;
- The purchaser as a well-informed and price sensitive buyer;
- Reciprocity of trade between the purchaser and seller;
- Lack of alternative sources of supply; and
- Option not to purchase and option to delay.

The regulatory factors

5.12 If a communications provider is found to have SMP in the relevant market it may be considered appropriate to impose regulatory obligations. Therefore in assessing SMP and in particular CBP in this market review it is necessary to conduct the analysis on the basis that no regulatory intervention currently or potentially exists on the firm in the market to which the market analysis is related. However, any assessment of the likely behaviour of suppliers and purchasers in the course of negotiations must take account of other regulatory factors to which they are subject even in the absence of an SMP finding.

5.13 Specifically the European Commission noted in its veto of a notified draft measure by the German Regulator, RegTP, requiring it to withdraw its notification on the fixed call termination market that 53 Communications Providers, apart from Deutsche Telekom AG (DTAG), did not have SMP:

> "On the basis of competition rules, applicable under Article 14 and 16 of the Framework Directive, in particular Article 82 of the EC Treaty, an analysis of dominance (i.e. SMP) requires taking into account the concrete economic circumstances including legislative and administrative acts. In economic terms, it is not appropriate to exclude regulatory obligations that exist independently of a SMP finding on the market under consideration but that can have an

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http://www.erg.eu.int/doc/publications/public_hearing_concept_smp/erg0309rev1_smp_working_doc.pdf)

[29] Ibid. paragraph 11

> impact on the SMP finding on the markets under consideration. From a methodological viewpoint obligations flowing from existing regulation, other than the specific regulation imposed on the basis of SMP status in the analysed market, must be taken into consideration when assessing the ability of an undertaking to behave independently of its competitors and customers on that market. In the Commission's view, this could only be otherwise where it is uncertain whether the regulation concerned will continue to exist throughout the period of the forward looking assessment." [30]

5.14 Moreover, in the CAT's judgment in November 2005, in respect of Ofcom's determination of June 2004 that H3G had SMP, a key issue clarified was that regulation on the operator supplying termination should not be taken into account when undertaking an analysis of SMP, however, regulation affecting the purchaser of termination should be duly considered. In relation to the negotiations between H3G and BT over MCT, the CAT observed that:

> "…regulation is brought into account in determining CBP, whereas the regulation of H3G is left out of account in looking at its side of the SMP assessment. There is nothing inconsistent in this approach. We have identified the illogicality in allowing a presumption of regulation to a putatively regulated body to operate to determine whether SMP exists. This does not apply to a consideration of CBP where one has to consider the question of a counter party. In assessing the position of that counterparty it would be illogical not to look at the effect of regulation (and no one has suggested we should not), so OFCOM were quite correct in doing so in this case."[31]

5.15 Indeed, as regards the relevance of the possibility of regulation on H3G's conduct, the CAT's judgment observed that:

> "the possibility of regulation being brought to bear on H3G is a factor that cannot be prayed in aid by H3G as militating against its having SMP. We reiterate that H3G's submissions would give rise to an illogical and unattractive, if not unprincipled, position, and we consider them to be wrong. The correct position is as found in the RegTP decision, namely that regulatory obligations on a market counterparty can be taken into account, but not the potential for regulation on the party whose market position is under consideration."[32]

5.16 Ofcom considers that there are two regulatory obligations that are relevant in this context since they exist independently of an SMP finding on providers of MCT:

- Ofcom's dispute resolution powers - in the event that terms and conditions in relation to MCT cannot be agreed by negotiation between any particular purchaser or supplier, a dispute can be referred to Ofcom to resolve; and
- The obligation on BT to offer end-to-end connectivity - BT must provide end-to-end connectivity and must, therefore, purchase MCT (but not on whatever terms

[30] Commission Decision of 17 May 2005, Case DE/2005/0144, C(2005) 1442 final, paragraph 22.
[31] CAT judgment, paragraph 142.
[32] CAT judgement, paragraph 99.

a supplier specifies). In the event that terms and conditions cannot be agreed by negotiation, a dispute can be referred to Ofcom to resolve.

5.17 These two regulatory factors are introduced below. Their relevance to this analysis of CBP is discussed in detail in paragraphs 5.89-5.104 under "Option not to purchase (or to delay)".

5.18 As set out above at paragraphs 5.14 and 5.15, the CAT has observed that: (a) the possibility of regulation being brought to bear on an undertaking can not be prayed in aid of an undertaking as mitigating against its having SMP; and (b) the effect of regulation on a counter party should be looked at.

5.19 In response to this Ofcom considers that, in examining whether or not its dispute resolution powers result in an operator having CBP, it is not appropriate to consider the effect of such resolution on the undertakings on which the SMP analysis is being carried out . In other words, an undertaking can not be found not to have SMP simply because of the fact that a regulator may exercise its dispute resolution powers. To do so would, in the words of the CAT, be "illogical".

5.20 However, in the alternative Ofcom sets out how it would resolve disputes below. Ofcom also notes as regards point (b) in paragraph 5.18 above, that it has looked at the effect of an end-to-end connectivity obligation in paragraphs 5.26 to 5.28 below.

Ofcom's dispute resolution powers

5.21 On 6 July 2006 Ofcom published a consultation entitled Draft Enforcement Guidelines and is currently consulting on these guidelines until 14 September 2006.[33] These guidelines set out Ofcom's approach to handling complaints and disputes, and the procedures Ofcom uses in conducting investigations and resolving disputes.

5.22 In general, Ofcom's dispute resolution powers and duties, set out in sections 185 to 191 of the Act, would ultimately require it to resolve a dispute.

5.23 In the context of this analysis of CBP Ofcom considers that it is important to distinguish between a potential dispute referred to Ofcom that involves one or more parties that have SMP and disputes where no party has SMP.

5.24 This distinction is important because the different circumstances of a dispute are important since it is Ofcom's view that its approach to the resolution of an interconnection dispute is likely to be different in cases where the parties do not have SMP, as compared to its likely intervention in cases where one of the parties is considered to have SMP.

5.25 However, in either case Ofcom notes that it has the power to determine the price of an interconnection service in a dispute whether or not either or both parties has SMP in the relevant market in which the dispute takes place. In its judgment of 29 November 2005, the CAT noted that:

> "nothing in the wording of the Act suggests that SMP had to be found before the regulator decided a dispute over price".[34]

[33] See http://www.ofcom.org.uk/consult/condocs/enforcement/enforcement.pdf
[34] CAT judgment, paragraph 130.

The end-to-end connectivity obligation

5.26 End-to-end connectivity describes the ability of consumers to make calls to other customers or services on the same network or other providers' networks. This is a key feature that customers expect; they want to be able to call everyone with a telephone and not just a subset of that group.

5.27 BT is obliged to provide end-to-end connectivity in the form of an access related condition[35]. The condition requires BT:

- To purchase wholesale narrowband (fixed and mobile voice and narrowband data) call termination services from any provider of public electronic communications networks ('PECN') that reasonably requests in writing that BT purchases such services;
- To ensure that the purchase of the wholesale narrowband (fixed and mobile voice and narrowband data) call termination services shall occur as soon as reasonably practicable and shall be on reasonable terms and conditions (including charges), and on such terms and conditions (including charges) as Ofcom may from time to time direct;
- To ensure that after purchasing wholesale narrowband (fixed and mobile voice and narrowband data) call termination services, BT will not be able to unreasonably change, withdraw or restrict access to an applicable Normal Telephone Number; and
- To comply with any direction Ofcom may make from time to time under this Condition.

5.28 In this statement Ofcom also notes that it does not consider that it is proportionate to impose a similar obligation on other providers of Public Electronic Communications Services. However, Ofcom considers that all providers should provide end-to-end connectivity and therefore if Ofcom became aware that this was not be provided Ofcom would consider whether such an obligation were appropriate and proportionate in that case:

> "…if end-to-end connectivity is not ensured by an access-related condition on BT, then Ofcom will consider using its powers to impose such an obligation on all PECNs."[36]

BT's position as provider of transit services

5.29 MNOs are not able to identify in all cases, on a call by call basis, from which operator a call originates. This is because BT transits a significant amount of traffic to MNOs on behalf of a number of different originating operators. Cable and Wireless also transits a limited amount of traffic to MNOs. Ofcom estimates (based on confidential information from MNOs and FNOs collected during the consultation) that of all calls to mobiles, about 43% is transited by BT and Cable and Wireless on behalf of other originating operators (34% on behalf of other FNOs and 66% on behalf of MNOs originating calls to other MNOs). BT carries [✂%] and Cable and Wireless [✂%] of this transited traffic. The remaining 57% of calls to mobiles is directly conveyed to

[35] See Ofcom Statement "End-to-end connectivity" published on 13 September 2006. http://www.ofcom.org.uk/consult/condocs/end_to_end/statement

[36] See paragraph 3.25 "End-to-end connectivity" Statement 13 September 2006

MNOs, 29% by FNOs (of which BT accounts for [✂%] and Cable and Wireless [✂%]) and 28% by MNOs. Calls transited by BT (and Cable and Wireless) appear to a MNO as if they had been originated by BT (or Cable and Wireless) when in fact it they may have originated from a wide variety of different operators. Therefore MNOs are not able to price discriminate between different originating operators. The figure below sets out the share of total MCT minutes purchased by BT and other purchasers, after transit arrangements have been taken into account. The figure therefore sets out the shares of the ultimate purchasers of MCT.

Figure 5.1 Share of total MCT minutes purchased by different operators

Purchasing operator	**Share of total MCT minutes purchased (including minutes purchased to offer transit and termination to others)**
BT	[✂%]
Cable and Wireless	[✂%]
Other FNOs	[✂%]
MNOs	[✂%]
Orange	*[✂ %]*
Vodafone	*[✂ %]*
T-Mobile	*[✂ %]*
O2	*[✂ %]*
H3G	*[✂ %]*

Source: Information from operators and Ofcom analysis

5.30 The figure above shows that BT is the largest purchaser of MCT with other purchasers accounting for significantly lower shares. In offering transit services BT provides other originating operators with the options to either:

- directly interconnect with a terminating MNO and negotiate an interconnection charge directly, or
- indirectly interconnect, transiting its traffic via BT and effectively allowing BT to negotiate on its behalf alongside all other originating operators who transit traffic via BT.

5.31 This provides originating MNOs with a commercial trade-off, between the two options. The option that is best depends on the termination charge BT agrees with the terminating MNO and BT's charge for transit, compared to the termination charge the originating operator agrees with the terminating MNO and the costs associated with establishing direct interconnection.

5.32 The MCT charge that BT agrees to with each MNO (plus transit charge) therefore acts as a ceiling to the MCT charge that other originating operators would be willing to accept from a terminating MNO. If a MNO sought to charge an originating operator a higher charge than the charge BT has secured with that MNO the originating MNO

would have the option to transit its traffic via BT rather than directly interconnect. In practice there is no compelling evidence of originating operators seeking to transit traffic via BT for this reason. However, this may be because MNOs have always charged the same MCT charge to all originating operators.

5.33 Moreover, the MCT charge that BT agrees with each MNO may also act as a floor on the MCT charge that the terminating MNO will agree to with other originating operators. If an originating operator sought to secure a lower MCT charge with an MNO than the one BT had secured with that MNO, the MNO can refuse direct interconnection and force the originating MNO to transit traffic via BT. This ensures that the originating operator pays the same termination charge as BT. For this to be the case the originating operator must not be willing to accept a situation in which it does not interconnect with the MNO. As discussed later in paragraphs 5.89 – 5.107 Ofcom considers that it is unlikely that an originating operator could credibly threaten not to interconnect and in practice there is no compelling evidence that an originating operator has sought to use its bargaining power to secure a lower charge compared to that paid by BT.

5.34 These considerations are evidenced by the fact that, where termination prices are not regulated, MNOs do not charge each customer a different termination charge (as discussed in Section 3). Data received from each of the MNOs confirms that they charge the same price for termination to all originating operators. [✂.]

5.35 Furthermore, Ofcom considers that if an originating operator sought to secure a lower charge and the MNO refused to interconnect directly the negotiations would likely be referred to Ofcom as a dispute. Therefore, how Ofcom would resolve a dispute between two parties without SMP in this context is a relevant consideration in determining the level of CBP. This is discussed in paragraphs 5.96 – 5.104 below.

5.36 Therefore Ofcom considers that BT's charge (as a transit operator) conditions negotiations and effectively sets the charge for all other agreements between suppliers and purchasers of MCT. Even if this were not the case, the fact that BT is by far the largest purchaser of MCT means that if it were found not to have a level of CBP sufficient to negate any prima facie finding of SMP, it would follow that neither would any other purchaser of MCT.

5.37 Given the above, the relevant question for this SMP assessment of MNOs supplying MCT is the CBP of BT. Nevertheless, whilst Ofcom believes this is the relevant question, Ofcom, for completeness, has also considered below the position of other purchasers of MCT.

Review of evidence related to previous negotiations of MCT

Contracts for MCT

5.38 Contracts for interconnection between BT and each of the 2G/3G MNOs, and between each of the 2G/3G MNOs, were first agreed some eight to ten years ago. Although amendments to terms and conditions have subsequently been agreed from time to time (as noted below), the basic form of the contracts is substantially unchanged. In 2001 Vodafone instigated perhaps the most fundamental changes to its contracts with parties other than BT, when it initiated a lengthy process to replace its bilateral contracts (which had provided for both purchase and supply of termination services by Vodafone) with a series of mostly paired contracts each separately providing for purchase or supply by Vodafone (but not both). BT's Standard Interconnection Agreement ("SIA"), the terms of which apply to a very wide

range of different interconnection services purchased and supplied by BT, has also been subject to change over the years, perhaps most significantly in 1998 when changes were made to reflect Oftel's decision that BT's charges would no longer be determined annually by Oftel but, instead, regulated via a series of charge control baskets. By contrast, contracts between H3G and BT and each of the 2G/3G MNOs were agreed as recently as 2002. Although contracts exist between H3G and all 2G/3G MNOs, mobile voice call termination is supplied by H3G only to BT and O2 (with whom H3G has a national roaming agreement which also necessitates the provision of interconnection links).

5.39 When the contracts which apply to mobile voice call termination were first agreed variously between BT and the 2G/3G MNOs and between the 2G/3G MNOs, the relevant circumstance were very different to those of today. The regulatory frameworks applicable to BT and to the 2G/3G MNOs were not the same, in that the MNOs' charges for voice call termination were not regulated whereas BT's interconnection charges were subject to regulation. Similarly, penetration and usage of mobile telephony (and direct interconnection between MNOs) was far less extensive than today, and (with the exception of Vodafone) the corporate ownership and structure of the 2G/3G MNOs was very different from today. In Ofcom's view, an analysis of the process by which these interconnection agreements were first negotiated up to 10 years ago would serve little purpose (even if the parties were able to retrieve archived correspondence sufficient to take an accurate view; [✂]).

5.40 In respect of BT's interconnect agreement with H3G, Ofcom has undertaken a detailed review of available evidence in respect of negotiations between H3G and BT prior to the establishment of the interconnection agreement in January 2002 in order to identify factors which remain relevant in undertaking the assessment of the extent to which BT can exert CBP in the relevant period. From the evidence it is clear that the balance of the relationship between BT and H3G has evolved over time, for example as H3G has grown and become more established. Ofcom makes its assessment in relation to the relationship as it existed and is likely to continue during the period of this review. Ofcom's consideration of the relationship between BT and H3G up to March 2007 is contained in the Reassessment of H3G's SMP also published today.

5.41 Ofcom has also reviewed the terms of the present interconnect agreements between BT and each of the MNOs, as well as the contracts between the MNOs, and has considered the circumstances in which recent charge changes have been agreed. Ofcom recognises that, as Orange noted in its response to the March 2006 Consultation, where contracts for the supply of MCT are already in place, these may impose some constraints on the ability of either of the parties unilaterally to alter charges.

5.42 In Ofcom's view, the form of BT's SIA (which applies to mobile voice call termination purchased by BT and almost all other interconnection supplied or purchased by BT) is still influenced strongly by regulation, reflecting the extensive regulatory constraints on BT's ability to agree bespoke terms and conditions and BT's obligation to comply with charge controls and regulatory directions and determinations. Importantly, the SIA is also set against the background of the ability of interconnected parties (BT and third parties) to take disputes to Ofcom for resolution. While the SIA may appear to provide greater freedom for BT to alter unilaterally its charges for interconnection, and for BT to propose changes to termination charges of the MNOs, while failing to provide contractual provision for MNOs to propose changes to BT's interconnection charges, Ofcom does not believe this is a reflection of CBP held by BT. Rather, it is a reflection of regulatory constraints which prevent BT from negotiating bespoke

charges, and other terms and conditions in respect of many services. It should also be noted that paragraph 4.14 of the Guidelines published by Oftel in 1997(*Guidelines on the operation of the Network Charge controls*[37]), when Oftel altered the regulatory provisions for setting BT's charges for providing interconnection, stated that, subject to specified changes (which were subsequently incorporated within an amended SIA), terms and conditions reflecting those "in BT's Standard Agreement for interconnection in effect on 30 September 1997 will generally be reasonable". These conditions remain, substantially unchanged in the BT SIA currently in force today.

5.43 The terms of the interconnection agreements between MNOs for the provision of MCT are either reciprocal within each contract (the same terms applying to both parties in their capacities of either purchaser or supplier) or, in the case of current contracts to which Vodafone is party, are mirrored in a pair of contracts providing for the same, or very similar, terms to apply where Vodafone is the purchaser or the provider.

5.44 The terms relating to charge changes vary between the contracts, although, as noted above, they are symmetrical between the parties to the contract, or pair of contracts. However, as already discussed Ofcom recognises that, all contractual arrangements must be viewed against this regulatory backdrop which provides a unifying factor.

5.45 Ofcom has reviewed the process by which Vodafone implemented fundamental changes to its contracts with parties other than BT during the period 2001 to 2003. While the exercise appears to have been initiated on a unilateral basis by Vodafone, negotiation of the revised contract terms appears to have been conducted with a high degree of interaction between the parties and with a sense that it would be mutually beneficial to agree pragmatic and efficient contractual arrangements for managing the relationship. Furthermore, the fact that, where the parties both purchase interconnection services from each other, the texts of each of the two new contracts almost precisely mirror each other, tends to support the view that the outcome was achieved through genuine negotiation between parties.

5.46 As noted in paragraph 5.38 above, the terms and conditions applicable to the supply of MCT by H3G to BT are those of BT's SIA and, given the regulatory constraints under which BT operates, reveal little about the bargaining position of the parties. The contracts between H3G and the other MNOs are broadly similar to those agreed by those other MNOs with other purchasers of MCT.

Negotiation of charge changes

5.47 As charges for the supply of MCT on the 2G networks of the 2G/3G MNOs have been regulated (or under the threat of regulation) since 1998/9, changes by these MNOs during that time have all been made within the regulatory framework, reflecting either a change to the charge control imposed by Ofcom or changes to traffic profiles which have triggered changes to charges by time of day/week (within the scope of the charge control). The documentary evidence obtained from MNOs by Ofcom, indicates that, until very recently, these changes have been infrequent and uncontested (being within the established regulatory framework). [✂].

5.48 The existence of charge controls has, therefore, meant that, until recently, no attempt has been made to exercise any CBP in respect of purchases of MCT from the 2G/3G MNOs by any third parties.

[37] See http://www.ofcom.org.uk/static/archive/oftel/publications/1995_98/pricing/ncc1097.htm

5.49 It is also notable, however, that in respect of MCT on 3G networks (which is unregulated) each of the 2G/3G MNOs has sought to levy, within its blended charges, charges for 3G termination which are between two and three times as much as Ofcom's assessment of the cost of 3G termination by an MNO with both a 2G and a 3G network. Furthermore, [✂].

5.50 The process of blending unregulated implicit charges for 3G MCT with regulated charges for 2G MCT was first adopted by Vodafone in 2005 but, in view of the very low volumes of voice call minutes forecast to be terminated on Vodafone's 3G network (and assumed by the blending), blending does not seem to have been apparent to purchasers until the early part of 2006. Vodafone's charge changes implemented on 1 June 2005, therefore, passed uncontested, as they were assumed by purchasers to be fully constrained by charge controls. When the basis of Vodafone's charges became more fully apparent during January 2006, purchasers expressed serious concern to Ofcom and it was questioned whether the charges applied were in breach of the charge control condition. In January 2006 Ofcom said that Vodafone (and any other MNOs which chose to blend distinct charges for 2G and 3G termination) should ensure that the basis of such charges were made apparent to purchasers.

5.51 Five months later, in July 2006, O2, Orange and T-Mobile each, within a space of 3 days, separately notified Ofcom that they intended to blend distinct charges for 2G and 3G MCT, thereby increasing their blended charges. A week earlier Vodafone had notified Ofcom of a proposal to reduce its blended charges from 1 September 2006. Having subsequently obtained documents from BT and the 2G/3G MNOs, it became apparent that the following sequence of events had occurred;

- [✂]
- [✂]
- [✂]
- [✂]
- [✂]

5.52 Whether the parties to these proposals will resolve their differences or will seek dispute resolution from Ofcom (as provided for by the SIA as well as by the Communications Act) remains to be decided as of the date of the publication of this consultation. Ofcom recognises, as does BT and the MNOs concerned, that these attempts to increase (and decrease) charges, and the response of purchasers to the proposals, may be considered significant in the context of an assessment of whether suppliers have SMP and whether any purchasers have CBP. However, in Ofcom's view, the timing of the recent proposals to vary MCT charges, means that it is very difficult to determine to what extent the behaviour of the parties (suppliers and purchasers) has been affected by awareness of the significance which might be read into such behaviour.

5.53 Having reviewed the documentation obtained by Ofcom from BT and the five MNOs, it is Ofcom's view that negotiation in respect of charges for MCT is focussed largely on the regulatory constraints under which each party operates. Purchasers and suppliers of MCT appear to be strongly aware of their own obligations and the obligations of the other party, whether as a consequence of ex ante regulation or competition law, not to unduly discriminate when negotiating supply or purchase of

MCT. As a consequence, much of the recent negotiation appears to have been concerned with establishing whether the other party (purchaser or supplier) was treating other parties differently; suppliers being concerned with whether purchasers (typically BT) had accepted charge changes from other suppliers, and purchasers being concerned to establish whether the proposed charge changes had been proposed to and accepted by all other purchasers. Suppliers frequently attempted to justify the revised level of their blended charges by drawing comparisons with the charges of other UK MNOs.

5.54 The parties generally appear to have been unfamiliar, at least at the outset of negotiations, with the operation of the commercial contracts for supply of MCT and frequently unsure how an attempt to impose or resist a charge change would be played out under the terms of those contracts. In some instances, this unfamiliarity (more obvious amongst some parties than others) has been exploited as one of the very few means to establish a degree of advantage, albeit short-lived, over the other party.

5.55 One of the more common means to obstruct the imposition of charge changes appears to have been by exploiting administrative failures by the other party, typically, failure to meet the letter of the minimum notice periods set out in the relevant contract, or failure to deliver proposals using the mechanism required by the contract (e.g. fax. email or post). Added complexity is sometimes achieved by playing out such strategies in the light of the other party's anxiety about claims that they are acting in an unduly discriminatory fashion. In such cases, the supplier's attempts to comply with contractual notice periods (which vary between purchasers) while simultaneously attempting to impose uniform charges on all purchasers, can have the effect of bringing progress to a halt. These, essentially bureaucratic, strategies can hinder the imposition of charge changes but, ultimately, appear to be viewed by all parties as no more than short term delaying tactics.

5.56 Internal discussion, within suppliers and purchasers, intended to identify sources of commercial leverage, appears largely confined to consideration of whether outright refusal to accept charge changes, or unilateral insistence on such changes, might be successful. Ofcom has found no material evidence that any of the parties believe they have any tools with which to bargain for a commercially acceptable intermediate outcome, as might be expected in a competitive market. Recognition of the absence of conventional bargaining tools appears to prompt early consideration of regulatory and legal factors, including whether the behaviour of one or other party would be considered as evidence of CBP or would be viewed by Ofcom as being in breach of prohibitions of undue discrimination.

5.57 Familiarity, or lack of familiarity, with the regulatory regime on the part of those involved in discussion of negotiating options, often seems to be a key determinant of the views of the different managers involved in these internal discussions. At one extreme, a proposal by one purchaser [✂] that the MCT charges of [✂] should be reduced was viewed by one members of the supplier's team as unacceptable because the proposal was "purely for commercial reasons" and the purchaser had "put forward no substantive legal or regulatory reasons for proposing a reduction". At the other extreme, another manager employed by the same MNO took the view, in the context of a proposed increase in MCT charges by another MNO, that " we have no obligation to enter into this discussion ... the fact that our rate is [✂] than [✂]'s is not an issue if the service is not regulated." More neutral, a manager with another supplier of MCT [✂] asked whether the purchaser has "got grounds to reject our blended rates or can we simply advise [him] of the rate change". A senior manager of yet another supplier of MCT asked his team, about a purchaser which had indicated

unwillingness to accept a charge change, " does [✂] actually have a choice?", to which the relevant operational manager responded "I cannot be 100% clear on that yet". It is interesting to note that, 2 weeks later, the focus of that particular supplier was strongly directly towards an assessment of the possible regulatory outcomes of different strategies, including the impact on Ofcom's assessment of the purchaser's CBP. In summary, while different managers appear to have recommended different strategies when attempting to impose or reject charge changes, none appear to have taken the view that a negotiated settlement could be achieved.

5.58 Ultimately, when the wider legal and regulatory resources of the company have been brought to bear on the issue, BT and the five MNOs each appear to have concluded that the outcome will be strongly influenced by regulation. Furthermore, none of the parties appear to have a clear view of whether other parties would take a dispute to Ofcom or, if they did, what would be the outcome. As one party put it [✂] "it is a moot point whether we would refer this to Ofcom, but [✂] needs to believe we will". Another party [✂] appears to have taken the view that there might be merit in referring a complaint to Ofcom, not in order to see a dispute resolved but, rather, to ensure that "Ofcom ropes in 3G from 1 April 2007". A senior manager with the same party, when faced with intransigence by another party, asked his team "what are the implications for Ofcom's term rate review (and responses to H3G's SMP challenge/CAT verdict) of this development".

Evidence of bargaining in the absence of regulation (or the threat of regulation)

5.59 As noted above, any analysis of the existence of SMP in a given market must be undertaken within a framework which assumes, for the purpose of the assessment, that the market is not subject to regulation or the threat of regulation arising from a finding of SMP in the market. Ofcom considers that the behaviour of purchasers and suppliers of MCT, in respect of the recent proposals to increase or decrease MCT charges has been strongly conditioned by the existence or threat of regulation in these markets, and by the expectation that these markets may be subject to further regulation from April 2007. Ofcom's March 2006 Consultation set out the prima facie evidence of SMP and expressed a preference for using a technology neutral form of charge control which would apply to both 2G and 3G MCT. Similarly, BT's agreement (and the agreement of other purchasers) to Vodafone's proposal to increase charges in June 2005 seems to have been influenced by a belief that the charge was fully constrained by regulation. As such, Ofcom does not believe that the behaviour of BT or the MNOs mirrors the behaviour likely to be observed absent regulation or the threat of regulation.

Assessment of purchasers' countervailing buyer power

5.60 In the following paragraphs Ofcom considers the issue of CBP in light of the criteria set earlier and by reference to the evidence above. This section assesses for the period 1 April 2007 to 31 March 2011 the extent to which purchasers of MCT can exert sufficient CBP so that prices charged by MNOs for MCT are constrained to the competitive level.

The purchaser as an important outlet for the seller

5.61 For the buyer to be able to affect the seller's terms of trade, the buyer must be an important outlet for the seller. In this context, the ERG suggests a number of factors which determine the scale of the countervailing power on the part of buyers:

> "…The higher the amount of purchase of services by customers or the higher the proportion of the producer's total output that is bought by a certain customer, the stronger the countervailing power might be. …
>
> … Further to this, the higher a seller's locked-in investment in specific customers (asset specificity), the more willing he will be to negotiate. Overall, this criterion is more meaningful in wholesale markets, because providers purchasing network services from other providers are in general more visible and powerful than retail customers."[38]

5.62 Being an important customer may confer a degree of buyer power on the buyer, because the seller will be more willing to negotiate with a customer it cannot afford to lose.

5.63 The various direct purchasers of MCT are unlikely to be perceived as equally important by terminating MNOs, and different terminating MNOs may take a different view of the various purchasers of MCT on their network(s). For example, some terminating MNOs receive a larger proportion of inbound voice traffic directly from originating operators than do others (reflecting the varying reliance on direct interconnection as opposed to BT transit).

5.64 BT is an important customer for all terminating MNOs. BT continues to purchase more than half of all UK off-net termination on mobile networks. This is because BT buys termination for its own subscribers originating calls on its networks and also acts as a transit operator for other FNOs and MNOs. Furthermore, BT has always had a significantly larger subscriber base than any of the MNOs. BT has approximately 28m subscriber lines. In contrast, each of the 2G/3G MNOs has between 12 million and 18 million customers (those figures are believed to be somewhat inflated by churn management practices which, for a period of time, leave some non active customers on an MNO's subscriber records). H3G reports that its currently registered subscriber base is over 3.5 million.

5.65 As a consequence, it is necessary for all MNOs to maintain an interconnect agreement with BT. Current and prospective subscribers of each MNO would see relatively little value in a network which precluded making calls to and receiving calls from BT's retail customers and customers of other providers which rely on BT to provide transit services to and from MNOs.

5.66 Whether any FNOs other than BT are perceived by terminating MNOs as important outlets for MCT is less obvious. Many originating FNOs rely entirely on transit services offered by BT (or, in some cases, by C&W), purchasing no MCT directly from any MNO. Some have direct interconnection with one or more MNOs, but all rely to some extent on transit services. No UK FNO other than BT purchases MCT directly from H3G [✂].

5.67 As all originating FNOs have the option to purchase transit services from BT, terminating MNOs will be aware that, in the event of failure to reach agreement on terms for direct interconnection, the FNO is likely to purchase transit services

[38] See paragraph 11 "Revised ERG Working paper on the SMP concept for the new regulatory framework", October 2004, (See http://www.erg.eu.int/doc/publications/public_hearing_concept_smp/erg0309rev1_smp_working_doc.pdf)

instead, resulting in no loss of MCT revenue to the terminating MNO and no loss of incoming calls valued by the terminating MNO's own retail customers. On this basis it might be considered that none of the FNOs other than BT are perceived as important direct outlets (actual or potential). Furthermore, Ofcom has no compelling evidence that any FNOs consider themselves sufficiently important outlets that they have attempted to obtain directly from MNOs terms which are better than those obtained by BT, for example by threatening to cease both direct purchases and purchases via BT's transit service if improved terms are not offered. Even where the extent of direct purchases of MCT increases, the availability of BT transit services is likely to continue to reduce the importance of other FNOs as purchasers of MCT.

5.68 As discussed above, to a large extent, the importance of originating MNOs as outlets for MCT is similarly affected by the availability of BT transit services, even though a much larger proportion of MNO originated voice calls are terminated via direct termination arrangements with terminating MNOs than is the case with FNOs other than BT. Each of the 2G/3G MNOs now sells MCT directly to each of the other 2G/3G MNOs. The only operator other than BT to whom H3G sells MCT is O2, which also provides a national roaming service which necessitates the provision of direct interconnect links. Whether H3G has plans to use direct interconnection with a range of other fixed and mobile networks is not known. Nevertheless, the availability of BT transit is likely to continue to condition H3G's views of the importance of other MNOs as outlets for MCT, as it continues to condition the views of other terminating MNOs.

- As such, it can be concluded that BT is an important outlet for all sellers. Given the availability of transit services, however, whether other purchasers are also important outlets is less clear. They are unlikely to be as important as BT.

The purchaser as a well-informed and price sensitive buyer

5.69 As discussed in paragraph 5.8 the better informed a purchaser is as to the price and quality of the service the more ready they might be to switch suppliers or to reduce demand.

5.70 Information, for example on the importance of the deal to the seller or the level of costs incurred by the seller in providing the service, may improve the buyer's bargaining position and allow it to better substantiate and defend its negotiating strategy vis-à-vis the seller.

5.71 However, knowledge and price sensitivity alone are insufficient to constrain prices: it is also necessary for the prospective buyer to have the ability to act on its knowledge or sensitivity.

5.72 A buyer's credibility in negotiations with a seller is enhanced where the buyer understands how important his custom is to the seller, and has some insight into the seller's operations and negotiating strategy. It may reasonably be assumed that all purchasers of MCT, being major commercial undertakings, are well informed and price sensitive buyers with extensive commercial expertise.

5.73 Wholesale termination charges (whether paid directly to the MNO or through BT as part of the cost of BT's transit services) make up a significant proportion of the cost base for originating operators in providing calls to mobiles. Therefore, to the extent that they impact on the retail price for these calls and therefore on the customers of originating operators, originating operators will be sensitive to wholesale termination charges.

5.74 Whilst, during the start-up phase of its business, H3G's charges for MCT represented only a very small proportion of any purchaser's total expenditure on MCT, this has changed as H3G's subscriber base has grown. As termination on H3G's network represents an increasing cost, purchasers are likely to become increasingly sensitive to the price it pays for that service. The evidence cited in paragraph 4.90 of the Reassessment of H3G's SMP supports the view that BT, the largest purchaser of MCT, is sensitive to the level of H3G's charges, and this sensitivity is likely to continue to grow with the growth in H3G's customer base. Therefore, it can be assumed that all purchasers of MCT have an incentive to try and negotiate competitive prices with all five MNOs.

5.75 Moreover, originating operators face five terminating MNOs and therefore can make price comparisons across MNOs for what their customers would likely perceive to be the same service i.e. calling a mobile. It appears, therefore, that originating operators have the ability and incentive to compare the charge offered by one seller with that offered by another, consider other wider repercussions an agreement with one supplier may have for similar agreements with others, and recognise the implications of MCT charges for the retail prices faced by its subscribers for calls to mobile networks.

- As such, it can reasonably be concluded that all purchasers of MCT are well informed and price sensitive buyers.

Reciprocity of trade between the purchaser and seller

5.76 Telephone networks generally negotiate termination charges with each other on a bilateral basis. This is because customers on one network would look unfavourably on a situation where they were able to make calls to customers on another network, but were unable to receive calls from them. However, when considering the impact such reciprocity may have on countervailing buyer power in this review, it is important to note that the termination charges of BT and other FNOs are constrained by regulation. This regulation exists independently of a finding of SMP on any of the MNOs supplying MCT and therefore, as discussed above, should be taken into account. However, it must also be assumed that mobile termination charges are unregulated since MNOs are subject to ex ante regulation on MCT that would not exist independently of an SMP finding in the market under review. Therefore analysis of reciprocity is different as between fixed and mobile operators and mobile operator to mobile operator.

5.77 Absent regulation, the extent of BT's buyer power will be influenced by the extent to which it can take into account the prices it charges for its own services as part of the negotiations. For example, BT, with a market share of around 80% of fixed network subscribers, might potentially be able to exert significant bargaining power in respect of an MNO's price for MCT by varying, or threatening to vary, its charge for fixed network termination in response to proposals for mobile termination charges. However, BT's termination rate is determined by regulation[39]. As a consequence, the price BT charges an MNO for termination on BT's network cannot influence the negotiations of the price the MNO charges BT for MCT on its network. It cannot therefore be considered to be a source of BT's bargaining strength.

5.78 Where BT sells other services, for instance leased lines, to an MNO, it might be able to adjust the terms on which it sell those services in the course of negotiation of the

[39] See http://www.ofcom.org.uk/consult/condocs/charge/statement/

mobile call termination rate with the MNO. However, where BT has SMP it is constrained by regulation from unduly discriminating.

5.79 FNOs other than BT are required by regulation to offer termination on their networks on fair and reasonable terms, which Ofcom has defined by reference to BT's charges.[40] As a consequence, the price they charge an MNO for termination on their network cannot influence the negotiations of the price the MNO charges them for MCT on their networks and cannot therefore be considered to be a source of bargaining strength for FNOs.

5.80 By contrast, absent regulation, an originating MNO faced with a high price for termination provided by another (unregulated) MNO may threaten to charge a similarly high (unregulated) price for termination on its network to that MNO. However, whether or not this is a credible threat depends on the impact this would have on the profitability of both MNOs.

5.81 If traffic between MNOs is balanced then the threat is not effective as a means of constraining the charges of a terminating MNO. The threat of higher reciprocal charges does not change the profitability of the terminating MNO. In this situation, as noted by respondents to the March 2006 Consultation, the outcome for charges could be that MNOs agree to charge each other relatively high or low charges. However, the evidence and theory in this area is not conclusive.

5.82 However, if the originating MNO is a net receiver of calls the terminating MNO will face a net cost associated with such a reciprocal agreement. Therefore the threat, to respond to a high termination charge by setting a similarly high termination charge in return, is a credible one for an MNO engaged in a reciprocal negotiation with another MNO from which they are a net receiver of calls.

5.83 Nevertheless in practice Ofcom does not consider that this threat is particularly strong. MNOs do not know whether they are net receivers of traffic from each other because at present incoming traffic is often from operators who have used BT as a transit operator. In addition, mobile subscriber churn is significant and this may lead to a lack of stability in the calling behaviours of subscribers (and in whether an MNO is a net receiver of calls from another MNO).

5.84 Moreover, as discussed above and by respondents to the March 2006 Consultation, where charges have already been agreed between BT and other MNOs for mobile termination, if any originating MNO threatens to charge a higher termination charge in order to improve its negotiating position with a terminating MNO, the terminating MNO can simply transit traffic via BT and nullify the threat of a high termination charge.

- As such, it is Ofcom's view that whilst reciprocity or the lack thereof may affect the CBP of purchasers, the ability of all purchasers to transit traffic is a key consideration for both purchaser and seller of MCT.

Lack of alternative sources of supply

5.85 The ERG explains that in order to constrain the seller's price effectively, the purchaser must be able to bring some pressure to bear on the supplier to prevent a price rise:

[40] See further the fixed geographic call termination market review statement - http://www.ofcom.org.uk/consult/condocs/narrowband_mkt_rvw/Eureviewfinala1.pdf

> "…The extent of countervailing buyer power largely depends on whether customers can credibly threaten to switch to other suppliers, to self-provide the service, to significantly reduce consumption or to cease to use the service at all in case of a price increase…"[41]

5.86 Where the buyer may be able to induce competition between sellers, for example via a procurement auction, the buyer can be expected to have considerable power to determine the terms of trade.

5.87 A further consideration is the extent to which the buyer is able to self-provide the good or service in question. If so, this would present the buyer with an alternative to purchasing from the prospective seller, thereby presenting the buyer with a bargaining mechanism.

5.88 As discussed in paragraph 3.105 above, it is only the terminating MNO that can terminate calls on its own network and therefore competitive entry by an alternative supplier cannot be expected; there are absolute barriers to entry.

- Therefore no originating operator (buyer of termination) can seek to enhance its bargaining position by relying on competition between sellers nor can it opt to self-supply.

Option not to purchase (or to delay)

5.89 Absent other potential sources of supply (i.e. third party or self-supply), a buyer may bring pressure to bear on the seller in the event that it can threaten credibly not to purchase the service (or, to a lesser extent, to threaten to reduce the amount it purchases). This source of negotiating strength is not based on the buyers' capability to substitute the service - even if at some cost - for a similar service but, rather, on the relative importance to the buyer and the seller of reaching a deal and the ability of the buyer to credibly threaten not to purchase.

5.90 In the context of the establishment of an initial agreement between the buyer and seller, a further relevant consideration is the extent to which the buyer can threaten credibly to delay. However, this is not a relevant factor in this case because interconnection agreements with all of the MNOs (as providers of termination) have been agreed with all existing direct purchasers (including other MNOs).

5.91 While all of these contracts require the parties to observe minimum notice periods in the event that either party wishes to terminate or modify a contract, none require the purchaser to buy a minimum quantity of MCT and none require the purchaser to ensure that his retail customers are able to call mobile phones connected to the supplier's network. Thus, the contracts do not prevent purchasers from ceasing to purchase MCT, or threatening to cease purchasing MCT, permanently or temporarily, while renegotiation of prices or other terms and conditions takes place.

5.92 It is therefore relevant to assess the extent to which a threat to refuse to continue purchasing MCT would provide an originating operator with buyer power such that it could influence in its favour the price charged by a terminating MNO for MCT. In this respect Ofcom has identified two issues:

[41] See paragraph 11 "Revised ERG Working paper on the SMP concept for the new regulatory framework", October 2004, (See http://www.erg.eu.int/doc/publications/public_hearing_concept_smp/erg0309rev1_smp_working_doc.pdf)

5.93 Firstly, the exercise of such a threat may result in negotiations being referred to Ofcom under its powers to resolve a dispute. Therefore, the parties' expectations of how Ofcom would resolve such a dispute are an important consideration in the negotiation and therefore will affect the level of countervailing buyer power.

5.94 In the case of BT, its obligation to provide end-to-end connectivity is a relevant consideration in how Ofcom would resolve a dispute between BT and MNOs supplying MCT. BT's end-to-end connectivity obligation requires BT to purchase termination from each of the MNOs. If the obligation on BT to purchase termination were absolute, BT would not have any buyer power at all. However, the obligation on BT is not an absolute one; termination has to be offered by the MNO on reasonable terms and conditions. Therefore if BT does not consider the terms and conditions offered by the MNO for termination to be reasonable, it can refer a dispute to Ofcom in order to try to obtain more favourable terms and conditions, as can any prospective purchaser of MCT.

5.95 Secondly, the threat to cease purchasing may not be a credible threat from a commercial perspective. The credibility of the threat is related to how important it is for an originating operator to provide calling for its subscribers to the subscribers of a particular terminating MNOs' network.

Ofcom's dispute resolution powers

5.96 As discussed in paragraphs 5.18 to 5.20 above, Ofcom considers an undertaking can not be found not to have SMP simply because of the fact that a regulator may exercise its dispute resolution powers. To do so would, in the words of the CAT, be "illogical". However, in the alternative Ofcom sets out below how it would resolve disputes

5.97 As discussed above, purchasers of MCT can refer a dispute to Ofcom if they are unable to agree terms with a particular MNO. The effectiveness of any threat to refer a dispute to Ofcom in achieving lower charges for a purchaser has an important bearing on the likely outcome of negotiations on charges for MCT. This is because, if both parties have a reasonable expectation of a specific outcome of a dispute, this expectation will shape any agreement on charges, even absent any intervention by Ofcom. Furthermore, the negotiated outcome could approximate to the expected outcome of a dispute resolved by Ofcom in certain circumstances, because both parties know that the other will have an incentive to refer if it considers that it has something to gain from so doing.

5.98 Ofcom considers that a terminating MNO would not have SMP if the expectations of the parties to a dispute were that Ofcom would resolve the dispute by setting a charge for MCT at the competitive price level. The proxy for the competitive price level used in the last MCT market review was a strict cost oriented charge based on LRIC plus mark-ups for common cost and externality.

5.99 Only in this case is the purchaser able to exercise sufficient CBP through the threat of referring a dispute to Ofcom. Therefore, a purchaser's and supplier's view of the effectiveness of a threat to refer a dispute to Ofcom will be determined by its expectation of the outcome in the event that a referral takes place.

5.100 In the exercise of its dispute resolution powers, Ofcom will consider each dispute or complaint on its merits, and may employ a number of alternative methodologies to assess what might be an appropriate charge for example, for MCT supplied by a particular MNO. As discussed, the CBP of BT is particularly important. If BT was to

refer a dispute to Ofcom, it would be important for Ofcom to take into account BT's obligation to provide end-to-end connectivity and therefore to purchase termination provided it is offered on reasonable terms and conditions. This obligation will affect how Ofcom determines a dispute. However, in general, any intervention by Ofcom has to be appropriate and proportionate to remedy the issues identified. Depending on the dispute, possible outcomes might be that Ofcom decides to:

- Consider whether alternative dispute resolution (ADR) is an option;
- Uphold the charge proposed by the MNO so long as it is not unreasonable;
- Develop an understanding of the extent to which BT and the MNO would generate net gains from trade, imposing an outcome that shares these gains on some basis between the parties to the dispute;
- Undertake a benchmarking exercise of relevant comparators and draw conclusions as to an appropriate termination charge based on those benchmarks;

5.101 Ofcom notes that this list of outcomes is not exhaustive. The above illustrates that Ofcom has a broad range of options at its disposal should it be required to intervene to resolve a dispute and that there is no certainty as to the outcome of the dispute resolution.

5.102 In the particular case that is relevant in this assessment of CBP, where a supplier does not have SMP, it is unlikely to be either proportionate or appropriate for Ofcom to impose a strictly cost orientated charge. In the event of a dispute over interconnection charges between two parties who do not have SMP, Ofcom, in determining a charge, would have to strike the appropriate and proportionate balance between the expected benefits of its intervention, such as addressing consumer detriment by ensuring lower prices for end customers and in the specific case of BT ensuring end-to-end connectivity, and the expected costs, such as the risk of dis-incentivising investment by setting a relatively restrictive charge. The absence of SMP is relevant to the way in which this balance would be struck.

5.103 In Ofcom's view this suggests that neither party in a negotiation over MCT, where the MNO had not been found to have SMP, is in a position to assume that the resolution of a dispute by Ofcom (either in the context of end-to-end connectivity or otherwise) would result in a strictly cost oriented charge. Instead, absent a prior SMP finding, any charge determined by Ofcom may be expected to lie within a broader range.

5.104 In the case of resolving a dispute between BT and a supplier of MCT who did not have SMP, Ofcom's underlying objective would be to ensure the provision of end-to-end connectivity, as set out under Article 5 of the Access Directive. Therefore, the focus of Ofcom's intervention would be to prevent the charges from leading to a lack of such connectivity. More broadly, for the reasons stated in paragraphs 5.98 to 5.102 above, in the case of a dispute between any purchaser of MCT and a supplier without SMP, Ofcom would be unlikely to consider a strict cost oriented charge which as discussed above in paragraph 5.98 is a proxy for the competitive price level.

- Ofcom considers that bringing a dispute to Ofcom or the threat of doing would be insufficient to constrain MCT charges to the competitive level. Therefore Ofcom does not accept the argument presented by Vodafone and by H3G in their responses to the March 2006 Consultation, that the ability to refer disputes to Ofcom affords purchasers sufficient CBP to constrain MNOs charging above the competitive price level.

Commercial considerations

5.105 In general, the larger an MNO's network, the greater the likely value to the customers of another originating operator of being able to call the subscribers of that MNO network and conversely the greater the commercial damage to the originating operator if its subscribers cannot call that network.

5.106 All five MNOs have significant numbers of subscribers on their networks and H3G, the smallest MNO continues to grow its subscriber base. Therefore Ofcom considers that there would potentially be a significant commercial imperative for most originating operators to provide their subscribers with the opportunity to call the different mobile networks. Indeed the evidence suggests that BT, the largest purchaser of MCT, regarded the entry of H3G in 2001 as an opportunity for incremental income from its retail customers.[42] BT therefore had an incentive to purchase call termination services from H3G.

5.107 It is theoretically possible to envisage an originating operator offering calling services to its subscribers that do not enable them to call mobiles or a specific mobile network. Such a strategy would afford this operator the ability to threaten not to purchase termination. However, the operators today have not positioned themselves in this way. They generally seek to offer their customers the ability to call anyone on any network. Furthermore, as the end-to-end connectivity obligation on BT (the largest provider of retail call services) means that BT must offer the ability to call the customers of all other networks, a provider which failed to offer a comparable level of service is likely to be viewed by consumers as deficient. In addition, as discussed in paragraph 5.28, although it is only BT that is subject to an end-to-end connectivity obligation it is Ofcom's view that all providers of Public Electronic Communications Networks should provide end-to-end connectivity and, if they did not, Ofcom may consider whether it were appropriate and proportionate to impose a similar obligation.

- In Ofcom's view, therefore, all originating operators face strong commercial pressure to purchase MCT.

Review of H3G's evidence with regards to the economic framework

5.108 H3G has submitted that two papers by Harbord and Binmore should form the starting point for any further analysis to be undertaken by Ofcom. These papers set out a proposed economic framework for assessing CBP. In this section, Ofcom considers the arguments presented by Harbord and Binmore in their published paper, as well as David Harbord's submission to the CAT dated 28 July 2004.

5.109 Binmore and Harbord state that their model predicts that incumbent fixed network operators (BT) will never agree to pay H3G a termination rate which exceeds the cost of termination, and that it is likely that charges will lie between average 2G rates and the entrants' (3G) cost (assuming that the regulated 2G rates lie below the 3G cost of termination).[43]

[42] WPAG paper "Proposed termination rates for calls to H3G's mobile services", Internal BT paper dated 10 January 2002.
[43] "Bargaining over Fixed-to-Mobile Termination Rates: Countervailing Buyer Power as a Constraint on Monopoly Power", published in Journal of Competition Law and Economics.

5.110 As with every economic model, this result is based on a number of assumptions on the parties' incentives and their ability to act upon them.[44]

5.111 Critical to the results of Binmore and Harbord's model are the assumptions as to how Ofcom would resolve a referred dispute. The assumptions underlying Binmore and Harbord's results are that the regulator would either set a charge based on the average 2G rates or would set a cost based charge. Were these assumptions correct, Ofcom would agree that it is probable that the outcome of a negotiation would be likely to lie in this range. However, it is clear from the explanation of Ofcom's dispute resolution policy above that the assumptions made by Binmore and Harbord in respect of dispute resolution in the context of the end-to-end connectivity obligation are erroneous. As explained in paragraphs 5.96 to 5.104 where it was set out how Ofcom might resolve a dispute in the context of end-to-end connectivity, Ofcom has a broad range of options and is unlikely to set charges at a level set in the context of ex ante regulation following a finding of SMP.

5.112 Furthermore, as noted at paragraph 4.29 in the case of 3G mobile termination, Ofcom's cost modelling, set out in Section 9, indicates that the 3G charges presently levied by H3G are significantly above Ofcom's proposed view of the appropriate charges for MCT.

5.113 Finally, as regards the negotiations prior to the Initial Agreement, Binmore and Harbord considered the impact that impatience on the side of the seller (e.g. because his entire future stream of profits depends on the establishment of interconnection with BT) may have on the seller's bargaining position, concluding that it would weaken it considerably.

5.114 From the evidence before it, Ofcom considers that H3G did perceive the cost of delay prior to the establishment of the Initial Agreement to be significant since delay represented an opportunity cost to H3G through foregone income.

5.115 Further, whilst Ofcom has seen no compelling evidence that may suggest that BT artificially delayed establishing the Initial Agreement, it is possible that the fact that H3G was under pressure to conclude the initial negotiations on charges presented BT with a stronger bargaining position prior to the initial agreement.

5.116 However, the relative bargaining positions of the two parties – and hence the likely outcome of the analysis – changed significantly once an Initial Agreement had been reached and both parties had a sizeable customer base. In particular, once the initial termination agreement and charges were in place, there was no longer significant asymmetry in the cost of delay between the parties. Indeed, this change in situation is recognised by H3G in a letter to Ofcom after the establishment of the initial agreement where H3G informed Oftel that it was hopeful that a reasonable commercial solution could be reached.[45]

5.117 In summary, following the establishment of the Initial Agreement, H3G has a clear commercial incentive to remain interconnected since BT is clearly an important –

[44] As regards the assumptions relevant to the parties' incentives, Binmore and Harbord consider the factors of market saturation and negative externalities, which may reduce the incentives of the incumbent to come to an agreement. Although it is noted that the evidence provided by the parties has not validated these assumptions, Ofcom recognises that there may indeed be other reasons why BT – on a purely commercial basis – may have incentives to negotiate forcefully. This is explored in detail in the sections on the importance of BT as a buyer to H3G, and on BTs likely price sensitivity as a buyer.

[45] Letter from H3G to Ofcom dated 21 January 2002

probably its single most important – customer. Both BT and H3G could issue an OCCN and enter into price negotiations and, in the event that no agreement is reached, either party could refer a dispute to Ofcom. Harbord and Binmore erroneously assume that the best assumption about the outcome of such a process is that it would yield charges at cost or at the level of charges of the 2G operators. However, as Ofcom has explained, this is unlikely to be the case absent a finding of SMP on H3G. As a consequence, Ofcom does not find Harbord and Binmore's arguments persuasive: their assumptions do not accord with the characteristics of the case and therefore their conclusion is not relevant.

Proposed conclusions on CBP

5.118 In light of the factors explored above, it is Ofcom's view that BT does not have sufficient CBP to constrain MCT charges to the competitive price level.

5.119 BT is an important outlet for all suppliers of MCT and is a well informed and price sensitive buyer, although the absence of reciprocity in negotiations between BT and suppliers of MCT means that BT may have less CBP than would be the case in the presence of reciprocity. There are, however, no alternative sources of supply and BT is unable to self supply. BT faces strong commercial pressure to purchase MCT and, furthermore, is obliged by its end-to-end connectivity obligation to purchase MCT (but not on whatever terms a supplier specifies).

5.120 To the extent that it is appropriate to consider the impact of dispute resolution on BT's ability to exercise CBP, Ofcom considers that BT's ability to bring a dispute to Ofcom or the threat of doing would be insufficient to constrain MCT charges to the competitive level, for the reasons set out above.

5.121 It is also Ofcom's view that no other purchasers of MCT (whether FNOS or MNOs) have sufficient CBP to constrain MCT charges to the competitive level. These too are well informed and price sensitive buyers, although the absence of reciprocity in negotiations between FNOs and suppliers of MCT means that FNOs may have less CBP than purchasing MNOs. There are, however, no alternative sources of supply and no originating operators are unable to self supply. All face strong commercial pressure to purchase MCT (whether directly or through a transit provider). Although originating operators other than BT are not subject to an ex ante condition requiring them to provide end-to-end connectivity, Ofcom has stated that it considers all providers should provide end-to-end connectivity.

5.122 To the extent that it is appropriate to consider the impact of dispute resolution on the ability of other purchasers on MCT to exercise CBP, Ofcom considers that this ability to bring a dispute to Ofcom or the threat of doing so is insufficient to constrain MCT charges to the competitive level, for the reasons set out above.

Section 6

Impact assessments - Introduction

6.1 The analysis presented in sections 6 to 9 below, when read in conjunction with the rest of this document, and with the March 2006 Consultation, represents an impact assessment, as defined in section 7 of the Communications Act 2003 (the Act).

6.2 Interested parties should send any comments on this impact assessment to Ofcom by the closing date for this consultation. Ofcom will consider all comments before deciding whether to implement its proposals.

6.3 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making. This is reflected in section 7 of the Act, which means that generally Ofcom has to carry out impact assessments where its proposals would be likely to have a significant effect on businesses or the general public, or when there is a major change in Ofcom's activities. However, as a matter of policy Ofcom is committed to carrying out and publishing impact assessments in relation to the great majority of its policy decisions. For further information about Ofcom's approach to impact assessments, see the guidelines, Better policy-making: Ofcom's approach to impact assessment, which are on the Ofcom website: http://www.ofcom.org.uk/consult/policy_making/guidelines.pdf

Ofcom's duties under the Communications Act 2003

Section 3 – Ofcom's general duties

6.4 When considering the appropriateness of the remedies proposed in this section, Ofcom has had regard to its duties under the Communications Act 2003 (the 'Act').

6.5 Section 3(1) of the Act sets out the principal duty of Ofcom, in carrying out its functions under the Act:

- to further the interests of citizens in relation to communications matters; and,
- to further the interests of consumers in relevant markets, where appropriate by promoting competition.

6.6 Ofcom has also considered when carrying out its functions, amongst other things, the requirements in section 3(2) of the Act to secure the availability throughout the UK of a wide range of electronic communications services and section 3(4) of the Act, namely that in performing its duties Ofcom must also have regard to such of the following as appears to be relevant in the circumstances, in particular:

- The desirability of promoting competition in relevant markets;
- The desirability of promoting and facilitating the development and use of effective forms of regulation;
- The desirability of encouraging investment and innovation in relevant markets; and

- The opinions of customers in relevant markets and of members of the public generally.

Section 4 – European Community requirements for regulation

6.7 Section 4 of the Act requires Ofcom to act in accordance with the six European Community requirements for regulation. In summary these requirements are to:

- Promote competition in the provision of electronic communications networks and services, associated facilities and the supply of directories;
- Contribute to the development of the European internal market;
- Promote the interests of all persons who are citizens of the European Union;
- Take account of the desirability of carrying out Ofcom's functions in a manner which, so far as is practicable, does not favour one form of or means of providing electronic communications networks or services, i.e. to be technologically neutral;
- Encourage the provision of network access and service interoperability for the purpose of securing:
  - Efficient and sustainable competition; and
  - The maximum benefit for customers of Communications providers; and

  Encourage compliance with certain standards in order to facilitate service interoperability and secure freedom of choice for the customers of communications providers.

6.8 In regard to Ofcom's proposals outlined in the present document, Ofcom has considered its duties in those sections, as set out below.

Ofcom's objectives in this review

6.9 Ofcom considers that there are a number of relevant considerations to be borne in mind when deciding on appropriate remedies for SMP in this market, including, amongst others, the following:

- seeking to promote the interests of consumers by ensuring prices are not excessive and resources are efficiently allocated;
- ensuring technological neutrality and avoiding regulatory distortion of MNO decisions about delivery of mobile termination – seeking to ensure MNOs' incentives to use one technology (for example, 2G) over another (for example, 3G) are not distorted by regulation;
- encouraging investment and innovation in existing and new mobile services – seeking to ensure operators recover efficiently incurred costs; and
- ensuring competitive neutrality and avoiding economic distortions, for example in the downstream retail market

The option presented in this consultation document

6.10 In Section 7, Ofcom has assessed the detriment likely to arise from the exercise of SMP in the absence of ex ante regulation. Ofcom concludes from this analysis that the option to "do nothing" is not appropriate. (The inadequacy of an ex post competition law approach is explored in paragraphs 8.13 to 8.18 below.)

6.11 Ofcom has also taken into consideration the ERG common position on the approach to appropriate remedies in the new regulatory framework[46] ("Revised ERG common position on remedies"). The ERG sets out that in the case of termination markets the following remedies should be considered:

- Obligation to interconnect
- Transparency;
- Non-discrimination; and
- Price control and cost accounting[47]

6.12 In Section 8, Ofcom has revisited a number of different options for addressing the identified detriments, including the possibility of technical intervention, a reliance on charge transparency obligations, retail tying, obligations requiring that charges are "fair and reasonable" or cost oriented, and charge controls. These options were explored extensively in the March 2006 Consultation and, having considered responses Ofcom is proposing that charge controls should be imposed.

6.13 In the March 2006 Consultation, Ofcom also proposed additional conditions including transparency conditions, a prohibition of undue discrimination and an obligation to meet reasonable demand for MCT on fair and reasonable terms. Having considered responses to the March 2006 consultation Ofcom has also set out in Section 8 a firm proposal that it should impose such conditions as charge control conditions alone will not be sufficient to remedy the identified detriment.

6.14 Ofcom is, therefore, proposing a single option to impose charge controls and further conditions requiring transparency of charges and contract terms, prohibiting undue discrimination and requiring the provision of MCT on fair and reasonable terms. In Section 9, Ofcom presents a number of options for determining the appropriate level of charges in each of the four years of the charge control, and Ofcom proposes to determine those levels following consideration of responses.

6.15 Ofcom has attached at Annex 21 Notifications of its proposed market definition, SMP finding and draft SMP conditions which are intended to implement the proposed charge controls and further conditions considered in Sections 8 and 9.

[46] Revised ERG Common Position on the approach to appropriate remedies in the ECNS regulatory framework. (http://www.erg.eu.int/doc/meeting/erg_06_33_remedies_common_position_june_06.pdf)
[47] The ERG also notes that an accounting separation obligation may also be required in particular to assist in the estimation of costs. However, Ofcom does not consider that it requires an accounting separation obligation in order to estimate costs. Ofcom has undertaken detailed cost modelling in order to estimate the costs of termination set out in Annex 5.

Section 7

Impact Assessment: Part 1- Benefits of regulation vs no regulation

Introduction

7.1 As discussed in Section 4 above, Ofcom considers that the MNOs have SMP in supplying MCT. Ofcom believes that absent regulation (or the threat of regulation) MNOs would have the ability and incentive to set excessive charges for MCT. Ofcom considers that excessive charges result in detrimental impacts on consumers and, therefore, given Ofcom's objective to promote the interests of consumers, regulation of MCT is required.

7.2 In this first section of the regulatory impact assessment, Ofcom considers the detrimental impact on consumers that is likely to result in the absence of regulation (or the threat of regulation) of MCT, and the benefits of regulation which ameliorates these detriments and realises gains for consumers.

7.3 In Sections 8 and 9, the detailed options for regulation are assessed in the context of the objective of realising gains for consumers. This consideration assumes that regulation (in whatever form) constrains MNOs' behaviour such that charges are not excessive.

7.4 It is important to note the counterfactual against which the benefits of regulation are measured is a situation where no regulation or threat of regulation exists. This is largely a hypothetical situation because, with the exception of MCT supplied by H3G and 3G MCT supplied by 2G/3G MNOs, MCT is currently regulated and has been regulated for a number of years.

7.5 The following paragraphs consider the detrimental impact of excessive CTM charges, which can, broadly, be summarised as follows;

- Excessive prices; to the extent that the "waterbed" effect is not complete, the excess profit on termination is not fully competed away in competition for mobile consumers so that, overall, MNOs may generate excess profits and consumers pay too much for inbound call services.

- Even if the "waterbed" effect is complete and MNOs do not retain excess profits, the resulting structure of prices is inefficient. This inefficiency would lead to over consumption of mobile network services and under consumption of fixed network services. Consumers would face too high a price for calling a mobile and other fixed network services whilst mobile services would be priced too cheaply. Rectifying this inefficient structure of prices brings welfare benefits to consumers.

- A related factor is that if MNOs set excessive prices for mobile termination whilst FNOs are only able to charge regulated (cost orientated) prices for fixed termination, this would result in a transfer of rents from fixed to mobile operators. This transfer is not an efficient allocation of resources and, in a situation where fixed and mobile operators may begin to compete with each other, could result in a competitive distortion with mobile prices being subsidised at the expense of fixed operators.

- Under the “waterbed” effect, excessive prices result in transfers between different types of consumers. This raises equity concerns. There will be groups of consumers who pay excessive prices for calling a mobile and other fixed network services but who do not benefit from cheaper (subsidised) mobile network services and mobile phones. There will also be transfers within the group of mobile users, some of whom may benefit, or lose, disproportionately from those subsidised services and handsets

- Setting excessive prices may increase the risk of other anticompetitive behaviour such as undue discrimination.

7.6 Many of these concerns are closely inter-related and, in the following paragraphs, Ofcom considers these under five headings;

- Excessive prices overall
- Inefficient structure of prices
- Distortion of consumer choice
- Inequitable distributional effects
- Risk of anti competitive behaviour

Excessive prices overall

7.7 If MNOs set excessive prices for MCT they may be able to earn excess profits at the expense of consumers, as discussed below. It has been argued by the MNOs that Ofcom should not be concerned if mobile termination charges are set above the competitive level if the “waterbed effect” is complete. This is because excess profits arising as a result of excessive termination charges will be returned to mobile consumers in the form of lower retail prices for mobile services. Therefore whilst MNOs make excess profits from termination they will not make excess profits overall across their whole business. In responding to the March 2006 Consultation, O2, T-Mobile and Vodafone each argued that retail competition is such that the waterbed effect is complete, and T-Mobile also expressed the view that the UK mobile market is the least concentrated in Europe. In addition, T-Mobile presented data to support its view that the UK mobile industry is not making its cost of capital, and that average ARPU and EBITDA have fallen (in the fourth quarter of 2005).

7.8 Ofcom’s high level analysis of MNOs’ profitability, set out in paragraphs 2.22 to 2.27 above, illustrates that estimating profitability robustly is complicated and sensitive to assumptions made about the relevant capital base and the time horizon over which profitability is assessed. Under different assumptions Ofcom has found MNOs could be considered to be earning returns variously in excess of and below their cost of capital. In Ofcom’s view the evidence does not confirm whether or not the waterbed effect is complete.

7.9 However, with regard to the presence of excess profits, Ofcom considers that for all excess profits earned from MCT to be competed away, the mobile retail (access and origination) market in which MNOs operate would need to be sufficiently competitive. Ofcom notes that although no MNO has been found to have SMP in the retail market

for mobile services[48], conditions may not be such as to ensure that the MNOs would always compete away any excessive profits earned in supplying MCT by offering lower prices for retail mobile services.

7.10 As Ofcom noted in the March 2006 Consultation, SMP is a threshold for assessing a firm's market power in relation to ex ante regulation. Consequently, there is a wide range of firm behaviours and outcomes consistent with finding that none of the firms in a market have SMP. Ofcom maintains, therefore, that full pass-through of termination profits to retail customers is not a necessary consequence of the finding that no MNO has SMP in the mobile access and call origination market. T-Mobile, in responding to the March 2006 Consultation, argued that Ofcom's remarks indicated discomfort with the SMP threshold for regulation. In Ofcom's view, however, although the SMP threshold is an appropriate threshold for assessing the need, or otherwise, for ex ante regulation, it is, indeed, only a threshold. Ofcom considers that it is still possible for firms to earn excess returns (i.e. returns above their cost of capital) in markets where no firms have SMP because these firms may still experience a degree of market power. However, the degree of market power experienced is not sufficient to be characterised as SMP and therefore warrant ex ante regulation in its own right.

7.11 Ofcom acknowledges, however, that the retail market has become more competitive in recent years (and has seen the entry of a fifth MNO) and it has become less likely that MNOs will be able to retain excess profits earned in supplying termination services. However, the way in which profits are competed away is also relevant. If excess profits are used to lower mobile retail prices this will benefit consumers directly. However, if they are used for example to increase expenditure on marketing then this may have a less direct benefit for consumers. Nevertheless, Ofcom remains of the view that, in a market with a limited number of network competitors, complicated retail tariffs, low concentration notwithstanding, and significant entry barriers (due to factors including the high level of sunk costs involved in entry and the historic scarcity of spectrum), it is unlikely that the waterbed effect will be complete.

7.12 Furthermore, if the waterbed effect were complete, MNOs' profits would be invariant to the level of termination charges and MNOs would in theory be unconcerned about the level of such charges. In fact, as Ofcom noted in the March 2006 Consultation, it is apparent that MNOs are far from indifferent about the level of their own termination charge which, Ofcom proposes, may indicate that the "waterbed effect" is not complete. For example T-Mobile's response to the March 2006 Consultation indicated a concern that stringent regulation of MCT charges may contribute to MNOs failing to earn their cost of capital – an explicit concern over the level of termination charges.

7.13 In responding to the March 2006 Consultation Vodafone argued that MNOs are concerned about the relative levels of termination charges, as these may create competitive distortions. As Vodafone noted, Ofcom is strongly aware of this risk of retail distortions arising from the ability of some MNOs to set MCT charges without facing the constraint of charge regulation.

7.14 Ofcom recognises that the relative levels (between MNOs) of regulated MCT charges are important. If certain MNOs are able to earn greater excess profits than others (by charging a relatively higher margin over the cost of MCT than others) this has a

[48] See Oftel's consideration of the retail market for outbound mobile services contained within its assessment of the market for wholesale mobile outbound services; Oftel statement *Mobile access and call origination services market review* – published August 2003.

potential to create a competitive distortion in the retail market to the detriment of consumers. This is discussed in further detail in Section 9 below where Ofcom discusses the appropriate level of charge controls to apply to each of the MNOs.

Inefficient structure of prices

7.15 In Ofcom's view, however, even if MNOs do not make excess profits from setting excessive termination charges, the resulting structure of prices in retail and wholesale markets is inefficient and has a detrimental impact on consumers. This is because MNOs do not have the incentives to set efficient prices as the competitive conditions (as discussed in paragraph 3.120) between MCT and other mobile retail services are different.

7.16 If MNOs set excessive charges for MCT, even if they do not earn excessive profits overall, a structure of prices will result that is inefficient. The inefficient structure of prices would lead to over consumption of mobile retail services and under consumption of other retail services that use MCT, such as fixed retail services. Consumers would face too high a price for calling a mobile and potentially too high a price for other fixed retail services (whilst mobile retail services would be priced too cheaply).

7.17 In its response to the March 2006 Consultation, T-Mobile argued that, in determining regulated charges, unless Ofcom followed Ramsey principles to achieve the efficient structure of charges then regulation to set a more efficient structure of prices would not be effective. Issues of charge setting are dealt with in Section 9. Ofcom recognises that the interaction of related demand and externalities are important considerations in determining appropriate charges.

7.18 Ofcom set out in the March 2006 Consultation evidence that approximately two thirds of cost savings generated for providers of fixed to mobile calls as a consequence of MCT charge reductions, had been passed through directly to lower fixed to mobile retail call charges. In noting this finding, T-Mobile and Vodafone both argued that these levels of direct pass-through indicate that the objective of addressing inefficient price structures is not being achieved by wholesale charge regulation, calling into question the value of such charge regulation. Ofcom does not agree with this conclusion.

7.19 In Ofcom's view, reductions in termination charges may be used by fixed network operators to reduce prices of other fixed network services such as line rental, local and national calls, and broadband and television services. From a consumer welfare perspective this could be more efficient than the full reduction being passed through directly to fixed-to-mobile calls. Therefore, the observation that fixed network operators have not passed on the full reduction in wholesale termination charges directly to fixed-to-mobile calls is not a significant concern. The issue is whether fixed network operators have the incentive to set an efficient structure of prices for fixed network prices which depends on the competitive conditions. Ofcom has found that no fixed operator, other than BT, has SMP in the fixed retail market and Ofcom's recent review of BT's retail price controls[49] suggests that competition in the fixed retail market is likely to increase going forward.

7.20 T-Mobile argued in its response to the March 2006 Consultation that Ofcom's view, set out in the March 2006 Consultation, that pass-through of savings made on MCT charges would be efficiently distributed across a broad basket of fixed services

[49] See http://www.ofcom.org.uk/consult/condocs/retail/

according to Ramsey principles, is incorrect. T-Mobile argued that under Ramsey principles a relatively larger reduction in retail prices of calls to mobile would be expected given a reduction in the marginal cost of calling a mobile, and that this was not being experienced in practice. Ofcom considers that T-Mobile's argument holds only under the strict assumption that the elasticity of demand for fixed to mobile calls is constant at all prices. In Ofcom's view this is an extreme assumption and it is more likely that elasticity of demand is not constant, which is consistent with Ofcom's view of pass-through.

7.21 Ofcom has estimated the welfare gains from regulating call termination by comparing a situation with unregulated (excessive) and regulated (cost based) termination charges. The analysis captures the interrelationship between demand for calls to mobiles and for mobile retail services. If the welfare gain from regulation was assessed only in the light of the impact on calls to mobiles this would overstate the overall welfare gain because, as discussed earlier, MNOs use profits from termination to reduce the prices of retail mobile services. This benefits mobile subscribers and potentially trades off against the detriment to callers of excessive charges.

7.22 The analysis compares an unregulated termination charge of 24.2 ppm based on Ofcom's estimate of the monopoly termination charge and a regulated termination charge of 5.4 ppm based on the weighted average (by termination volumes) of Ofcom's proposals for charges set out in Section 9. The full set of assumptions that have been employed in this welfare analysis are set out in Annex 19.

7.23 The welfare analysis estimates the change in consumption of calls to mobiles and mobile retail services following a move (via regulation) to a more efficient price structure. The welfare gain amounts to £1.4 billion in 2010/11 and over four years of a hypothetical charge control assuming a smooth glidepath down to the target charge from the monopoly charge amounts to approximately £3.3 billion in present value terms at the beginning of 2007/08. Ofcom acknowledges that this is an order of magnitude estimate and not a precise estimate of the overall gains from regulation compared to no regulation (or threat of regulation).

7.24 In their response to the March 2006 Consultation, T-Mobile and Vodafone both commented that the economic efficiency gains from regulation are smaller than estimated by Ofcom. However, the view relates to movements from current (regulated) charges to different (lower) regulated charges. This does not mean, as is argued by T-Mobile, that the welfare gains from regulation compared to no regulation (or threat of regulation) are small, rather that small changes in the regulated termination charge do not have as large impacts on welfare.

Distortion of consumer choice

7.25 To the extent that direct pass-through operates, excessive termination charges feed through into higher retail prices for fixed to mobile and mobile to mobile (off-net) calls. However, mobile to mobile (on-net) calls incur no explicit termination charge, and mobile to fixed calls face a regulated fixed termination charge as part of their cost base. Moreover, excessive MCT charges enable reductions in prices of mobile retail services. Therefore, Ofcom considers that consumers' choices will be distorted between mobile and fixed calling due to distortions in the relative prices of fixed and mobile services, as the relative prices do not reflect the underlying resource costs. Consumers are potentially driven to use the higher resource cost mobile technology (higher cost because mobile networks involve higher usage-dependent costs

compared to fixed networks) and this is inefficient and may be detrimental to consumers.

7.26 In particular, while fixed termination charges are regulated at cost[50], excessive mobile termination charges amount to a transfer of rents from fixed to mobile operators. This is not an efficient allocation of resources and, in a situation where fixed and mobile operators may compete with each other more closely, could result in a competitive distortion with mobile retail prices subsidised at the expense of fixed operators. As Ofcom discussed in the last calls to mobile market review, Ofcom does not consider that it would be sensible to promote competition between mobile and fixed operators by providing MNOs with a more favourable regulatory treatment. Ofcom considers that sustainable competition between mobile and fixed operators should be driven by the underlying costs of the technologies, facilitated by a neutral regulatory environment consistent with Ofcom's duties under Section 4(6) of the Act. There would be serious doubts as to the sustainability of competition between mobile and fixed operators if it were underwritten by excessive pricing of mobile termination services at the expense of fixed operators and callers to mobiles.

7.27 T-Mobile argues that this view is heavily focused on static efficiency gains. In its view, if a dynamic long run efficiency perspective is considered, Ofcom should note that mobile networks represent the key means by which BT's control over the local loop bottleneck can be overcome. Ofcom considers that MNOs may in the future prove to be a strong competitor to BT in providing access to consumers in their homes. However, as discussed, it is not efficient for this competition to be based on excessive charges for MCT.

Inequitable distributional effects

7.28 As Ofcom noted in the March 2006 Consultation, as mobile termination charges are a major component of the price of calls to mobiles, if the former are excessive, callers to mobiles can face an excessive price for fixed-to-mobile and mobile off-net calls, and, given some level of pass-through (via the 'waterbed' effect), lower prices for other retail mobile services. Therefore callers to mobiles may face excessive charges while mobile subscribers may benefit through lower prices for mobile services. Different consumers will face a different distribution of these benefits. At a high level there are three categories of consumers to which these distributional benefits are important (date based on Quarter 4 2005 data from Ofcom's Residential Tracker Survey):

- Fixed only consumers i.e. those not personally using mobile phones and living in households with fixed line phones. This group accounts for approximately one in ten (9%) of adults;

- Mobile only consumers i.e. those personally using a mobile and living in a household without a fixed line phone. This group accounts for approximately one in ten (10%) of adults; and

- Mobile and fixed consumers i.e. those who have been found to use mobile phones and live in household with fixed line phones. This group accounts for approximately four-fifths (80%) of adults.

7.29 Fixed only consumers are adversely affected by the negative impact of excessive termination charges. However, the proportion of fixed only consumers is declining

[50] See http://www.ofcom.org.uk/static/archive/oftel/publications/eu_directives/2003/cal_term0803.pdf

and is now slightly smaller than the number of mobile only users. Ofcom's January 2006 survey (see paragraph 3.19 above) also suggests that many fixed only consumers are not frequent callers of mobiles; for example, only 7% of this group reported calling a mobile daily (compared with 34% of consumers with both a fixed and a mobile phone).

7.30 Other types of consumers face a tradeoff, higher prices for calling a mobile compared to lower prices for mobile services. Within the population of mobile users ("mobile-only" and "mobile and fixed"), it is highly likely that some consumers will be adversely affected by high termination charges; this will depend on the extent to which they consume calls to mobiles relative to other services. For example those who frequently change their (subsidised) mobile phone and also make few fixed to mobile calls are more likely to benefit from subsidies to customer acquisition and retention than those who do not change their handset from year to year and are frequent callers from fixed to mobile phones.

7.31 Given the existence of SMP, the difference between the cost of MCT and the wholesale charge in the absence of any intervention (or the threat thereof) is likely to be large. The transfers between different sets of customers are unlikely to be 'undone' by compensation from those made better off to those worse off. Ofcom therefore believes that distributional factors should legitimately be taken into account in the decision as to whether there is a justification for regulation of termination charges, as an adjunct to the basic efficiency rationale, set out in the previous section.

7.32 In responding to the March 2006 Consultation, T-Mobile, O2 and Vodafone each noted Ofcom's finding that there are now roughly the same number of mobile-only households as fixed-only households, and took from this that any distributional concerns that excessive MCT charges are detrimental to fixed-only households are of less importance than hitherto. Vodafone draw similar conclusions from Ofcom's observation that fixed-only households are not particularly frequent callers of mobiles.

7.33 T-Mobile presented further data and analysis of its own relating to the incomes of fixed-only and mobile-only households. This indicated that mobile-only households are also, broadly, less prosperous than fixed-only households. T-Mobile took from this finding that, as it is the poorer and marginally more numerous group (mobile-only households) which benefits from relatively high MCT charges, any reduction in these charges would not have a positive redistributive effect.

7.34 Ofcom acknowledged in Section 5 of the March 2006 Consultation that the demographics of fixed and mobile users had changed, and Ofcom recognises that there is no longer a clear argument that lower MCT charges particularly benefit disadvantaged groups. However, as noted in that Section 5, it remains the case that excessive MCT charges which are used to subsidize particular retail mobile services (while increasing the cost base of providers of fixed network services) are disadvantageous to certain groups of consumers(defined by their relative levels of spending on the affected services). To the extent that this disadvantage arises from the exercise of SMP, rather than an economically efficient structure of prices, it remains Ofcom's view that the overall effect is likely to be detrimental to consumer welfare.

Risk of anti-competitive behaviour

7.35 The ability to set excessive charges for MCT enjoyed by the MNOs could also be used to distort and reduce competition in retail mobile markets. Each MNO is a monopolist in the provision of termination services to originating operators for calls to that MNO's subscribers. These services are an input into retail products sold by the MNO and competitors in both outgoing and access market and other retail markets. Hence, an MNO may be able exploit its position in the termination market to impair its rivals' ability to compete for customers. Similar concerns may also arise in respect of anti-competitive behaviour towards fixed network operators where these are close competitors. The greater the gap between wholesale price and cost, the greater the risk that certain types of behaviour e.g. discrimination, would have anti-competitive effect in retail markets.

7.36 Where all MNOs are of similar size in terms of revenues or subscribers, they may have similar levels of market power in the retail mobile market. This issue is less likely to be of concern, because, with the entry of H3G and possible future entry associated with the liberalisation of spectrum, there is potential for anti-competitive pricing by larger MNOs to the detriment of smaller MNOs and therefore competition.

7.37 In particular, the larger MNOs could charge higher termination charges to smaller MNOs than they charge to each other. A new entrant, given its asymmetric position in the retail market with respect to the incumbent MNOs could find itself at a significant disadvantage in offering retail access and outgoing call services if, for example, its incoming and outgoing traffic were not balanced. Ofcom therefore believes that the competitive distortions that may arise if MNOs were free to exploit their SMP in the market for mobile voice termination should also be considered in the decision whether to regulate.

7.38 However, Ofcom notes that if an MNO (such as a small new entrant) is unable to negotiate reasonable terms for mobile call termination (or is unable to establish direct interconnection), it may instead seek to use another operator (such as BT) to transit the call to the relevant mobile network. The call will then be terminated under the terms of that transit operator's mobile termination agreement. BT offers such services and, therefore, the termination rate paid by BT to the other MNOs effectively acts a ceiling on the maximum charge any new entrant would have to pay. As T-Mobile argued in its response to the March 2006 Consultation, a concern such as this does not necessitate charge controls but rather could be addressed with an obligation to prevent undue discrimination. Regulatory remedies are discussed in the next part of the impact assessment.

7.39 In its response to the March 2006 Consultation, T-Mobile presented reasons why this issue does not justify regulation. In particular they argued that if excessive termination charges lead to lower mobile prices and greater competition with BT and other fixed operators this should be welcomed given BT's SMP in the fixed retail market. However, as discussed earlier, in relation to the distortion of consumer choice, Ofcom does not consider that competitive distortions between fixed and mobile operators due to asymmetric regulation should be encouraged as T-Mobile suggest. Competition promoted by excessive pricing is not an efficient form of competition.

7.40 A final issue raised by T-Mobile was the consideration that it is regulation itself that is currently distorting the competitive process by allowing H3G to set termination charges almost double those of the other MNOs. It argues that H3G is using higher termination charges to undercut the retail prices of the other operators and grow its

customer base, regardless of relative efficiency. This last point is not related to Ofcom's general analysis of detriments in this section but to the current asymmetric regulation of mobile termination across MNOs. As discussed earlier in this section Ofcom is considering the relative position of MNOs and appropriate remedies in the course of this review. The current asymmetric regulation of H3G is not a sound reason for Ofcom to refrain from regulating any MNOs, and Ofcom is not proposing to adopt that approach.

Summary

7.41 In summary it is Ofcom's view that, while the waterbed effect is likely to operate to a material extent, some excessive profits generated by MCT charges may be retained by MNOs at the expense of consumers paying excessive prices, since the mobile retail market may not be sufficiently competitive for all excess profits to be competed away. Furthermore, in Ofcom's view it is important to note that even if the waterbed was fully effective, the resulting structure of prices in retail and wholesale markets would be inefficient and would have a detrimental impact on consumers, which would warrant regulatory action.

7.42 The level of MCT charges has an impact on prices, and consumption, of a wider range of fixed network retail services, and, more broadly, on the relative extent to which fixed and mobile networks are used and developed. In Ofcom's view, the importance of this issue is likely to continue to grow as fixed and mobile services continue to converge.

7.43 Ofcom also recognises that demographic changes are such that concerns expressed in previous reviews of this market, that low income groups may be particularly disadvantaged by high MCT charges, are now less relevant. As such, as T-Mobile noted in its response to the March 2006 Consultation, where additional weight has been placed on the need to address social disadvantage, the distributive benefits arising from reductions on MCT charges may be lower than hitherto. It remains the case, however, as noted in 7.34 above, that certain groups (defined by their telecoms consumption patterns rather than their broader demographic identity) are materially disadvantaged by the inefficient structure of prices arising from certain retail mobile services being subsidised by excessive MCT charges.

7.44 For the reasons cited in paragraphs 7.35 to 7.41, it also remains Ofcom's view that the risk of anti competitive behaviour increases in the presence of excessive MCT charges. In particular, Ofcom acknowledges that charge controls are not the primary means to address such behaviour. A concern that MNOs may discriminate between different purchasers of MCT may be remedied with an undue discrimination obligation. However, to the extent that a reduction in MCT charges lessens this risk, this does represent a further benefit to be derived from charge controls.

Section 8

Impact Assessment: Part 2 – Regulatory options for realising the benefits of regulation

8.1 In the March 2006 Consultation, Ofcom considered a number of different ways in which it might address detriment arising where SMP is exercised to set high MCT termination charges. These were divided into two groups; (i) structural change to address the underlying causes of SMP in this market and (ii) remedies for ensuring that charges are set at an appropriate level in the event that SMP persists.

8.2 In this section, Ofcom has not attempted to quantify the costs and benefits of the different approaches to addressing SMP in this market as, with the exception of the structural option to require technical change to enable competitive termination, the costs and benefits have to do, mainly, with certainty and market stability, which are difficult, if not impossible, to quantify with any useful degree of accuracy. The cost of the option to require technical change to enable competitive termination is also very difficult to quantify, as considerable development work would be required before even the technical feasibility of such intervention could be assessed. In Ofcom's view the administrative cost of implementing a charge control and complying with obligations to notify and publish charges and contract terms are unlikely to be material in context of the scale of the welfare gains explored in paragraphs 7.21 to 7.23 above.

Structural change

8.3 In the March 2006 consultation, two alternative kinds of structural change were explored; a mandated move to a RPP billing arrangement and technical intervention to enable more than one mobile network to terminate call to any given handset. Ofcom did not favour either of these approaches, for reasons set out in the March 2006 Consultation. Responses to the March 2006 Consultation were almost unanimous in agreeing that neither was attractive (BT was the exception in presenting a more agnostic view of the possible longer term benefits of a mandated move to RPP).

Mandated RPP

8.4 Ofcom remains of the view, as set out in the March 2006 Consultation, that a move from CPP to RPP would currently be to the detriment of consumers in the UK, for the following reasons:

- Consumer response: there is considerable uncertainty as to consumer response to a move to a RPP system in the context of an established market with tens of millions of subscribers currently facing a familiar and well established charging structure;

- Short-term regulatory intrusion and uncertainty of net benefits: whilst RPP per se represents a framework within which repeated regulatory intervention to set charges may no longer be necessary (charges, typically, being set at zero for the long term) the extent of regulatory intervention in moving from CPP to RPP – and

potentially mandating such a move – is significant, and with a high degree of uncertainty that the net benefits will outweigh the associated costs;

- Associated costs: it is likely that the costs incurred by operators, subsequently passed on to end users, would exceed the benefits to consumers.

8.5 Ofcom's position is consistent with that of the UK Competition Commission which considered the issue in 2003[51] , and was broadly shared by responses to the Preliminary Consultation and the March 2006 Consultation which, with the exception of BT's agnostic response to the March 2006 Consultation, all expressed a strong sentiment against its introduction, on the grounds of disruption, customer confusion, lack of clarity over extent of benefits and (in the case of MNOs) distortion of competition absent the introduction of similar regulation to apply to termination of calls on fixed networks.

8.6 Ofcom is aware that there remains academic support for a move to RPP, particularly in the form of Bill and Keep, where the termination charge is set at zero and the cost of mobile termination might be recovered from a wide range of outbound mobile services. Ofcom recognises that such an approach might create less disruption in retail markets than one where customers pay a distinct fee to receive calls.

8.7 Ofcom considers that while the theoretical case for RPP has some merit, the evidence that RPP would lead to better prices for mobile customers today is not convincing. Compulsory RPP or Bill & Keep would be equivalent to very low or no wholesale termination charges. Requiring average charges to fall to zero, or near zero would not be deregulatory but equivalent to much stricter charge controls. The removal of fixed to mobile MCT revenues is unlikely to lead to lower charges for mobile customers.

8.8 Industry observers who support some form of Bill & Keep often cite relative data on penetration, call usage and prices in countries with RPP and CPP billing arrangements. In Ofcom's view, in making cross country comparisons it is difficult to be consistent and control for key country specific differences. Such evidence does not provide reliable evidence that consumer outcomes would be improved if Ofcom were to mandate RPP (or set MCT charges close to zero across all operators). Ofcom notes that this situation may change over time, and in the event that fresh evidence on the matter is brought to it, Ofcom will consider any such evidence and any potential implications for structural remedies.

Technical intervention

8.9 Ofcom noted in the March 2006 Consultation that, at any point in time, each mobile device is generally within the coverage area of 4 or 5 different mobile networks and, in theory, it is conceivable that callers or originating operators might be enabled to choose which network should terminate any call, thereby facilitating competition for the provision of such termination services.

8.10 However, responses to the Preliminary Consultation and the March 2006 Consultation confirmed Ofcom's view that this would require substantial technical changes. All respondents agreed that such change is not feasible at this time and the costs are unlikely to be proportionate to the benefits. For example, MNOs might need to develop a common home location register (HLR) to which they would connect via visiting location registers. This approach might obviate the need for major changes to

[51] See paragraph 2.112 of the CC's 2003 Report referred to at footnote 13 above

phones or the need for consumers to switch between SIMs, but design and implementation of a shared HLR would take time and be expensive. The alternative, of competing suppliers of termination services each tracking the location and status of each mobile phone, would require very substantial changes to mobile network infrastructure, signalling and phones, particularly to ensure the continued functionality of ancillary services such as voicemail.

8.11 In Ofcom's view, therefore, the costs of any mandated form of technological change to remove the underlying cause of SMP, would exceed the benefits.

Remedies for SMP

8.12 The March 2006 Consultation explored five possible approaches to ensuring that charges are set at an appropriate level in the event that SMP persists; competition law, charge transparency, retail tying, an obligation that charges should be "fair and reasonable" or cost oriented and a requirement to comply with a charge control.

Reliance on ex post intervention under competition law;

8.13 Ofcom potentially could withdraw all ex ante conditions relating to MCT charges and instead rely on ex post competition law. This would have the advantage of reducing the level of ex ante regulatory intervention.

8.14 However, as noted in the March 2006 Consultation, reliance on ex post competition law has a number of disadvantages. As set out at paragraph F.47 of Policy Annex F of the TSR Phase 2 consultation[52] the principles of competition law, as they can be derived from the statute and existing case law, do not always provide ready-made solutions to the problems experienced in telecoms markets. While competition law can, where necessary, incorporate such highly technical matters, there is nonetheless a practical case for addressing such issues through sector rules. This avoids what would otherwise be protracted delays in the development of a body of case law that supports the necessary technical requirements.

8.15 Indeed, without the imposition of ex ante regulation actively to promote the development of competition in markets in which competition is not effective, it is unlikely that ex post general competition law powers would be sufficient to ensure that effective competition became established. For example, ex post powers prohibit abuse of dominance rather than the holding of a dominant position. Ex ante powers can be used to reduce the level of market power and thereby encourage effective competition to become established. Ofcom recognises, however, as set out in paragraphs 8.9 to 8.11 above, that in the MCT markets being considered in this review, ex ante action to promote competition in this market is difficult to envisage.

8.16 Additionally, reliance on ex post competition law may not allow for the certainty of intervention that is necessary to give all parties (including MNOs and FNOs) the confidence to plan their businesses and make significant investments within a clear and predictable regulatory environment.

8.17 The March 2006 Consultation, which, for the reasons summarised above, did not favour reliance on ex post competition law where SMP persists, did not specifically invite respondents to comment on the merits of a reliance on competition law, and few comments were made. H3G strongly favoured an "ex post" approach to charge setting, whether enforced through competition law or an ex ante obligation that

[52] http://www.ofcom.org.uk/consult/condocs/telecoms_p2/tsrphase2/PolicyAnnexes_FL.pdf

charges should be fair and reasonable or cost oriented. In H3G's view such broadly "ex post" approaches provide a greater degree of flexibility than a direct charge control, as they allow providers to modify their charges in the light of changing costs. H3G acknowledged, however, that competition law principles have not been developed with the circumstances of interconnection in mind, and a reliance on pure competition law at this stage would be inappropriate and could lead to industry confusion for a period of time. H3G's response was, therefore, focussed on the use of an ex ante condition requiring that charges should be fair and reasonable or cost oriented. Ofcom has addressed H3G's views below in the context of the evaluation of an approach based on a condition requiring that charges must be fair and reasonable or cost oriented.

8.18 Ofcom considers that in these markets a reliance on ex post competition law (where SMP persists) would not be appropriate or cost effective. This is because, among other reasons, ex ante regulation would give greater regulatory certainty to MNOs and FNOs from which to plan their businesses and make the appropriate investment choices, while also ensuring that competition in related markets is promoted. A reliance on competition law could potentially lead to a high degree of uncertainty concerning Ofcom's ability to take appropriate action within a reasonable time. It could also create uncertainty with respect to the appropriate level of charges as discussed further below in the context of a possible reliance on ex ante conditions requiring that charges should be fair and reasonable or cost oriented.

Transparency

8.19 The March 2006 Consultation set out Ofcom's view that an ex ante price transparency obligation for each MNO (for example notifying charges and publishing a reference offer) on its own may provide a constraint on the level of call termination charges to the extent that it affects the purchasing decisions of either the calling party or the called party. However, the co-incidence of (i) SMP call termination on each network and (ii) the presence of CPP as the prevailing pricing framework creates a situation in which calling parties do not impose a sufficient constraint on terminating operators. This is because they are unable to substitute to other forms of contacting a mobile subscriber, and the called party does not take into account the cost of being called when deciding which network to subscribe to.

8.20 Whilst price transparency may result in consumer pressure and lobbying, this is unlikely to wield sufficient pressure on MNOs to ensure the price is at the competitive level, unless the levels of mobile termination charges were such that they affected the subscription decisions of end users, for example as a consequence of negative end user sentiment impacting brand. The level at which mobile termination charges would have such an effect is untested. What is evident, however, is that levels of mobile termination charges significantly higher than those prevailing today have been tolerated by called parties, and appear to have had little impact on subscription decisions. As a consequence, the adoption of such a remedy, of itself, would not provide sufficient constraint on the pricing freedom of the MNOs.

8.21 The March 2006 Consultation did not specifically invite respondents to comment on the costs and benefits of relying on a transparency obligation to constrain MCT charges in the presence of SMP. The responses made no material reference to this option. H3G stated that it had no significant comments on this option, although H3G claimed that the March 2006 Consultation was unclear about what was meant by a price transparency obligation, and assumed that it referred to some kind of retail price transparency; H3G observed that the relevant retail prices are not charged only by mobile operators. In fact the March 2006 Consultation cited, at paragraph 7.16,

the example of an obligation which required each MNO to notify charges and publish a reference offer (i.e. wholesale charges). In Ofcom's view, in the context of a finding of SMP in a wholesale market for the supply of MCT, any transparency obligation would relate to wholesale charges.

8.22 Thus it is Ofcom's view that, although the costs of implementing a transparency obligation may be low (in terms of publishing and/or notifying charges), where each operator has been designated as having SMP in its respective market for MCT, price transparency, of itself, is insufficient to constrain excessive pricing practices.

8.23 However, Ofcom has considered, in paragraphs 8.53 to 8.56 below, the costs and benefits of transparency obligations to supplement a charge control.

Retail tying

8.24 The March 2006 Consultation noted that the option of tying MCT charges to retail prices appears to represent a 'light touch' (and potentially low cost) framework for constraining MCT charges, as compared, for example, with cost-orientation obligations. However the March 2006 Consultation also noted (as had responses to the Preliminary Consultation) that the approach also presents a risk of distorting 'spillover' effects into the retail market, along with practical implementation difficulties. The March 2006 Consultation did not specifically ask respondents to comment again on this option for constraining wholesale MCT charges in the presence of SMP, as detailed responses had been made in response to the Preliminary consultation. These responses had been taken into account and commented upon in the March 2006 Consultation. No responses to the March 2006 Consultation identified any additional benefits in retail tying.

8.25 Ofcom continues to believe that retail tying presents significant challenges from both theoretical and practical perspectives. These include the likelihood that, as set out in the March 2006 Consultation, MNOs subject to such controls will respond to linkages between retail and wholesale prices by making pricing decisions in respect of retail prices taking into account the consequent effect on call termination prices. Therefore, rather than drive competitive effects from retail into call termination the opposite effect may occur. The competitive effects in the retail market could become distorted by its links with the wholesale MCT market. For example, in considering a reduction in retail prices, an MNO will recognise that this will, in turn, lead to a consequent reduction in call termination prices. Depending on the levels of the two charges with respect to their respective underlying costs, the MNO may choose to forgo the benefits such a retail price reduction may bring (for example, in terms of greater market share) in order to preserve the (potentially monopoly) profits which accrue from call termination.

8.26 Ofcom also recognises that it would be necessary to consider what the appropriate starting price points should be for the different operators. MCT charges (and prices for retail outbound services) vary between MNOs and, to an extent, between termination technologies. Such a starting point would, in theory, be the competitive price level i.e. an efficient set of prices taking into account operators' efficiently-incurred costs. Therefore, such an approach, if rigorously applied, will not preclude the need for a detailed assessment of the appropriate starting point. This in turn, would require an understanding of the cost structures of the existing operators and the relationships between prices for different services and their underlying costs.

8.27 Further practical difficulties arise as a consequence of the introduction of increasingly sophisticated pricing structures for access and call charges. The retail mobile market

is characterised by significant use of bundling (for voice and data traffic as well as including both on- and off-net calls to both fixed and mobile networks) and flat-rate charging structures. As a consequence of this complexity the identification of price(s) for an appropriate measure of retail prices to which mobile termination charges could be tied is challenging. In addition, attempting to specify a framework which regulates all operators with equal levels of stringency such that a 'fair' framework for competition is established, is also difficult since complexity and differences across operators' tariffs means there is scope for operators to manipulate any established price index. Furthermore, given the variety of available pricing structures, it is quite possible that if retail tying were introduced operators would not only make decisions regarding price changes with respect to their knock-on effects to mobile termination charges, but also in respect of the definition of those prices themselves, as baskets, services and service offerings constantly evolve in response to consumer demand.

8.28 One possible way to reduce the impact on retail markets involves the use of a framework whereby (i) the lowest industry mobile termination charges are adopted as the starting point and (ii) changes in mobile termination charges are based upon changes in industry price movements. Ofcom considers that this framework would dampen the feed-through from retail prices to mobile termination charges for any given operator, as their respective retail market shares will be below 100%. This could lead to a possible outcome such that the gain in retail market share from undercutting rivals will more than outweigh the diluted impact of reduction in mobile termination charges for all. However, whilst such an approach dampens the retail market distortion arising due to the knock-on effects to mobile termination charges, it still does not address the fundamental weakness of the framework in that this link remains. Operators will be incentivised to retain existing economic profit and desist from price competition that reduces their profits but is beneficial for consumers.

8.29 An extension of this framework is one in which the changes in the mobile termination charges of any given operator is a function of changes in the retail prices of the other operators. T-Mobile, in its response to the Preliminary Consultation, noted that the risk of distorting spillover effects could be addressed in this way. The approach breaks the link, for each operator, considered individually, between retail prices and mobile termination charges. However, the outcome of such a framework is ambiguous, and will depend, inter alia, on the assumptions made by each operator in respect of competitive responses to lower retail prices.

8.30 It is instructive to note that such an approach was relied upon from July 2001 by the Australian Competition and Consumer Commission (ACCC)[53]. This approach tied the change in each operator's mobile termination charges to the retail price movements of its 'overall package of services.' The ACCC adopted such an approach against the backdrop of significant recent reductions in retail charges and, in parallel with its introduction, also established a monitoring framework to assess the outcome. The ACCC noted, in recommending a return to mobile termination charge regulation in March 2004, that 'this ha[d] not been as effective as it was hoped, as retail prices in mobile services ha[d] not decreased as much as was expected.' This is in keeping with the outcome of the review process, which concluded that 'during the monitoring period, the rate of change in the retail price of the bundle of mobile services … was, by and large, inconsistent with the price decreases observed by the Commission prior to adopting this methodology … [and that] such results would appear to call into question the foundation upon which the retail benchmarking principle is designed to work.' Whilst this is not proof of the concern that MNOs' retail pricing decisions would be distorted by the knock-on effects to mobile termination charges, it is certainly

[53] See ACCC: Mobile Services Review, Mobile Terminating Access Service, June 2004

consistent with such an outcome. The ACCC now adopts a cost-oriented approach to determining the appropriate level of mobile termination charges.

8.31 In conclusion, retail tying may have the benefits of lower administrative and informational burdens when compared, for example, with cost orientation. However, it is Ofcom's view that the cost of competitive distortions which may 'spillover' into the retail markets outweighs the benefits relative to other options for controlling MCT charges which do not rely on this linkage. It is also Ofcom's view that, given the need to determine the fair starting point for the relation between retail prices and MCT charges, retail tying does not obviate the need for Ofcom to take a view as to the appropriate level of MCT charges (albeit defined relative to specified retail prices). In Ofcom's view, the potential costs arising from this assessment (particularly, the costs consequent on setting charges too high or too low) are no less than those which may be incurred in the course of more obviously intrusive forms of regulation such as charge controls.

Ex ante conditions requiring that charge are 'fair and reasonable' or cost oriented

8.32 The March 2006 Consultation noted that, in their application, there are likely to be close similarities between SMP conditions requiring, respectively, that charges are "fair and reasonable" ("F&R") or cost oriented. Whilst the term F&R itself allows for significant freedom of interpretation, its practical application, in the context of SMP regulation, has tended to be linked to some definition of cost, both in the UK and in other jurisdictions. As noted in paragraph 4.11of the Statement on end-to-end connectivity (see note 32 above), however, interpretation of the concept of "reasonable terms" when applied in a context where the supplier does not have SMP, will depend on the particular circumstances and may span a broader range of outcomes than that which might be considered in the circumstances of SMP.

8.33 For example, the Swedish regulator, PTS, has articulated a more explicit link between F&R and cost orientation. In the market for mobile call termination, five operators were judged to have SMP, but only three; TeliaSonera, Tele2, and Vodafone, are under cost orientation obligations, while H3G and Telenor are required to adopt F&R pricing. The PTS clarified this by stating that charges should be "fair and reasonable with reference to performance costs". A similar approach to regulating H3G has been applied in Denmark, although the European Commission has expressed concerns as to what this means in practical terms.

8.34 In Australia, interconnection rates are determined by negotiation, but the negotiating parties do have recourse to the regulator who will make a decision to ensure that rates are fair and reasonable. The rates charged should be cost orientated, transparent, reasonable, have regard to economic feasibility, and sufficiently unbundled so that the operator only pays for the network components required.

8.35 In the context of F&R as a remedy to SMP in mobile call termination, as a consequence, whilst the term itself allows for significant freedom of interpretation, its practical application in these markets, along with the necessary conditions, may yield, in this case, an outcome that has similarities with cost orientation. Responses to the March 2006 Consultation recognised these similarities. No respondents expressed a clear preference for one of these forms of regulation over the other, even where a condition requiring that charges should be fair and reasonable or cost oriented was the preferred approach where SMP could be demonstrated to exist. H3G, which expressed a strong preference for one or other of these forms of regulation as an alternative to charge controls, expressed a slight preference for

condition requiring that charges must be cost oriented (as opposed to "fair and reasonable") on the basis that such a condition might be more closely aligned with the principle that MNOs should be permitted to recover efficient costs. However H3G acknowledged that the issue is finely balanced and which approach is preferable would depend on the actual implementation and detail around the guidance provided as part of the remedy.

8.36 The following paragraphs explore the costs and benefits of these forms of regulation. Ofcom considers that, in practice, the costs and benefits of these two approaches to regulation in these markets are very similar.

8.37 The March 2006 Consultation recognised the merits of cost orientation in respect of economic efficiency and efficient market entry and exit decisions. However, the document also noted that, in the markets under consideration, there potentially exist material disadvantages in imposing a cost orientation remedy or F&R condition on its own. These disadvantages included that it would be highly likely to result in a period of commercial and regulatory uncertainty (including disputes, challenges and appeals) followed by the likely setting of prices or imposition of charge controls in response to individual disputes. As such, it was Ofcom's view that the approach was likely to be burdensome, costly and inefficient. The March 2006 Consultation specifically invited interested parties to say whether they agreed with this view.

8.38 BT and C&W both agreed with Ofcom's view, and BT draw attention to what it perceived as a failure of such an approach during the 1990s which led to charges being referred to the MMC in 1998. [✂.]

8.39 The views of mobile network operators were more varied. O2 agreed with Ofcom's view and argued strongly that either approach (cost orientation or F&R) would be abused by some MNOs which would exploit the uncertainty by setting high charges, prompting others to follow suit. Vodafone, T-Mobile and Orange, however, all noted that such a framework could be made to work provided that Ofcom issued appropriate guidelines. That view was also shared by H3G, which expressed a strong preference for one or other of these approaches in place of a direct charge control (if a need for regulation could be justified). Indeed H3G argued that Ofcom had dismissed this approach far too quickly. T-Mobile, in support of its view that there is merit in such an approach, noted that Ofcom had proposed that controls on BT's retail prices should be lifted in favour of reliance on assurances from BT, despite BT's continuing high market share in the access and calls markets.

8.40 Ofcom recognises that it would be possible for it to publish guidelines on its approach to assessing whether charges are cost oriented (or whether charges are F&R if some other measure of fairness and reasonableness was judged appropriate). However, as illustrated in Section 9 below, the complexity of MCT costs is such that any assessment will inevitably necessitate very detailed decision taking on conceptual issues. These include accounting principles, allocation of common costs and allowance for network externalities, as well as principles for recovery of direct costs and licence fees. Each of these factors, depending on the approach taken, has the potential to make significant differences to the view of whether any charge is cost oriented or F&R. In Ofcom's view, it is highly unlikely that any guidelines, short of a detailed published evaluation of costs, would be sufficient to provide purchasers and suppliers with a reasonable level of clarity as to the level of charges which could be considered cost oriented or fair and reasonable.

8.41 As summarised in Annex 20 below, responses to the March 2006 Consultation, from suppliers as well as purchasers, highlight the absence of a common industry view of

what is the appropriate level of charges for MCT and what, if any, cost differences between different suppliers should reasonably be reflected in charges. Ofcom remains of the view that reliance on a condition requiring that charges must be cost oriented or F&R, even in the presence of detailed guidelines, would result in a period of uncertainty followed by the likely imposition of charge controls in response to specific disputes, unless the "guidelines" were so prescriptive as to set out the appropriate level of charges in closely specified circumstances. In Ofcom's view, as proposed in the March 2006 Consultation, with detailed cost modelling, and having consulted extensively on conceptual costing issues, it would not be appropriate to delay publishing a conclusion on the appropriate level of costs until disputes are brought, particularly if such an approach is taken simply on the grounds that a restricted obligation is "light touch".

8.42 The approach would generate costs in terms of market distortions caused by different suppliers adopting different charge setting strategies in response to regulatory uncertainty. As O2 argued in its response to the March 2006 Consultation, it is likely that some suppliers would exploit the regulatory uncertainty by setting charges at a relatively high level, preferring to delay aligning charges with cost until Ofcom has determined the appropriate level of charges. Others, seeking to avoid regulatory intervention, might initially set charges at a relatively low level, subsequently increasing their charges in response to the behaviour of other suppliers. As a consequence, until charges are determined by Ofcom, the level of charges would tend to reflect suppliers' views on their ability to take advantage of the regulatory uncertainty. There would also be administrative costs in resolving multiple disputes, and costs arising from purchasers' uncertainty about the level of costs to be included in retail prices for calls to mobiles. These costs are unlikely to be outweighed by any benefits which, in Ofcom's view, would be largely illusory, limited to an appearance of "light touch" regulation.

8.43 Ofcom notes H3G's view, as expressed in the March 2006 Consultation, that a cost orientation or F&R condition would afford suppliers of MCT greater flexibility to alter charges in response to unexpected changes to costs as and when these become apparent. In H3G's view, the uncertainty with respect to future costs is such that, while a charge control might afford certainty about the future level of the regulated charge, it provides no certainty that suppliers will be able to recover efficiently incurred costs. In Ofcom's view, the appropriate approach to dealing with any uncertainty about future costs, in the context of a charge control, is to assess the detriment consequent on setting charges too low or too high, and to set charges at a level which minimises the risk of such detriment. Ofcom has explored this approach in paragraphs 9.74 to 9.77 below. In Ofcom's view, the alternative approach, of enabling suppliers of MCT to alter their charges as and when they perceive a change in costs, would generate a high probability of multiple series of disputes initiated each time a charge is altered. There is also the risk that charges overall will rise as suppliers may increase their charges in response to increases notified by other suppliers of MCT.

8.44 Therefore, in the presence of SMP, Ofcom does not consider it appropriate to rely solely on an obligation that charges should be cost oriented or F&R. The benefits arising from cost reflective charges (as set out in Section 7 above) are likely to be similar to those of a charge control set directly by Ofcom. However, the method of achieving that outcome (i.e. by resolving disputes as and when received) is likely to be more costly than that of a direct charge control, in terms of continuing commercial uncertainty, a high risk that charges will remain excessive until disputes are resolved and higher administration costs.

8.45 Ofcom does believe, however, that it would be appropriate to include an obligation to supply MCT on fair and reasonable terms as part of the proposed Network Access obligation. This view is explored in paragraph 8.58 below.

Charge controls

8.46 A charge control is distinct from an obligation that charges should be cost oriented or 'fair and reasonable', in that an upper limit on prices is directly set by Ofcom. Such an arrangement can create positive incentives, from the outset, for MNOs to reduce their costs in order to benefit from increased profitability during the period of the control.

8.47 In the event that Ofcom decides to impose a specific charge control, the appropriate level of charges would be determined after detailed consultation with stakeholders. That process takes place over a significant period of time and involve a high degree of interaction with stakeholders. In contrast, where Ofcom is requested to resolve a dispute, Ofcom is generally required by the Act to resolve the dispute within four months. In the case of dispute resolution, while Ofcom could be expected to establish a close dialogue with the parties to the dispute, the opportunity for close and transparent consultation with a wide spectrum of stakeholders would be limited. Ofcom recognises that where it has already consulted on the basis on which future disputes will be addressed and has published Guidelines, all interested parties could be said to have had some opportunity to influence the approach which Ofcom takes. However, as noted in paragraph 8.40 above, for such Guidelines to be capable of ensuring that there is a reasonable level of clarity about Ofcom's future approach, they would need to set out in considerable detail Ofcom's views on a wide range of complex conceptual and charging issues. In such a case it might be considered more appropriate to enforce the detailed views expressed with a direct charge control (which would remove uncertainty arising from implementation and compliance).

8.48 Furthermore, the timing of regulatory intervention to set a charge control would be known to stakeholders (in contrast to the situation under a cost-orientation or fair and reasonable charges obligation where timing would be dependent on when a dispute is brought to Ofcom for resolution). A decision to impose a direct charge control may, therefore, avoid a period of uncertainty and enable controls to be imposed in an orderly manner and on a basis which has been subject to extensive consultation, rather than on an ad hoc basis in response to individual disputes.

8.49 In their responses to the March 2006 Consultation, Vodafone, Orange and T-Mobile all acknowledged that, where SMP can be shown to exist and the consequent detriment can be shown to require action to constrain charges, the direct setting of an appropriate charge control can be an efficient and proportionate remedy for SMP. O2 did not comment on the merits of a direct charge control but, as noted in paragraph 8.39 above, was strongly of the view that a condition requiring that charges should be cost oriented or fair and reasonable would be abused by at least one supplier of MCT. H3G, as noted in paragraph 8.43 above, was of the view that a direct charge control, while providing certainty with respect to the regulated charge fails to provide adequate certainty that charge controlled suppliers of MCT will be able to recover their efficiently incurred costs in the light of uncertainty about future costs. All MNOs shared H3G's concern that any control must allow suppliers to recover their efficiently incurred costs. T-Mobile proposed that a proportionate approach might be to apply a safeguard cap which is set at a level that provides a high degree of confidence that suppliers will be able to recover their costs. Ofcom has set out in Section 9 its approach to addressing uncertainty with respect to future costs, which relies in part on the use of conservative assumptions about future traffic volumes.

8.50 As noted in paragraph 8.41 above, responses to the March 2006 Consultation expressed widely divergent views on whether the present MCT charges (regulated and unregulated) of the various suppliers can, broadly, be considered fair and reasonable. This evidence suggests to Ofcom that there is no consensus view on the appropriate level of charges for mobile voice call termination in a world where calls are variously terminated using 2G and 3G networks. In Ofcom's view, therefore, a reliance on a requirement that charges should be cost oriented or fair and reasonable would almost certainly result in a period of commercial uncertainty and subsequent challenge. In these circumstances, it is Ofcom's view that it would be more efficient to set charges ex ante on a transparent basis following extended consultation. Furthermore, it is Ofcom's view that the charge controls imposed in these markets in June 2004 have been broadly successful to date in preventing MNOs from exploiting their SMP to the detriment of consumers.

8.51 In view of the costs and benefits of the different options identified for constraining MNOs with SMP from setting excessive MCT charges to the detriment of consumers, it is Ofcom's view that the most cost effective option is a direct charge control. Ofcom recognises that direct controls on charges are an intrusive form of regulation and should be designed with great care to avoid regulatory distortions and unforeseen consequences. In Section 9 below Ofcom sets out its view on the costs and benefits of different charge control structures and charge levels

Proposed additional conditions

8.52 The March 2006 Consultation proposed that three further conditions should be imposed on MNOs which have SMP in the market for the supply of MCT, in addition to an appropriate condition to constrain charges.

Condition requiring publication of charges

8.53 As noted in paragraph 8.22 above, Ofcom does not consider that a price transparency obligation alone would provide sufficient constraint on MNOs' ability to exploit SMP to the detriment of consumers. However, the March 2006 Consultation reported Ofcom's view that it is important that charge controls are associated with a high degree of transparency for interconnecting operators, consumers and other interested parties and commentators. MNOs are currently subject to an obligation to notify charge changes to interconnected parties, but Ofcom proposes that this obligation should be extended to an obligation to publish charges at large. [✂] None of the non confidential responses to the March 2006 Consultation commented on the need, or otherwise, to require MNOs with SMP in MCT to publish at large their charges for MCT, as well as notifying those charges to Ofcom and to interconnected parties. Ofcom proposes that such a requirement should be imposed on all MNOs with SMP.

8.54 The March 2006 Consultation proposed that, in the event that some form of blending of 2G and 3G charges based on actual traffic volumes can be envisaged, this should be made subject to an obligation to publish the basis on which charges are blended, including the relative weights, based on volumes of the different services within any blend. This information would both provide transparency to stakeholders and facilitate compliance monitoring by Ofcom. As explained in paragraph 9.9 and 9.10 below, however, it is Ofcom's view that separate charge controls imposed on 2G and 3G termination are not desirable and, therefore, the issue of blended charges will not arise in future. Condition MA6 at Annex 21 does not, therefore, contain any provision for such data to be provided to Ofcom.

Obligation to publish access contracts

8.55 Ofcom also considers it appropriate that MNOs with SMP should be required to publish their access contracts, in addition to publishing their charges. In Ofcom's view both publication obligations are required to enable purchasers to assure themselves that MNOs are complying with their obligation not to unduly discriminate in the supply of MCT.

Prohibition of undue discrimination

8.56 The March 2006 Consultation explained that Ofcom considers that a prohibition of undue discrimination remains important to ensure that SMP is not used to the detriment of consumers. As noted in paragraph 7.35 above, the pricing freedom, enjoyed by the MNOs with SMP in the mobile termination markets could be used to distort and reduce competition in the retail mobile market. In particular, concerns could arise with respect to smaller new entrants, including future new entrants which may emerge with the increased availability of spectrum. Ofcom therefore proposes that all MNOs with SMP should be prohibited from unduly discriminating in the supply of mobile voice call termination. The draft condition "Undue discrimination" at Annex 21 sets out the scope of the prohibition, which is similar to the condition which currently applies to 2G/3G MNOs in respect of to 2G voice call termination, with the exception that the proposed condition would now apply to all forms of mobile voice call termination.

Obligation to meet reasonable demand for voice call termination

8.57 The March 2006 Consultation noted that the imposition of a charge control is of limited value if the supplier remains at liberty to refuse to meet reasonable demand for voice call termination or will only offer this on unreasonable contractual terms. Ofcom is therefore of the view that all MNOs with SMP should be subject to a condition requiring them to meet reasonable demand for mobile voice call termination on fair and reasonable terms. The draft condition "Obligation to meet reasonable demand for mobile voice call termination" at Annex 21 sets out the proposed scope of this condition, which is similar to the condition which currently applies to 2G/3G MNOs in respect of to 2G voice call termination, with the exception that the proposed condition would apply to all forms of mobile voice call termination.

Legal tests

8.58 Ofcom has explored more fully in Section 10 below its application of the legal tests for deciding whether it is appropriate to impose these SMP conditions (including charge controls) in these markets. Before doing so, however, Ofcom has set out in Section 9 its preferred approach to controlling charges.

***Question 3**: Do you agree that it is appropriate to impose the following SMP conditions on each of the five MNOs;*

- *A charge control on mobile to mobile MCT to apply until 31 March 2011.*
- *A charge control on fixed to mobile MCT to apply until 31 March 2011*
- *A prohibition of undue discrimination*
- *An obligation to meet reasonable requests for MCT on fair and reasonable terms*

- *An obligation to publish access contracts*
- *An obligation to publish charges*

Section 9

Impact Assessment: Part 3 – Charge control options

9.1 For the reasons set out in Section 8 above, Ofcom is proposing that charge controls are the most appropriate means of addressing the detriments, identified in Section 7 above, that are likely to arise from the MNOs exercise of SMP in each of their respective markets where they supply MCT to other Communication Providers.

9.2 The charge controls in force today are time-limited and apply only to four of the five MNOs (no proposal was made to impose charge controls on H3G in June 2004 when Ofcom determined that H3G had SMP) and only to termination of voice calls on those MNOs' 2G networks. A number of key questions arise, therefore, when considering the form of any future charge controls;

- **Duration**; how long each control should last for,
- **Technology neutrality**; whether charge controls for a given operator should continue to distinguish which network (2G or 3G) is used to terminate voice calls,
- **Operator neutrality**; whether the same charge controls or different controls (or no controls) should be imposed on each or only some of the MNOs,
- **Path of reductions in charges**: how charges should be brought down to the level of the efficient charge during the course of the control period.

9.3 The following paragraphs consider these in turn.

Duration

9.4 With respect to the first question, it is Ofcom's view that the duration of the charge control should be of sufficient length to establish material incentives for MNOs to reduce their costs in order to benefit from increased profitability during the period of the control. Furthermore, Ofcom notes that each review of the market for MCT has required a detailed and complex assessment of costs, which has generated significant commercial uncertainty for purchasers and suppliers. Such reviews also require the MNOs (and major purchasers) to devote significant resources to presenting their views on competition and the level of costs. As such, it is Ofcom's view that there are benefits in setting charges for an extended period of time during which suppliers and purchasers can operate with a high degree of certainty as to MCT charges.

9.5 Ofcom recognises, however, as H3G noted in its response to the March 2006 Consultation, that a lengthy charge control may exacerbate the effects of forecasting or costing errors. The consequent risks must, therefore, be taken into account when deciding on the duration of any charge control. As set out in more detail below (and in Annex 5), Ofcom has addressed the identified risk of forecasting errors in this market review by considering a range of plausible traffic scenarios. Furthermore, as noted in the March 2006 Consultation, in the event that unexpected market or technological developments (such as VoIP) start to have a material impact on the MCT market, such that it appears that charge controls may no longer be required, it

would be possible (and appropriate) for Ofcom to review the market again before any charge control expires, with a view to withdrawing the charge control conditions.

9.6 Having assessed the risks and benefits of a lengthy charge control compared with a charge control of shorter duration (as set out in paragraph 9.4 above), and taking into account that Ofcom (and Oftel before it) has generally set charge controls, in other markets, for a duration of four years, Ofcom proposes that charge controls should be imposed with a duration of four years from 1 April 2007 when the charge controls presently in force in respect of the 2G/3G MNOs expire.

Technological neutrality

9.7 In respect of the second question, the March 2006 Consultation observed that, logically, there are three options for charge controls applied to an MNO operating both 2G and 3G networks:

- a charge control (or controls) for voice call termination on 2G networks, or 3G networks, but not both;
- separate charge controls for mobile voice call termination on 2G and 3G networks; and
- a combined charge control (or controls) for the blended mobile voice call termination rate on 2G and 3G networks, irrespective of which technology is used.

9.8 A decision to charge-regulate only 2G or 3G MCT, while allowing MNOs to charge a single blended contractual charge for an undifferentiated wholesale service, provides MNOs with the ability to set blended contractual charges at the level of their choice (subject to any commercial or competition law constraints). This factor is evidenced by the proposed and/or actual blended contractual charges of the four 2G/3G MNOs today (see Figure 2.1 above). It can be argued that, in the presence of charge regulation which applies only to one of these two forms of MCT, blending of regulated charges (2G in the present case) and unregulated charges (3G in the present case) should be prohibited. Such a prohibition, however, would be unlikely to be practicable as the network (2G or 3G) used to terminate a call depends on the capability of the called phone and its location. Neither the calling party (or his call provider) nor the billing systems of the terminating MNO are able to determine in advance of call set-up which type of MCT will be used. Indeed the call may switch between MCT types while in progress if the called party is moving.

9.9 Ofcom proposes, therefore, that the option to regulate MCT on either 3G networks or 2G networks (but not both) would be undermined by the ability to set unregulated blended charges, and should not be pursued.

9.10 The option to set a control for voice call termination on the 2G network, and separately, a control on the 3G network would prevent operators from setting blended charges above the regulated levels. However, such an approach may influence the rate of migration between the two networks, depending on the actual or perceived relative stringency of the controls. In this regard, and as explained in paragraph 7.54 of the March 2006 Consultation, differing levels of stringency across the two separate controls would mean that cost minimisation and profit maximisation outcomes (within the constraints of charge controls) would not be congruent. For example, in the event that operators perceive the controls on 3G call termination charges to be more stringent than those applied to 2G call termination, they may be

encouraged to retain significant traffic volumes on the 2G networks even where migration to 3G networks may present a more efficient (i.e. lower cost) longer term outcome.

9.11 Ofcom is therefore of the view that a single charge control to apply to a given operator without distinction of the network used to supply MCT, described as a 'technology neutral' approach in the March Consultation, is appropriate and consistent with Ofcom's duties under Section 4(6) of the Act. It would provide appropriate incentives for operators to invest in and migrate traffic to the most efficient network, i.e., that with the lowest unit costs, such that cost minimisation and (constrained) profit maximisation are congruent. In Ofcom's view, a single technology-neutral control would also provide operators with appropriate incentives to invest in and utilise the lowest-cost technologies to the benefit of end users.

9.12 With one exception, responses to the March 2006 Consultation were all in favour of the technology-neutral approach (should it be demonstrated that charge controls are appropriate). H3G, by contrast, argued that Ofcom should accept the inevitability of regulatory distortion and should act with a view to encouraging investment in 3G networks. Ofcom does not agree that regulatory distortion in inevitable. As discussed above Ofcom considers the potential for separate charge caps to distort MNOs incentives to use one network over another. Ofcom considers that a single charge cap to apply irrespective of what network is used to terminate a call provides MNOs with incentives to use the most efficient technology.

9.13 Ofcom notes that the level of this charge control is an important issue. Vodafone and H3G expressed some concern that the March 2006 Consultation appeared to link the concept of technological neutrality to a particular approach to charge setting (one based on benchmarking to 2G costs). As Ofcom has subsequently explained to these respondents, this was not Ofcom's intention. Where the concept of technological neutrality is adopted, the level of charges under such a control might be set by reference to any number of benchmarks or cost models as is discussed later in this section. The distinguishing feature of the "technology neutral" model, as envisaged by the March 2006 Consultation, was simply that no distinction is drawn between the permitted regulated rate for 2G and 3G MCT for MNOs operating both networks.

Operator neutrality

9.14 With respect to operator neutrality, the March 2006 Consultation noted that such considerations would need to be informed by cost information relating to the different MNOs. Furthermore, the March 2006 Consultation noted that consideration of the relative merits and demerits of setting a uniform charge cap across all MNOs with SMP, as opposed to different charges by operator or operator type, should be made within the context of the principle that differences in costs resulting from exogenous factors merit consideration in determining the appropriate level(s) of price(s) across operators. However, endogenous differences should not be reflected in distinct charge caps, as such reflection may reward inefficiency.

9.15 Responses to the March 2006 Consultation were broadly in agreement with Ofcom's view, although varied views were expressed about the extent, if any, and the nature of any exogenous costs differences. These issues are explored more fully in paragraphs 9.56 to 9.62 below).

Path of reductions in charges

9.16 In broad terms, the path of reductions in charges should give due consideration to balancing two objectives:

- reductions should be achieved sufficiently quickly in order to deliver substantial benefits to consumers; and
- reductions should allow sufficient time for operators and customers to adjust to new levels and structures of mobile charges and take these changes into account in their business plans and planned capital expenditure.

9.17 The first point seeks to ensure that consumers are able to benefit from lower fixed network services (including fixed to mobile calls). The second point notes that benefits to callers to mobiles should not be at the expense of unacceptable disruption to the mobile sector, the industry and consumers more generally. The relevant considerations are discussed in paragraphs 9.74 to 9.77 below.

Key benchmarks for establishing the level of technology neutral control(s)

9.18 There are three key cost benchmarks to consider in evaluating relative and absolute levels of cost-based charges for MCT:

- a '2G-only' approach i.e., assuming 2G networks represent the efficient benchmark for the supply of voice call termination;
- a 3G-only approach, on the basis that 3G networks represent, on a forward-looking basis, the appropriate technology and associated costs; and
- a blended 2G and 3G approach (using a 3G-only structure when considering a 3G-only MNO's costs) consistent, in terms of technology, with existing networks and plans.

The 2G-only approach

9.19 In as much as 2G and 3G voice call termination can be viewed as delivering the same service, there may be an argument for taking the cost of 2G termination as a benchmark for a reasonable cost of supplying MCT in general, irrespective of the technology used to supply it in practice. Callers and their call providers are unable to select which type of termination is used to terminate any given call (and are unlikely to have a preference based on the quality or nature of the service). 2G has been the technology used to deliver mobile voice call termination for many years. It could be argued that the charge for this service should not be higher in the future as a consequence of the introduction of 3G as a new technology to supply what can be considered to be the same wholesale termination service.

9.20 As Ofcom noted in paragraph 7.60 of the March 2006 Consultation, an approach on these lines would be consistent with Ofcom's approach to charging for narrowband conveyance ("PSTN-emulation" services) on BT's NGN. Charges for the latter are subject to the Network Charge Control (NCC) which was set on the basis of projections derived from PSTN costs. It is Ofcom's view[54] that such an approach has

[54] set out in "Next Generation Networks: Developing the regulatory framework", March 2006 (See http://www.ofcom.org.uk/consult/condocs/nxgnfc/statement/)

good incentive properties in the short-term and is likely to be appropriate until a future NGN interconnect model is agreed.

9.21 In considering this approach, however, it is important to recognise the potential impact on investment incentives if MNOs are unable to recover their efficiently-incurred costs, for example if the cost of supplying 3G termination is above the cost of 2G. In addition Ofcom is mindful of the concern raised by Vodafone and T-Mobile in their responses to the March 2006 Consultation, that a decision to set charges for 2G and 3G termination simply on the basis of present 2G costs, may present a risk that MNOs will under-recover costs in a phase in which they are running two networks in parallel.

The 3G–only approach

9.22 Alternatively, as H3G noted in its response to the March consultation, there may be an argument that it is impossible for regulation not to distort MNOs incentives (i.e. to avoid creating incentives to migrate traffic to a lesser or greater extent between 2G and 3G networks), and that Ofcom should set out to promote investment in 3G as a policy objective. On this basis, charge cap levels would be set with this objective in mind.

9.23 This issue has most impact on the 2G/3G MNOs, and H3G's view was that this policy aim would be best achieved by setting separate charge controls (each with distinct incentive properties). However, Ofcom considers that to the extent that 3G unit costs are lower than 2G unit costs (which, as discussed in Annex 13, is supported by Ofcom's cost analysis, at least in the long term) if Ofcom sets a single charge for termination in line with the principle discussed above MNOs will be incentivised to migrate customers to 3G because this is the lower cost technology.

The 2G/3G blended approach

9.24 Ofcom proposes that the level of the charge control(s) to be applied to MNOs with 2G and 3G networks should be determined with reference to a blended 2G/3G benchmark. This will be based on an average of 2G and 3G cost benchmarks, weighted according to the respective volumes of terminated voice minutes in each year. These component 2G and 3G cost benchmarks for an MNO with both 2G and 3G networks can be constructed so as to take into account reasonable assumptions around the migration of traffic between these networks and the potential cost savings arising due to a degree of asset sharing.

9.25 To the extent that such controls would not enable a 3G-only MNO to recover its efficiently incurred costs (if the costs of a 3G-only MNO are higher than the average cost of an MNO operating both 2G and 3G networks), it is Ofcom's view that charge controls in respect of a 3G-only MNO should be benchmarked to the costs of 3G MCT. This issue is discussed in more detail at paragraphs 9.61 to 9.62 below. 3G-only cost benchmarks have been constructed so as to account for national roaming agreements which allow traffic in (rural) areas outside the MNO's own 3G network coverage to be carried on the network of another operator. Such traffic has been excluded so that only own-network costs are considered.

Approach to identifying the efficient charge level

9.26 In assessing the efficient charge level for providing MCT, it is worth highlighting four components as follows;

- Network costs
- 3G spectrum costs (included within the network cost modelling)
- Non-network costs
- Network externality surcharge

9.27 Each one of these components of the cost of MCT is subject to uncertainty and sensitivity to key assumptions. Ofcom has therefore sought to identify a reasonable range of values for the overall cost of MCT that is based on scenarios for these key components and the underlying assumptions. Having defined these ranges, Ofcom has used these to determine the parameters of a series of ranges in respect of the efficient charge level for MCT. These are set out in Figure 9.1 below.

9.28 Ofcom's approach to modelling network costs is summarised in Annex 5 below and its approach to non-network costs is set out in Annex 15. A range of different views on the appropriate approach to account for 3G spectrum costs is considered in Annex 14, and the different methodologies for assessing network externality effects are explored in Annex 16. The following paragraphs provide a high level summary of Ofcom's approach in each case.

The network cost model

9.29 In considering the form of any charge control it is necessary to understand the levels and structures of costs across the different operators and, specifically, the costs of providing MCT. As set out in Annex 5, Ofcom has conducted an extensive cost modelling exercise, in close association with the MNOs, to forecast costs under a broad range of different scenarios. The structure and scope of the model is set out in Annex 5. The primary objective of the model is to assess on a LRIC basis the network costs of a single MNO of delivering voice services over 2G and/or 3G mobile networks. However, there are significant economies of scope in the provision of voice and data services, particularly on 3G networks. Therefore data services have also been included in order to provide an accurate view of the costs of voice services and voice termination in particular.

9.30 The model is based on the use of technologies and spectrum bands which have been, or are currently being deployed in the UK. Specifically it includes:

- GSM in the 900MHz band
- GSM in the 1800 MHz band
- UMTS using 5MHz paired spectrum in the 2.1GHz band.

9.31 The model explicitly calculates the capital and operating costs associated with network equipment, in particular the following:

- Radio network (including base station sites and equipment)
- Backhaul (i.e. links from the base stations to the core network)
- Backbone network
- Core network switching equipment and other assets.

9.32 In line with the approach taken in the 2G LRIC model, used by Ofcom to determine the appropriate level of charges in June 2004, the model includes all network costs from the radio network to the core network, up to and including the gateway switches and interconnect ports. The model explicitly calculates the network costs for the period 1990/91 to 2039/40.

9.33 As in the previous market review, the depreciation approach selected by Ofcom for defining paths of cost recovery within the LRIC model is economic depreciation (see Annex 5). This matches the cost of equipment to its actual and forecast usage over the long term. As a consequence, there is relatively little depreciation in years where utilisation is low and relatively high depreciation in years of full, or almost full, equipment utilisation. By contrast, usual accounting methods take the actual price paid for equipment (or its replacement cost) and divides this by the expected equipment life to reach a depreciation charge for the year (thereby adopting a straight-line depreciation profile). The timing of cost recovery under economic depreciation varies from that under such forms of accounting depreciation. Taking account of 3G network rollout, by the end of the proposed charge control period the use of economic depreciation results in a higher per minute cost of terminating calls. Conversely, in some years prior to the control, economic depreciation would have resulted in lower costs compared to an equivalent calculation based on accounting straight-line depreciation.

9.34 The cost model has been calibrated against MNOs' own high level accounting costs data to ensure that the model provides a reasonable estimate of a MNO's efficiently incurred costs. By calibrating Ofcom's model against this information it is possible that inefficient as well as efficient costs are included in Ofcom's benchmarks. However, Ofcom has not attempted to make any efficiency adjustments in the absence of compelling evidence suggesting it should do otherwise. The methodology used to conduct this calibration is set out in Annex 12, and the account data supplied by each MNO that is used when conducting this calibration is set out in Annexes 7 to 11. As the accounting data is confidential to each MNO, Annexes 7 to 11 are confidential and each is being released only to the MNO whose accounting data is considered in the relevant annex.

9.35 The impact of network costs on overall MCT unit costs varies significantly with variations in forecast voice and data traffic on 2G and 3G networks, as well as the choice of depreciation methodology and the approach to 3G spectrum costs. As explained in Annex 5, in forecasting demand, Ofcom has considered a broad range of scenarios encompassing high, medium and low cases for voice and data traffic usage per subscriber. These scenarios are based on historical data and a range of third party forecasts, including those provided by the MNOs. Ofcom has also considered a voice-only traffic scenario which it considers to be useful in determining more conservative unit cost estimates for MCT.

3G spectrum costs

9.36 Spectrum is a scarce resource and its opportunity cost is the measure of the resource cost to society. Consumers should ideally face this cost in order to be exposed to efficient signals for relative prices as between different services. The new LRIC model has the capability to include the cost of 3G spectrum and to apportion the recovery of this cost between voice and data services according to a range of methodologies. However, since these costs have the potential to make a substantial contribution to the overall cost benchmarks (MNOs paid between £4bn and £6bn for their 3G licences in 2000), the treatment of 3G spectrum costs is explained further below.

9.37 Ofcom has identified three potential objectives in assessing the costs of 3G spectrum to be included in the cost base and charges for mobile termination. These are:

- Providing appropriate price signals to consumers for efficient consumption of services using mobile termination;
- Impact on cost recovery by MNOs; and
- Incentivise operators to use spectrum efficiently.

9.38 The exploration of these issues in Annex 14 illustrates the difficulty in deriving a precise estimate of the appropriate cost of 3G spectrum for inclusion in regulated termination charges. In such circumstances, rather than exploring complex modelling, for example to estimate the marginal opportunity cost of 3G spectrum on a forward looking basis (that might prove to be inconclusive), Ofcom has instead explored the bounds of the impact of different licence fee treatments on Ofcom's cost benchmarks. The appropriate cost of spectrum can be expected to lie within these bounds.

9.39 Ofcom has therefore explored a number of scenarios for the treatment of licence fees with the aim of reflecting a reasonable upper and lower bound impact on the cost of mobile voice call termination. There are four key factors to the scenarios explored:

- Spectrum – the allocation of spectrum assumed (i.e. 2 or 3 carriers)
- Cost – the level of total 3G spectrum cost included in the model
- Market share in 2020/21 – the ultimate market share of the MNO at the end of the market share modelling period
- Allocation approach – cost allocated in proportion to lifetime radio traffic or total traffic volumes

9.40 These scenarios indicate an additional cost of around 1.1ppm in 2010/11 for the 2G/3G operators and 1.9ppm in 2010/11 for the 3G-only operator. The difference is due to the averaging of the 2G and 3G cost benchmarks in the case of the 2G/3G operators. In 2010/11, 2G/3G operators are still assumed to be terminating a significant proportion of calls onto their 2G networks and therefore the impact of the licence scenarios on the 3G cost benchmark is diluted when looking at the blended 2G/3G benchmark.

Non-network costs

9.41 As explained in Annex 15 non-network costs are costs of all activities that are not directly associated with enabling calls to be made. These can be grouped into three categories:

- Customer acquisition, retention and service costs (CARS) – comprising advertising and marketing, handset costs, discounts and incentives, customer care, billing and bad debts;
- Administrative costs – to include general overheads; and
- Other costs – costs that Ofcom considers are irrelevant to a consideration of the costs of MCT.

9.42 It is Ofcom's view that CARS costs should not be recovered from MCT. These costs should be recovered from the prices paid for mobile retail services since they are incremental to mobile retail services and vary with the number of subscribers on a MNO's network. Ofcom considers that administration costs are common across all an MNO's activities and therefore a share should be included in the costs of MCT. This is consistent with the approach taken by Ofcom in its last market review and by the Competition Commission.

9.43 Using the MNO's accounting information Ofcom has estimated the share of administration costs that can appropriately be allocated to network services and specifically to MCT. Ofcom estimates that £112m in 2006/7 terms should be allocated to network activities as a share of administration costs for the average operator. Ofcom proposes that the absolute level of MNOs' administration costs would remain relatively constant with changes in traffic. In addition Ofcom also assumes that the proportion of total costs that are network costs is constant over time. Therefore, Ofcom proposes that this estimate should remain constant in real terms on a forward looking basis.

9.44 The administration cost in each year is allocated across network activities e.g. incoming calls, outgoing calls and data services in proportion to the share of total network costs that these services account for. Under Ofcom's medium traffic scenario the impact on the overall cost of MCT in 2010/11 is an addition of 0.18ppm for the 2G/3G operators and 0.32ppm for a 3G only operator.

Network externality

9.45 As explained in Annex 16, users of both fixed and mobile communication networks benefit from having a large number of mobile subscribers with whom they are able to communicate. In general, however, when a person decides whether or not to subscribe to a mobile network, he takes his own personal benefit into account but not the benefit that fixed and other mobile subscribers derive from contacting and being contacted by him. This difference is the source of a "network externality".

9.46 In the presence of the network externality, not enough consumers may choose to become mobile subscribers from the perspective of society as a whole. This is because a person may choose not to join the network because his personal benefits do not cover the price of becoming a subscriber, even though economic welfare would be enhanced if he did, because of the benefits obtained by others.

9.47 In some cases, consumers internalise the network externality. For instance, this occurs when consumers contribute to the cost of the subscription of others with whom they expect to communicate. However, it is reasonable to expect that not all of the network externality is internalised and, therefore, that social welfare can be increased by providing a subsidy to some of those consumers who are not willing to pay the full price of subscription.

9.48 To the extent that any such subsidies need to be funded by MNOs, it would be optimal to collect revenues by raising the price of all services supplied by MNOs. Ofcom believes that it would be appropriate, therefore, for MCT charges to include a contribution towards the recovery of these subsidies ("externality surcharge").

9.49 It should be noted that the purpose of the externality surcharge is not to create a form of universal service provision of mobile services. It is designed to achieve the socially optimal level of subscription and usage. While externalities can provide a justification

for universal service provisions, they are not the only justification[55] and Ofcom's policy on universal service in telecommunications is achieved via obligations on BT.

9.50 Estimates of the optimal termination surcharge can be derived from a variety of modelling approaches. Ofcom does not consider that any single model is, on its own, sufficiently accurate to estimate the correct optimal surcharge due to the uncertainties in some key parameter values and the inability to capture the complex interaction between all the factors relevant to the determination of the optimal surcharge. However, by placing different weights on different factors, each modelling approach provides useful, albeit incomplete, information on the level of the optimal externality surcharge.

9.51 In particular, Ofcom has considered in Annex 16 an explicit externality model to inform its decision on the optimal externality surcharge. The explicit externality models, which follow a similar approach to that used by the CC in 2002.

9.52 In light of the results presented and discussed in Annex 15, Ofcom considers that the appropriate level of the externality surcharge is 0.3ppm.

Summary of cost modelling results

9.53 Ofcom has modelled a wide range of subscriber migration and voice and data demand scenarios including, at the extremes, those where voice and data traffic volumes are forecast not to increase materially from today's levels to, at the other extreme, assumptions that growth in voice and data demand will be vigorous over the modelled period. In determining the level of forecasts for a medium case "most likely" voice and data demand scenario, Ofcom has placed weight on MNOs' own demand forecasts as well as forecasts from independent analysts. Ofcom has also considered a 'voice only' scenario, which assesses the cost of carrying medium case voice demand in the absence of any data traffic.

9.54 Furthermore, Ofcom has examined various treatments for 3G spectrum costs in the case of the 2G/3G and 3G-only operator cost benchmarks. These account for different valuations of the spectrum, allocations of spectrum, assumed terminal market shares and methodologies for allocating the licence fee costs between voice and data traffic.

9.55 In combination, these alternative approaches to demand forecasts and the treatment of 3G spectrum costs result in a very wide range of cost benchmarks for each type of operator, as shown in Figure A13.11, which include the appropriate administration cost and network externality related mark-ups. Based on this wide range of benchmarks, Ofcom has determined three broad options for the level of charge controls for each type of operator. These can be characterised as generating "High", "Medium" and "Low" ranges of potential charge levels. The breadth of the ranges (1ppm for 2G/3G operators and 1.3ppm for 3G-only operators) reflects the degree of uncertainty with respect to future demand forecasts, which is greater in respect of a new entrant 3G-only operator[56]. The High unit cost scenario places weight on the lowest voice and data demand scenarios with minimal growth from today's levels, but

[55] See paragraphs G34 to G42 of Ofcom's *Strategic review of Telecoms* consultation: http://www.ofcom.org.uk/consult/condocs/telecoms_review1/telecoms_review/annexg/

[56] In the case of a 2G/3G operator, the level of uncertainty in the 3G cost benchmark is similar to that for a 3G-only operator. However, this uncertainty is diluted by the 2G cost benchmark (which is less uncertain due to the large proportion of modelled 2G demand which is historical and therefore fixed) in the calculation of a 2G/3G blended benchmark.

allows a significant contribution to recovery of the opportunity cost of 3G spectrum (as set out in Annex 14). The Low unit cost scenario, by contrast, allows no recovery of 3G spectrum costs on MCT and assumes, for the reasons set out in paragraphs 9.19 to 9.20 above, that charges for MCT on 3G networks should be no higher than the charges for MCT on 2G networks. The Medium cost scenario makes similar assumptions in respect of recovery of 3G spectrum costs as the High cost scenario, but places weight on the balanced medium voice and data and conservative voice only demand forecasts discussed above. Ofcom therefore considers that this scenario includes a range of conservative unit cost benchmarks.

Figure 9.1 Ranges for unit charge levels in 2010/11 (real 2006/07 prices)

Unit cost range	MNOs with 900/1800MHz 2G networks plus 3G networks	MNOs with 1800MHz 2G networks plus 3G networks	3G–only MNOs
High	5.9-6.9ppm	6.2 – 7.2ppm	8.0 – 9.3ppm
Medium	4.5 – 5.5ppm	4.8 – 5.8ppm	5.4 – 6.7ppm
Low	3.2 – 4.2ppm	3.4 – 4.4ppm	3.0 – 4.3ppm

Cost differences between MNOs

9.56 As noted in paragraph 9.14 above, Ofcom considers that exogenous cost differences between MNOs may warrant consideration when determining the appropriate level of any charge controls. The cost modelling undertaken by Ofcom indicates that there may remain some exogenous differences between the costs of MNOs which are reliant on the use of different spectrum allocations (although over time, spectrum liberalisation and trading should cause these differences to cease to be exogenous). All MNOs operate 3G networks using spectrum in the 2100MHz band and Ofcom considers that these spectrum allocations present no material exogenous cost differences. Additionally, Vodafone and O2 operate 2G networks mainly using 900MHz spectrum (although they also use some 1800MHz spectrum) and Orange and T-Mobile operate 2G networks using 1800MHz spectrum. H3G does not operate a 2G network (although national roaming agreements enable H3G to use the 2G network of at least one other MNO).

9.57 The charge controls currently in force recognise cost differences arising from the use of 900 MHz and 1800 MHz spectrum, and Ofcom, as part of this consultation is considering whether such costs differences remain and whether these should be reflected by setting different charge controls. Furthermore, to the extent that there are exogenous cost differences between the operation of 2G and 3G networks, Ofcom must also decide whether these should be reflected in different charge controls imposed on MNOs which operate only a 3G network and those which operates both 2G and 3G networks.

Cost differences between 900/1800 and 1800-only operators

9.58 The differences in unit costs between the 2G/3G operators (as illustrated in Figure 9.1 above) arise predominantly due to the costs resulting historically from deploying coverage networks. The 1800MHz-only operators face higher coverage costs, other

things being equal, as a consequence of the need for a greater number of coverage cells.[57] However, as traffic demand grows, the difference in the required numbers of cells (and by extension other network equipment such as BTSs and BSCs) narrows. The requirement to meet traffic demand becomes increasingly the binding constraint in network deployment, i.e., what were initially cells required for coverage purposes become capacity-constrained as demand increases.

9.59 However, Ofcom recognises that, on a forward-looking basis, the 1800MHz operators will face a continuing need to repair, maintain and replace a greater number of cells to the extent that coverage requirements persist. Further, whilst significant traffic loads means the number of required cells between the two types of operators has narrowed over time (since the requirement to meet traffic demand, rather than provide coverage, becomes the primary binding constraint in cell site deployment) the impact of coverage requirements on total and unit costs may become more significant again as traffic is migrated from 2G to 3G networks. In the context of the "Medium" unit cost range illustrated in Figure 9.1 above, this future need to maintain 2G coverage while demand for 2G technology reduces, may be expected to partially offset the diluting effect on the cost differential of decreasing volumes of 2G voice call termination minutes relative to 3G termination minutes. For the latter, there are no material exogenous cost differences.

9.60 In keeping with this view, the differences in unit costs have narrowed over time. For example, based on cost modelling undertaken for the previous market review, the current charge controls give a unit cost difference of 0.7ppm between the two types of 2G/3G operator, compared with a forecast unit cost difference of only around 0.3ppm in 2010/11 under economic depreciation (and less than 0.1ppm under accounting depreciation).

Cost differences between 3G-only and combined 2G/3G operators

9.61 As set out in more detail in Annex 5, the output of Ofcom's cost modelling indicates that the 2010/11 unit costs of a 3G-only MNO are likely to be higher than the costs of an MNO operating 2G and 3G networks. This is due to the fact that the unit costs of 3G call termination (specifically when a contribution to 3G spectrum costs is included) are higher than for 2G call termination. However, it is important to note that, absent 3G spectrum costs, 3G costs are lower than those of 2G such that the 2G/3G operators will be incentivised to migrate to the lower-cost 3G technology in future.

9.62 Ofcom forecasts the unit costs of a 3G-only operator to converge with those of a 2G/3G operator as the latter conveys increasing proportions of traffic on its 3G network. For example Ofcom forecasts a convergence of unit costs following 95% subscriber migration to 3G networks by 2015 under the 'medium' case demand scenario. Ofcom's modelling indicates, however, that cost differences of the order of around 1ppm will persist between a 3G-only MNO and a 2G/3G MNO at the end of the proposed charge control period in 2010/11.

[57] Radio propagation characteristics exhibit an inverse relationship between maximum coverage area per cell and frequency of spectrum. Combined 900/1800 MHz operators (i.e., Vodafone and O2) can therefore deploy fewer cells for a given coverage area compared with their 1800 MHz-only counterparts by providing coverage using 900 MHz spectrum. See Annex F, paragraph F.90 to the December 2003 Consultation.

Adverse impact of differentiated charge controls

9.63 Although the cost modelling undertaken by Ofcom highlights that cost differences between MNOs may persist during the period of the proposed charge control, where the cost difference is narrow, other considerations may, however, suggest that consumers interests could be served better by a uniform charge control which applies to all 2G/3G MNOs and, potentially, which applies also to 3G-only MNOs.

9.64 As consumers are unaware of, and likely to be indifferent to, the type of network or, indeed, which operator their call terminates on, there is an argument in favour of setting a single price for call termination across operators. This would mean that end users face the same charge for what is, from their perspective, effectively the same service. Simplified wholesale pricing may also translate (even in the presence of limited direct pass-through) to simplified retail prices for calls to different mobile networks. This would provide consumers with greater clarity in the pricing of services which rely on mobile voice call termination.

9.65 As noted in paragraphs 7.67 and 7.68 of the March 2006 Consultation, in the context of the liberalisation and prospective trading of spectrum, a single price for mobile voice call termination may ensure MNOs and other potential traders of spectrum have the appropriate and efficient incentives to trade spectrum based on undistorted relative valuations of different types, frequencies and quantities of spectrum.

9.66 A more straightforward establishment of a common charge for mobile voice call termination should have a number of benefits. As well as potentially being more appropriate in the context of spectrum trading, it may mean that, as new spectrum is released and alternative technologies and forms of access competition grow (such as WiMAX and '4G' wireless solutions), Ofcom and others are not encumbered with an ever-increasing and ever-challenging burden of detailed cost analysis in the face of new, untried and uncertain technologies and underlying costs. Furthermore, if a common charge can deliver a reasonable degree of charge stability, and consensus with respect to appropriate charges, this may potentially obviate the need in future for prescriptive charge controls in the markets under review in the present consultation document. This may have benefits in terms of the efficiency and clarity of the regulatory process, the associated cost burden for operators and, ultimately, through prices for end users.

9.67 The existing MNP arrangements in the UK, as explained in paragraphs 7.69 to 7.73 of the March Consultation, are such that the effective average call termination rates faced by operators are determined not only by their own termination rates (either as regulated for 2G termination or determined by the operators for 3G termination) but also by the termination rates of other operators for ported-in customers. The current MNP arrangements therefore distort the 'headline' average termination charges of each operator. A single control may be more pragmatic in the context of narrowing cost differentials and, further, may eliminate any incentives operators have to target subscriber acquisition efforts with reference to the termination rates of their existing network[58]. Ofcom recognises, as did H3G in its response to the March 2006 Consultation, that there may be a contrary argument that, to the extent that MNP arrangements impact the effective termination charges of each MNO, the arrangements should be changed such that MNOs are able to control that effective rate. Ofcom has committed to conduct a review of General Condition 18 on number

[58] For example, the current higher termination rates of H3G may induce the 2G/3G operators to target H3G subscribers on the basis that the call termination charge they would receive for calls to ported H3G customers will reflect H3G's higher 'donor' rate.

portability. Ofcom will be issuing a consultation on this issue in the autumn of this year with a view to issuing a final statement (together with any modifications to the General Condition if appropriate) in the early part of next year. Nevertheless, it remains a fact that differences in termination charges set by different MNOs (whether regulated or not) are currently affected by MNP arrangements and, to the extent that these MNP arrangements persist, they further reduce the effective differential.

9.68 The merits of a common charge control to apply to all MNOs, as set out in the preceding paragraphs, should be considered with reference to the fact that the cost differentials between 2G/3G MNOs have narrowed over time. This narrowing is forecast to continue over the proposed charge control period, such that, in 2010/11, the differential is projected to represent approximately 5% of unit costs under economic depreciation, compared with approximately 12% for 2005/6[59].

Ofcom's preferred approach to differentiation between charge controls for each MNO

9.69 Taking account of the potential adverse impacts set out in paragraphs 9.63 to 9.68, and in light of the narrowing differential, Ofcom proposes that, on balance (and notwithstanding the cost differential illustrated in Figure 9.1 above), a single charge control should be applied to all four 2G/3G operators.

9.70 This approach could potentially generate additional costs (compared with the approach of maintaining a differential) if the level of the undifferentiated control failed to allow Orange and T-Mobile to recover their efficiently incurred costs. To the extent that this impacts on investment decisions, the outcome would be unlikely to serve the longer term interests of consumers. Ofcom proposes, therefore, that the level of the control should be set on the basis of conservative cost modelling assumptions intended to provide strong incentives for continued investment and innovation and, further, set consistent with the middle of a single range reflecting the higher of the individual ranges for two types of operator.

9.71 With this objective in mind, and seeking to reflect appropriately the degree of uncertainty in forward looking cost in the breadth of this range, Ofcom proposes that the uniform range in respect of the charge control to apply to the 2G/3G MNOs in the final year of the control (2010/11), should be 4.8ppm to 5.8ppm. This range is based on conservatively placing weight on the upper parts of the reasonable range of costs for 2G/3G MNOs.

9.72 While the loss of the small differential may be considered potentially to impact adversely the competitive position of T-Mobile and Orange (relative to Vodafone and O2, which the cost modelling indicates have slightly lower costs), Ofcom does not consider that this impact will have a material impact on competition. This is because the proposed range within which the level will be set does not prevent those MNOs from recovering their efficiently incurred costs, and the size of the cost differential which Ofcom is proposing should not be reflected in differentiated charge controls (around 5% of costs of termination at 2010/11) is such that it is unlikely to have a material impact on the retail market for outbound mobile services in which these MNOs compete. (As noted in Section 3 above, MNOs do not compete in the markets for wholesale MCT). The MCT cost differential in respect of Orange and T-Mobile equates to less than 1% of those MNOs' overall revenues. Given the identified advantages of moving to an undifferentiated charge level (as set out in paragraphs

[59] Under accounting depreciation this differential is approximately 1% of unit costs in 2010/11 compared with approximately 2% in 2005/6

9.63 to 9.68) Ofcom does not consider that the proposed condition unduly discriminates against T-Mobile and Orange .

9.73 Ofcom's view, however, is that it would not be appropriate to attempt to align the charge controls imposed on all five MNOs (including the 3G-only MNO) during the period to 2010/11, as the size of the cost differential between a 3G-only MNO and a 2G/3G MNO is such that a uniform control would be likely to result in levels of under-recovery or over-recovery of costs on a scale which would not be in the best interests of consumers, as discussed in paragraphs 9.74 to 9.77 below. The output of Ofcom's cost modelling does, however, indicate that the appropriateness of a uniform charge control applicable to all MNOs (including 3G-only MNOs) should be reconsidered carefully in 2010/2011 when the need, or otherwise, for continuing charge regulation is considered again. Ofcom's latest cost modelling suggests that these unit cost levels will converge in the longer term.

Risks inherent in setting charges too high or too low

9.74 As Ofcom has acknowledged in Annex 5, there remains a high degree of uncertainty about future traffic volumes on mobile networks and, hence, unit costs. Ofcom is mindful of the risks to MNOs' ability to recover efficient costs if charge controls are set on a basis which ultimately proves to over-estimate actual traffic levels. This could impact on investment and in the longer term impact on consumer services. As discussed in Section 7, Ofcom considers that there are material gains for consumers from regulating MCT charges. However, respondents have argued that the gains from small changes in termination charges are not significant and that Ofcom should take this into account when determining the appropriate MCT charges and in particular when reaching a view on different charges where differences between them are relatively small.

9.75 In Ofcom's view, there is potentially an asymmetry in the risks and impact of setting charges on the basis of forecast costs that are ultimately below MNOs' actual outturn costs. Charge controls which, in practice, fail to enable recovery of efficient costs may have an adverse impact on investment in mobile services, which would ultimately be detrimental to consumers generally.

9.76 To the extent that the waterbed is complete, and Ofcom notes that MNOs have argued that it is, the level of termination charges does not in theory affect MNOs' profitability. It may, therefore, not have any impact on MNOs' ability or incentives to invest in 3G and, in this respect, only a limited impact on consumers. However, if termination charges are below costs, MNOs may (via the waterbed effect) be able to earn sufficient revenues to cover their costs by setting higher mobile retail prices. This may be detrimental to consumers in the long run because it may slow the growth of new mobile services and lead to slower investment by MNOs. This may lead to a loss in consumer welfare resulting from a delay in the availability and innovation in new services. Ofcom is proposing, therefore, that unit estimates adopted when identifying the appropriate level of CTM charges should be based on reasonably conservative assumptions which, in the presence of any uncertainty, are not likely to result in under-recover of costs.

9.77 Having considered responses to the March 2006 Consultation and the risk to MNOs' ability to recover efficient costs, the consequent likely impact on investment and the longer term consequent impact on consumer services, Ofcom proposes, on balance, that benchmarking to 2G costs (the "Low" unit cost scenario) would not be in the longer term interests of consumers. Ofcom does not, however, believe that the demand assumptions implicit in the "High" unit cost scenario, which assumes

negligible growth in voice or data traffic, are realistic in the light of industry consensus. Furthermore, these low traffic forecasts seem inconsistent with the values of the MNOs' 3G spectrum that they reflect in their accounts. While adoption of the "High" unit cost forecast would minimise the risk of under-recovery of costs, Ofcom proposes that it would not represent a fair outcome for consumers. It would be likely to deliver over-recovery of costs, representing an excessive charge and an inefficient structure of prices would result as discussed in Section 7. Ofcom proposes, therefore, that the "Medium" unit cost scenario, which is based on cost benchmarks in the upper-medium of the range described in Annex 5, presents the best balance in the presence of inevitable forecasting uncertainty.

Summary of proposed efficient charge level

9.78 Given the level of uncertainty over future traffic volumes and the speed of migration from 2G to 3G networks, the level of charges in respect of the 2G/3G MNOs is defined in this consultation document by reference to a range of 1ppm. The level of the charge control which Ofcom proposes should apply to H3G is defined by a range of 1.3ppm (reflecting the higher degree of uncertainty associated with a new entrant).

9.79 After considering responses to the present consultation, Ofcom proposes to determine, where within each range (or beyond) the charge control applicable to each of each MNOs should be fixed in the final year of the four year charge control (2010/11). Ofcom's present view is that charge controls for 2010/11 should be set at the mid point of the applicable cost range. Ofcom considers that that these ranges are themselves set on a conservative basis with respect to demand forecasts and in particular in the treatment of the 3G spectrum costs. Ofcom will, consider carefully any evidence that may indicate that controls for any or all MNOs should be set at a different level, including the possibility that a differential should be maintained between the 900/1800 MHz MNOs (Vodafone and O2) and the 1800 MHz MNOs (Orange and T-Mobile).

Figure 9.2 Proposed ranges for unit charge levels in 2010/11 (real 2006/07 prices)

	MNOs with 900/1800MHz 2G networks plus 3G networks	MNOs with 1800MHz 2G networks plus 3G networks	3G–only MNOs
Unit cost range	4.8 – 5.8ppm		5.4 – 6.7ppm
Mid point	5.3ppm		6.0ppm

9.80 Ofcom's proposals for charge control levels applicable in the first three years of the charge control are set out in paragraphs 9.81 to 9.92 below, and are informed by the merits, or otherwise, of imposing glide paths.

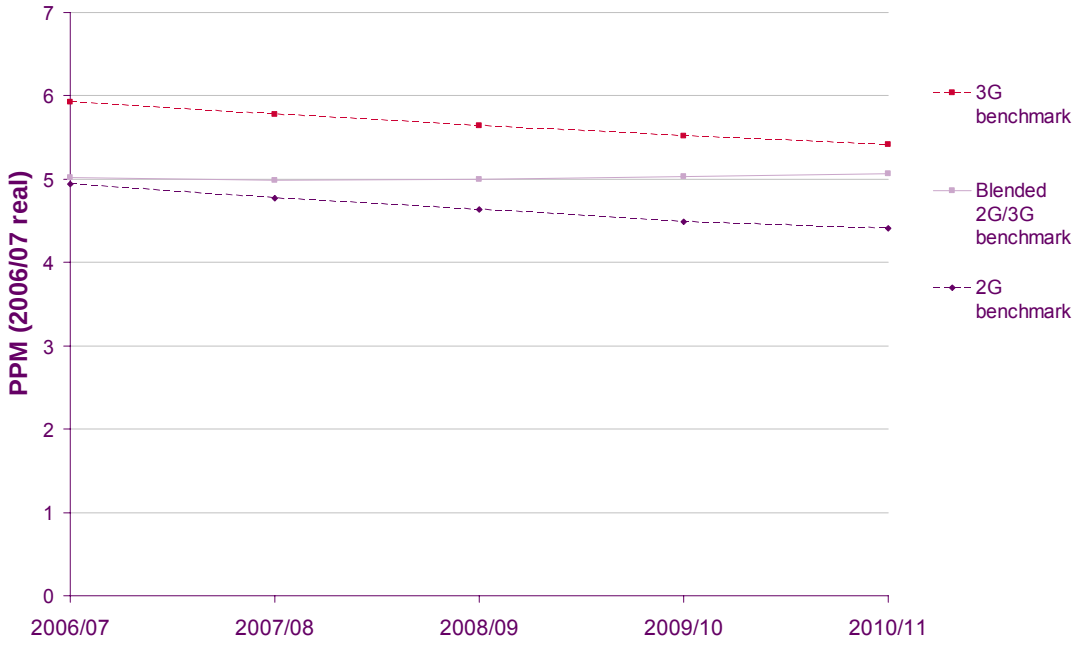
The path of reductions in charges

9.81 The charges of all five operators are presently above the midpoints of the ranges proposed in Figure 9.2 above, although the contractual blended charges of the 2G/3G MNOs are within, or close to, the top of the cost-based range being consulted on in respect of those MNOs. H3G's current charges, however, are well in excess of the cost-based range to which Ofcom is proposing H3G's charge should fall by

2010/11. It is therefore necessary to consider how quickly the charges of each MNO should fall to the charge level which Ofcom determines is the appropriate charge for 2010/11.

9.82 In addressing this question, Ofcom considers that MNOs should not be denied the opportunity to recover their efficiently incurred costs and it is therefore important to ensure that the path of required charge reductions does not require that MNOs charge below the underlying cost benchmark. In the case of the 2G/3G MNOs, Ofcom's cost analysis at Annex 13 suggests that the blended 2G/3G path of cost recovery is actually increasing over the period of the proposed charge control, due to increasing proportions of voice traffic being terminated on the 3G network, which has a higher unit cost benchmark than 2G within this period (largely due to the impact of the 3G spectrum costs), as shown in Figure 9.3 below. As costs during the first three years of the charge control are not forecast to be materially in excess of those in the final year of the control (2010/11), any reasonable pattern of cost reductions is unlikely to require MNOs to charge below the cost path. However, in the case of H3G, costs are forecast to fall over the course of the four year control as network utilisation increases, therefore this is a material consideration.

Figure 9.3 2G/3G operator (1800MHz 2G/3G combined spectrum) cost path



9.83 Ofcom recognises that a balance must be achieved between serving the short term welfare of consumers (through lower prices and hence immediate reductions of prices to a level consistent with the underlying costs), and conversely the need for efficient investment incentives for existing and prospective network operators and service providers and allowing a sufficient period of time for operators and customers to adjust to new levels and structures of mobile charges (which benefit consumers in the longer term).

9.84 Nevertheless, where a provider has SMP and, in the absence of regulatory controls, has set charges materially above cost, a smooth glide path which reduces charges over an extended period might be considered to allow that provider to continue to set

excessive charges. The more excessive the charges, the longer such a glide path will allow above-cost charges to be levied.

9.85 In the case of the 2G/3G MNOs, while the blending of unregulated 3G charges has, in some cases, caused charges to rise above the regulated 2G level, the level of the blended charges set by these MNOs has been determined for the most part by regulation of the 2G charges which have a high weight in the blended charge. This has not been the case with H3G which is not presently subject to charge controls and which has used its freedom to set charges at its discretion. This is an important consideration in determining the appropriate path of regulated charges to 2010/11.

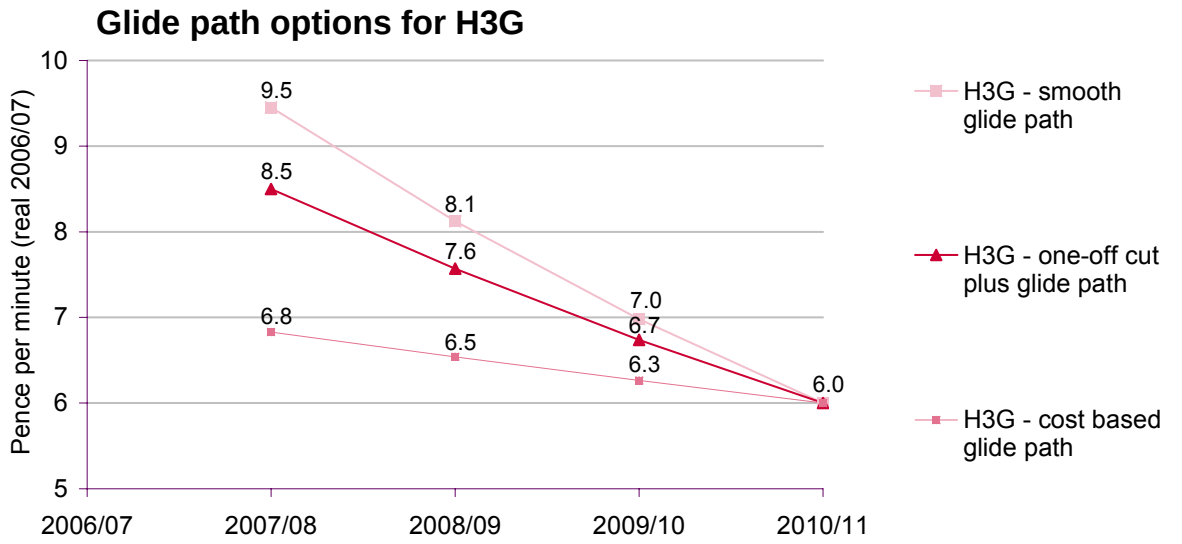
H3G path of charge reductions

9.86 Given the finding that H3G's charges are well in excess of the cost-based range to which Ofcom is proposing these charges should fall by 2010/11, Ofcom has identified three possible options for implementing charge reductions:

- Option 1 Establish a smooth 'glide path' under which charges are reduced at a constant percentage rate in each of the four years (using an 'RPI – X' formulation), such that charges in 2010/11 align with the cost-based target for that year;
- Option 2 Reduce charges immediately through a partial one-off cut and then adopt a glide path, which is less steep than a smooth four year glide path as a consequence of the initial cut, to ensure charges align with the cost-based target for the final year of the charge control; and
- Option 3 Reduce charges immediately to align with the 3G-only operator cost benchmark for 2007/08, and then set charges equal to the forecast cost path thereafter.

9.87 These are set out in the figure below.

Figure 9.4 Options for implementing charge reductions for H3G (Real 2006/07 prices)



9.88 As noted in paragraphs 9.74 to 9.77 above, in assessing these options, a balance must be struck between the short term and longer term interests of consumers which

may be addressed by charge controls. While Ofcom considers, for the reason set out in paragraph 9.84 above, that to allow H3G to benefit from a smooth glide path from the present high level of charges (Option 1) could perpetuate a situation where consumers face a material detriment, Ofcom is concerned that a sharp and immediate reduction to cost (Option 3) may not be in the longer term interests of consumers (if such a reduction presents a material risk to further investment in mobile services).

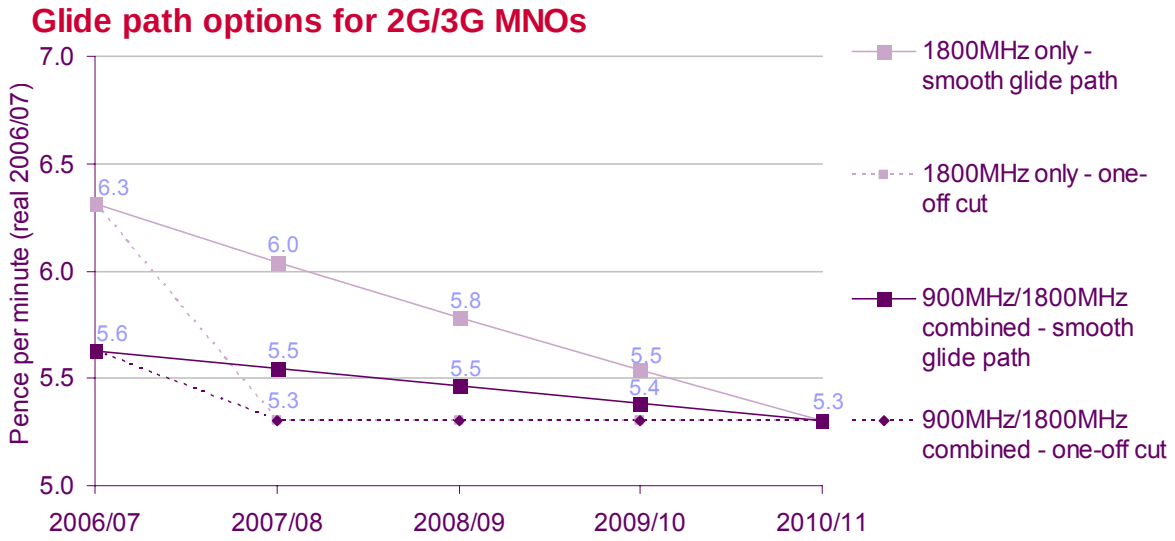
9.89 Ofcom is also including for consultation, therefore, Option 2 which would require H3G to implement a substantial reduction in its average charges for the first year of the charge control (2007/8), but would not require H3G finally to reduce its charges to cost until the final year of the charge control (2010/11). The size of the initial reduction would be determined with reference to the factors discussed in paragraphs 9.74 to 9.77 above.

9.90 The principles for applying Options 1 or Option 3 across each of the proposed four years of the charge control are generally self evident (Ofcom proposes that the starting point for calculating the steepness of a smooth glide path should be the average of H3G's MCT charges since 1 January 2006). Ofcom proposes that if Option 2 were adopted, the further reduction to cost (including network externality mark-up) should be achieved in three further uniform percentage reductions in each of the following three charge control years.

2G/3G MNOs' path of charge reductions

9.91 The same three options are potentially relevant in considering the appropriate glide path (if any) which should apply to the 2G/3G MNOs. However, whilst H3G's current termination charges are well above today's cost (and still further above the level of costs forecast for 2010/11), the charges of the 2G/3G MNOs are only slightly above the level which Ofcom's cost modelling indicates will be appropriate in 2010/11 (and even that differential may be eroded by retail price inflation). Furthermore, the existing charges of the 2G/3G operators have been heavily influenced by the current charge control framework (although some blending of unregulated 3G charges has been implemented in recent months). As such, a one-off cut straight to the target charge may have less impact on the MNOs and bring benefits to consumers. However, a glide path may represent a more appropriate approach given the role regulation has played in determining the level of the 2G/3G MNOs' termination charges today. The options are set out in the figure below.

Figure 9.5 Options for implementing charge reductions for 2G/3G MNOs (Real 2006/07 prices)



9.92 On balance, Ofcom considers that the 2G/3G MNOs should be required to reduce their charges in line with a smooth glide path of four equal percentage reductions, the steps to be calculated with reference to the applicable average charge for the final year of the charge control (2010/11), taking the headline level of the charge controls currently in force (i.e. 5.63ppm for Vodafone and O2 and 6.31 ppm for Orange and T-Mobile) as the starting point for the glide path. Ofcom will, however, determine the appropriate form of the glide (if any) after it has considered responses to the consultation exercise.

Structure of the proposed charge controls

9.93 The previous sections discussed proposals for the efficient charge level and how quickly charges should be reduced to these levels over the course of the proposed charge control. This section describes Ofcom's approach for the structure of the control, specifically:

- the control periods;
- the treatment of calls from fixed networks and off-net mobile-to-mobile calls;
- the calculation of compliance with the control;
- the treatment of variations in time of day / week; and
- the treatment of ported numbers.

9.94 The following paragraphs deal with each in turn.

Control periods

9.95 For the reasons discussed in paragraphs 9.4 to 9.6 above, Ofcom considers that the proposed charge control should last until 31 March 2011, resulting in four annual periods:

- 1 April 2007 to 31 March 2008 (2007/08);
- 1 April 2008 to 31 March 2009 (2008/09);
- 1 April 2009 to 31 March 2010 (2009/10); and
- 1 April 2010 to 31 March 2011 (2010/11).

Separate controls for mobile to mobile and fixed to mobile termination charges

9.96 In Ofcom's view, a charge control which permits MNOs to levy higher MCT charges in respect of fixed to mobile calls, compared with charges for mobile to mobile calls, within a single control basket would present a risk that MNOs could discriminate against fixed network call originators and their customers. MNOs may have incentives to charge fixed network operators a higher average charge for MCT compared with charges for other MNOs, and a single charge control basket would allow MNOs to follow this incentive. Ofcom proposes, therefore, that two separate charge control conditions should be imposed on each MNO (each control having the same target average charge). This will ensure that average MCT charges levied in respect of fixed to mobile calls do not exceed the regulated maximum average. This is the arrangement currently in force in respect of the charge controls applicable to the 2G/3G MNOs.

9.97 The charge control conditions currently in force in respect of each of the 2G/3G MNOs include time of day weights. When calculating the average MCT charge in any given period the time of day weights are provided to be mobile to mobile and fixed to mobile termination traffic weights in the relevant period, unless Ofcom consents that the sum of each of these sets of weights may be used. Ofcom has granted such consent for the duration of the current charge controls. This is because the MNOs have advised Ofcom that they are unable to calculate fixed to mobile and mobile to mobile traffic weights separately. The principal reason being that many mobile to mobile calls are transited through BT and appear to the terminating MNO as fixed to mobile calls.

9.98 Ofcom understands that it is unlikely, during the period to 31 March 2011, that terminating MNOs will be able to distinguish accurately between fixed to mobile calls and mobile to mobile calls which are transited through BT. Ofcom proposes therefore that, while MNOs continue to charge the same price to all originating operators, the charge control conditions should allow MNOs to use traffic weights based on the sum of fixed to mobile and mobile to mobile traffic. This is a change to the current conditions and is intended to reflect the practical reality of how MNOs charge for MCT and therefore how traffic weightings are measured.

Compliance with the proposed charge control

9.99 As in the existing charge controls on 2G mobile voice call termination, Ofcom proposes to place a charge control on the average of the charges levied by each of the MNOs (i.e. across daytime, evening and weekend charges) for terminating voice calls, weighted by the relative call volumes in the previous year. This charge control is intended to bring the weighted average charge down to the efficient charge level by 2010/11. Ofcom's charge controls require that, during each period of the control, the average charge set by the regulated MNO (the Average Interconnection Charge or 'AIC') does not exceed the charge with which the operator is required to comply (the Target Average Charge or 'TAC').

9.100 Ofcom proposes to set the target average charge for the first period (2007/08) to be equal to an absolute target in pence per minute, so as to ensure that Vodafone and O2's charges are brought to the same level and that Orange and T-Mobile's charges are also brought to the same level (currently modest differences in the blended 2G/3G rate exist, primarily due to the blending in of different proportions and levels of unregulated 3G termination rates). These absolute target charge levels for the 2G/3G MNOs in the first year of the control will be equivalent to the first of four equal percentage reductions from the current regulated 2G MTRs to reach the target efficient charge level at the end of the charge control period. In the case of H3G, Ofcom proposes to implement an absolute target charge for the first year of the charge control, consistent with the approach outlined above for the 2G/3G MNOs. However, if Ofcom decides to adopt the second of the options identified in paragraph 9.86 above (i.e. a one-off cut followed by a glide path), the level of this target will not reflect a smooth glide path to the final year target efficient charge level, but rather an initial one-off reduction in line with the discussion in paragraph 9.90 above.

9.101 Ofcom proposes to specify the target average charge (TAC) for the subsequent periods of the charge control (2008/09, 2009/10 and 2010/11) as an RPI-X control to reflect the required reduction from the 2007/08 charges necessary to reach the efficient charge level for 2010/11.

9.102 Under this approach, the TAC in each of these years is calculated as the previous year TAC for that MNO multiplied by (1 + ΔRPI - X), where ΔRPI is the change in the Retail Prices Index and X is the specified uniform percentage reduction in the real level of the charge for that MNO. The change in RPI is measured as the change measured over the 12 month period from 31st December to 31st December immediately prior to the start of the annual charge control period. This approach is designed to give clarity as to the level of the TAC for the coming year so as to enable MNOs to set prices with certainty at the beginning of each annual charge control period.

9.103 In the previous MCT market review, which was concluded with the June 2004 Statement, Ofcom determined that a Weights Adjustment Factor (WAF) should be applied to the level of the Target Average Charge (TAC) for each MNO. However, in the context of a new market review, it is appropriate to consider this aspect of the charge control mechanics afresh.

9.104 The aim of the WAF, as applied to the charge control in the previous market review, is to address concerns that unearned gains or losses could arise during the period of the charge control, solely though a change in traffic profile rather than as a result of price changes. In this context, there are two important properties of the WAF which Ofcom has previously highlighted: First, the WAF maintains consistency between the weighting mechanism used to determine an MNO's Average Interconnection Charge (AIC) and the TAC which the AIC must not exceed. Second, the WAF exhibits important characteristics in relation to movements in underlying costs.

9.105 Absent consistency in the weighting of the AIC and the TAC, as ensured by the WAF, it is possible for MNOs to raise their prices across all times of day, or symmetrically, for MNOs to fall into breach of the charge control conditions, without changing any of their prices, simply as the result of a shift in the traffic mix. As discussed in paragraph 3.103 of the December 2005 Statement and paragraphs 6.42-6.45 of the June 2004 Statement, the WAF is designed to address these concerns.

9.106 However, following responses from Vodafone and T-Mobile to the June 2005 Extension Consultation (see footnote 2 above) which raised concerns about the

characteristics of the WAF in relation to underlying costs, Ofcom has undertaken further investigation in this area. As indicated in paragraph 3.104 of the December 2005 Statement, there is a complex behaviour dependent on the inter-relationship of a number of linked issues. These issues are associated with underlying costs which has the potential to lead to complications, both with or without the application of the WAF. The ability of the WAF to address concerns about unearned gains and losses is dependent upon these factors. In particular, the relationship between the structure of underlying costs to the structure of prices by time of day. Understanding the behaviour of underlying cost structures is further complicated by the current migration of traffic from 2G to 3G networks. Furthermore, arguments for applying the WAF, or not, depend on the extent to which traffic movements by time of day are endogenous or exogenous. For example, MNOs should be allowed to benefit from efficiency gains, which they have achieved by intentionally shifting their traffic mix so as to reduce costs. Such benefits arising from endogenous changes in traffic mix are, in general, suppressed by the application of the WAF. In such cases it may be more appropriate to remove the WAF from the charge control mechanics. However, Ofcom recognises that in reality changes in traffic mix by time of day are likely to be a combination of endogenous and exogenous effects.

9.107 Whilst the TAC mechanism incorporating the WAF is well-established, with an equivalent mechanism having operated in BT's retail and network price controls since 1984, Ofcom observes that there are some notable differences between the situations where BT charge controls have been implemented and those relevant to this market review. In particular, these differences include the imposition of a charge control on a single versus multiple operators and considerations of competitive neutrality.

9.108 In summary, whilst the consistency benefits of the WAF are clear, as stated in the December 2005 Statement, Ofcom recognises that consistency is not the only factor relevant to the WAF. There are a number of further issues associated with movements in underlying costs. Ofcom notes that the benefits of the characteristics of the WAF in this respect are not unambiguous, and application of the WAF adds additional complexity to the charge control mechanics. On balance, Ofcom therefore proposes to not apply a WAF factor under the mechanics of the proposed charge controls on mobile voice termination, but invites views on this issue.

Charge variations by time of day/week

9.109 As indicated above and consistent with current MCT charge controls, Ofcom proposes that charge controlled MNOs should be permitted to vary MCT charges by time of day/week provided that, as at present, the traffic weighted average complies with the charge control. The proposed charge control levels referred to in this consultation exercise should, therefore, be viewed as maximum average charges. Given the impracticability of applying actual traffic weights achieved during the period of each charge change, and the commercial uncertainty which such an approach would generate, Ofcom proposes that compliance with specified maximum average charges should be assessed on the basis of traffic weights achieved during the relevant period 12 months before the charging period in question.

Ported numbers

9.110 While, under the current MNP arrangements, MNOs are not able to control the termination charge for ported-in subscribers, Ofcom continues to hold the view expressed in paragraphs 6.46 – 6.49 of the June 2004 statement that call minutes to ported-in numbers should be excluded from the charge controls on voice termination.

However, if the current MNP arrangements change and MNOs control the termination charge for calls to ported-in numbers they will be included in the charge controls. In addition in the last market review Ofcom did not seek to take into account the effect of MNP on the effective average charges of MNOs and therefore whether or not their effective average charges were equal to the MCT regulated charges. It continues to be Ofcom's view that it is not appropriate to seek to account for MNP and its impact on effective charges in this review. Ofcom considers that the impact of current MNP arrangements are unlikely to be material in their impact on effective charges.

The specific proposals

9.111 As summarised above, Ofcom proposes to set a maximum average charge to apply to MCT supplied by each of the five MNOs during each of the four periods of 12 months from 1 April 2007 to 31 March 2011. As detailed in paragraph 9.102 above, Ofcom proposes that the determined target average charges should be subject to adjustment in line with movements in the Retail Prices Index.

H3G

9.112 Ofcom proposes that, across the final year of the control (1 April 2010 to 31 March 2011), H3G's average charges should not exceed 6ppm (2006/7 prices). The proposed figure may be varied by Ofcom after considering responses to this consultation exercise. Ofcom's present view is that the level should be within +/- 0.65ppm of 6ppm. Ofcom will determine where the charge cap should be set when it publishes the Notifications and concluding statement.

9.113 In respect of the first three years of the controls on H3G's charges, Ofcom is consulting on three glide path options, as set out in paragraph 9.86 above. Ofcom proposes to take as the starting point for these glide paths H3G's average charges during the period from 1 January 2006. These glide path options are as follows

- Option 1. Smooth glide path. The maximum average charge to reduce at a constant percentage rate in each of the four years, such that in 2010/11 this aligns with the target determined for that year;

- Option 2. One-off cut plus glide path. The maximum average charge for the first year (1 April 2007 to 31 March 2008) to be 8.5 ppm (2006/7 prices) and then follow a smooth glide path to ensure that the maximum average charge aligns with the target determined for the final year of the charge control; and

- Option 3. Cost based glide path. Reduce charges immediately to align with the 3G-only operator cost benchmark for 2007/08, and then set charges equal to the forecast cost path thereafter, such that in 2010/11 the maximum average charge aligns with the target determined for that year.

9.114 Ofcom would welcome the views of stakeholders on the merits of each of these three glide path options for H3G.

The 2G/3G MNOs

9.115 Ofcom proposes that across the final year of the control (1 April 2010 to 31 March 2011), the average charges of each of the four 2G/3G MNOs should not exceed 5.3 ppm (2006/7 prices). The proposed figure may be varied after considering responses to this consultation exercise. Ofcom's present view is that the level should be within

+/-0.5ppm of 5.3ppm. Ofcom will determine where the charge cap, in respect of each of the 2G/3G MNOs, should be set when it publishes the Notifications and concluding statement.

9.116 Ofcom would welcome the views of stakeholders on the proposal not to maintain a charge differential between Vodafone/O2 and Orange/T-Mobile. Ofcom's reasons for proposing this approach were set out in paragraphs 9.63 to 9.68 above.

9.117 In respect of the first three years of the charge control, Ofcom proposes that, in respect of the four 2G/3G MNOs, the maximum average charge should reduce at a constant percentage rate in each of the four years, such that in 2010/11 this aligns with the target determined for that year. As detailed in paragraph 9.92 above, Ofcom proposes that the starting point for this glide path should be the unadjusted headline Target Average Charge applicable under the present charge control (i.e. 5.63ppm for Vodafone and O2 and 6.31ppm for Orange and T-Mobile). However, Ofcom will determine the form of the glide path(s) (if any) after considering responses to the consultation exercise.

9.118 The following indicative table sets out the proposals in approximate 2006/7 prices, and assumes a figure of 6ppm in respect of H3G's 2010/11 charge and a figure of 5.3ppm in respect of the 2010/11 charge for the 2G/3G MNOs.

Figure 9.6 Illustrative table of charge control proposals (2006/07 prices)

	Average regulated charges today	**Target charge in 2007/08 (nominal)**	**% reduction 2008/09-2010/11 (RPI-X)**	**Final charge in 2010/11 (real 2006/07 prices)**
Vodafone and O2	5.6	5.7	1.5%	5.3
T-Mobile and Orange	6.3	6.2	4.4%	5.3
H3G Option 1 (Smooth glide path)	Not regulated	9.7	14.4%	6.0
H3G Option 2 (Immediate cut plus glide path)	Not regulated	8.7	11.2%	6.0
H3G Option 3 (Cost based glide path)	Not regulated	7.0	4.3%	6.0

***Question 4**: Do you agree that the appropriate level of the target average charge to apply to mobile to mobile MCT and fixed to mobile MCT in 2010/11 in respect of H3G is 6ppm (2006/7 prices), and in respect of the 2G/3G MNOs is 5.3ppm (2006/7 prices)?*

***Question 5**: Which of the following glide path options should be used to define H3G's target average charge in each of the first three years of the charge control period;*

Option 1 - A smooth glide path with charges reducing at a constant percentage rate in each of the four years from today's average charges to the target determined for 2010/11.

Option 2 - A one-off partial cut to 8.5ppm (2006/7 prices) for the first year followed by a smooth glide path to ensure that the maximum average charge aligns with the target determined for the final year of the charge control.

Option 3 - A cost based glide path with charges reducing immediately to align with the 3G-only operator cost benchmark for 2007/8, and then set equal to the forecast cost path thereafter, such that in 2010/11 the maximum average charge aligns with the target determined for that year

Question 6: *Do you agree that the 2G/3G MNOs should be required to reduce their charges in line with a smooth glide of constant percentage rate in each year of the charge control such that average charges in the fourth year (2010/11) align with the target determined for that year?*

Section 10

Summary of regulatory proposals

Market definition

10.1 For the reasons set out in Section 3 above, Ofcom proposes that there are separate markets for MCT as follows;

- Wholesale mobile voice call termination provided to other Communications Providers by H3G in the UK.
- Wholesale mobile voice call termination provided to other Communications Providers by O2 in the UK
- Wholesale mobile voice call termination provided to other Communications Providers by Orange in the UK
- Wholesale mobile voice call termination provided to other Communications Providers by T-Mobile in the UK
- Wholesale mobile voice call termination provided to other Communications Providers by Vodafone in the UK

SMP

10.2 For the reasons set out in Section 4 above, Ofcom proposes that Vodafone, O2, Orange, T-Mobile and H3G each have SMP in the market for wholesale voice call termination which it provides to other operators in the UK.

Proposed SMP conditions

10.3 Given the detriments identified in Sections 7 to 9 above, and in the light of the costs and benefits of addressing those detriments through the remedies considered in Section 8 and 9 above, Ofcom proposes that the following condition should be imposed on each of the five MNOs with SMP;

- An obligation to meet reasonable requests for MCT on fair and reasonable terms (proposed condition MA1).
- A prohibition of undue discrimination (proposed condition MA2).
- A charge control on fixed to mobile MCT to apply until 31 March 2011 (proposed condition MA3).
- A charge control on mobile to mobile MCT to apply until 31 March 2011 (proposed condition MA4).
- An obligation to publish contracts and charges applicable to supply of MCT, and to notify interconnected parties and Ofcom of any changes to such charges at least 28 days before they are proposed to take effect (proposed conditions MA5 and MA6).

10.4 Ofcom has attached at Annex 21 the Notification setting out its proposals.

Legal tests

10.5 Section 87(1) of the Act provides that, where Ofcom has made a determination that a person has SMP in the market reviewed, it must set such SMP conditions as it considers appropriate and as are authorised in the Act. This implements Article 8 of the Access Directive.

10.6 Section 46 of the Act provides that a person to whom an SMP services condition is applied must be a 'communications provider' or a 'person' who makes associated facilities available and a 'person' who Ofcom has determined to have SMP in a specific market for electronic communications networks, electronic communications services or associated facilities.

10.7 Article 16 of the Framework Directive requires that, where a national regulatory authority determines that a relevant market is not effectively competitive, it shall identify "undertakings" with SMP on that market and impose appropriate specific regulatory obligations. For the purposes of EC competition law, "undertaking" includes companies within the same corporate group (*Viho v Commission* Case C79 73/95 P [1996] ECR I-5447), for example, where a company within that group is not independent in its decision making.

10.8 Ofcom considers it appropriate to prevent a dominant provider to whom a SMP service condition is applied, which is part of a group of companies, exploiting the principle of corporate separation. The dominant provider should not use another member of its group to carry out activities or to fail to comply with a condition, which would otherwise render the dominant provider in breach of its obligations. For this reason, Ofcom proposes that the proposed conditions should apply to O2, Orange, T-Mobile, Vodafone, and H3G, and any O2, Orange, T-Mobile, Vodafone, or H3G subsidiary or holding company, or any subsidiary of that holding company, all as defined by Section 736 of the Companies Act 1985 as amended by the Companies Act 1989.

10.9 The Act (sections 45-50 and 87-92) sets out the regulatory obligations that Ofcom can impose if it finds that any undertaking has SMP. Sections 87 to 92 implement Articles 9 to 13 of the Access Directive and Articles 17 to 19 of the Universal Service Directive. The potential regulatory obligations relevant to this review are:

- the provision of network access;
- no undue discrimination;
- transparency;
- price control;

10.10 Recital 27 of the Framework Directive provides that ex ante regulation should only be imposed where competition is not effective and where competition law remedies are not sufficient to address the problem. In order to provide a full analysis, Ofcom has, therefore, considered the option of no ex ante regulation, and whether it would be sufficient to rely on competition law alone. Section 7 above discusses the need for ex ante or ex post regulation.

10.11 Section 4 of the Act imposes a duty on Ofcom, in carrying out its functions, to act in accordance with the six Community requirements set out in that section. This implements Article 8 of the Framework Directive. Ofcom, in considering for the purposes of this market review whether to propose any SMP conditions, has considered all of these requirements. In particular, it has considered the requirement to promote competition in relation to the provision of electronic communications networks and electronic communications services. Ofcom has also considered the requirement to encourage network access and service interoperability for the purposes, inter alia, of securing efficient and sustainable competition in the markets for electronic communications networks and services, and for securing maximum benefits of customers of communications providers.

10.12 Furthermore, as well as being appropriate (section 87(1)), each SMP condition must also satisfy the tests set out in section 47 of the Act, namely that each condition must be:

- objectively justifiable in relation to the networks, services or facilities to which it relates;
- not such as to discriminate unduly against particular persons or a particular description of persons;
- proportionate to what the condition is intended to achieve; and
- in relation to what it is intended to achieve, transparent.

10.13 There are also additional matters to consider in respect of network access conditions, set out in section 87(4) of the Act, including the feasibility of the provision of the proposed network access, and additional requirements for network access pricing conditions, set out in section 88 of the Act. It is Ofcom's view that the proposals contained in this Section satisfy the relevant requirements specified in the Act and relevant European Directives. This view is explained in detail in the following paragraphs.

Aims of the conditions being proposed

Proposed Condition MA1: Requirement to provide network access on reasonable request

10.14 Condition MA1.1 requires MNOs with SMP to meet reasonable requests for Network Access on fair and reasonable terms. As discussed in paragraph 8.58 above, Ofcom considers that such a condition should be imposed on MNOs with SMP. Although the charge control conditions limit the average charges which MNOs may levy for MCT, they do not, of themselves, require MNOs to supply MCT and, in the absence of condition MA1.1, MNOs might refuse to supply MCT. Condition MA1.1 also requires that terms and conditions (and not just charges) should be fair and reasonable. In Ofcom's view it is necessary to impose a condition requiring the supply of network access (MCT) on fair and reasonable terms, even in the presence of charge control condition.

10.15 In proposed SMP condition MA1.3, Ofcom sets out that the charges for 2G/3G Calls as covered by the proposed charge control SMP conditions MA3 and MA4, shall be as set out in those conditions rather than as set out in than proposed condition MA1.1 (fair and reasonable), but only for the duration of those conditions. Ofcom has proposed this condition to ensure that the MNOs have certainty in this context of

what the appropriate charges should be for the provision of such calls i.e. that the only rules regarding the level of 2G/3G charges are contained in conditions MA3 and MA4.

10.16 Section 87(3) of the Act authorises the setting of SMP services conditions requiring the dominant provider to provide network access, as Ofcom may from time to time direct. These conditions may, pursuant to section 87(5), include provision for securing fairness and reasonableness in the way in which requests for network access are made and responded to and for securing that the obligations in the conditions are complied with within periods and at times required by or under the conditions. When considering the imposition of such conditions in a particular case, Ofcom must have regard to the 6 factors set out in section 87(4) of the Act, including, inter alia, the technical and economic viability of installing other competing facilities and the feasibility of the proposed network access. As explained in paragraph 8.11 above, Ofcom does not consider it technically or economically feasible to install competing facilities. However, given that MNOs are currently providing network access, Ofcom considers that this is feasible.

10.17 Section 87(9)(a) of the Act authorises the setting of an SMP services condition imposing charge controls in relation to matter connected with the provision of network access.

10.18 Section 88(1) of the Act authorises the setting of an SMP condition falling within section 87(9) where there is a relevant risk of adverse effects arising from price distortion (as noted in paragraphs 7.15 to 7.20 above); and it also appears that the setting of the condition is appropriate for the purposes of promoting efficiency, promoting sustainable competition and conferring the greatest possible benefits on the end-users of public electronic communications services. As discussed above in Section 7, it appears from the market analysis that there is a relevant risk of adverse effects arising from price distortion. As required by section 88(1)(b) of the Act, this obligation therefore promotes efficiency, confers the greatest possible benefits on the end-users and, by ensuring that PECN Providers competing for customers in the retail market are not exploited by the five MNOs setting unreasonable conditions in the wholesale market, promotes effective and sustainable competition. Furthermore, the proposed fair and reasonable obligation takes into account the costs and reasonable rates of return on investments required by the five MNOs in providing wholesale voice call termination. As such, the proposed fair and reasonable obligation takes account of the extent of the investment in the matters to which the condition relates of the five MNOs, as required by section 88(2) of the Act.

10.19 Further guidance as to how Ofcom proposes to apply the network access obligation can be found in the Revised ERG common position on remedies[60], the guidelines on imposing access obligations under the new EU Directives, dated 13 September 2002[61] (the “Access Guidelines”), and Oftel’s guidelines for the interconnection of public electronic communications networks, dated 23 May 2003[62] (the “Interconnection Guidelines”).

10.20 Ofcom in proposing this obligation has considered all the Community requirements set out in section 4 of the Act, in particular the requirements to promote competition, secure efficient and sustainable competition and secure the maximum benefit for retail consumers. Furthermore, Ofcom has considered its duties under section 3 of

[60] See http://www.erg.eu.int/doc/meeting/erg_06_33_remedies_common_position_june_06.pdf
[61] See http://www.ofcom.org.uk/static/archive/oftel/publications/ind_guidelines/acce0902.htm
[62] See http://www.ofcom.org.uk/static/archive/oftel/publications/eu_directives/2003/intercon0503.htm

the Act, in particular the requirements to further the interests of citizens and to promote competition. In particular, an access obligation ensures that other PECN providers are able to complete calls to subscribers of the MNOs in question under fair and reasonable terms. By ensuring that competing PECN providers are therefore not disadvantaged through the application of unfair or unreasonable terms, the requirement promotes competition, ultimately furthers the interests of consumers and citizens, and helps to secure effective and sustainable competition.

10.21 Ofcom believes that this condition meet the tests set out in section 47 of the Act. Section 47 requires conditions to be justifiable, non-discriminatory, proportionate and transparent. The proposed condition:

- is objectively justifiable, in that it is aimed at ensuring that call termination services are provided by the five MNOs, such that competition develops to the benefit of consumers.

- does not discriminate unduly, in that it applies equally to all those MNOs who, in Ofcom's view, have the ability and have, or could, develop the incentive not to offer access on fair and reasonable terms.

- is proportionate, since it does not require MNOs to provide access if the request is unreasonable, and only requires access to be provided to public electronic communications network providers.

- is transparent, in that the proposed condition has been drafted to secure maximum transparency, which is aided by the explanation as to the intended operation and effect of the conditions as set out in this document.

10.22 Ofcom in making this proposal has taken into account all the factors listed in section 87(4) of the Act, in particular the feasibility of the provision of the proposed network access and the need to secure effective competition in the long term – Ofcom believes it is feasible for the five MNOs to provide such network access and that the proposal will help to secure effective competition in the long term.

Proposed condition MA2: Requirement not to unduly discriminate

10.23 Condition MA2.1 prohibits MNOs with SMP from unduly discriminating in respect of the supply of MCT. For the reasons set out in paragraph 8.56 above, Ofcom considers that such an SMP condition should be imposed on MNOs with SMP.

10.24 Section 87(6)(a) of the Act authorises the setting of an SMP services condition requiring the dominant provider not to unduly discriminate against particular persons, or against a particular description of persons, in relation to matters connected with the provision of network access.

10.25 As discussed in Section 8 above, the requirement not to unduly discriminate is intended, principally, to prevent MNOs from discriminating horizontally against other PECN providers, but this does not exclude other forms of discrimination.

10.26 Oftel considered how it might treat undue discrimination in its Access Guidelines. In paragraph 3.8 of these Guidelines, to which Ofcom subscribes, it is stated:

> 'Non-discrimination' does not necessarily mean that there should be no differences in treatment between undertakings, rather that any differences should be objectively justifiable, for example by

differences in underlying costs, or

no material adverse effect on competition"

10.27 Ofcom, in proposing this obligation has considered all the Community requirements set out in section 4 of the Act, in particular the requirements to promote competition, secure efficient and sustainable competition and secure the maximum benefit for retail consumers. Furthermore, Ofcom has considered its duties under section 3 of the Act, in particular the requirements to further the interests of citizens and to promote competition. In particular, an obligation to not unduly discriminate ensures that other PECN providers are not unfairly disadvantaged in the provision of access to voice call termination services by the MNOs in question. By ensuring that competing PECN providers are not discriminated against so as to materially affect their ability to compete, the requirement therefore promotes competition, furthers the interests of consumers and citizens, and helps to secure effective and sustainable competition.

10.28 Ofcom believes that this condition meet the tests set out in section 47 of the Act. Section 47 requires conditions to be justifiable, non-discriminatory, proportionate and transparent. Ofcom believes that the proposed condition:

- is objectively justifiable, in that it provides safeguards to ensure that competing PECN providers, and hence consumers (who would gain the benefits of competition), are not disadvantaged by an MNO unduly discriminating between them;

- does not discriminate unduly against any MNO, in that they apply equally to all those MNOs who, in the view of Ofcom, have the ability and incentive to unduly discriminate;

- is proportionate in that discrimination is only prohibited if it is 'undue' and it is the least onerous obligation required to address the concerns outlined above; and

- is transparent, in that it has been drafted so as to secure maximum transparency, which is aided by the explanation as to the intended operation and effect of the conditions as set out in this document.

Proposed condition MA3 – Control of Fixed-to-Mobile Interconnection Charges and Proposed condition MA4 - Control of Mobile to Mobile Interconnection Charges

10.29 Conditions MA3 and 4 control the average charges which MNOs with SMP may levy in respect of termination of, respectively, calls originated on fixed networks and calls originated on mobile networks. Ofcom's reasons for proposing the particular form of these conditions are set out in Section 9 above and at paragraphs 10.30 to 10.40 below.

10.30 Ofcom proposes that the two charge controls applicable to termination of mobile to mobile calls and to termination of fixed to mobile calls should be subject to the same values and adjustments (the purpose of having two separate conditions being simply to ensure that relatively low MCT charges for termination of mobile to mobile calls cannot be offset within the same control basket with relatively high charges for terminating fixed to mobile calls). Ofcom proposes, however, that compliance with each of these two controls should be assessed using the time of day/week traffic profiles in respect of the sum of these two termination types.

10.31 Ofcom proposes that MNOs should be permitted to vary charges by time of day, subject to compliance with other SMP conditions, provided that the average charges (weighted by voice call termination traffic volumes in each relevant charging period) comply with the charge control. Ofcom proposes that, as at present, rather than requiring MNOs to demonstrate compliance against actual traffic weights by time of day/week (which would be impracticable), MNOs should be required to use the traffic weights actually achieved in the period 12 months before the period in question.

10.32 Ofcom proposes that charge controls should imposed for a period of four years from 1 April 2007

10.33 Ofcom proposes that the maximum average charges, defined in the proposed SMP conditions as the Target Average Charge ("TAC") of the 2G/3G MNOs during the fourth year of the charge control period should be 5.3ppm (2005/6 prices) being the mid-point of the range below. After considering responses to this consultation exercise, Ofcom will determine precisely where the charge cap should be set. Ofcom's present view is that it should be within the range 4.8 to 5.8ppm.

10.34 Ofcom proposes that the TAC of H3G during the fourth year of the charge control period should be 6ppm (2005/6 prices) being the mid-point of the range below. After considering responses to this consultation exercise, Ofcom will determine precisely where the charge cap should be set. Ofcom's present view is that it should be within the range 5.4 to 6.7ppm.

10.35 Ofcom proposes to define the TAC applicable to each MNO in the first three years of the charge control by reference to glide paths. The precise form of each glide path will be determined by Ofcom following consideration of responses to this consultation exercise, although Ofcom may decide that no glide path should apply and that charges should be reduced immediately to the level applicable during the fourth year of the charge control. The options are set out in Section 9 above. Ofcom also proposes that each TAC should be adjusted in line with movements in the Retail Prices Index, as set out in paragraph 9.102 above.

10.36 Section 87(9)(a) of the Act authorises the setting of an SMP services condition imposing charge controls in relation to matter connected with the provision of network access.

10.37 Section 88(1) of the Act authorises the setting of an SMP condition falling within section 87(9) where there is a relevant risk of adverse effects arising form price distortion; and it also appears that the setting of the condition is appropriate for the purposes of promoting efficiency, promoting sustainable competition and conferring the greatest possible benefits on the end-users of public electronic communications services.

10.38 Ofcom in proposing these obligations has considered all the Community requirements set out in section 4 of the Act, in particular the requirements to promote competition, secure efficient and sustainable competition and secure the maximum benefit for retail consumers. Furthermore, Ofcom has considered its duties under section 3 of the Act, in particular the requirements to further the interests of citizens and consumers to promote competition.

10.39 Ofcom has performed those duties also by ensuring that, for the purposes of imposing a charge control, the tests set out in section 88(1) of the Act have been met. As discussed above in Section 7, it appears from the market analysis that there is a relevant risk of adverse effects arising from price distortion. In particular, Ofcom

considers that there is relevant risk of adverse effects arising from price distortion as the five MNOs might so fix or maintain some or all of their prices at an excessively high level as to have adverse consequences for end-users of mobile call termination services. The proposed charge controls are also designed to reflect considerations of economic efficiency and have the intention to maximise benefits to end-users. As required by section 88(1)(b) of the Act, this obligation therefore promotes efficiency, confers the greatest possible benefits on the end-users and, by ensuring that PECN Providers competing for customers in the retail market are not exploited by the five MNOs setting excessive prices in the wholesale market, promotes effective and sustainable competition. The charge controls proposed also ensure that other PECN providers are not unfairly disadvantaged in the provision of access to voice call termination services by the MNOs in question. Furthermore, as set out in Annex 5 the proposed charge controls have taken account of the costs and reasonable rates of return on investments required by the five MNOs in providing wholesale voice call termination. As such, the proposed charge controls take account of the extent of the investment in the matters to which the condition relates of the five MNOs, as required by section 88(2) of the Act.

10.40 Ofcom believes that these conditions meet the tests set out in section 47 of the Act. Section 47 requires conditions to be objectively justifiable, non-discriminatory, proportionate and transparent. Ofcom believes that these proposed conditions:

- are objectively justifiable, in that they provide safeguards to ensure that competing PECN providers and consumers are not disadvantaged by an MNO setting excessive charges for wholesale voice call termination services.

- do not discriminate unduly against any MNO, in that they apply to all MNOs who, in the view of Ofcom, have the ability and incentive to set excessive charges for wholesale voice call termination services. Ofcom's proposal that the TAC to apply in 2010/11 should be the same for all of the 2G/3G MNOs, notwithstanding the remaining cost differential, does not unduly discriminate against T-Mobile and Orange as the proposed range within which the level will be set does not prevent those MNOs from recovering their efficiently incurred costs. While the loss of the small differential may potentially impact adversely the competitive position of these MNOs (relative to Vodafone and O2, which Ofcom's cost modelling indicates have slightly lower costs), Ofcom does not consider that this impact will have a material impact on competition. Given the identified advantages of moving to an undifferentiated charge level (as set out in paragraphs 9.63 to 9.68) Ofcom does not consider that the proposed condition unduly discriminates against T-Mobile and Orange.

- are proportionate, in that the charge controls are the least onerous obligations, in Ofcom's view, to address effectively the concerns set out above, as in the absence of such a control there is a serious risk of adverse effects arising from excessive termination charges. Furthermore, the charge controls are designed to reflect considerations of economic efficiency and have the intention to maximise benefits to end-users.

- are transparent, in that they have been drafted so as to secure maximum transparency, which is aided by the explanation as to the intended operation and effect of the conditions as set out in this document

Proposed Conditions MA5 and MA6: Requirement to publish Access contracts and Requirement to publish charges

10.41 Condition MA5 requires MNOs with SMP to publish Access Contracts, and Condition MA6 requires MNOs with SMP to publish charges. Charge changes and changes to access contracts are to be published not less than 28 days before any such amendment comes into force. For the reasons set out in paragraphs 8.53 to 8.55, Ofcom considers it necessary to impose such conditions.

10.42 Section 87(6)(b) of the Act authorises the setting of SMP services conditions which require a dominant provider to publish, in such manner as Ofcom may direct, all such information for the purpose of securing transparency. Section 87(6)(c) of the Act authorises the setting of SMP services conditions which require a dominant provider to publish, in such manner as Ofcom may from time to time direct, the terms and conditions on which it is willing to enter into an access contract. Section 87(6)(d) also permits the setting of conditions requiring the terms and conditions on which the dominant provider is willing to enter into an access contract to include such terms and conditions as may be specified or described in the condition. Section 87(6)(e) allows a condition requiring the dominant provider to make such modifications as Ofcom may direct of any offer by that provider which sets out the terms and conditions on which it is willing to enter into an access contract.

10.43 Ofcom, in proposing this obligation has considered all the Community requirements set out in section 4 of the Act, in particular the requirements to promote competition, secure efficient and sustainable competition and secure the maximum benefit for retail consumers. Furthermore, Ofcom has considered its duties under section 3 of the Act, in particular the requirements to further the interests of citizens and to promote competition. In particular, this transparency provides certainty to PECN providers and complements other obligations such as the obligation to not unduly discriminate, without risking commercial confidentiality or network security. The requirement therefore promotes competition, furthers the interests of consumers and citizens, and helps to secure effective and sustainable competition.

10.44 Ofcom believes that this condition meets the tests set out in section 47 of the Act. Section 47 requires conditions to be justifiable, non-discriminatory, proportionate and transparent. The proposed conditions:

- are objectively justifiable, in that they ensure that the terms and conditions are published which will encourage competition and provide stability in the relevant markets. They also ensure that other PECN providers have advance sight of the charges for voice call termination services provided by the MNOs in question. This helps ensure that competing PECN providers are able to take account of charge changes in order to compete with the MNO making the changes, whilst helping Ofcom to monitor other obligations such as the proposed charge control.

- do not unduly discriminate in that they apply equally to all MNOs who have the ability and incentive to discriminate and in circumstances where Ofcom is required to monitor other obligations, such as no undue discrimination and a charge control.

- are proportionate as they are the least onerous obligations to address concerns described above, in that information that is necessary to ensure that that there is no material adverse effect on competition would have to be provided, without raising issues of commercial confidentiality or network security associated with publishing a reference offer.

- are transparent, in that they have been drafted so as to secure maximum transparency possible within the confines of commercial confidentiality and network security, which is aided by the explanation as to the intended operation and effect of the condition as set out in this document.

Next steps

10.45 Ofcom has also proposed to revoke the notifications at (a) Annex A in the Wholesale mobile voice call termination market review, published by OFCOM on 1 June 2004, and any subsequent modifications to the SMP services conditions set by those Notifications, and (b) Annex 3 in the Assessment of whether H3G holds a position of SMP in the market for wholesale mobile voice call termination on its network published by Ofcom on 13 September 2006.

10.46 Ofcom is inviting interested parties to comment on these proposals by 22 November 2006. After considering responses Ofcom expects to make a final statement early in 2007.

Annex 1

Responding to this consultation

How to respond

A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on 22 November 2006**.

A1.2 Ofcom strongly prefers to receive responses as email attachments, in Word format, as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 3), to indicate amongst other things, whether there are confidentiality issues. This coversheet can be downloaded from the "Consultations" section of our website.

A1.3 Please send your response to michael.richardson@ofcom.org.uk . Responses may alternatively be posted or faxed to the address below, marked with the title of the consultation:

Michael Richardson
Floor 4
Riverside House
2A Southwark Bridge Road
London SE1 9HA

A1.4 Note that we do not need a hard copy in addition to an electronic version. Ofcom will acknowledge receipt of responses.

A1.5 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together at Annex 4. It would also help if you can explain why you hold your views and how Ofcom's proposals would impact on you.

Further information

A1.6 If you want to discuss the issues and questions raised in this consultation, or need advice on the appropriate form of response, please contact Michael Richardson on 020 7783 4157.

Confidentiality

A1.7 Ofcom believes it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, www.ofcom.org.uk, ideally on receipt. If you think your response should be kept confidential can you please specify what part or whether all of your response should be kept confidential and specify why. Please also place such parts in a separate annex.

A1.8 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and will try to respect this. But sometimes we will need to publish all responses, including those which are marked as confidential, in order to meet legal obligations

A1.9 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's approach on intellectual property rights is explained further on its website, at www.ofcom.org.uk/about_ofcom/gov_accountability/disclaimer.

Next steps

A1.10 Following the end of the consultation period, Ofcom intends to publish a statement early during 2007

A1.11 Please note that you can register to get automatic notifications of when Ofcom documents are published, at http://www.ofcom.org.uk/static/subscribe/select_list.htm.

Ofcom's consultation processes

A1.12 Ofcom is keen to make responding to consultations easy, and has published some consultation principles (see Annex 2) which it seeks to follow, including on the length of consultations.

A1.13 If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at consult@ofcom.org.uk. We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, whose views are less likely to be obtained in a formal consultation.

A1.14 If you would like to discuss these issues, or Ofcom's consultation processes more generally, you can alternatively contact Vicki Nash, Director, Scotland, who is Ofcom's consultation champion:

Vicki Nash
Ofcom (Scotland)
Sutherland House
149 St. Vincent Street
Glasgow G2 5NW
Tel: 0141 229 7401
Fax: 0141 229 7433
E-mail: vicki.nash@ofcom.org.uk

Annex 2

Ofcom's consultation principles

A2.1 Ofcom has published the following seven principles that it will follow for each public written consultation:

Before the consultation

A2.2 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

During the consultation

A2.3 We will be clear about who we are consulting, why, on what questions and for how long.

A2.4 We will make the consultation document as short and simple as possible with. where possible, a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened version for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

A2.5 We will normally allow ten weeks for responses to consultations on issues of general interest.

A2.6 There will be a person within Ofcom who will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organizations interested in the outcome of our decisions. This individual (who we call the consultation champion) will also be the main person to contact with views on the way we run our consultations.

A2.7 If we are not able to follow one of these principles, we will explain why. This may be because a particular issue is urgent. If we need to reduce the amount of time we have set aside for a consultation, we will let those concerned know beforehand that this is a 'red flag consultation' which needs their urgent attention.

After the consultation

A2.8 We will look at each response carefully and with an open mind. We will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

Annex 3

Consultation response cover sheet

A3.1 In the interests of transparency, we will publish all consultation responses in full on our website, www.ofcom.org.uk.

A3.2 We have produced a coversheet for responses (see below) and would be very grateful if you could send one with your response (this is incorporated into the online web form if you respond in this way). This will speed up our processing of responses, and help to maintain confidentiality where appropriate.

A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their coversheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.

A3.4 We strongly prefer to receive responses in the form of a Microsoft Word attachment to an email. Our website therefore includes an electronic copy of this cover sheet, which you can download from the 'Consultations' section of our website.

A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only, so that we don't have to edit your response.

Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

CONFIDENTIALITY

What do you want Ofcom to keep confidential?

Nothing	☐	Name/contact details/job title	☐
Whole response	☐	Organisation	☐
Part of the response	☐	If there is no separate annex, which parts?	

If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

DECLARATION

I confirm that the response supplied with this cover sheet is a formal consultation response. that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations

If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here. ☐

Name Signed (if hard copy)

Annex 4

Consultation questions

Question 1: Do you agree with Ofcom's market definitions?

Question 2: Do you agree that each of the five MNOs has SMP in the market for wholesale mobile voice call termination provided by it to other Communications Providers in the UK?

Question 3: Do you agree that it is appropriate to impose the following SMP conditions on each of the five MNOs;

- *A charge control on mobile to mobile MCT to apply until 31 March 2011.*
- *A charge control on fixed to mobile MCT to apply until 31 March 2011*
- *A prohibition of undue discrimination*
- *An obligation to meet reasonable requests for MCT on fair and reasonable terms*
- *An obligation to publish access contracts*
- *An obligation to publish charges and notify call volumes*

Question 4: Do you agree that the appropriate level of the target average charge to apply to mobile to mobile MCT and fixed to mobile MCT in 2010/11 in respect of H3G is 6ppm (2006/7 prices), and in respect of the 2G/3G MNOs is 5.3ppm (2006/7 prices)?

Question 5: Which of the following glide path options should be used to define H3G's target average charge in each of the first three years of the charge control period;

- *Option 1 - A smooth glide path with charges reducing at a constant percentage rate in each of the four years from today's average charges to the target determined for 2010/11.*
- *Option 2 - A one-off partial cut to 8.5ppm (2006/7 prices) for the first year followed by a smooth glide path to ensure that the maximum average charge aligns with the target determined for the final year of the charge control.*
- *Option 3 - A cost based glide path with charges reducing immediately to align with the 3G-only operator cost benchmark for 2007/8, and then set equal to the forecast cost path thereafter, such that in 2010/11 the maximum average charge aligns with the target determined for that year*

Question 6: Do you agree that the 2G/3G MNOs should be required to reduce their charges in line with a smooth glide path of constant percentage rate in each year of the charge control such that average charges in the fourth year (2010/11) align with the target determined for that year?

Annex 5

Network costs modelling

Development of a new mobile LRIC model

A5.1 In the previous market review of 2G mobile voice termination (see June 2004 Statement), Ofcom used a Long-Run Incremental Cost (LRIC) model to derive the cost to a 2G network operator of providing 2G voice termination services. The LRIC of voice termination is the additional cost an MNO incurs to provide termination. This can also be seen as the cost that the firm would avoid if it decided not to provide voice termination, taking a long-run perspective. It corresponds more closely to the charges that would prevail in an effectively competitive market than accounting based measures of cost; it is a fundamental goal of price regulation to mimic the effects of a competitive market and this consideration underpins the use of LRIC.

A5.2 LRIC is widely used as a regulatory costing technique, for example by other NRAs in Europe and by the FCC in the US. It has also been identified as the most appropriate methodology to use for setting interconnection charges by the European Commission in its 1998 Recommendation on Interconnection. For further details, see The Use of Long Run Incremental Cost (LRIC) as a Costing Methodology in Regulation, 12 February 2002, http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/lric120202.pdf. Furthermore, the Competition Commission (CC) agreed with the use of LRIC as the appropriate costing methodology for setting termination charges, as stated in paragraph 2.251 of the CC's 2003 Report (see footnote 13 above).

A5.3 Ofcom continues to hold the view that a LRIC methodology constitutes the most appropriate means of determining the efficient levels for charges on mobile voice call termination services.

A5.4 There are two commonly used approaches to the construction of cost models - namely 'top-down' and 'bottom-up'. Under a top-down approach, the historical accounting cost levels of an entity are taken as the starting point; output/cost relationships are then derived from historical observations and costs are projected forward on the basis of output forecasts. Under a bottom-up approach, the model identifies all components of cost at a much more granular level, from the "bottom-up", that will be incurred by the entity over the period of interest. Cost causal relationships are then defined to link the quantity of each of these cost components required with output and other cost drivers, based on practical and theoretical evidence.

A5.5 Each of these approaches has distinct benefits and drawbacks. Whilst the top-down approach reflects, by construction, a precise snap shot of cost levels, the cost forecasting is applied at an aggregated level and may not be as robust where the entity faces significant uncertainty or evolutionary change. Furthermore, any existing cost inefficiencies are embedded in the cost forecasts by construction. A bottom-up approach provides a better understanding of underlying cost structures and is able to determine more accurately the changes in cost over time under significant uncertainty or where cost structures are expected to change. However, this approach does not necessarily result in an accurate total level of costs, since it is more difficult to ensure that all efficiently incurred costs have been fully accounted for.

A5.6 Alternatively, it is possible to combine the strengths of both of these approaches in a top-down / bottom-up 'hybrid' approach. A bottom-up model is first developed as outlined above. This model is then calibrated, by adjusting the unit cost levels and cost causality relationships of each cost component, until the model achieves in aggregate the same level of costs as a top-down approach would achieve in historical years.

A5.7 In the case of the new mobile LRIC model, the focus is on the long-run. With the emergence of 3G technology and associated new services, significant changes to the relative cost structures are likely over the horizon of the model. Hence in order to make robust forecasts of a mobile operator's costs over the long-run, it is necessary to adopt a bottom-up approach. Nevertheless, Ofcom believes that the historical cost level properties of a top-down approach are also desirable to ensure that all relevant costs are fully included in the model. The hybrid approach outlined above has therefore been used, with a calibration of the cost model to MNOs' accounting data; this calibration is discussed in detail in Annex 12.

A5.8 In the June 2004 Statement, Ofcom used a 2G-only LRIC model to derive levels for regulated 2G termination charges, modelling all future voice traffic as if it was carried on the 2G network of a reasonably efficient operator. At the time of the June 2005 Extension Consultation which proposed an extension to the existing charge controls, all of the 2G MNOs had launched 3G services and had the potential to migrate significant volumes of traffic from their 2G to 3G networks. Ofcom therefore began to consider the impact of reduced volumes of traffic on 2G networks as a result of migration to 3G networks. However, cost analysis at that stage was limited due to the absence of a cost model capable of accurately capturing the impact of 3G network rollout.

A5.9 Ofcom therefore began work on a new mobile LRIC model in April 2005 and commissioned Analysys Consulting to assist in its development. The model has built upon the June 2005 version of the old 2G LRIC model (hereafter referred to as the "June 2005 model"), but has been extended to include both 2G and 3G network technologies and the effects of traffic migration and cost sharing between these networks.

A5.10 Throughout the model development process, Ofcom has actively consulted key industry stakeholders (including the five MNOs as well as BT and UKCTA). This industry involvement has been critical in terms of developing Ofcom's understanding of 3G network design and likely future demand scenarios as well as obtaining cost benchmarks for calibration of the new LRIC model. This process has taken place through a wide range of channels:

- **Information requests**: Mobile operators have submitted responses to several Ofcom data requests. These requests have focussed on obtaining accurate model inputs, realistic network dimensioning algorithms and calibration benchmarks for total GBV and operating costs

- **Workshops**: Ofcom has held three workshops with key industry stakeholders to discuss the structure, inputs and outputs of the model at various stages of development

- **Meetings:** A number of face-to-face meetings have been held with each of the mobile operators, BT and UKCTA. Generally these meetings have focussed on modelling implementation and key conceptual issues

- **Model releases:** Ofcom has already shared two work-in-progress model versions ("Release 1" in October 2005 and "Release 2" in March 2006) with key industry stakeholders. Release 1 focussed on developing an appropriate model structure, whereas Release 2 aimed to strengthen the model inputs. Release 3 of the model accompanies this document and reflects feedback from operators on the previous two model releases

Overview of the new mobile LRIC model

Scope included

A5.11 The primary objective of the model is to assess on a LRIC basis the network costs to a single network operator of delivering voice services over 2G and/or 3G mobile networks. However, there are significant economies of scope in the provision of voice and data services, particularly on 3G networks, and therefore data services have also been included in order to provide an accurate view of the costs of voice services and voice termination in particular.

A5.12 The model is based on the use of technologies and spectrum bands which have been, or are currently being deployed in the UK. Specifically it includes:

- GSM in the 900MHz band
- GSM in the 1800 MHz band
- UMTS using 5MHz paired spectrum in the 2.1GHz band.

A5.13 The model also has the flexibility to assess the impact of spectrum in other bands becoming available at a later date, or potentially the deployment of new technologies such as High Speed Downlink Packet Access (HSDPA). However, this flexibility has not been employed for the purpose of assessing the efficient level of charges over the timeframe of this market review. In general, Ofcom is of the view that such developments would likely result either in efficiency gains which would result in a lower efficient target charge, or new data services in which case the additional costs should be borne by these services.

A5.14 The model explicitly calculates the capital and operating costs associated with network equipment, in particular the following:

- Radio network (including base station sites and equipment)
- Backhaul (i.e. links from the base stations to the core network)
- Backbone network
- Core network switching equipment and other assets.

A5.15 In line with the approach taken in the 2G LRIC model from the previous market review, the model includes all network costs from the radio network to the core network, up to and including the gateway switches and interconnect ports.

A5.16 The model calculates the network costs to an operator in delivering voice and data services to end users. In common with the 2G LRIC model, the new model is driven by three key cost drivers: the number of subscribers, coverage requirements and the total traffic that subscribers consume. The number of subscribers drives a

relatively small number of assets e.g. HLRs and handsets, whereas service demand (traffic) drives the majority of costs. Service demand from all traffic services is combined to form aggregated cost drivers. Since certain traffic services use different network resources more or less intensively than others, specific aggregation factors are applied in order to capture these effects. This is discussed below in paragraphs A5.46-47. These cost drivers are used to calculate the required deployment of 2G and 3G networks (where appropriate) in order to meet the demands for capacity and coverage.

A5.17 In order to capture the relevant effects of national roaming, the model is capable of roaming off traffic from the 3G-only operator's network (and onto a combined 2G/3G operator's network) where the extent of its coverage is insufficient to convey calls that are demanded. Commercial costs associated with network roaming for a 3G-only operator are not included within the scope of the network cost model.

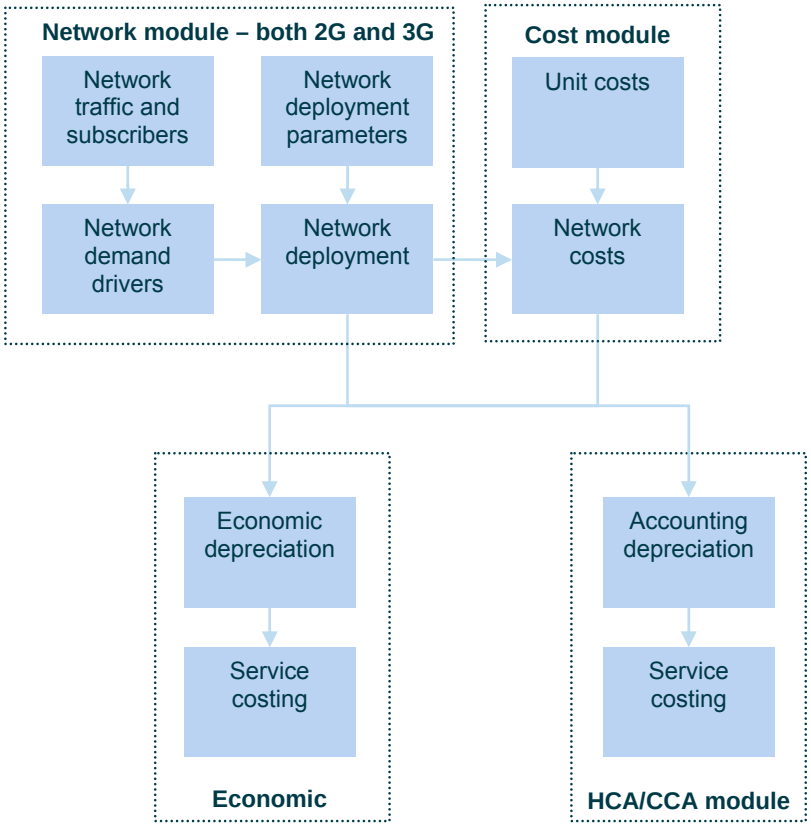
A5.18 Service costs are arrived at by allocating all the costs identified to different services according to service routing factors. To the extent that common costs exist, these are allocated to service increments according to routing factors. The model does not explicitly identify or estimate the level of common costs. The outputs of the model are unit costs that exhaustively include all network costs. Therefore the model outputs and in particular the cost of termination is an incremental cost and an implicit mark-up for an allocation of any potential common costs. This is a particular form of network common cost allocation. Allocation of common costs is discussed in more detail Annex 17.

A5.19 The model explicitly calculates the network costs for the period 1990/91 to 2039/40 with a perpetuity based terminal value thereafter, although demand inputs are constrained to be constant from 2020/21 onwards.

Model structure

A5.20 The new mobile cost model comprises four distinct modules, as shown in Figure A5.1 below.

Figure A5.1 Model structure



- The **network module** forecasts the 2G and 3G network deployment required to support the input level of demand and network coverage over time.
- The **cost module** produces the network costs, based on asset costs (both capital and operating) and a projected network deployment.
- The **economic depreciation module** calculates service costs from the forecast network costs, based on two different forms of economic depreciation[63].
- The **HCA/CCA module** outputs the gross book value and service cost based on applying Historical Cost Accounting and Current Cost Accounting forms of depreciation to the network asset costs.

Model outputs

A5.21 The model outputs unit costs in each year for traffic and subscriber services, including incoming voice call minutes. These service unit costs can be stated according to four different paths of cost recovery which have been included in the model; the same form of Economic Depreciation used on the previous market review ("Original ED"), a simplified form of Economic Depreciation ("Simplified ED") as well as HCA and CCA accounting approaches. The entire model is calculated in real 2006/07 terms and all outputs are stated in this form.

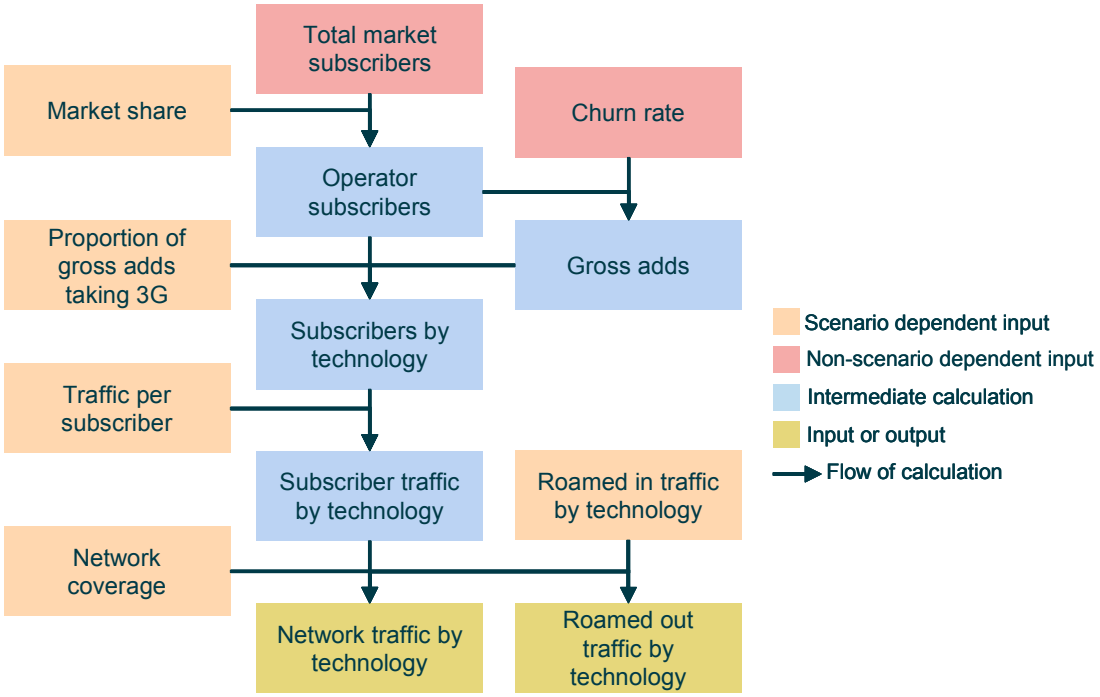
[63] See http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/depr0901.htm for a detailed explanation of economic depreciation and its implementation in the previous market review

Demand and coverage inputs

Overview

A5.22 Forecasts have been generated for subscribers and service demand on the 2G and 3G networks. These forecasts have been constructed according to the logic flow shown in Figure A5.2 below:

Figure A5.2 Development of demand forecasts



A5.23 The subscriber numbers for the modelled operator are calculated based on the total number of mobile subscribers (forecast assumes population growth at 0.4% per annum[64] and a take-up S-curve which saturates at 110% penetration of the population with SIMs[65]), multiplied by an assumed market share for that operator.

A5.24 Two alternative market share profiles have been used: one for a 2G-only or 2G/3G operator and another for a 3G-only operator. These profiles are consistent with the principle of competitive neutrality, with five players taking equal shares of the market by the end of the explicitly modelled period. In this context, competitive neutrality is an important consideration and Ofcom's considers that the fourteen year timeframe from the present to 2020/21 should provide H3G sufficient opportunity to reach an average operator efficient benchmark of 20% market share. This approach is in-line with that taken in the previous market review, where efficient operators were modelled as having the same market shares. MNOs have raised a concern that Ofcom's programme of spectrum releases, liberalisation and trading may lead to the introduction of new mobile network operators. They consider that this would reduce their share of the total mobile market to below 20% in the long run. Ofcom does not consider that it is appropriate at this point to speculate on the possibility of new entrant MNOs; whilst this possibility cannot be dismissed, neither does it seem likely that new entrants would be likely to seek to

[64] Based on data from The Economist Intelligence Unit
[65] Assumption that all over 10s will become mobile subscribers, with 25% of those owning dual SIMs

offer a national mobile network and take a significant share of the total mobile market over the period under consideration.

A5.25 The market share assumption for a 3G-only operator is based on H3G's historical subscriber numbers, with a forecast based on H3G's own forecasts[66] as well as other third party sources (including WCIS as well as a number of brokers' reports). The 3G-only operator's market share is assumed to increase gradually up to 20% by 2020/21, equal with the other four operators. For 2G-only or 2G/3G operators, market share declines from 25% prior to the entrance of the 3G-only operator, reducing to 20% by 2020/21 in line with the assumption of a five player market with equal shares.

A5.26 The migration of subscribers from 2G-only to 3G enabled handsets is continuing at an increasing rate. The assumptions in the model about the rate of this migration for a 2G/3G combined network operator are based on an assumed handset churn rate of 40% and an increasing proportion of churning subscribers taking 3G enabled handsets in each year (for a 2G-only operator this is always assumed to be zero, and for a 3G-only operator this parameter is 100%). Three alternative migration scenarios have been evaluated in the model with high, medium and low rates of subscriber migration, based on 100% of churned subscribers taking 3G-enabled handsets by the end of 2007/08, 2009/11 and 2010/11 respectively. These scenarios are intended to include the likely range of realistic market outcomes.

A5.27 Demand for each service per subscriber in the model has been based on historical data combined with simple growth-rate based forecasts. Substantial revisions have been made to these forecasts, following comments from stakeholders on Release 2 of the model that demand assumptions were too high. The latest forecasts in Release 3 of the model have been generated with reference to forecasts from MNOs, as well as third-party mobile market research. High, medium and low scenarios have been investigated for each of the services below, with a breadth intended to capture the likely range of realistic outcomes and a medium case which is intended to give the best fit to a range of third party forecasts. The following services have been included in the model:

- 2G incoming, outgoing and on-net voice calls
- 2G SMS and MMS
- 2G packet data
- 3G incoming, outgoing and on-net voice calls
- 3G incoming, outgoing and on-net video calls
- 3G SMS and MMS
- 3G packet data (including data cards)

A5.28 A rebalancing adjustment has also been applied to 2G and 3G traffic to account for 3G subscriber traffic being roamed onto 2G networks where 3G coverage is not available. This rebalanced traffic will be delivered on the operator's own 2G network

[66] The 3G-only demand and coverage inputs for the model cannot be made publicly available due to their reliance on confidential data provided by H3G

if available, or in the case of a 3G-only operator it is assumed that this will be roamed out to a national roaming partner.

Geotype definition

A5.29 The June 2005 model dimensioned radio sites separately within each of four "geotypes". These geotypes are a means of mapping different UK geographies according to the likely density of traffic and building clutter that would be experienced (e.g. city centres with high traffic density and high building clutter versus rural areas with low traffic density and low building clutter). These geographically varying factors have a direct influence on the number of sites that would be required to provide a coverage network alone, and the number of sites that would be required to provide sufficient network capacity to carry all of the traffic. The geotype definitions within the model are an attempt to capture these important geographic differences, and have been defined according to population density (as a proxy for variations in traffic density and building clutter). Traffic forecasts are necessarily split into these geotypes to allow accurate modelling of the radio network.

A5.30 The new mobile LRIC model has been extended to include a total of nine geotypes[67]. The number of geotypes has been increased in order to provide a more granular assessment of costs. The nine geotypes in the new LRIC model are listed below:

- Urban
- Suburban 1 and 2
- Rural 1, 2, 3 and 4
- Highways
- Railways

Demand scenarios

A5.31 The following nine alternative overall demand scenarios have been included in Release 3 of the model, including one 2G-only operator scenario and four demand scenarios for both the 2G/3G and 3G-only operator cases:

- 2G-only operator, medium voice and data traffic
- 2G/3G operator, high voice and data traffic
- 2G/3G operator, medium voice and data traffic
- 2G/3G operator, low voice and data traffic
- 2G/3G operator, medium voice only traffic
- 3G-only operator, high voice and data traffic
- 3G-only operator, medium voice and data traffic

[67] The June 2005 model had four geotypes – Urban, Suburban, Rural and Highways

- 3G-only operator, low voice and data traffic
- 3G-only operator, medium voice only traffic

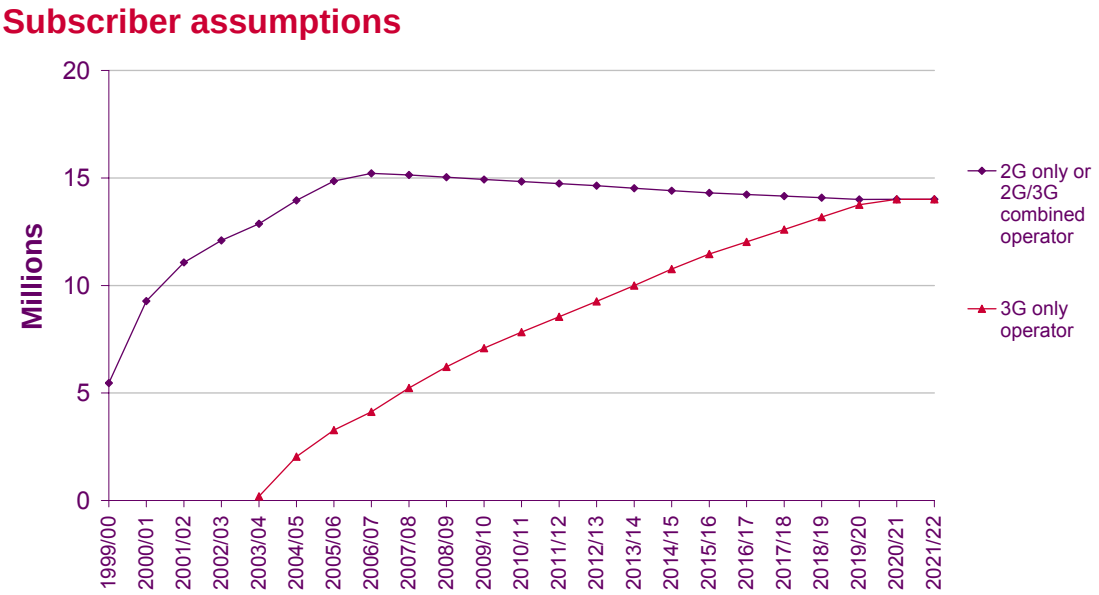
A5.32 Under each of these scenarios, a different combination of assumptions has been made in generating forecasts of future demand. The following demand drivers have been established following stakeholder comments on previous model releases. Each of these factors has been set to high, medium or low cases, depending on the chosen overall demand scenario, and many of these vary over time in the model:

- rate of subscriber migration from 2G-only to 3G enabled handsets[68]
- average voice minutes (including video calls) per subscriber
- ratio of 3G to 2G voice traffic per subscriber as a proxy for the usage patterns of early adopters
- proportion of 3G users who are active users of video calls
- proportion of active video call user minutes that would be video minutes if both originating and called party are in coverage
- outgoing messages per average subscriber
- ratio of 3G message use to 2G message use as a proxy for usage patterns of early adopters
- proportion of 2G messages that are MMS
- proportion of 3G messages that are MMS
- proportion of 2G subscribers who use data services
- 2G data usage per user of data services
- proportion of 3G subscribers who use data services (including 3G data cards)
- 3G data usage per user of data services (this takes account of the use of 3G data cards)

A5.33 Some of the key demand assumptions over time which have been generated by the approach described above are shown in the figures below:

[68] The rate of migration is set to the most rapid under high traffic scenarios and the slowest under low traffic scenarios, since these combinations minimise and maximise blended 2G/3G unit costs respectively

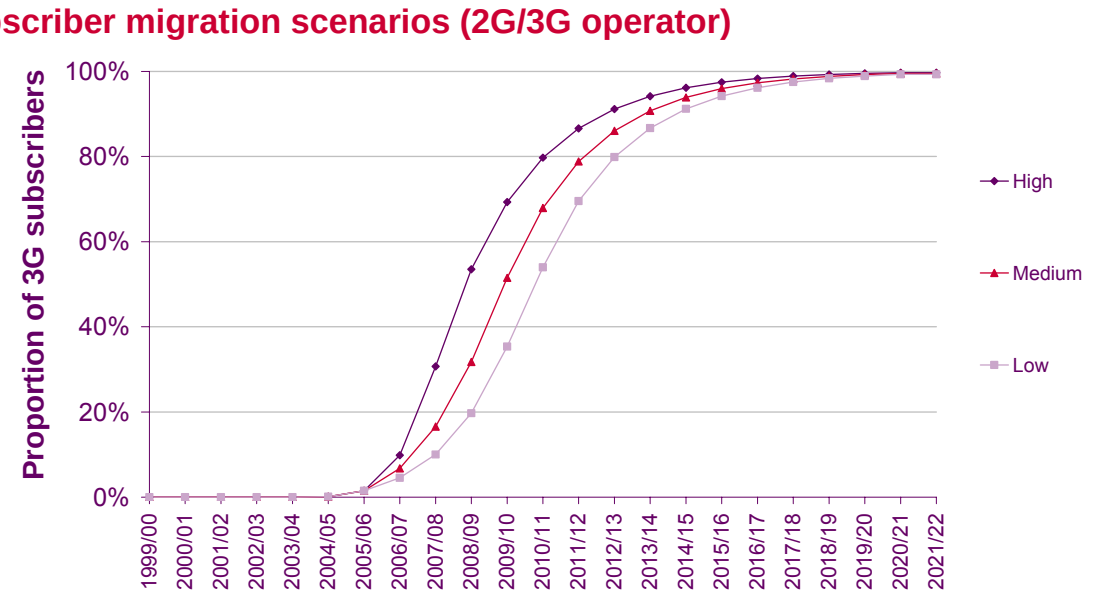
Figure A5.3 Subscriber forecasts



A5.34 These subscriber assumptions are consistent with the rationale explained previously, giving five efficient operators with equal market shares by the end of the explicit modelling period.

- The fall in 2G-only or 2G/3G combined operator subscribers reflects a fall from 25% to 20% market share, consistent with the assumptions made in last market review due to the entry of H3G
- The 3G-only operator is assumed to gradually gain market share, rising from 0% in 2003/04 up to 20% by 2020/21

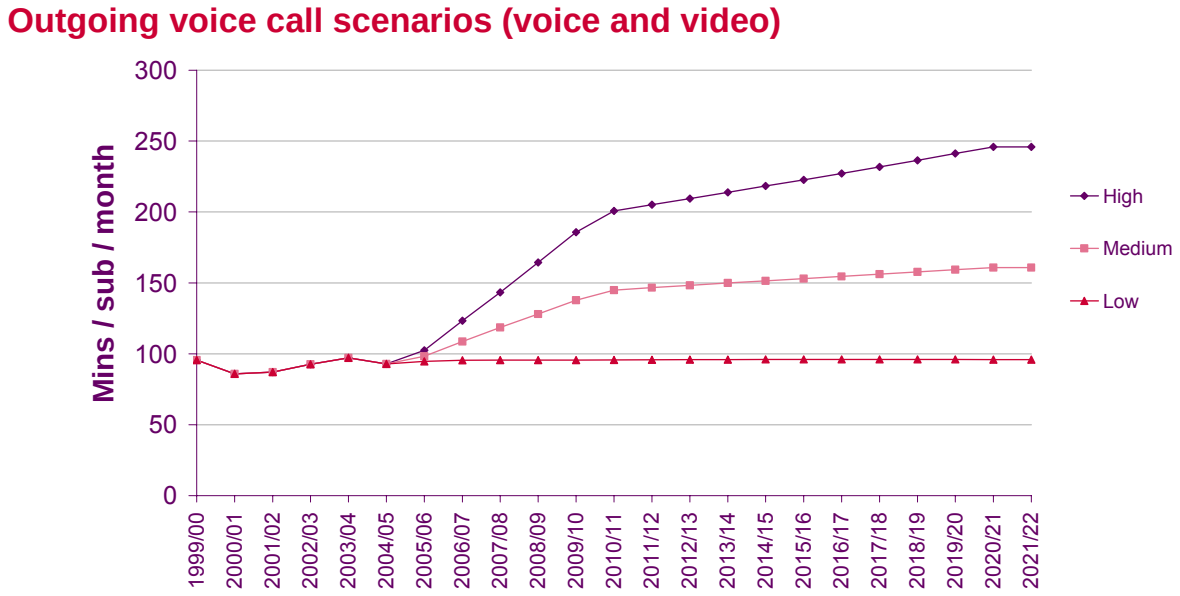
Figure A5.4 Subscriber migration forecasts



A5.35 These migration scenarios all exhibit the same historical starting point in 2004/05, prior to which the 2G/3G MNOs' traffic was carried entirely on 2G networks.

However, different assumptions on the 3G take-up rates of churned subscribers lead to a range of migration S-curves. All of these curves reach 100% by the end of the explicit modelling period.

Figure A5.5 Outgoing voice call forecasts (2G and 3G subscriber weighted average)

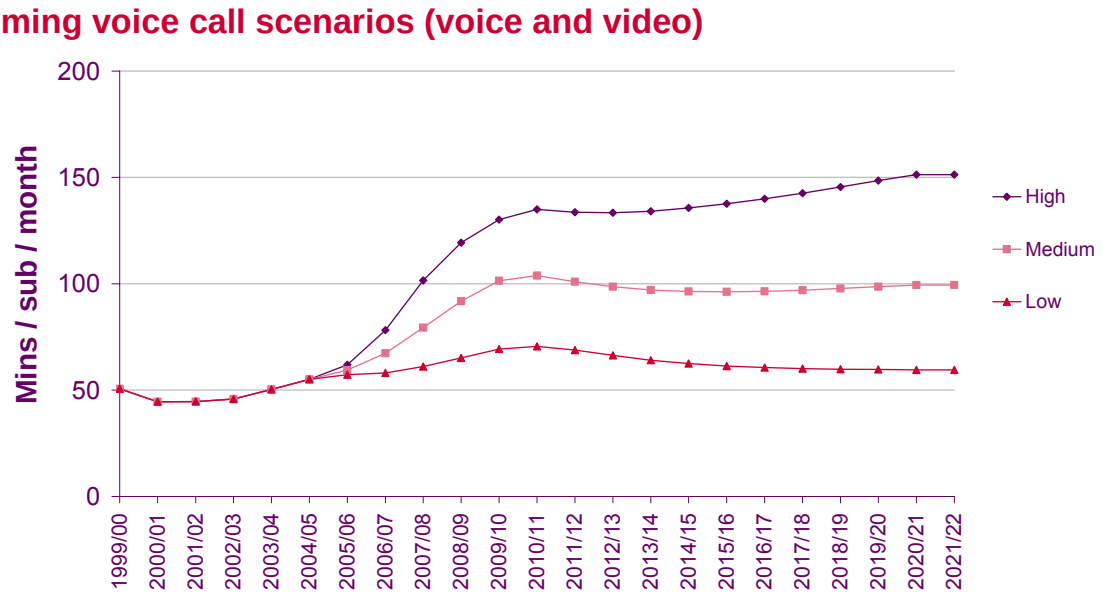


A5.36 The outgoing voice usage scenarios in the new LRIC model can be summarised as follows:

- **Low case**: No growth in subscriber voice call usage
- **Medium case**: Moderate voice usage CAGR of 9% up to 2010/11
- **High case**: Higher voice usage CAGR of 16% up to 2010/11

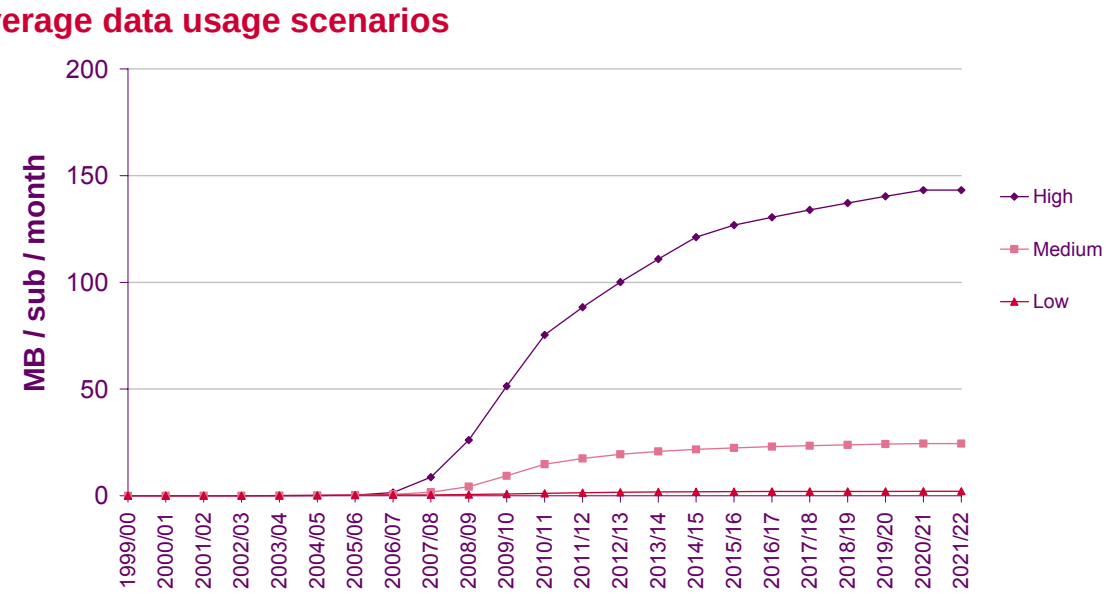
A5.37 The medium case outgoing voice traffic scenario gives the best fit to a range of forecasts obtained from MNOs, brokers' reports and third party market research from IDC.

Figure A5.6 Incoming voice call forecasts (2G and 3G subscriber weighted average)



A5.38 The incoming voice call scenarios included within the new LRIC model are similar to the outgoing voice call scenarios in terms of the range of different forecasts which have been considered. The level of these forecasts is based on historical data and model assumptions around the relative proportion of voice calls which will be incoming versus outgoing. The temporary demand peak around 2010/11 is caused by the rebalancing of on-net calls which cross both the 2G and 3G networks; these calls are separated into an incoming call on one network and an outgoing call on the other in the new LRIC model for the purpose of accurately capturing their costs.

Figure A5.7 Data forecasts (2G and 3G subscriber weighted average)



A1.15 Currently the market for 3G data services is not well established and the outlook for growth in this area is therefore highly uncertain. The divergence of the three data usage scenarios shown above is intended to reflect the extent of this present

uncertainty. The medium case scenario is based on a conservative interpretation of the consensus of demand forecasts which Ofcom has obtained from mobile operators as well as third party market research from IDC.

Coverage scenarios

A5.39 Along with traffic, national coverage requirements are a key driver of radio network deployment for a mobile operator. This cost driver was captured within the June 2005 model in the form of a 2G rollout plan over time as a percentage of the land area contained within each of the geotypes listed above. Following comments and information provided by mobile operators in response to previous releases of the model, the assumed extent of final 2G network rollout has been set at 99% of the UK population.

A5.40 The new LRIC model is also required to dimension a 3G network which is driven by coverage requirements in the same way as the existing 2G networks. Ofcom considers that the 3G coverage profile over time must be compatible with the coverage obligations imposed on the mobile operators at the time of purchasing their 3G licences. However, Ofcom does not believe that an efficient 2G/3G operator would necessarily be motivated to rollout a 3G network to the same extent as existing 2G networks[69], due to the relatively low demand experienced in these regions. The new LRIC model therefore assumes that 2G/3G operators' 3G networks will ultimately be rolled out to give 90% population coverage, with a focus on the higher density urban and suburban geotypes. In the case of a 3G-only operator, a 3G network rollout higher than 90% (up to ✂ population coverage) has been assumed since the operator does not possess its own 2G network to support roaming in rural areas. This rollout falls short of the 99% level of 2G network coverage and therefore assumes some reliance on the ability to roam out traffic to a 2G network.

A5.41 Furthermore, Ofcom recognises that there is an important relationship between traffic and coverage in the early stages of 3G network rollout. For example, H3G launched 3G services in advance of the other MNOs, gaining subscribers and traffic before the other MNOs, and correspondingly implemented a more rapid coverage deployment of its 3G network. It is important that the assumptions about the build-up of 3G traffic contained within the new LRIC model are consistent with the assumptions about the rate of 3G network coverage rollout. Since the 3G-only operator traffic scenario is based on H3G's historic 3G subscriber levels, in contrast to the 3G traffic in the 2G/3G operator scenarios which is based on the average of the four other MNOs' 3G subscriber base which has grown less quickly, the assumed rate of rollout for the 3G-only operator should be more rapid than that for a 2G/3G operator to maintain the appropriate consistency between traffic volumes and rollout costs. The new LRIC model therefore assumes two separate 3G rollout scenarios; one for a 3G-only operator based on H3G's stated network coverage, which has been removed from the published model for confidentiality reasons; and another for the 2G/3G operators which is an average based on the stated rollout profiles of the four other MNOs.

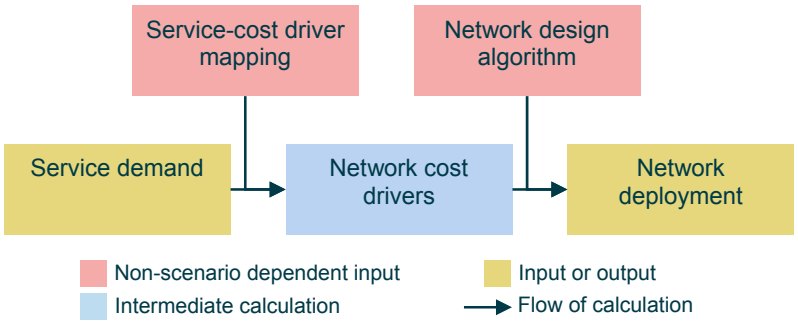
[69] Ofcom has considered scenarios under which the 2G network is switched off in future and 3G networks are rolled out further, so as to provide the same overall level of coverage. However, under realistic assumptions these switch-off scenarios result in similar levels of unit costs to a no switch-off scenario within the period of interest as the cost reductions on the 2G network are offset by the additional cost of rolling out 3G network coverage in rural areas.

Network module

Overview

A5.42 The network module calculates the deployment of each type of 2G and 3G network asset required to meet the input levels of service demand and coverage in each year. The flow of calculation in this module is illustrated in Figure A5.8 below:

Figure A5.8 Calculation flow



Modelling of different operator types

A5.43 The purpose of the new LRIC model is to provide relevant benchmarks to inform the appropriate levels for charge controls on mobile voice termination. The network module has therefore been designed to model (a) an operator with a 2G network only, as in the previous market review, as well as (b) an operator with both a 2G and a 3G network and (c) an operator with a 3G network only. The network design algorithms used to determine the deployment of all three types of operator are consistent (although different dimensioning rules exist for 2G and 3G specific equipment). However, for an operator with both 2G and 3G networks, certain assets (e.g. radio sites) may be shared between the 2G and 3G networks.

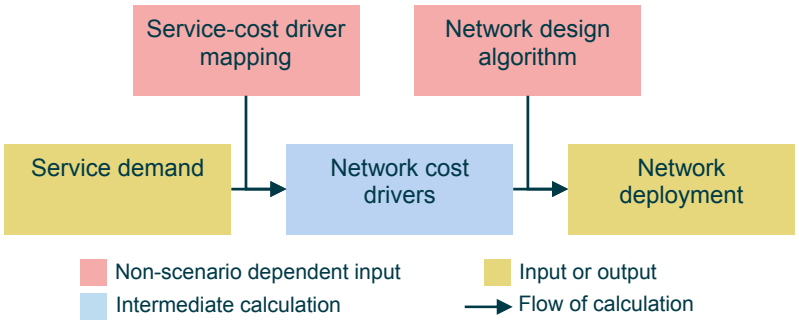
A5.44 As previously stated, traffic generated by 2G and 3G subscribers has been adjusted to estimate the proportion that will be carried on the 2G and the 3G networks given 3G coverage limitations. During this process, on-net calls between subscribers on the 2G network and subscribers on the 3G network are converted into an outgoing call on one network and an incoming call on another. For a 2G/3G operator, this assumes that the cost of an on-net call between an operator's 2G and 3G network is equal to the cost of an outgoing call on one network and an incoming call on the other. In the 3G-only operator case, it has been assumed that the network cost of an on-net call is that of an outgoing call if the receiving party is outside 3G coverage or that of an incoming call if the calling party is outside 3G coverage.

Cost drivers

A5.45 In order to dimension 2G and 3G networks on the basis of cost causation relationships, the network model first converts the demand for each service under the selected input scenario into a number of specific cost drivers, each of which drives the deployment of certain network assets. A common measure of traffic output is required so that demand from multiple services can be aggregated

appropriately; traffic on each service is therefore converted into busy-hour Mbit/s[70]. A matrix of routeing factors is then applied in order to map the services into a full set of network cost drivers.

Figure A5.9 Cost driver typical calculation flow



A5.46 A key issue in terms of the conversion of services into cost drivers is the relative efficiency with which voice (circuit switched) and data (packet switched) is carried on the radio network, since this impacts the relative proportions of costs which are driven by and therefore attributable to voice and data services. Ofcom therefore commissioned a technical investigation to determine an appropriate down-lift factor which takes account of these relative efficiency differences by linking data traffic to a voice equivalent measure. A factor of two was determined on theoretical grounds. However, in light of further evidence on this issue provided by operators in response initial model releases, in part reflecting early practical experience, this factor has been increased to three. Ofcom has also included a voice only traffic scenario, which provides an upper-bound view on the potential impact of this factor.

Network dimensioning parameters

A5.47 A number of technical parameters are required in order to establish quantifiable relationships between cost drivers and network deployment. The key parameters which affect the dimensioning of 2G and 3G networks in the model are as follows:

- Cell radii for the radio network (defined separately by geotype for GSM 900MHz, GSM 1800MHz and 2.1GHz UMTS spectrum)
- Equipment capacities (from the radio network through the backhaul and backbone networks up to the core network)
- Utilisation factors (including design utilisation, scorched node allowance and the look-ahead period)[71]

A5.48 The 2G parameters assumed in the new LRIC model are similar to those used in the June 2005 model. However, in some cases the MNOs have provided Ofcom with improved data and parameters have been modified accordingly. This is particularly true of cell radii and certain utilisation parameters. These have been adjusted in order to bring them more in-line with stated operational parameters from

[70] On the radio network, this is calculated in voice-equivalent terms. This is a more predictable measure than data-equivalent terms, since the efficiency with which data can be carried depends on the bandwidth provisioned

[71] Design utilisation reflects the maximum working level of utilisation used by network designers. Scorched node utilisation reflects the fact that utilisation is constrained by the history of deployments. The look-ahead allows for equipment purchase in advance of the exact date at which it is required.

mobile operators, and to give an accurate calibration of the model according to high-level asset count and cost benchmarks also obtained from mobile operators. This calibration process is discussed in detail in Annex 12.

A5.49 The 3G specific parameters in the new mobile LRIC model have been based on MNOs' responses to data requests, as well as Analysys' experience in this area. As for the 2G parameters, cell radii and certain utilisation factors have been adjusted with regard to both stated values from mobile operators as well as calibration to mobile operators' high level asset counts and cost benchmarks, as described in detail in Annex 12.

Network dimensioning algorithms

A5.50 In order to derive a realistic assessment of cost structures for a mobile operator, Ofcom has developed a bottom-Up approach similar to that used in the last market review, which calculates the quantities of each type of network asset required starting from the radio network and working up through backhaul links to the core network. These assets are dimensioned in the model according to the cost drivers discussed previously, either directly or indirectly (in the case of assets which are dimensioned on the basis of other asset quantities).

A5.51 The approach that has been taken for dimensioning 2G networks is broadly consistent with that taken in the last market review, with most of the calculations being based on those of the June 2005 model. This approach is based on a radio network which is dimensioned for whichever is the greatest of coverage and capacity requirements within each geotype.

A5.52 In order to model 3G networks, an initial dimensioning approach was implemented using initial feedback from MNOs combined with Analysys' technical expertise, taking a similar approach as taken in the 2G network modelling exercises. An iterative process with the MNOs was then initiated, with subsequent model releases being amended in order to reflect operators' feedback on real-world networks. Specifically, some additional asset types have been added and the way that certain assets are dimensioned has also been modified.

A5.53 As Ofcom stated in paragraph E.52 of the June 2005 Extension Consultation (see footnote 2 above), "it is also appropriate to take account of the opportunity that the four MNOs have for sharing costs of certain elements across their existing 2G networks and their new 3G networks. In particular, many sites used for 2G transmitters are likely to be used for 3G transmitters as well, which provides opportunities for cost sharing between 2G and 3G networks". The network dimensioning algorithms in the new LRIC model therefore take account of a degree of sharing of certain assets between 2G and 3G networks, in the case of an operator with both of these network technologies. Site sharing is the most significant effect; however, backhaul and some core network equipment is also shared. The proportion of these assets which are shared has been informed by data and comments from the MNOs.

2G network dimensioning

A5.54 As in the June 2005 model, a series of network design algorithms is applied to create asset requirement projections for the 2G network, starting at the level of the radio network. These algorithms are based on those implemented in the June 2005 model. However, some minor adjustments and improvements have been applied to

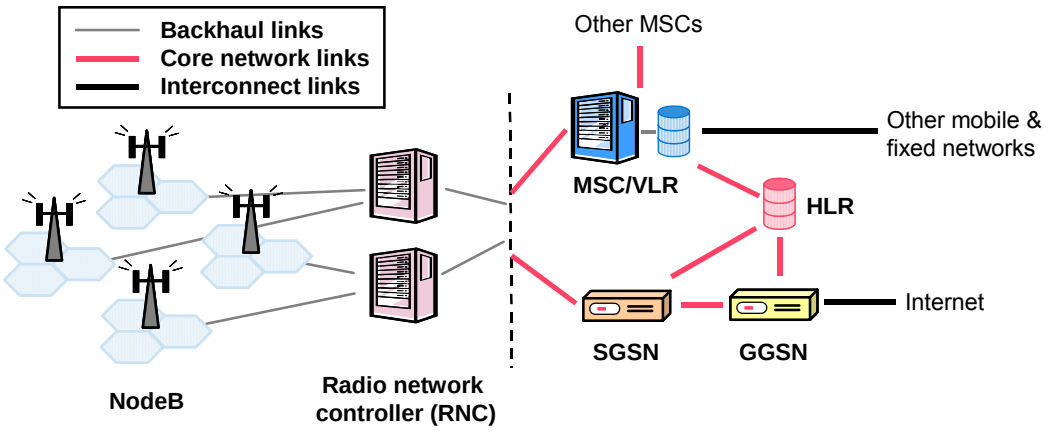
take account of the increased modelling scope and the availability of more recent data from the MNOs. These changes are explained in detail below:

Expansion of modelling scope	The scope has been expanded from the June 2005 model which was a voice only model, to include network elements used to support SMS and data services (namely SMSC, SGSN, GGSN and PCUs).
Greater geotype granularity	As already noted, the new model works at the level of an increased number of geotypes, in order to provide a more granular assessment of costs and flexibility to model 3G deployment strategies that vary in rural areas.
Network sharing	Base station sites, backhaul, ports[72] and switch sites are shared between the 2G and 3G networks.
Other changes	Some modifications were made to the dimensioning of backhaul and core network architecture to better reflect the practice of operators. The way in which asset utilisation drives deployment has also been modified slightly.

3G network dimensioning

A5.55 The network design algorithms used for 3G networks are similar to those used for the 2G network, but have been adjusted to take into account the different assets with different technical characteristics used in a 3G network as compared to a 2G network. The diagram below provides a simplified representation of some of the 3G network elements included in the new mobile LRIC model:

Figure A5.10 Simplified UMTS network diagram



- Node-Bs, Radio network controllers and backhaul links form the radio access network

[72] In the June 2005 model, BSC ports and BSC-facing ports in the MSC were calculated based on the number of backhaul links. In the new model backhaul is assumed to be shared by the 2G and 3G networks if sites are shared, so ports are now dimensioned based on the amount of traffic flowing between network elements

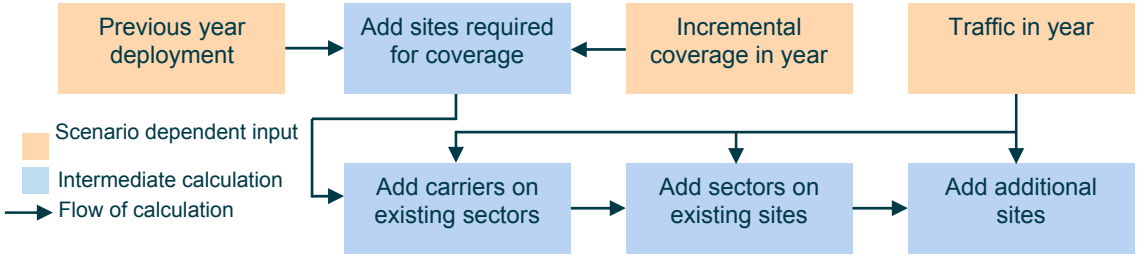
- The circuit-switched core network is similar to that for a 2G network, including an HLR and core network links. The MSC equivalents are MSC servers and Media Gateways (MGWs)

- The packet-switched core network includes SGSNs (Serving GPRS Support Nodes) and GGSNs (Gateway GPRS Support Nodes) which connect to the Internet

A5.56 There is a single Node-B per base station site. A Node-B can be deployed with a variety of sector configurations (omni-sector, bi-sector, tri-sector, etc.), similar to a 2G base station. While in a 2G base station the amount of spectrum in use is determined by the number of TRXs per sector, in a 3G Node-B, spectrum usage is determined by the number of carriers deployed in a given sector. Each additional carrier uses an additional 2×5MHz of spectrum and adds to the traffic capacity of the cell.

A5.57 An incremental approach has been implemented in calculating the number of required carriers, sectors and sites, as illustrated in Figure A5.11 below. Several of the key parameters which govern the network deployment (e.g. maximum cell radius, number of available carriers) have been configured so that they may change over time and the network design must adapt to account for these changes without exhibiting unusual behaviour. However, in the special case when these parameters are fixed over time, this incremental approach does not differ in output from the approach of the 2G network design algorithm in the current model, which assesses the network deployment required each year without reference to historic deployment.

Figure A5.11 Calculation of the number of required carriers, sectors and sites



A5.58 These radio network dimensioning algorithms first calculate the number of sites needed to give the required increase in geographic coverage which occurs in each year, based on the maximum cell radii within each geotype. The additional number of carriers, sectors and sites required to support the assumed level of demand in that year is then calculated, given that spectrum allocation constrains the number of carriers per sector and physical capacity constrains the number of sectors per site. The resulting in-year total deployment is finally adjusted to take into account the expected utilisation of these assets, giving the total deployment of assets for the radio network.

A5.59 The remaining 3G network assets included in the new LRIC model are described in Figure A5.12 below. The cost drivers which drive deployment of each of these assets are also shown in detail; these are combined with assumptions about effective utilisation, including look-ahead allowances similar to those included in the

June 2005 model, and the capacity of individual assets in order to define cost-causal network dimensioning relationships.

Figure A5.12 Dimensioning of 3G network assets

Asset	Function	Cost driver(s)	Other comments
Backhaul links	Transfers traffic from the Node-Bs to the RNCs	3G radio traffic within each geotype	These links are dimensioned on the basis of a tree and branch structure and are shared with 2G backhaul
RNCs	Sit between the Node-Bs and the core network and control functions including encryption and radio resource management	Total circuit-switched and packet-switched traffic in the radio network	Deployment is the sum of RNCs required for circuit-switched traffic and for packet-switched traffic, and also subject to a maximum number of Node-Bs per RNC
Node-B facing ports	Deployed on RNCs for connection to backhaul links	Required number of 2Mbit/s backhaul links	
Core facing ports	Deployed on RNCs for connection to the core network	Total radio network traffic	
Remote RNC backhaul	Connects remotely located RNCs to the core network	Traffic per RNC and an assumed proportion of RNCs which are remote	
MSC server	Subscriber-related services including location updates; call-related processing functions	3G subscriber numbers for location updates; incoming, outgoing and on-net call attempts for call processing	Location update costs are driven by subscribers but recovered across incoming services
MGW	Interface between the radio network and the core network for circuit switched traffic. Contains the switching matrix	Ports required to accommodate traffic from RNCs, inter-switch links and interconnection links	
SGSN	Serving GPRS Support Node – Central element in the packet-switched network which contains subscriber and location information	Busy-hour data sessions and busy-hour data traffic	Minimum deployment of two SGSNs for resilience
GGSN	Gateway GPRS Support Node – routes incoming and outgoing calls between SGSNs and the IP network	Busy-hour data sessions and busy-hour data traffic	Minimum deployment of two GGSNs for resilience
SMSC	Switches the messaging traffic	Busy-hour SMS and MMS messages	Minimum deployment of two SMSCs for resilience
Core transmission network	Carries traffic between core network nodes	Traffic between RNCs and MGWs, RNCs and SGSNs, intra MGWs and between SGSNs and GGSNs	Based on an assumed proportion of traffic which traverses the core network
NMS	Network management functions	Single asset deployment in first year of 3G operation	

A5.60 Whilst mobile operators purchased their 3G licences in the 2000/01 financial year, the new LRIC model does not deploy a 3G licence fee asset until the first year of demand on the 3G network. This approach has been taken so as to avoid under-recovery of costs on an HCA or CCA basis (which would assume depreciation charges in years where there is no 3G output from which to recover these charges). However, the purchase cost of the licence fee has been adjusted to give the same net present value as if it had been purchased in 2000/01.

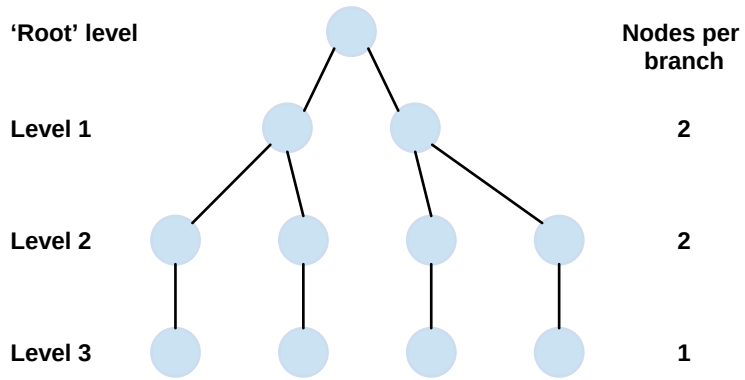
Shared network assets

A5.61 As discussed previously, the network dimensioning algorithms within the new LRIC model account for a degree of sharing of cell sites, backhaul and some core network equipment between the 2G and 3G networks of a mobile operator with both network technologies, based on feedback from MNOs on the level of asset sharing which is achievable in practice. Ofcom's modelling approach in this area is described in some detail below.

A5.62 The 2G and 3G network dimensioning algorithms separately calculate the site requirements for each network. These requirements are then passed to a site sharing algorithm which establishes how many of these sites can be shared rather than purchased as standalone sites; the proportion of incremental 3G sites which will be shared with 2G sites is assumed as an input to this calculation and is allowed to vary over time. This leads to a restatement of the number of sites required, all of which are now classified as either standalone 2G, standalone 3G or shared.

A5.63 In order to model the effects of backhaul sharing, calculations are made for the total backhaul capacity that would be required in a geotype for both the 2G and 3G network cell sites. Backhaul is then deployed to accommodate the implied average traffic per site. The configuration of the modelled backhaul network is tree-and-branch, as illustrated in Figure A5.13 below, and is broadly based on the network configurations of mobile operators who shared information on this issue. The defined tree-and-branch structure is deployed multiple times such that all sites are served by backhaul. The impact of this approach is that transmission links from sites, other than from those at the lowest levels in the tree, will carry traffic from several sites and therefore use higher bandwidth backhaul links, resulting in economies of scale for backhaul which would be expected and achieved in practice.

Figure A5.13 Example backhaul tree-and-branch structure



A5.64 HLRs are driven by the number of active subscribers, as in the June 2005 model. In the new LRIC model, it is assumed that HLRs are shared between the 2G and 3G networks, and as such they are dimensioned based on total 2G and 3G subscribers.

A5.65 Switch sites in the model are also shared between the 2G and 3G networks, in-line with evidence from the MNOs that 3G switches are generally deployed at existing 2G switch sites. Deployment of switch sites is driven by whichever is the greatest number of assets in the following three asset classes – MSCs in the 2G network, and MSC Servers and MGWs in the 3G network. This relationship is based on observed deployment trends in the MNOs' actual data. An assumed number of four switches per site is used to calculate the number of sites required, along with an assumed maximum of thirty and minimum of three switch sites. These assumptions are based on a calibration of the switch site counts in the model to real operator data.

A5.66 The total number of core network transmission links required is the sum of the requirements from the 2G and 3G networks.

Output for service costing

A5.67 The output volumes which determine service costs are based on the cost drivers for each asset type. In response to comments from MNOs on Release 2 of the model which pointed out some discrepancies between the causal drivers of costs and the measures of output to which these costs were allocated, Ofcom has modified its approach on cost allocation to remove these discrepancies.

Cost module

Overview

A5.68 In order to determine the appropriate cost-oriented level for the proposed charge controls on voice call termination, it is necessary to forecast the costs that would be incurred by efficient mobile network operators operating different combinations of 2G and 3G network technologies.

A5.69 The cost module therefore forecasts the total cashflows (including investment and operational expenses) that would be incurred in each year to purchase, renew and maintain the required level of deployment of each type of network asset, as calculated by the network module.

A5.70 Consistent with the approach adopted in the previous market review, these forecasts have been based on a Modern Equivalent Asset (MEA) approach, which takes into account changes in the investment and maintenance per unit costs of a particular type of asset, as well as technological developments which improve its functionality. For example, an asset which would be expected to halve its investment price and double its effective capacity over a given period of time would have an MEA investment price at the end of the period equal to a quarter of the original price.

Investment costs

A5.71 The investment costs calculated in each year take into account increases in the required quantity of each network asset and the replacement of assets which have

reached the end of their economic life, as well as historical and forecast levels of MEA investment cost per unit for each asset type.

A5.72 The number of assets purchased is calculated as the number of incremental assets required in that year, plus the number of assets whose economic lifetime has expired and therefore need replacement - this is calculated with reference to the input economic lifetime of each asset as in the June 2005 model. In previous model releases, Ofcom used similar values for asset lifetimes to those used in the June 2005 model. However, a number of stakeholder responses argued that the lifetime of assets is significantly reduced by suppliers withdrawing after-sales support. These asset lifetimes have therefore been significantly reduced to reflect this feedback and are now broadly in-line with mobile operators' stated accounting lifetimes.

A5.73 As in the June 2005 model, incremental asset deployment in the cost module is smoothed so as to avoid artificial behaviour and over-purchasing in relation to equipment which declines in quantity but then recovers in later years in response to changes in demand[73]. Typically the required level of deployment of an asset climbs to a peak before declining over its lifetime. A smoothing algorithm ensures that up until the lifetime peak requirement is reached, the required deployment of that asset can only increase or remain constant in any year, while after the peak requirement has been reached, the required deployment must always decrease or remain constant. This smoothing is intended to reflect the fact that in reality, it would be inefficient for an operator to remove network assets in response to a transitory fall in demand for that asset.

A5.74 In the June 2005 model, it was assumed that operators need to pay for assets an average of twelve months before these assets are actually deployed in the network. However, recent information provided by the MNOs suggests that in reality, payment for assets occurs close to the point at which they are deployed. This has been reflected in the new LRIC model which no longer assumes any payment in advance.

A5.75 MEA unit investment costs have been calculated on the basis of input absolute values for 2004/05 which are extrapolated forward and backward according to historical MEA trends for 2G networks and forecast MEA trends for 2G and 3G networks. Historical and forecast 2G MEA unit investment cost trends in the model have been based on those used in the June 2005 model. However, explicit MEA forecasts in the previous LRIC model could only be varied out to 2009/10 and were assumed to be flat thereafter so these forecasts have been refined to give smoother MEA trends over time. A number of further adjustments have been applied in response to feedback from mobile operators[74], and to give an accurate calibration with mobile operators' latest accounting cost benchmarks as discussed in Annex 12.

A5.76 Investment cost MEA trends for 3G equipment are based on data received from mobile operators, Analysys' experience and the calibration process as mentioned above.

A5.77 For information on the investment costs for 3G licence fees which have been evaluated in the model, see Annex 14.

[73] See December 2003 Consultation, Annex C, paragraphs C.17-C.22
[74] Including improved consistency between different switch site and cell site MEA trends

Operating costs

A5.78 Operating costs are modelled for each type of network asset included in the model, taking into account the costs that would be incurred in maintaining the deployed 2G and 3G networks. These are calculated based on the deployment of each network asset multiplied by an MEA operating cost per unit specific to that asset. This approach is consistent with that taken in the previous market review.

A5.79 Normally, required in-year asset deployment is taken as the input to the operating cost calculation. However, in years where asset deployment is decreasing (due to decommissioning), it has been assumed that there will be a lag between the point in time from which the asset is no longer required in the network and the point in time from which it will no longer incur operating expenses. This is the same approach as adopted in the June 2005 model.

A5.80 In the June 2005 model, age-on-age unit operating cost trends were applied in combination with MEA trends and were intended to model the effects of increasing maintenance costs on older assets. However, operators have subsequently argued that equipment lifetimes are usually curtailed by the withdrawal of after-sales support by suppliers and that such age-on-age effects are less important in determining operating costs or asset lifetimes. Ofcom has therefore removed these age-on-age trends from the new LRIC model, but has applied shorter asset lifetimes as discussed previously. Removal of the age-on-age effects has resulted in substantial simplifications to this part of the model.

A5.81 The approach that has been taken on MEA operating cost trends over time is similar to that described above for capital costs. However, for asset types where less information is available on levels of operating costs, greater reliance has been placed on the calibration process.

A5.82 Additionally, factors have been applied to the 3G operating costs of a 2G/3G operator in the early life of the 3G network which reduce the level of costs incurred. The rationale for these factors is explained in Annex 12.

Economic module

Overview

A5.83 The economic module implements a form of economic depreciation, “Original ED”, which is similar to that used in the June 2005 model, to calculate a cost per unit of output in each year for every asset in the model. These are then used to estimate the unit service cost for each service modelled using service routing factors.

Conceptual approach

A5.84 The aim of any depreciation methodology is to determine how the costs of network assets and operating expenses should be recovered over the lifetime of the network. Since investment by operators is ongoing and the charge control period is significantly shorter than the period over which investment costs would be recovered, the timing of the recovery of costs is an important issue to consider.

A5.85 There are two theoretical objectives in determining the appropriate path of cost recovery. Firstly, the profile of cost recovery should give the best signals for consumption and investment. This implies that the profile of cost recovery should be identified by determining the path of prices in a competitive market. Secondly,

regulation should avoid denying operators the opportunity to recover their efficiently incurred costs, including a reasonable return on investment.

A5.86 Economic depreciation seeks to set the optimal path of cost recovery over time by mimicking the outcomes of a competitive market. The conceptual approach taken in the previous market review (which has been well documented[75]) has been maintained in the new LRIC model and is summarised in the following paragraphs.

A5.87 In order to determine a unique path of cost recovery under economic depreciation, it is necessary to define the competitor constraints which would characterise a hypothetical benchmark competitive market. In the previous market review, Ofcom adopted a competitor constraint which took account of both potential competition from new entrants as well as actual competition between incumbents. In the benchmark competitive market, it was assumed that new entrants would face similar barriers to entry as incumbents and therefore would not derive a lifetime utilisation advantage. Ofcom has maintained this same conceptual approach to the competitor constraint for the purpose of the new LRIC model.

A5.88 The effect of these assumptions regarding the nature of the benchmark competitive market is that the unit prices generated under an economic depreciation approach do not depend on the level of utilisation at that point in time, but on the level of utilisation achieved over the lifetime of the network. This is because new entrants to the market are not expected to derive a lifetime utilisation advantage over incumbents and hence reduce the competitive market unit price on account of this advantage. Therefore, absent changes in input costs, the economic depreciation methodology results in constant unit cost recovery over the lifetime of the network. Consequently, the total costs recovered in a year are directly proportional to output in that year.

A5.89 However, hypothetical new entrants in later years would be expected to experience different levels of input costs, particularly MEA investment and operating costs. If future input costs were lower, future new entrants would derive an associated cost advantage over incumbents in this respect; given the assumption of a competitive market, these reduced costs would be expected to be passed through in the form of future price reductions. Changes in input cost levels are therefore allowed to change the shape of the profile of cost recovery determined under an economic depreciation approach.

Implementation

A5.90 As in the June 2005 model, the economic depreciation algorithm has been implemented in three additive steps to calculate a cost recovery profile:

i) The theoretical level of constant unit cost recovery is calculated as if the final year utilisation and input cost levels applied over the entire lifetime of the network.

ii) A second constant unit component is added to the profile of cost recovery to recover the additional costs caused by earlier under-utilisation of the network versus the final year level.

[75] See http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/depr0901.htm for a detailed explanation of economic depreciation and its implementation in the previous market review

iii) A third and final component of unit cost is added to recover the remaining un-recovered costs due to input costs being different from the final year level in earlier years. The shape of this component is determined by the arithmetic difference between in-year and final-year input costs, and is therefore zero in the final year.

A5.91 A desirable feature of this implementation is that the final year unit cost recovery is exactly as expected under the given assumptions about the nature of the benchmark competitive market.

Changes since the June 2005 model

A5.92 Ofcom has identified improvements in the implementation of this approach which have been included in the new LRIC model. These improvements are as follows:

- Previously a simplified functional form (an annuity) was used to calculate the constant unit cost in step 1. Whilst this gave a very close approximation to the theoretical unit price, further investigation showed that this simplified approach could give rise to slightly inaccurate results under certain circumstances. This calculation step has now been expanded and made more explicit so as to give an exact calculation of the theoretical unit price.

- Actual discount rates were previously used for calculating present values of cost and output in steps 2 and 3. This approach has been revised so that theoretical discount rates, based on the final year cost of capital, are used in all calculations up to step 3. The effect of this modification is that costs arising due to variations in the cost of capital versus the long-term level are now recovered solely in step 3, rather than across steps 2 and 3. This revised approach is in-line with the view that variations in the cost of capital should be treated in a similar way to input cost trends on the basis that both are accessible by new entrants in that year.

- In the June 2005 model, a fix was applied to the way that economic depreciation treated the shaping of cost recovery for the 2G licence fee, in order to rectify an instability problem in step 3 associated with the arithmetic determination of a shaped profile for cost recovery[76]. This amendment has now been applied consistently to the treatment of operating costs across all asset types.

- The treatment of 3G spectrum costs included in the model has also been modified following comments from some mobile operators. For this asset, the dependence of the shape of the cost recovery profile on variations in the cost of capital has been removed, since inclusion of this effect gave rise to somewhat artificial behaviour caused by small variations in the cost of capital in the early years of the licence, where the costs of capital on the 3G licence fee investment is high but output volumes are very low.

Additional ED approach

A5.93 An additional form of economic depreciation, “Simplified ED”, has been implemented in the new mobile LRIC model. This approach is intended to retain many of the characteristics of the current methodology, whilst using a simplified functional form which may give a more natural relationship of the unit cost profile to changes in input costs levels over time. In this approach, the shape of the path of unit cost recovery remains independent of the level of in-year utilisation and is

[76] See June 2005 Extension Consultation, Annex E, footnote 17

therefore determined by changes in input costs alone, as in the Original ED methodology. However, the entire profile of cost recovery for an asset is given a shape which exactly mimics the profile of input cost trends, scaled so as to achieve full cost recovery for incumbents.

A5.94 The inclusion of this approach is intended to serve both as a cross-check on the profiles generated under the Original ED methodology, and as an alternative means of generating profiles of cost recovery to inform the appropriate levels of charge controls. The relative merits of this approach compared to Original ED are discussed in Annex 13.

HCA/CCA module

Overview

A5.95 The HCA/CCA module uses the same approach as used in the June 2005 model, calculating GBV and opex based on historic cost accounting and current cost accounting methods. The module also produces unit costs for services (including voice termination) based on the depreciation profiles derived under each of these accounting approaches.

A5.96 While both of these approaches result in the same level of total cost recovery over the timeframe of the model, the chief difference between them lies in the timing rather than the total amount of cost recovery. The key characteristics of the timing of cost recovery under either of these accounting depreciation approaches are as follows:

- Capital costs are recovered as the sum of depreciation and the cost of capital employed. Depreciation is calculated for each asset as the gross book value of that asset divided by its lifetime, whilst total capital employed is calculated as the cost of capital multiplied by the net book value of the MNO's total asset base. Gross and net book values are dependent on the asset valuation concept used, (i.e. HCA or CCA). In the case of CCA, annual depreciation charges are dependent on the choice of capital maintenance concept used; in this case, the Financial Capital Maintenance (FCM) methodology has been chosen.

- Depreciation is not deferred from years when utilisation is lower to those when it is higher, as under an economic depreciation approach. Consequently, unit capital costs tend to be inversely related to utilisation.

- Operating costs are recovered in the year in which they are incurred, meaning that they are also inversely related to utilisation. The level of recovery of operating costs in each year is identical under HCA and CCA approaches.

A5.97 Under HCA, assets are valued based on the price paid by the firm at the time of purchase, i.e. gross book value (GBV). Annual depreciation charges on each asset are therefore calculated as (GBV ÷ AL), where AL is the length of the asset's financial lifetime. The annual cost of capital employed is equal to (NBV × WACC), where NBV is the net book value, i.e. GBV less the sum of accumulated depreciation.

A5.98 Under CCA, assets are valued based on the price the firm would be obliged to pay in order to replace them with a modern equivalent asset, i.e. the Gross Replacement Cost (GRC). This is calculated with respect to MEA prices as described in A5.72. Under the FCM approach which has been adopted, annual

depreciation charges are calculated as [(GRC ÷ AL) + HL], where HL is holding loss, the decline in GRC in the year. The annual cost of capital employed is equal to (NRC × WACC), where NRC is the net replacement cost of an asset, GRC less accumulated depreciation.

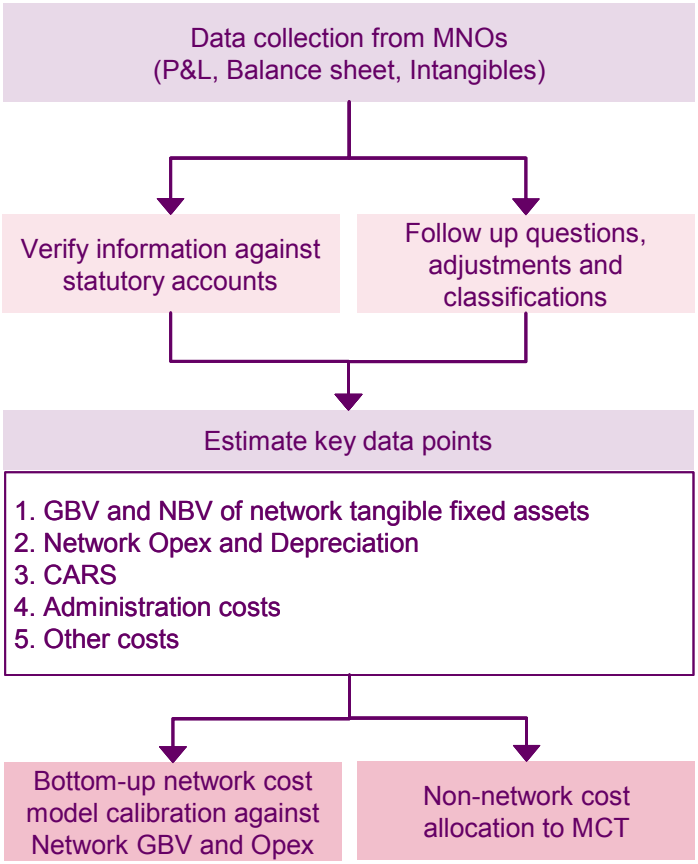
Annex 6

MNO cost information (non confidential)

Introduction

A6.1 This Annex sets out Ofcom's analysis of accounting data that was collected from MNOs during the course of the review. It explains the methodology Ofcom has employed in order to estimate key data points with which to assess the reasonableness of Ofcom's bottom-up network cost model. It also outlines how the data was obtained to inform the level of non-network costs. In Annex 12 Ofcom sets out in detail how this information was used to calibrate the bottom-up cost model and Annex 15 sets out Ofcom's approach to non-network costs. Ofcom's overall approach is summarised in the figure below:

Figure A6.1 Ofcom's approach to its analysis of MNOs' cost information



A6.2 Since the MNOs' detailed accounting information is confidential Ofcom has presented its analysis in terms of average costs across operators. However, each MNO has also been provided with a confidential Annex that sets out in detail the analysis Ofcom has carried out on their specific information.

A6.3 The years analysed and presented are 2002, 2003 and 2004. For simplicity, these are referred to by the year in which the majority of the accounting period falls: for example "2004" would refer to both 1 April 2004 to 31 March 2005 and to 1 January 2004 to 31 December 2004. Orange, T-Mobile and H3G have 31 December year-ends, whereas Vodafone and O2 have 31 March year ends.

Data Collection

A6.4 MNOs were required to provide Ofcom with specified information in accordance with a formal notice under Section 135 of the Communications Act 2003 dated 6 December 2005. This requested MNOs information for the years 2002, 2003, and 2004.

A6.5 With regards to MNOs' 2005 accounting information a further request was made for this information on 16 June 2006. Ofcom was aware at this time that not all MNOs had finalised their 2005 accounts. Since this information has not been finalised by all the MNOs, Ofcom considered that it was not appropriate to account for this information in the calibration of the cost model in the same way as the 2002, 2003 and 2004 accounting information. However, Ofcom reviewed this information to identify any major unexpected changes in MNOs costs compared to the model's output and none were found. Once the issues regarding the 2005 accounts have been clarified (and where possible draft accounts can be replaced by final accounts) this information will be fully incorporated into Ofcom's analysis and the calibration exercise discussed in Annex 12.

A6.6 Similarly, there remain some matters of clarification outstanding regarding earlier years. We have made assumptions and estimates where necessary. Once these items have been resolved, in discussion with the MNOs, they will be similarly incorporated into the exercise

A6.7 The MNOs were given the following five schedules, with a guidance note explaining how to complete them:

- Profit and Loss Account
- Balance Sheet
- Analysis of intangible assets
- Reconciliation of information provided in the Profit and Loss to information in the statutory accounts
- Reconciliation of information provided in the Balance Sheet schedule with the information in the statutory accounts.

A6.8 In the sections that follow the analysis undertaken with respect to each schedule is discussed. Prior to that Ofcom provides definitions for the different cost categories that are discussed in the rest of this annex.

Definitions

UK network operating costs

A6.9 These are the operating costs of the UK network, before administration costs, and they relate to the MNOs' own network activities, i.e. setting up and running their UK mobile network. They comprises network operating expenditure and network depreciation. Note: adjustments were made to exclude from network costs, both depreciation and amortisation of 3G licence fees and other intangible assets. This also applies to the figures contained in the confidential Annexes 7 to 11.

Customer acquisition, retention and service costs ("CARS")

A6.10 CARS consist of customer acquisition, retention and service costs (CARS) – comprising advertising and marketing, handset costs, discounts and incentives, customer care, billing and bad debts.

A6.11 In this Annex CARS costs are presented gross of handset revenues. Further discussion of gross and net CARS is set out in Annex 15 in relation to Ofcom's approach to estimating the allocation of non-network costs across different services.

Support costs i.e. administration

A6.12 Administration costs include the costs that should be recovered across all areas of an MNO's business, including both network and retail services. These consist of overheads for non-network depreciation (IT, furniture and office equipment), property costs, human resources, finance and legal costs and IT overheads.

Other Costs

A6.13 Other costs do not relate to the running of the UK network and/or MCT. Therefore they do not fall into any of the above three categories. Other costs include payments to other operators that are not part of network costs, not part of administration costs and are not considered as requiring support from administration activities, such as roaming charges.

Profit and Loss Account (Schedule A)

A6.14 The purpose of the data collection exercise and the subsequent analysis is the identification of the MNOs' UK network costs and non-network costs. Ofcom has sought to identify costs wholly related to the network, CARS and administration costs and other costs that Ofcom does not consider are relevant to the analysis of MCT costs.

A6.15 MNOs were asked to provide a breakdown of network costs between voice, data and shared costs. They were asked to identify and separate out those other network costs that Ofcom does not consider are relevant to the consideration of the cost of MCT, namely:

- interconnection charges (these costs are not incurred in relation to a MNO's own network but are costs incurred in the provision of retail (outgoing) calls)
- roaming charges (these costs are also not incurred in relation to an MNO's own network)
- leased lines not associated with backhaul or core (these may be used to provide services other than UK voice call origination and termination).

A6.16 MNOs were asked to separate CARS expenditure between handset costs, vouchers, SIM costs, as well as operational selling expenses.

A6.17 MNOs were asked to identify administration costs with as detailed breakdown between key cost categories as possible.

A6.18 In addition to the above, MNOs were subsequently asked if they could provide a further breakdown of IT costs between network voice, data and shared, and other costs of sales (bought in goods and services), sales/account management/ distribution and support of UK activities.

Balance Sheet (Schedule B)

A6.19 The schedule required the separate identification of the GBV and NBV of sites and switch assets in the radio network, the backhaul network and the core network. In addition Ofcom requested that within these categories MNOs split assets between the network categories: 2G, 3G and shared assets. Transmission assets were also requested to a level of disaggregation that would allow direct assignment to the three network categories.

A6.20 To complete the balance sheet, information was required as to the GBV and NBV for property, plant and equipment not associated with the UK network. Information was also required on overall current assets and liabilities which are assumed not to relate to the UK network.

Intangible Fixed Assets, excluding Goodwill (Schedule C)

A6.21 This was a short schedule which required the MNOs to declare the movements in GBV and accumulated depreciation in intangible assets, split between the 3G licence, other licences and 'other'. 3G licence costs have been excluded from network costs for the purposes of calibration. 3G licence costs are discussed in detail in Annex 13 and in Annex 14.

Reconciliation of Profit and Loss Figures (Schedule D)

A6.22 Analysis of Profit and Loss (discussed above) led to the classification of these costs into four categories: network costs, CARS, administration and other costs e.g. payments to other operators.

A6.23 Schedule D reconciles the total of these four categories with the figure in the statutory accounts. There may be legitimate reasons why they are not equal and if so an explanation for any material difference was required.

Reconciliation of Balance Sheet Values (Schedule E)

A6.24 Similarly to Schedule D, this schedule sought to set out the reconciliation between the inputs at Schedule B and the corresponding values in the statutory accounts.

Analysis of MNOs' information

A6.25 Ofcom's analysis was limited to the extent that MNOs were unable to extract from their accounting systems costs split between voice, data and shared activities. In addition the 2G-3G operators were able to analyse their assets between 2G and 3G activity with the exception of one MNO who was able to split radio assets between these categories.

A6.26 Ofcom obtained statutory accounts for each MNO for the relevant time periods and compared data in the responses to the statutory accounts. Although the statutory accounts are less granular than the information received from the MNOs, particularly with regard to the profit and loss account, basic checks of the MNOs' information were carried out to give some assurance that the responses were

consistent with the MNOs' audited and published costs. Some anomalies were found, which were discussed with the MNOs and adjustments were made where appropriate.

A6.27 In addition, Ofcom conducted further analysis comparing across MNOs for similar levels of assets and costs, looking at historical trends and considering the response data in the light of other operational and business information, such as volume growth. In some cases, the MNOs were asked to justify unusually large or small items. For some of the large items, a further breakdown was sought from the operators to provide some further reassurances.

A6.28 Furthermore, having reviewed the MNOs response data, further information was required in order to clarify Ofcom's understanding of some of the costs. For example, breakdowns of administration costs and CARS into further cost categories was required in order to ensure that consistent approaches were employed across MNOs and in comparison with the Competition Commission's information collected during their last inquiry into mobile call termination. Ofcom is comfortable that any issues of inconsistency of data across operators have been addressed following Ofcom's additional questions to MNOs.

A6.29 The following adjustments were made to original MNOs responses:

- Depreciation was removed from network costs and separately identified. For the purposes of calibration, network costs excluding depreciation were used. (See Annex 12 for details of the calibration and Annex 5 for details of the approach to depreciation).

- Removal of 3G licence fee amortisation. Ofcom has removed this from network costs and placed it within "Other costs". As discussed above, the 3G licence costs have been treated separately within this review. (See A6.21 above)

- Ofcom has removed "other amortisation" from network costs and placed them within "Other costs". MNOs confirmed that these costs were not related to the network and they were therefore removed.

- Removal of amortisation of goodwill. Ofcom has placed "goodwill amortisation" in "Other costs". Ofcom did not consider that the goodwill was a relevant cost from the perspective of estimating the cost of MCT for the following reasons: in the case of one operator the goodwill had been internally generated and in the case of the other operators they confirmed that the goodwill was non-network in nature.

- Ofcom has made reclassifications where a breakdown submitted by an operator showed that costs had been, in Ofcom's view, inappropriately classified, i.e. an administration type cost had been included in network activity.

- Two operators revised their responses, one of these as a result of draft statutory accounts being revised to final form.

- Pre-paid top-up Vouchers. The treatment of these varied between operators: it appears some operators netted them against revenue whereas others included them in selling costs. Ofcom proposes to remove all voucher costs from CARS and included them in "Other costs". The reasons for this were: firstly, to achieve consistency across operators and secondly because they were considered to be a reduction in revenue rather than a selling cost.

A6.30 For each of the MNOs, as presented in their specific, confidential annexes, the following key data points have been estimated:

- GBV and NBV of UK network assets, excluding intangible assets (e.g. the 3G licence fee)
- The operating costs of the UK network, excluding: depreciation, amortisation of 3G licence fees and other intangible assets, interconnection costs, roaming charges and, leased lines not related to backhaul or core
- Network depreciation
- CARS
- Administration costs
- Other costs

A6.31 The table below presents these estimates averaged across the MNOs but excluding H3G.

Figure A6.2 Average costs across MNOs (excluding H3G) based on accounting cost information

	Average cost (excluding H3G) £m		
	2002	**2003**	**2004**
GBV	3,092	3,311	3,629
NBV	1,869	1,821	1,811
Opex	327	338	340
Network depreciation	342	362	377
CARS	1,251	1,383	1,534
Administration	266	279	275
Other	789	906	948

A6.32 The individual operator's costs as well as the averages set out above have been used to calibrate the bottom-up network cost model (specifically GBV and Opex data points for all MNOs). This is discussed in detail in Annex 12. In addition, as discussed in Annex 15 these data points have been used to estimate the non-network costs recoverable from MCT.

Annex 7

MNO cost information – H3G (confidential)

Introduction

[✂]

H3G's data

[✂]

Amendments to response

[✂]

Confirmation of data

[✂]

Annex 8

MNO cost information – O2 (confidential)

Introduction

[✂]

O2's data

[✂]

Amendments to response

[✂]

Confirmation of data

[✂]

Annex 9

MNO cost information – Orange (confidential)

Introduction

[✂]

Orange's data

[✂]

Amendments to response

[✂]

Confirmation of data

[✂]

Annex 10

MNO cost information – T-Mobile (confidential)

Introduction

[✂]

T-Mobile's data

[✂]

Amendments to response

[✂]

Confirmation of data

[✂]

Annex 11

MNO cost information – Vodafone (confidential)

Introduction

[✂]

Vodafone's data

[✂]

Amendments to response

[✂]

Confirmation of data

[✂]

Annex 12

Calibrating the new LRIC model

Overview

A12.1 There are two commonly used approaches to the construction of cost models - namely 'top-down' and 'bottom-up'. Under a top-down approach, the historical accounting cost levels of a company are used as the starting point and output/cost relationships are then estimated from historical observations and costs are projected forward on the basis of output forecasts. Under a bottom-up approach, the components of cost are identified at a more granular level. Cost causation relationships are then defined to link the quantity of each of these cost components with output and other cost drivers, based on practical and theoretical evidence.

A12.2 As discussed in Annex 5, for the purpose of this market review a top-down / bottom-up 'hybrid' approach has been developed - intended to capture the strengths of both approaches. The new LRIC model has been developed along the lines of a bottom-up cost model. However, the model has also been calibrated, by adjusting the unit cost levels and cost causality relationships of different cost components, so as to ensure the model is reasonably in line with MNOs' actual costs in historical years (where suitable accounting data is available). This approach differs from that taken in the last market review (and the Competition Commission inquiry), in which the output unit costs from the 2G LRIC model were adjusted exogenously to take account of MNOs' actual GBV and operating costs data. Ofcom considers that its approach of calibrating inputs rather than adjusting outputs is more appropriate ensuring the model produces reasonable outputs in its own right i.e. no exogenous adjustments are required.

A12.3 The purpose of this annex is to describe the methodology which has been applied to calibrate the new LRIC model to accounting data, and to summarise the results of the calibration, to the extent that MNO data confidentiality limits the level of detail at which the calibration process can be disclosed.

Calibration benchmarks

A12.4 The new LRIC model has been calibrated according to two different types of high-level benchmarks obtained from the MNOs: counts of different types of network equipment (e.g. cell sites, MSCs) and accounting costs based on data from the operators' management accounts (discussed in Annex 6).

A12.5 Equipment inventories were requested from operators in July 2005 to obtain the latest counts of the key types of network equipment as included in the new LRIC model. These counts relate to equipment at all levels of the 2G and 3G networks, ranging from 2G and 3G cell sites through backhaul and BSCs and RNCs to equipment on the core network. Whilst all five MNOs were not able to provide complete responses to this detailed request, Ofcom regards the information it has received as being sufficiently comprehensive for calibrating the bottom-up cost model. Cell site counts are of particular significance since the dimensioning of many other network components is driven (directly or indirectly) by the number of cell sites; all five operators provided useful high level information on these assets.

A12.6 Consistent with the form of the accounting cost benchmarks obtained by the Competition Commission and used in the previous market review[77], Ofcom has also derived updated figures for network gross book value (GBV) and network operating costs using accounting data obtained from each of the MNOs. The derivation of these calibration benchmarks is discussed in detail in Annex 6.

A12.7 In order to calibrate network capital investment expenditure Ofcom considers that GBV is more appropriate as a basis than actual in year capital investment costs. GBV provides a snapshot of the total value of assets for a MNO and thereby smoothes year on year fluctuations in investment that are likely to occur since mobile networks are unlikely to be in a steady state, particularly given the deployment of new 3G networks. Network operating costs, on the other hand, are likely to fluctuate less than capital costs on a year to year basis since these represent ongoing network maintenance and overhead costs; hence network operating costs have been used directly as a calibration benchmark. Notwithstanding, Ofcom notes that there are still likely to be year to year fluctuations in these cost benchmarks, particularly operating costs, which are not explainable solely in terms of factors included within the new LRIC model.

A12.8 Ofcom acknowledges that the use of more granular accounting data might conceivably allow a more detailed calibration approach. However, given the different cost definitions and levels of detail in accounting systems used by the five MNOs, Ofcom does not consider that in practice it is possible to collect a robust and consistent set of more granular accounting information set across all the MNOs. For example, Ofcom has attempted to derive separate benchmarks for the 2G specific, 3G specific and shared costs of MNOs; however, such a separation was not possible as operators did not consistently classify costs at this level of detail.

A12.9 In the previous market review, a single full year of accounting data was obtained for each of the four 2G MNOs in 2001[78]. In the context of this market review, Ofcom has had the opportunity to obtain a longer time series of accounting benchmarks to allow a more refined calibration of the model, particularly with respect to variations in the levels of capital and operating costs over time. Each of the five MNOs has provided GBV and operating cost data for 2002, 2003 and 2004, so that four years of data are available for each operator including the calibration points obtained from the previous market review[79].

Model inputs

A12.10 The objective of the cost modelling exercise is to derive benchmarks for the future unit costs of an efficient average operator in providing voice termination over 2G and 3G networks on a standalone and combined basis, rather than to assess operator-specific unit cost benchmarks.

A12.11 However, the MNO calibration benchmarks described above are based on the historical asset counts and accounting costs of specific operators. These benchmarks therefore reflect historical factors specific to each of the MNOs, such as the levels of traffic on each of their networks and the rate and extent to which they have deployed their 3G networks. Therefore in order to compare the outputs of the bottom-up cost model with a specific MNO's information, it is appropriate to

[77] See the CC's 2003 Report paragraphs 2.284-2.319
[78] The stated year refers to the year in which most of the accounting data falls; whilst Orange, T-Mobile and H3G have 31st December year ends, Vodafone and O2 use 31st March year ends
[79] With the exception of H3G, whose costs were not assessed within the previous market review

configure the model to reflect the actual position of a specific MNO in terms of spectrum allocation, number of subscribers, traffic and 3G network coverage over time. This approach seeks to ensure that a like-for-like comparison is made of the outputs of the cost model with a specific operator's costs and assets counts.

A12.12 The asset count and cost benchmarks (network GBV and network operating costs) discussed previously for each of the five MNOs have therefore informed the values of efficient operator model input parameters and network dimensioning rules which Ofcom believes to be similar across the industry and reasonable for an average efficient operator (e.g. design utilisation). Calibration of these key inputs has resulted in a configuration of the new LRIC model such that high level asset count and cost outputs from the model (specifically GBV and opex) for the modelled efficient average operator are in line with typical industry values for asset count and cost benchmarks.

A12.13 This process can be summarised in terms of adjusting non-operator specific inputs in order to produce the closest calibration of the model to operator specific data. These non-operator specific inputs are as follows:

- 900MHz GSM cell radii by geotype[80]
- 1800MHz GSM cell radii by geotype
- 2.1GHz UMTS cell radii by geotype
- Traffic shares by geotype
- Distribution of traffic by cell type (e.g. macro, micro, picocells)
- Design utilisation factors[81]
- Scorched node allowances[82]
- Look-ahead planning periods[83]
- Proportion of cell sites which are shared between 2G and 3G networks
- Proportion of RNCs and BSCs at remote switching sites
- MEA investment costs per unit over time
- MEA operating costs per unit over time

A12.14 As described in Annex 5, other sources of data have been used in conjunction with the calibration data from the MNOs in directly informing the appropriate values for a number of parameters. The calibration process has therefore placed primacy on adjusting parameters for which less reliable data has been available to inform input values directly.

[80] See Annex 5, for definition and explanation of geotypes
[81] Design utilisation reflects the maximum working level of utilisation used by network designers
[82] Scorched node utilisation reflects the fact that utilisation is constrained by the history of deployments
[83] Look-ahead allows for equipment purchase in advance of the exact date at which it is required

A12.15 Whilst the 2G related model input parameters from the June 2005 model formed the starting point for the inputs to the new LRIC model, some of these parameters have subsequently been adjusted to different levels during the calibration process. These adjustments reflect the availability of more detailed data in the form of the benchmarks described above, as well as other technical and unit cost data received from MNOs which directly informs suitable levels for these parameters.

Asset count calibration

A12.16 The aim of the asset count calibration exercise has been to adjust model inputs such that the high-level asset counts produced by the model are consistent with the consensus of operator data.

A12.17 As discussed above, this has involved running the model using operator specific spectrum allocation, traffic and 3G coverage inputs and comparing the asset counts with the benchmark data obtained for each operator and adjusting non-operator specific parameters to determine the best model calibration. In assessing the deployment of 2G specific and shared 2G/3G network equipment, Ofcom has taken account of the modelled and actual equipment levels of the four 2G operators; for 3G specific equipment, all five operators have been considered. Ofcom notes that, in the latter case, there are more significant differences between the level of deployment of each of the five operators, due to differing 3G launch dates and rollout strategies; these differences were controlled for in the model through the use of operator specific levels of 3G traffic and network rollout[84].

A12.18 Cell radii are a crucial input parameter for modelling a realistic deployment of cell sites in areas which are driven by coverage rather than capacity requirements (e.g. rural areas). Ofcom is mindful of the differential propagation characteristics of 900MHz and 1800MHz GSM spectrum in these areas and the need to reflect potential differences in cell radii parameters assumed in the new LRIC model, and has therefore used cell radii differentials which reflect theoretical evidence as well as the actual deployments of the four 2G MNOs.

A12.19 The asset count calibration focussed on adjusting the cell radii, traffic by geotype and cell type distributions, design utilisation, scorched node and look-ahead parameters.

A12.20 Figure A12.1 below shows the counts of key network equipment in the model compared to the operator benchmarks after complete calibration of the new LRIC model. This is shown on an average basis[85] for the four 2G/3G MNOs, and separately for the 3G-only operator case (although the H3G benchmarks cannot be shown for confidentiality reasons).

[84] In the case of combined 2G/3G MNOs Ofcom acknowledges that there are also differences in 2G network deployment strategies. Given the objective of obtaining unit costs for an efficient average operator with a benchmark level of 2G coverage, Ofcom has considered operators' 2G cell site counts to the extent that their coverage aligns with the benchmark 2G coverage assumption.
[85] The average model output is the average of the 900MHz/1800MHz combined and 1800MHz only 2G/3G non-operator specific scenarios from the new LRIC model

Figure A12.1 Comparison of asset counts of key network equipment between model output and MNOs data in 2004/05[86]

	2G/3G operator			3G-only operator*		
Asset type	**MNO average**	**Model average**	**% of GBV[87]**	**H3G**	**Model**	**% of GBV**
2G macrocells	7,770	8,132	33%	-	-	-
2G micro and picocells	2,217	2,637	5%	-	-	-
3G Node-Bs	3,330	3,439	19%	[✂]	[✂]	[✂ %]
TRXs	67,350	63,958	13%	-	-	-
BSCs	221	161	8%	-	-	-
RNCs	24	27	3%	[✂]	[✂]	[✂ %]
MSCs and MSC servers	68	77	6%	[✂]	[✂]	[✂%]

* The 3G coverage scenario assumed in the 3G only operator model is confidential and disclosed only to H3G.

A12.21 In general, Ofcom considers that it has taken a conservative approach with the model over-estimating rather than under-estimating the quantities of network equipment required. Whilst the model includes lower counts of certain types of network equipment than the average of the MNOs, in these cases there were generally large discrepancies between the counts of different operators' equipment.

Cost calibration

A12.22 Similarly to the asset count calibration, the aim of the cost calibration exercise has been to adjust model inputs such that the levels of GBV and operating costs produced by the model are broadly consistent with a consensus of operator data. However, in this case multiple years of GBV and operating costs benchmarks have been used to ensure that not only the absolute levels but also the changes in costs over time are reflected in the new LRIC model.

A12.23 The cost benchmarks obtained from MNOs could not be split consistently between 2G specific, 3G specific and shared costs so total network costs for each operator have been considered for the purpose of calibration. However, the 2001 data points obtained by the Competition Commission provide a view of 2G specific costs prior to the introduction of 3G networks, whereas H3G's cost benchmarks are entirely 3G-specific. These benchmarks were therefore used for initial 2G and 3G specific cost calibrations of the model; following this, the full range of 2G/3G operator cost benchmarks were assessed and further adjustments made to the model input parameters accordingly.

[86] Model output is 2004/05; MNO data is described in Annex 6

[87] GBV proportion calculated on the basis of network GBV excluding 3G licence fees and handsets. Cell site GBV is apportioned between 2G macrocells, 2G micro and picocells and 3G Node-Bs in proportion to the equipment installed on each network. BSC and RNC GBVs include associated ports

A12.24 Whilst the asset count calibration was focussed on adjusting cell radii, traffic by geotype and cell type distributions, design utilisation, scorched node and look-ahead parameters, the cost calibration has been focussed on adjusting the levels of MEA investment and operating unit costs over time.

A12.25 The figure below shows the levels of GBV and operating costs from the model in each relevant year compared to the operator benchmarks, after complete calibration of the new LRIC model. This is shown on an average basis[88] for the four 2G/3G MNOs, and separately under the 3G-only operator case (although the H3G benchmarks cannot be shown for confidentiality reasons).

Figure A12.2 Comparison of aggregate costs between model output and MNOs data

		2001	2002	2003	2004[89]
2G/3G GBV (£m)	MNO average	2,710	3,092	3,311	3,629
	Model average	2,726	2,921	3,198	3,605
2G/3G operating costs (£m)	MNO average	338	327	338	340
	Model average	309	339	361	376
3G-only GBV (£m)	H3G	-	[✂]	[✂]	[✂]
	Model*	-	[✂]	[✂]	[✂]
3G-only operating costs (£m)	H3G	-	[✂]	[✂]	[✂]
	Model*	-	[✂]	[✂]	[✂]

* The 3G coverage scenario assumed in the 3G only operator model is confidential and disclosed only to H3G.

A12.26 Whilst the average MNO GBV increases shown above seem reasonable in the light of 3G network rollout, operating costs exhibit some unusual behaviour. The 2001 data point appears to be out of trend with the later data points, suggesting a significant decrease in operating costs from 2001 to 2002. Ofcom has not received any reasonable explanation for such a reduction based on underlying cost movements; rather, it considers that the difference is likely to be due one-off expenses which were included in the 2001 benchmark and changes in accounting treatments. Ofcom has taken a "best-fit" approach to these operating cost levels, performing a calibration such that operating costs in the model fall below the 2001 level but above the 2004 level of the average MNO benchmark.

A12.27 Furthermore, operating costs for the 2G/3G MNOs have not risen sharply since the deployment of 3G networks. Significant increases in operating costs over this period might be expected, due to the additional maintenance required on new 3G network equipment; indeed, such increases were originally forecast in the uncalibrated model. However, feedback from the MNOs suggests that 3G operating costs have been delayed, in part due to initial deals obtained on 3G equipment

[88] The average model output is the average of the 900MHz/1800MHz combined and 1800MHz only 2G/3G non-operator specific scenarios from the new LRIC model

[89] For 3G only and 1800MHz only 2G/3G operators, the stated year is a calendar year. For 900MHz/1800MHz combined operators, the stated year is the financial year ending on the 31st March of the following year. All values are stated in nominal monetary terms.

which included maintenance contracts for a limited period. In order to account for these effects and provide a better alignment of the model to real MNOs' costs, Ofcom has applied an adjustment factor to the 3G related operating costs of a 2G/3G operator so that maintenance costs in the early life of the network are reduced. However, in the case of a 3G-only new entrant, Ofcom does not consider that such costs savings are appropriate. This is supported by H3G's actual accounting costs information. However, in the case of 2G/3G combined operator model and 3G only operator model operating costs are higher than MNOs actual costs (as set out in the figure above). Ofcom will continue to consider the appropriateness of this difference in light of comments it receives from stakeholders as part of the consultation.

A12.28 Modelled capital costs in 2004 are slightly lower than those of the average MNO benchmarks; however, capital and operating costs may be substitutable depending on an operator's commercial strategy and the lower capital costs in 2004 are effectively offset by the higher operating costs in this year. On balance, Ofcom's considers that its approach is reasonable in terms of the impact of the small differences between the accounting benchmarks and modelled costs on the level of unit costs for voice termination.

Annex 13

Benchmarks for the charge control levels

Overview

A13.1 In order to determine the appropriate levels for charge controls on mobile voice termination services, it is first necessary to consider the appropriate target level at the end of the proposed charge control period, in this case 2010/11, before considering the most reasonable path of charges to reach that target. The purpose of this annex is to set out the relevant unit cost benchmarks for determining the efficient target level for the charge controls in 2010/11.

A13.2 As set out in previous annexes, Ofcom considers that there are a number of components which should be combined additively in order to derive appropriate benchmarks for the efficient charge level for voice termination charges:

i) **Network costs of mobile termination**, which can be separated into a unit cost element for recovery of network capital and operating expenditure (excluding 3G spectrum costs) discussed in Annex 5, and a unit cost element to recover an appropriate portion of the 3G licence fee costs discussed in Annex 14.

ii) **Non-network costs of mobile termination**, for recovery of administrative overhead common costs related to operation of the mobile networks. This component is discussed in Annex 15.

iii) **Network externality mark-up**, which takes into account the external benefits to mobile and fixed subscribers of having a larger number of mobile subscribers with whom they can communicate. This component is dealt with in Annex 16.

A13.3 Ofcom considers that three different types of unit cost benchmark are relevant in the context of MNOs who possess 2G and 3G networks in combination and on a standalone basis:

- **2G-only operator "as if" benchmark**. This is the hypothetical unit cost of 2G voice termination which is consistent with the approach adopted in the previous market review. The 2G network operator is modelled as never building a 3G network and keeping all its full market share of traffic on the 2G network.

- **2G/3G combined network operator benchmark.** This is the weighted average (blended) 2G/3G unit cost for an operator which builds a 2G network and later a 3G network. This takes into account the migration of traffic between these two networks as well as the potential for cost savings derived from sharing of network assets. This benchmark is intended to reflect an efficient 2G/3G operator.

- **3G-only operator benchmark.** This is the unit cost for a 3G-only new entrant network operator. 3G traffic grows gradually from 2003/04 as the operator builds its market share and no cost savings are available as in the case of a 2G/3G operator. This benchmark is intended to reflect an average efficient 3G-only operator.

A13.4 Furthermore, both the network cost and non-network cost components of these benchmarks are sensitive to certain parameters for which Ofcom has considered a

range of approaches. These are listed below and are discussed in more detail in the following section:

- **Demand forecasts**, including voice and data services. Four overall demand scenarios have been considered for 2G/3G operators and 3G-only operators.
- **3G licence fee treatment**, incorporating both the level of costs for the licence fee and the proportion of which is allocated to voice termination services. This factor has no impact on the 2G-only operator benchmark.
- **Choice of depreciation methodology**, for which four options have been considered (two forms of economic depreciation and two forms of accounting depreciation).

A13.5 Ofcom believes it is appropriate to look at a range of efficient charge benchmarks in 2010/11 in order to determine the appropriate level for charge controls on mobile voice termination. This range is derived by considering relevant approaches on the three key parameters listed above, for each type of operator benchmark.

Key parameters

Demand forecasts

A13.6 As discussed in Annex 5, a range of demand forecasts has been considered for use in the new LRIC model to derive appropriate efficient charge benchmarks. The starting point for each of these scenarios is the same forecast of total mobile subscribers, which is then apportioned to each type of operator using market share forecasts consistent with competitive neutrality and an evolution to five equal share operators by 2020/21. For a 2G/3G operator, high, medium and low migration rate forecasts are applied to split these subscribers between the 2G and 3G networks. High, medium and low voice and data service usage per subscriber forecasts are finally considered, with a breadth that is intended to reflect the likely range of realistic outcomes. All of these demand forecasts have been developed in light of historical data as well as forecasts from MNOs, brokers' reports and third party market research (including IDC and WCIS[90]).

A13.7 Ofcom has developed the following four overall demand scenarios, separately for 2G/3G and 3G-only operators, by using different combinations of the forecasts listed above[91].

- High voice and data traffic
- Medium voice and data traffic
- Low voice and data traffic
- Medium voice only traffic

[90] Ofcom cannot make these third party forecast available to stakeholders due to copyright. However, they are available to purchase from the suppliers.

[91] Note that in the case of a 2G/3G operator, migration rates of high, medium and low have been combined with service usage forecasts of high, medium and low respectively, since these combinations provide the extreme bounds on the blended 2G/3G unit cost level

A13.8 The level of the network cost and non-network cost related components of the 2010/11 unit cost benchmark are strongly dependent on the overall demand scenario selected. Ofcom believes that each of these scenarios is relevant due to the degree of current market uncertainty, and has therefore considered the 2010/11 benchmark for 2G/3G and 3G-only operators under each of these overall demand scenarios. Since the 2G-only operator case is a hypothetical benchmark, only a medium voice and data demand scenario has been considered in this context.

3G spectrum costs

A13.9 The treatment of 3G spectrum costs and 3G spectrum allocation has a significant impact on the level of the 2010/11 unit cost benchmarks. Ofcom considers that three economic principles are relevant in considering the appropriate treatment. These are:

- Providing appropriate price signals to consumers for efficient consumption of services using mobile termination;
- The impact on MNOs' cost recovery; and
- The impact on MNOs' incentives to use spectrum efficiently.

A13.10 The application of each of these principles is discussed in detail in Annex 14. These considerations lead to arguments in favour of a number of alternative treatments for the valuation of the 3G licence fees, the allocation of 3G spectrum and the proportion of licence fee costs which are recovered on voice services, and Ofcom has explored the impacts of each of these different treatments on the level of unit cost benchmarks. The key alternative treatments are as follows:

i) Auction payments and spectrum allocations in 2000

ii) Auction payments in 2000 for a two carrier licence

iii) Auction payments in 2000 taking into account O2's write-down for a two carrier licence

iv) Spectrum allocations in 2000 with no spectrum costs

v) Two carriers with no spectrum costs

A13.11 Additionally, for each of these treatments, two alternative approaches for allocation of the spectrum fee costs have been examined, based on the proportions of voice and data traffic either in the radio network or at a service demand level.

Choice of depreciation methodology

A13.12 The new LRIC model is capable of generating unit costs for services on the basis of four alternative forms of depreciation – Original ED, Simplified ED, HCA and CCA as discussed in Annex 5. The level of the unit cost benchmarks is dependent on the choice of depreciation approach adopted. Ofcom has explored the characteristics of different approaches. These are summarised in the figure below:

Figure A13.1 Strengths and weaknesses of alternative depreciation approaches

Approach	Strengths	Weaknesses
Original ED	• Consistent with previous charge control determination, as accepted by the CC • Clear conceptual basis which explicitly attempts to mimic a competitive market outcome • Final year unit cost is exactly as expected for the theoretical benchmark competitive market	• Dependence on final year estimates which may be less reliable if forecasts are uncertain • More complex than some other approaches
Simplified ED	• Simplified form which gives some of the desirable conceptual properties of the Original ED approach • The shape of the profile of unit costs may be more naturally related to changes in input costs	• Does not have the same theoretical underpinnings as Original ED • Not entirely consistent with the approach taken in the previous market review; may generate windfall gains / losses
HCA	• Widely used and well understood; can be calculated from MNOs' accounts • May be illustrative of cost paths which vary inversely with utilisation	• Does not attempt to mimic the outcomes of a competitive market, therefore less likely to give optimal signals for consumption and investment • Inconsistent with the approach taken in the previous market review; likely to generate windfall gains / losses • Very sensitive to in-year costs and traffic
CCA	• As HCA, but does attempt to take input cost changes into account	• As HCA • More complex to calculate than HCA since must take account of changes in input costs

A13.13 In the previous market review, Ofcom used the Original ED approach in determining the suitable levels for charge controls on voice termination and did not place significant weight on other methodologies. This approach was also accepted by the Competition Commission in the CC's 2003 Report (see footnote 13 above):

> "We chose economic depreciation because it most accurately matches the costs incurred in order to carry traffic to the periods in which the traffic is carried" [92].

A13.14 Economic depreciation is in principle the most appropriate methodology since it explicitly attempts to mimic the outcomes of a competitive market and therefore generate the best signals for consumption and investment. HCA and CCA accounting approaches do hold some attractions from a practical perspective, but have limited theoretical justification in terms of mimicking competitive market outcomes. While these approaches may also give some indication of cost recovery paths which vary inversely with the level of in-year utilisation, Ofcom does not consider that this property is necessarily desirable in the context of setting regulated termination rates. Such cost paths would represent a significant deviation from the conceptual approach adopted in the last market review and accepted by the Competition Commission.

A13.15 The Original ED form of economic depreciation also holds significant advantages over the Simplified ED form; primarily, the conceptual basis for the Original ED approach is clear and gives rise to a terminal charge level which is exactly in line with that expected under the benchmark competitive market. However, the Simplified ED approach can serve as a useful cross-check on the Original ED approach and Ofcom believes that the broad similarity of the results from these approaches adds further confidence to the results obtained from the Original ED approach.

A13.16 Furthermore, Ofcom considers that it is important to be consistent with the means used to determine the previous charge controls, so as to avoid undesirable windfall gains and losses for mobile and fixed operators as well as consumers. It would be highly undesirable to adopt a different form of depreciation, unless new evidence suggested that the previous approach was no longer adequate.

A13.17 Ofcom therefore believes that the Original ED approach continues to be the appropriate methodology for determining the levels for the proposed charge controls. The following results are based on the LRIC unit costs determined under this approach.

A13.18 The impact of using an alternative depreciation methodology as opposed to the Original ED approach would be as follows:

- Simplified ED generates similar results to Original ED. However, the form of variation with input costs gives rise to less steep profiles of unit cost recovery over time. The level of network related unit cost in 2010/11 is typically 2-6% higher for a 2G/3G operator, or 0-7% lower for a 3G-only operator

- HCA gives rise to much steeper profiles of cost recovery than economic depreciation, due to high unit costs in early years where volumes are low. Typically the level of network related unit cost in 2010/11 is 6-22% lower for a 2G/3G operator or 0-11% lower for a 3G-only operator

- CCA gives rise to very similar cost levels to HCA. However, profiles of cost recovery under a CCA approach are slightly flatter due to the effect of adjustments for declining input costs, resulting in a 2010/11 charge which is typically around 4% higher than under an HCA approach

[92] See paragraph 2.305 of the CC's 2003 Report

Non-network cost and network externality mark-ups

A13.19 As discussed previously, in addition to the network costs calculated from the new LRIC model, two additional mark-ups also contribute to the level of the 2010/11 efficient charge benchmarks. These recover non-network costs (network related administration costs) as well as a network externality mark-up to account for the external benefits associated with marginal subscribers.

A13.20 A value of 0.30 pence per minute has been estimated by Ofcom for the network externality mark-up. As discussed in Annex 16, a range of potential approaches to the determination of this value have been explored and this value represents Ofcom's view of a reasonable estimate.

A13.21 The size of the non-network costs mark-up depends upon the traffic scenario selected, since this mark-up is aiming to recover a fixed quantity of costs across the relevant volume of traffic. The non-network costs mark-ups for different traffic scenarios are shown below.

Figure A13.2 Non-network costs mark-up under different traffic scenarios

	Non-network costs mark-up (ppm in 2010/11)[93]		
Traffic scenario	**2G-only operator**	**2G/3G operator**	**3G-only operator**
High voice and data	-	0.09	0.14
Medium voice and data	0.24	0.20	0.35
Low voice and data	-	0.35	0.66
Medium voice only	-	0.24	0.45

A13.22 The efficient charge benchmarks shown below all include the network LRIC unit cost as determined under Original ED, and include the non-network cost and network externality mark-ups.

Key benchmarks over time

A13.23 As outlined previously, there are three relevant types of benchmark for the 2010/11 charge level; a 2G-only operator 'as if' benchmark, a 2G/3G combined network operator benchmark and a 3G-only operator benchmark.

2G-only operator cost benchmarks

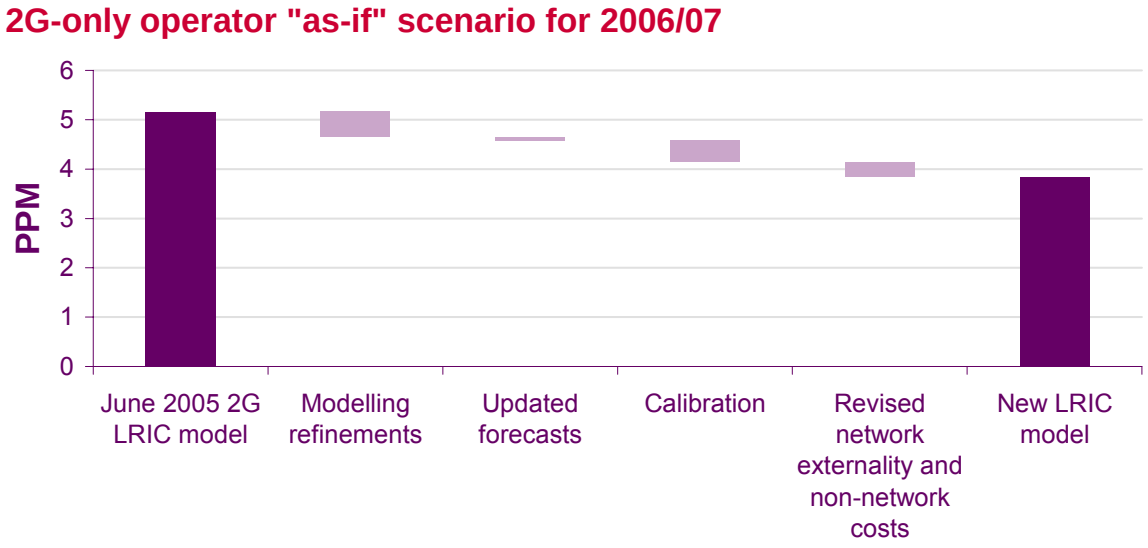
A13.24 In June 2005, Ofcom released an updated version of the April 2002 LRIC model which was used to determine the levels of charge controls on 2G mobile voice termination from the previous market review. In this update, a number of model inputs were revised in order to reflect the latest data available. Upward revisions to the level of traffic combined with downward revisions to the level of 2G spectrum fees and the cost of capital all contributed to reductions in the efficient charge levels

[93] The exact figure depends upon interactions with licence fee scenarios due to the Equal Proportionate Mark-Up (EPMU) approach taken on non-network costs

of 6% for 900MHz/1800MHz combined operators and 10% for 1800MHz only operators[94].

A13.25 The figure below shows the level of the efficient charge in 2006/07 (in real 2006/07 prices) as determined under the June 2005 model, and under the new LRIC model for a 2G-only operator scenario (in the 900MHz/1800MHz operator case; this analysis is similar for an 1800MHz only operator). Under both of these cases, it is assumed that no subscriber migration from 2G to 3G occurs and that the operator builds and maintains only a 2G network. The changes from the June 2005 model to the new LRIC model are explained by the intervening unit cost block diagram and are explained in more detail in the discussion that follows; the net effect of these changes is to give a reduction of around 1.3ppm in the 2006/07 efficient charge level.

Figure A13.3 Changes in the 2G-only operator efficient charge level for 2006/07 (in real 2006/07 prices)



A13.26 A number of refinements have been made to the 2G network modelling elements of the new LRIC model since the June 2005 version of the 2G LRIC model, in order to reflect the latest available data from operators as well as improved qualitative insights into the way that 2G networks are operated in practice. These refinements include the application of significantly reduced asset lives, the addition of extra geotype granularity, removal of a one year buy-ahead period on network assets and age-on-age operating cost trends, more granular asset utilisation calculations and a more efficient 'tree and branch' backhaul structure. These modelling changes are discussed in detail in Annex 5. The net impact of these changes is to give a moderate reduction in the level of the efficient charge in 2006/07.

A13.27 Demand forecasts have also been improved in the new LRIC model. Two important changes have led to increased lifetime traffic volumes, improved economies of scale and therefore lowered unit costs. First, the explicit modelling period has been extended beyond 2010, allowing growth in mobile subscribers and voice traffic usage to be continued past this date. Second, services have been added to the model including SMS, MMS and packet data in the case of the 2G network. While the aim of including these services is primarily to capture economies of scope

[94] See June 2005 consultation, Annex E, Figure E11, E12

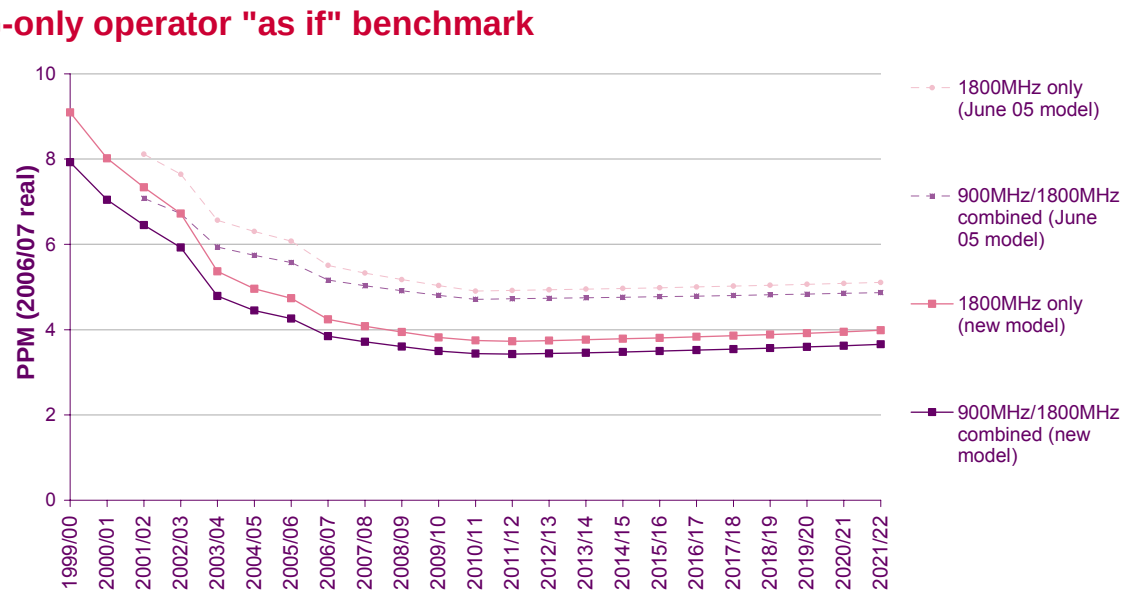
between voice and data services on the 3G network, their inclusion also results in more modest economies of scope on the 2G network and hence contributes to a reduced efficient charge level.

A13.28 In the previous market review, unit cost outputs from the 2G LRIC model were adjusted exogenously so as to take into consideration average accounting GBV and operating cost benchmarks of the four 2G MNOs. This approach was developed by the Competition Commission and was discussed at length in paragraphs 2.291 – 2.391 of the CC's 2003 Report. However, an alternative approach has been taken in developing the new LRIC model. The new model has had its inputs calibrated so as to generate GBV and operating costs in line with benchmarks obtained from the five MNOs and therefore does not require exogenous adjustments to its outputs. The detailed calibration approach and accounting cost benchmarks used for this are described in Annex 12 and Annex 6 respectively. This calibration has resulted in lowered unit costs; however this is primarily due to the availability of accounting cost benchmarks for 2002/03 – 2004/05 (whereas the previous exogenous adjustments were carried out purely on the basis of 2001 data), rather than the change of approach. The latest accounting cost benchmarks from MNOs suggest that operating costs in the relevant years are lower than those that might have been expected solely on the basis of the 2001 cost benchmarks, hence downward revisions to operating cost levels have been made in the new LRIC model compared to the June 2005 model.

A13.29 Finally, the levels of the administration costs and network externality mark-ups have also been recalculated as discussed above. Adjustments to these mark-ups have resulted in a further moderate reduction to the level of the efficient charge as shown above.

A13.30 The profile of efficient charges of voice termination over time under this 2G-only "as if" operator scenario under the June 2005 model and under the new LRIC model are shown below, both for operators with 900MHz/1800MHz combined and 1800MHz only GSM spectrum designations. In line with the figure above, the new LRIC model produces consistently lower unit costs than the June 2005 model under this 2G-only operator scenario.

Figure A13.4 2G-only operator efficient charge benchmark under the medium voice and data traffic scenario



2G/3G operator cost benchmarks

A13.31 In constructing efficient charge benchmarks for 2G/3G operators from the cost model, three different components are relevant:

- The 2G component efficient charge benchmark. This is calculated on the same basis as the 2G-only operator scenario outlined above, but with reduced volumes due to the migration of traffic to the MNO's 3G network and some cost savings due to the sharing of certain network assets with the 3G network (see Annex 5, for a detailed description of how this sharing has been modelled).

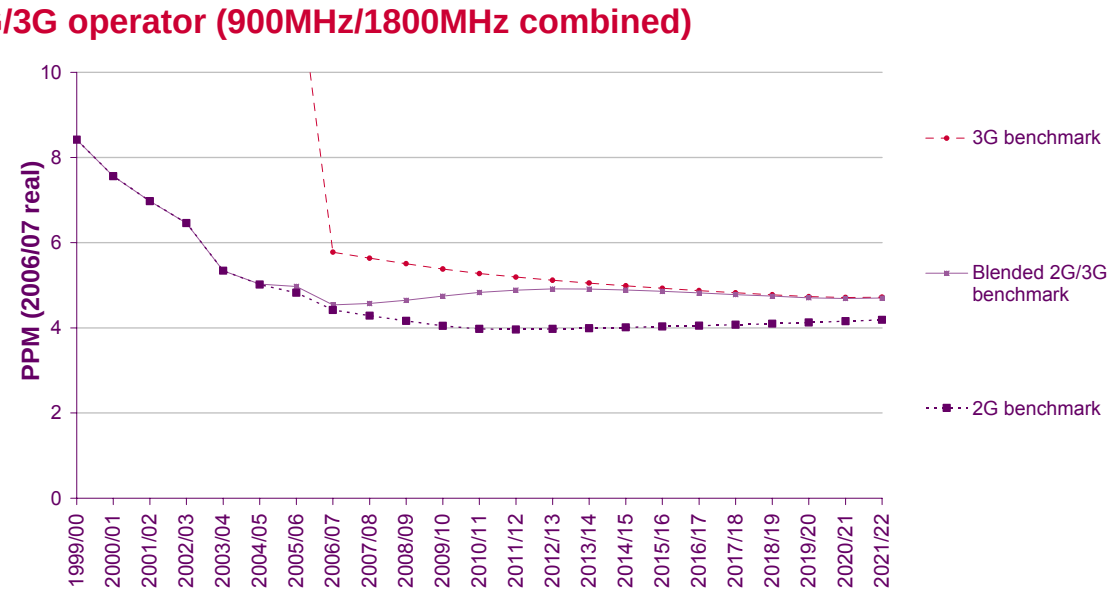
- The 3G component efficient charge benchmark. This is calculated based on the volumes of traffic migrated onto the MNO's 3G network, using the same network dimensioning principles as for a 3G-only operator but with a degree of asset sharing with the 2G network as described above. An allowance is also included for the recovery of some of the costs of a 3G spectrum on 3G voice termination.

- The blended 2G/3G efficient charge benchmark. This is taken as an average of the 2G and 3G component efficient charges outlined above, weighted by the respective proportions of 2G and 3G voice termination traffic.

A13.32 For the purpose of examining how these benchmarks vary over time, the medium voice and data traffic scenario is shown below, since this represents Ofcom's view of the most likely demand forecasts, combined with a £4bn 3G licence fee and two carriers as this represents a typical cost and allocation of spectrum obtained at auction in 2000.

A13.33 The 2G component, 3G component and blended 2G/3G efficient charges for voice termination of 2G/3G operators under these assumptions are shown below, for a 900MHz/1800MHz combined GSM spectrum operator (these results are similar for an 1800MHz only operator).

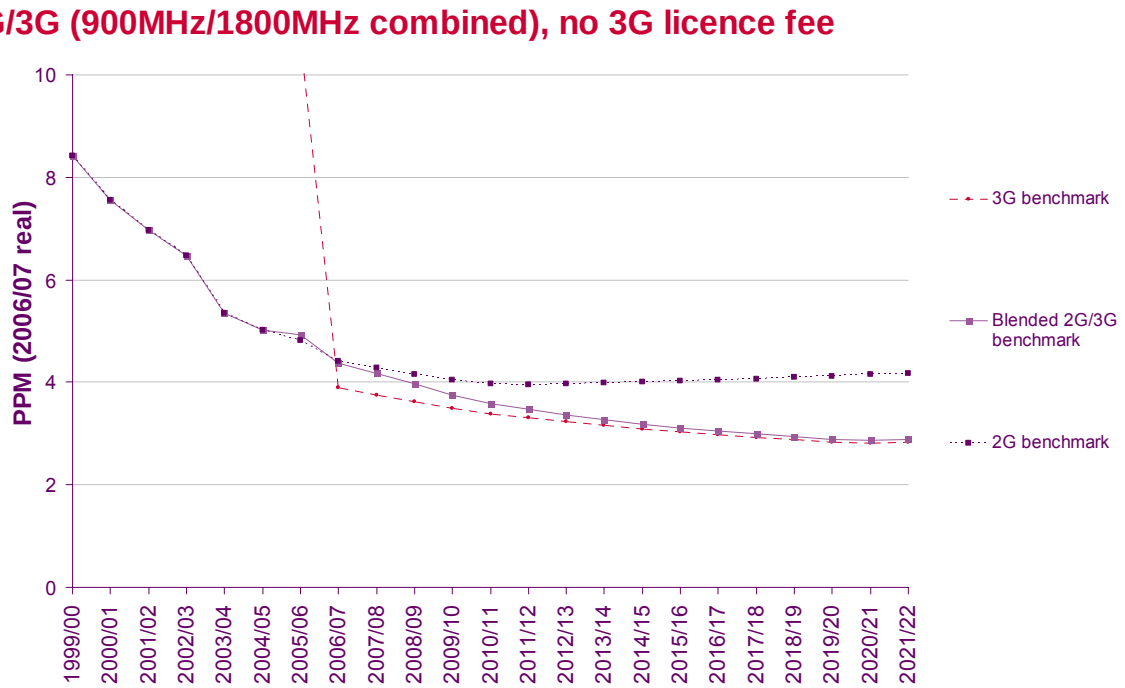
Figure A13.5 2G/3G operator: 2G, 3G and blended unit cost benchmarks under the medium voice and data traffic scenario



A13.34 As shown above, both the 2G and 3G component efficient charge benchmarks are decreasing over time. This is due to declining input costs, which have a shaping effect on the profile resulting from the use of economic depreciation. The level of the 3G component benchmark is initially higher than that of the 2G component benchmark; this is entirely due to the allowance for recovery of the 3G licence fee. Absent these costs, the 3G component benchmark would be lower, as might be expected given the increased efficiency of 3G technology, reductions in MEA costs since 2G networks were rolled out and more rapid forecast build up of demand on the 3G network than on the 2G network historically. This is shown in Figure A13.6 below.

A13.35 However, weighting of these components results in a 2G/3G blended unit cost benchmark which increases in real terms over the period of the proposed charge controls. This is due to the impact of traffic migration from 2G to 3G, which shifts the blended unit cost from the level of the 2G component to the higher 3G component unit cost benchmark. Beyond the period of the proposed charge controls, the 2G/3G blended unit cost is anticipated to decrease as full weighting is placed on the 3G component discussed above.

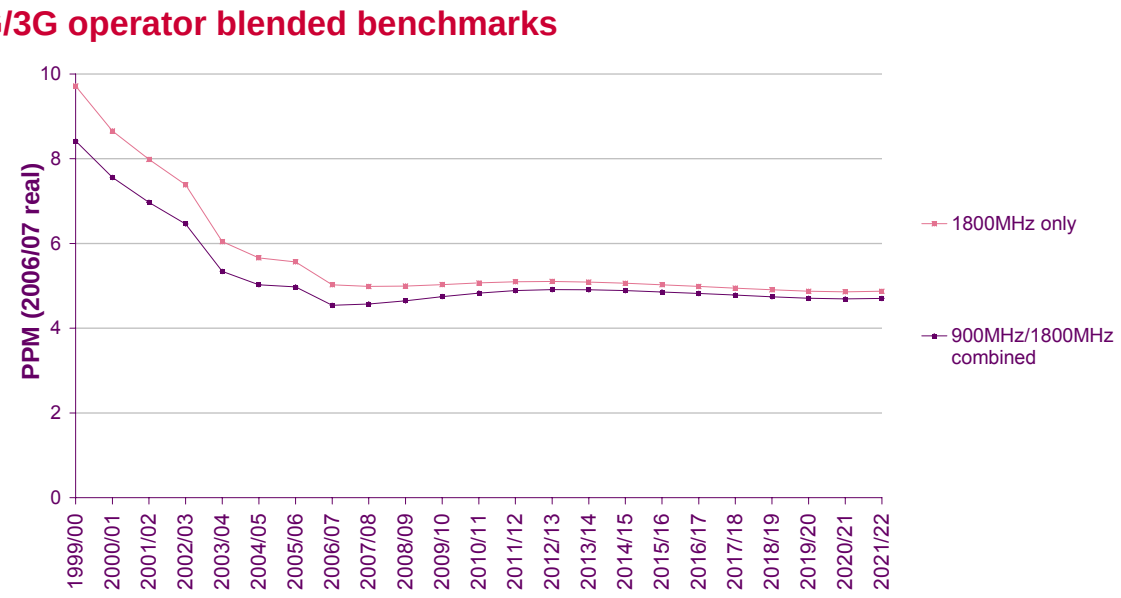
Figure A13.6 2G/3G operator: 2G, 3G and blended unit cost benchmarks under the medium voice and data traffic scenario without allowance for 3G spectrum costs on MCT



A13.36 The figure below shows a comparison of the blended 2G/3G efficient charge benchmark for operators with 900MHz/1800MHz combined spectrum compared to operators with 1800MHz spectrum only. As in the 2G-only 'as if' scenario, the efficient charges for a 900MHz/1800MHz combined operator are consistently lower. This is due to the advantageous propagation characteristics of 900MHz spectrum over 1800MHz for providing network coverage in periods where network traffic is low. This is the case not only in the early life of the 2G network as under a 2G-only scenario, but also in the latter years where minimal traffic remains on the 2G network due to migration of subscribers onto 3G networks. Economic depreciation spreads the extra coverage costs for an 1800MHz only operator in these periods over the entire life of the 2G network thereby creating a differential in all years. However, despite these effects, the differential between the blended benchmarks of the two types of operator is expected to narrow significantly both within and beyond the proposed period of the charge controls, due to the blending in of the 3G component efficient charge benchmarks which are broadly the same for both types of operator[95].

[95] Small differences in the 3G component unit cost benchmarks exist due to different 2G radio site counts creating varying degrees of opportunity for site sharing with the 3G networks

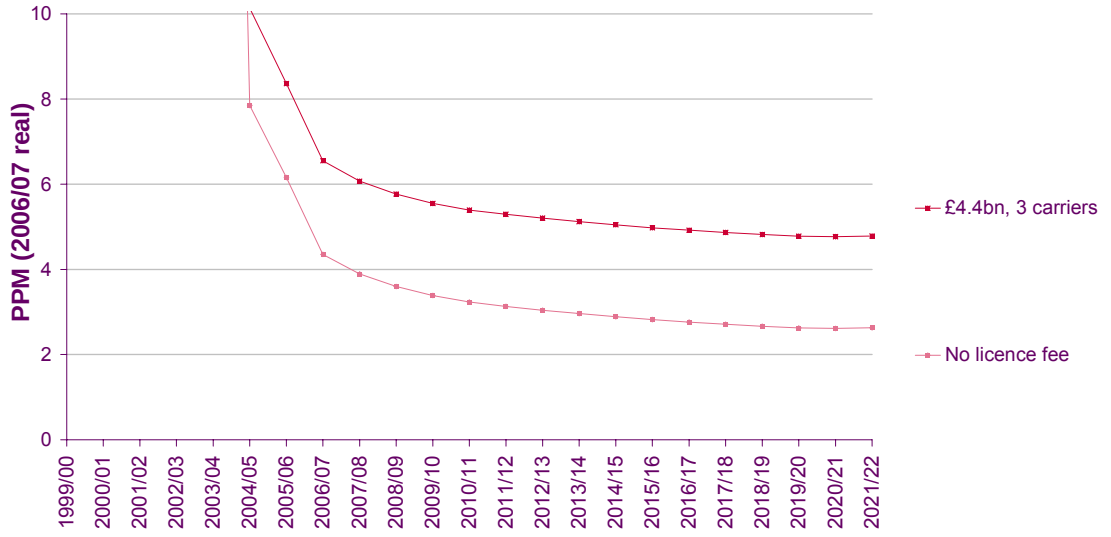
Figure A13.7 2G/3G operators: comparison of blended efficient charge benchmarks under the medium voice and data traffic scenario



3G-only operator cost benchmarks

A13.37 The 3G-only operator efficient charge benchmark is intended to reflect an efficient 3G-only new entrant. Since H3G is the only existing example of such an operator, it is appropriate to consider this benchmark under the assumption of H3G's licence fee cost of £4.4bn and spectrum allocation of three carriers. However, this scenario is also shown in the absence of a licence fee so that the impact of this cost can be seen more clearly. These efficient charge benchmarks are shown below:

Figure A13.8 3G-only operator efficient charge under the medium voice and data traffic scenario

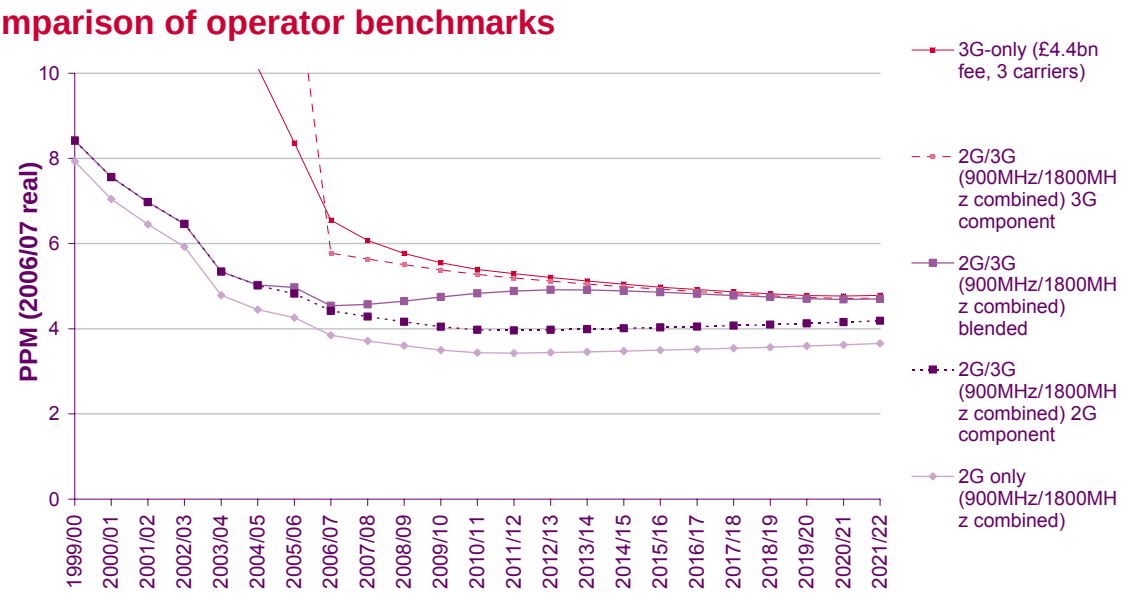


A13.38 The efficient charge benchmarks for a 3G-only operator are relatively high in the early life of the network. This is due to the way that economic depreciation recovers the costs associated with large 3G equipment investments at relatively higher MEA costs in this period (although accounting depreciation methods would give rise to much higher unit costs in these years). The efficient charge levels then stabilise to a gradually declining trend over the longer term, which includes the proposed final year for the charge controls. The 3G licence fee can be seen to have a very significant impact on the efficient charge level, not dissimilar in magnitude to the unit costs associated with all other network equipment.

Comparison of different operator type benchmarks

A13.39 The figure below shows a comparison of the benchmarks discussed above; the 2G-only operator efficient charge, the 2G/3G efficient charge, including the 2G and 3G components as well as the blended 2G/3G efficient charge, and the 3G-only operator efficient charge. These scenarios include a £4bn licence fee with two carriers and a £4.4bn licence fee with three carriers for the 2G/3G and 3G-only operators respectively, as before.

Figure A13.9 Comparison of different operator type unit cost benchmarks (with licence fees) under the medium voice and data traffic scenario



A13.40 The level of the efficient charge benchmark for a 3G-only operator and the 3G component efficient charge benchmark of a 2G/3G operator are broadly similar, due to the similar underlying 3G network costs and lifetime traffic volume forecasts. However, there are explainable differences caused by a number of effects; the 3G-only operator is assumed to begin network rollout and 3G traffic build-up a year earlier, has a different extent of ultimate 3G network rollout and does not benefit from the asset sharing experienced by a 2G/3G operator. These differences are discussed in more detail in Annex 5. The net effect is that the efficient charge benchmark for the 3G-only operator is shifted to a year earlier than the 3G component benchmark of the 2G/3G operator, and has a slightly higher level.

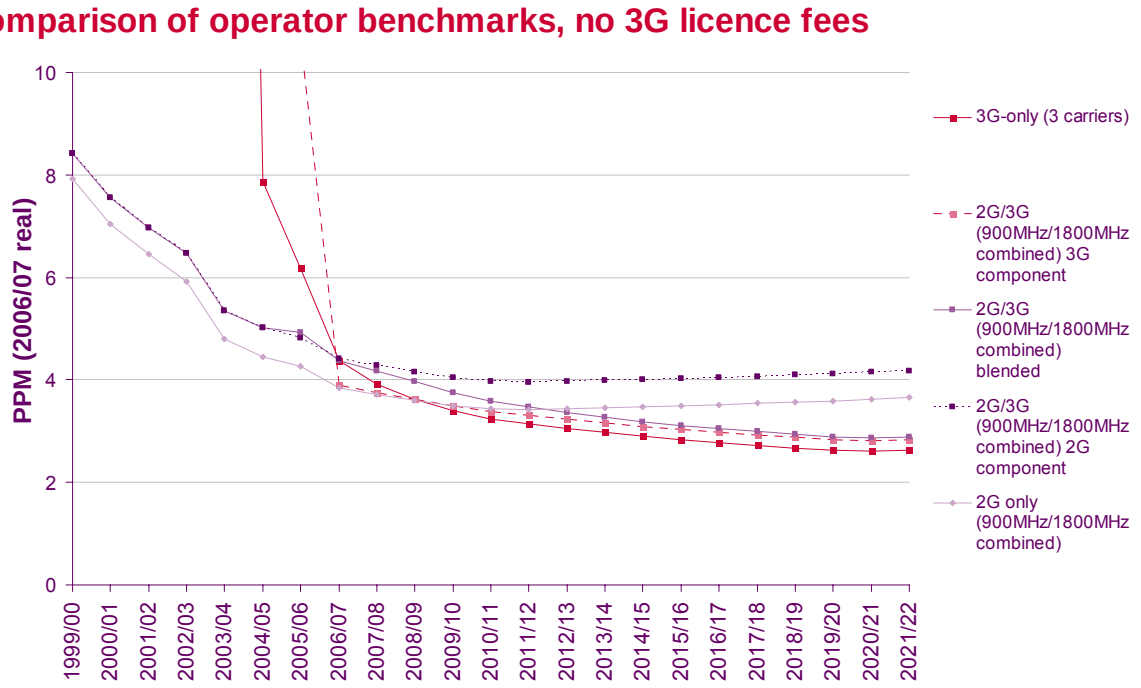
A13.41 This comparison also shows that the 2G/3G blended efficient charge tends to converge with the 3G-only benchmark in the long-run. This is due to the long-run

weighting of the blended unit cost being placed almost entirely on the 3G component which is similar to the 3G-only benchmark, as described above.

A13.42 There are however, differences between the 2G component efficient charge benchmark for a 2G/3G operator and the 2G-only operator benchmark. This is essentially caused by the migration of traffic to 3G networks in the 2G/3G case, resulting in lower lifetime traffic and hence reduced economies of scale.

A13.43 Within the proposed period of the charge controls, the blended 2G/3G operator efficient charge benchmark is lower than that of the 3G-only operator (assuming that the costs of 3G licence fees are included); this is effectively due to the significant weighting in of the lower 2G component rate for the blended 2G/3G operator rate. These components are shown in the figure below.

Figure A13.10 Comparison of different operator type unit cost benchmarks (without licence fees) under the medium voice and data traffic scenario



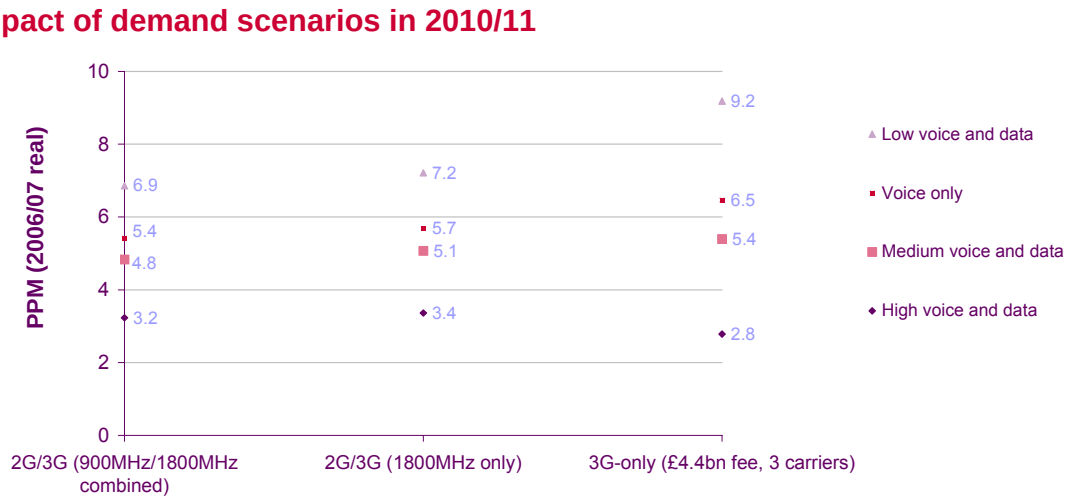
Impact of key parameters on benchmark levels

Demand scenarios

A13.44 As discussed previously, a range of demand forecasts has been considered in determining efficient charge benchmarks. Ofcom has developed four demand scenarios for each of the 2G/3G operator and 3G-only operator cases, which are intended to reflect the broad range of plausible market outcomes, due to present uncertainty around migration and the take-up of 3G services.

A13.45 The following chart shows the impact of each of these demand scenarios on the efficient charge benchmarks of each operator type in 2010/11, the proposed final year of the charge controls. Note that this shows the 2G/3G operator benchmarks with a £4bn licence fee and two carriers and the 3G-only benchmarks with a £4.4bn licence fee and three carriers.

Figure A13.11 Impact of demand scenarios in 2010/11 for different operator types



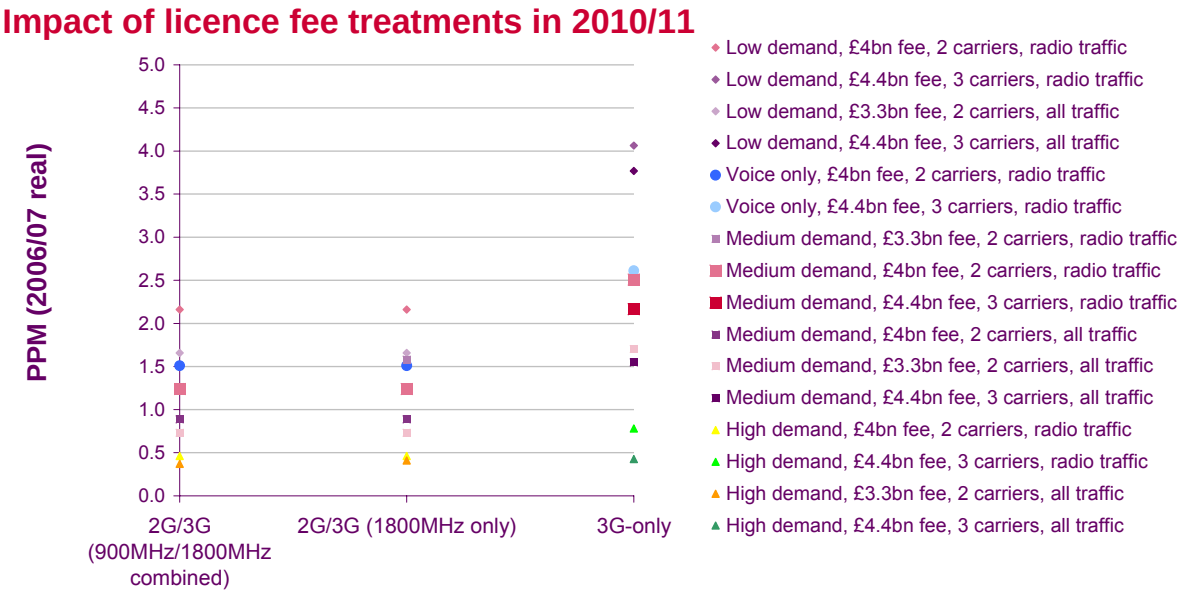
A13.46 The wide range of demand scenarios gives rise to substantial variance in the level of efficient charge benchmarks in 2010/11. For 2G/3G operator benchmarks, this variance is around 3.7ppm whereas in the case of the 3G-only benchmark, the variance is significantly larger at 6.4ppm. The relatively lower variance of the 2G/3G operator benchmarks is caused by the blending in of a 2G component, the level of which in 2010/11 is significantly less sensitive with respect to traffic forecasts because there is a long period of 2G historic volumes that are fixed with respect to different traffic forecasts; the 3G component for the 2G/3G efficient charge benchmark exhibits a similar degree of variance with alternative demand scenarios to that of the 3G-only benchmark.

Treatment of spectrum fees

A13.47 In addition to this range of demand scenarios, Ofcom also considers that it is appropriate to look at a variety of approaches for the treatment of 3G licence fees, as described fully in Annex 14. These approaches explore a range of assumptions around the cost of the licence, the allocation of 3G spectrum and the proportion of the licence fee costs which should be recovered on 3G voice calls as opposed to data services.

A13.48 The figure below shows the impact of the key alternative licence fee scenarios relative to scenarios without licence fees included, under both 2G/3G operator and 3G-only operator efficient charge benchmarks, and also shown under different traffic scenarios as described previously.

Figure A13.12 Impact of Impact of licence fee treatments in 2010/11



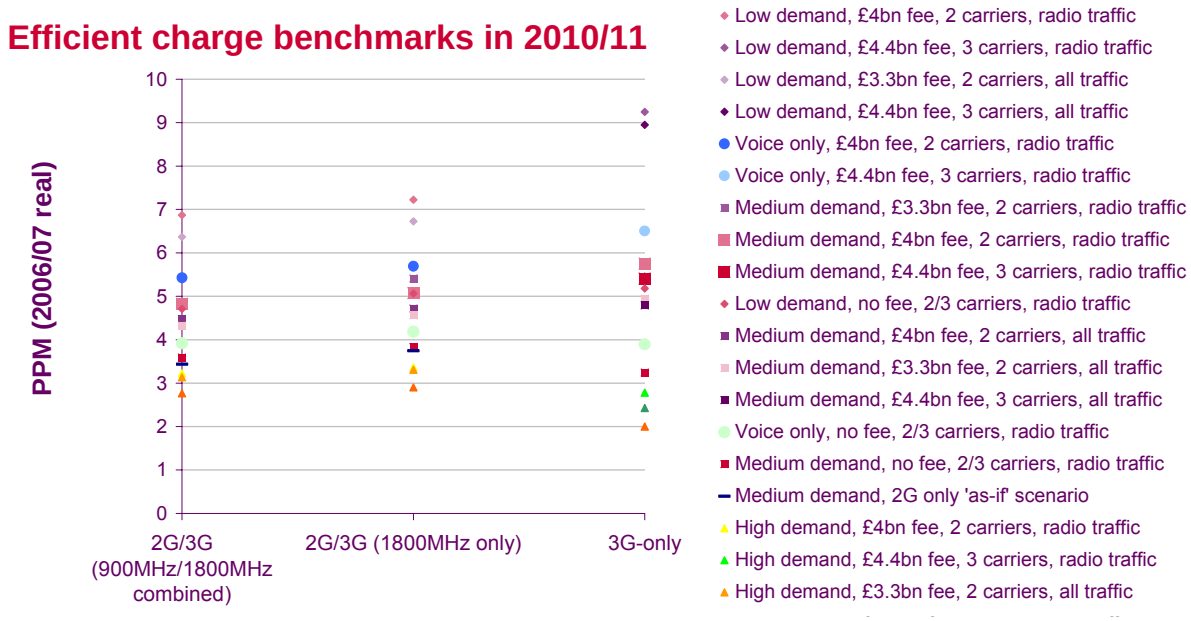
A13.49 These alternative licence fee treatments, in combination with different levels of forecast traffic, generate very wide ranges of potential contributions to the efficient charge level in 2010/11. As in the case under the range of traffic scenarios, the variance in the 2G/3G-only benchmarks is significantly smaller than that of the 3G-only benchmarks, due to the blending in of the 2G component which reduces the impact of the 3G licence fee.

A13.50 Ofcom also considers that there are some arguments in favour of not including any recovery of the licence fees on voice termination services, as discussed in Annex 14. Such an approach would lead to a substantially lowered level for the efficient charge.

Benchmarks for the 2010/11 target charge

A13.51 In order to inform decisions on the level of target charges in 2010/11 for the charge controls, Ofcom has combined the alternative demand and licence fee scenarios described above to produce ranges of benchmarks for each operator type which appropriately capture the current uncertainty around demand forecasts and the arguments in favour of a number of alternative treatments of the licence fees. Economic depreciation has been used throughout for the reasons expressed previously. This full range of efficient charge benchmarks is shown below. Note that 2G-only operator 'as-if' benchmarks have been included within the 2G/3G operator columns. However, as discussed in Section 9 this benchmark could be used as the basis for setting charges for all MNOs.

Figure A13.13 Full range of efficient charge benchmarks in 2010/11



A13.52 Based on this wide range of benchmarks, Ofcom considers that three broad options for the level of charge controls can be determined for each type of operator, each to include a range of specific scenarios; these can be characterised as generating "High", "Medium" and "Low" ranges of potential efficient target charge levels. These are set out in the figure below:

Figure A13.14 Potential charge ranges in 2010/11(real 2006/07 prices) to be used as the basis for setting charge controls

Efficient charge range	MNOs with 900/1800MHz 2G networks plus 3G networks	MNOs with 1800MHz 2G networks plus 3G networks	3G–only MNOs[96]
High	5.9-6.9ppm	6.2ppm – 7.2ppm	8.0ppm – 9.3ppm
Medium	4.5 – 5.5ppm	4.8 – 5.8ppm	5.4 – 6.7ppm
Low	3.2 – 4.2ppm	3.4 – 4.4ppm	3.0 – 4.3ppm

A13.53 The breadth of these ranges (1ppm for 2G/3G operators and 1.3ppm for 3G-only operators) reflects the degree of uncertainty in relation to future demand forecasts, which is greater in respect of a new entrant 3G-only operator due the blending in of a more stable 2G component in the case of 2G/3G operators, as explained previously.

[96] In figure A13.11, the scenarios for a 3G-only operator are based on 3G network costs assuming a proportion of traffic is roamed, as discussed in A5.17. As noted in Vodafone's March 2006 response, it could be considered appropriate to estimate a weighted average charge based on the cost of roamed and 3G network traffic. However, Ofcom considers that this effect is small due to the forecast low levels of roaming in Ofcom's 3G only model and is captured within each of these ranges.

A13.54 The High scenario places weight on the low voice and data demand scenario (which assumes minimal long-run growth from current levels), and allows a very significant contribution for recovery of the costs of the 3G licence fees. The Low scenario, by contrast, does not allow any cost recovery of the 3G licence fees on voice termination services and puts weight on the view that charges for call termination on 3G networks should be no higher than the charges for call termination on 2G networks i.e. placing weight on the 2G-only 'as if' benchmark. The Medium scenario makes similar assumptions in respect of recovery of 3G spectrum costs as the High cost scenario, but places weight on the balanced medium voice and data and conservative voice only demand forecasts. Ofcom is of the view that the Medium scenario includes the most likely demand outcomes at the lower end of its range and conservative demand benchmarks within its mid and upper ends, with a significant recovery of 3G licence fees from termination.

Annex 14

3G spectrum costs

Introduction

A14.1 The table below summarises the 3G licence fees that MNOs paid in 2000:

Figure A14.1 3G spectrum allocations and licence fees

Operator	Spectrum allocations		Payment in 2000
	FDD (paired)	TDD (unpaired)*	
H3G	2 x 15MHz	5MHz	£4.3847bn
Vodafone	2 x 15MHz	-	£5.9640bn
O2	2 x 10Mhz	5MHz	£4.0301bn
T-Mobile	2 x 10Mhz	5MHz	£4.0036bn
Orange	2 x 10Mhz	5MHz	£4.0950bn

* TDD spectrum is not currently used by the MNOs to provide commercial services.

A14.2 The treatment of these licence fees has a significant impact on estimates of the costs of supplying mobile termination. Ofcom has identified three potential objectives in assessing the costs of 3G spectrum to be included in the cost base and charges for mobile termination. These are:

a) Providing appropriate price signals to consumers for efficient consumption of services using mobile termination;

b) The impact on MNOs' cost recovery; and

c) The impact on MNOs' incentives to use spectrum efficiently.

A14.3 There are a number of different concepts that might be referred to by the 'value' or 'cost' of spectrum. Which is most relevant depends on the context and the issue being addressed. Set out below are the implications of each of these three potential objectives. The section concludes by setting out the approach Ofcom has taken in assessing the impact of 3G spectrum costs in the context of estimating the level for a regulated mobile termination charge.

Objectives

Providing appropriate price signals to consumer

A14.4 The implication of this objective is that the marginal opportunity cost of spectrum is the relevant concept. Spectrum is a scarce resource and its opportunity cost is the measure of the resource cost to society. Consumers should ideally face this cost in order to be exposed to efficient signals for relative prices as between different services. If the opportunity cost were not taken into account in the price of mobile services, these would be priced inefficiently low. The decision of consumers' to call a mobile would be distorted and they would tend to over-consume this service relative to others.

A14.5 However, whether or not the 3G licence costs are a good measure of this marginal forward-looking opportunity cost is a separate issue. The licence costs may or may not be a good proxy for this.

A14.6 It has been argued that the 3G licence costs, in themselves, could be considered a sunk cost investment. Economic theory suggests that efficient prices are based on forward-looking marginal costs. From this perspective the one-off auction payments would not be expected to have any impact on prices and therefore should not be taken into account in a regulated price. This view has, for example, been expressed by Ken Binmore and Paul Klemperer who helped design the UMTS auction[97]:

> "...Much more worrying is that companies' specious arguments may fool politicians and regulators into agreeing that the auction is a reason for allowing artificially high prices. If we do see higher prices in countries that ran auctions, it will probably be because of these political effects." [Page 78]
>
> "There are some signs that this might happen in the UK and Germany. For example, Oftel will be doing just this if it accepts operators' arguments that it should permit firms to set higher call-termination fees to 'reflect' firms' sunk auction costs." [Page 78, Footnote 17]

A14.7 With the introduction of spectrum trading, MNOs will be able to sell spectrum to other interested parties. MNOs' spectrum holdings will have a realisable value on a forward looking basis and therefore it may not be appropriate in the context of a forward looking cost model to treat spectrum as a sunk cost. However, whether the value realisable in future auctions will be the same as that paid in 2000 is a separate issue (discussed below).

Cost recovery

A14.8 In relation to this second potential objective, it is not usually appropriate for regulation to underwrite cost recovery, as this may induce cost inefficiency. But, in general, Ofcom considers that regulation should not deny regulated firms the opportunity to recover their efficiently incurred costs. In particular, Ofcom notes the discussion in Annex 19 in relation to its aim to assess MNOs' expected costs in setting regulated charges.

A14.9 However, there is a further consideration, which relates to the potential to distort future spectrum awards, and supports a conservative approach to cost recovery. The 3G licences were acquired in the auction held in 2000. Ofcom has a programme of spectrum auctions in the next year and beyond. If it were expected at the time of such auctions that, were any charges to be regulated (such as mobile termination), Ofcom would include the full licence fee, then there is a risk that bidding at these auctions would be distorted. Bidders might be encouraged to overbid, because they might not expect to face the full cost of such overbidding since it would be passed on to consumers through regulation.

A14.10 This issue was envisaged at the time of the 3G auction. In particular, guidance given at the time sought to address the problem:

> "*Question:* Won't licence costs be passed on to consumers?
>
> *Answer:* Bidders will be paying a cost determined by the auction based on their valuations instead of a licence fee fixed by the

[97] See "The biggest auction ever: The sale of the British 3G telecom licences", The Economic Journal 112 (March) C74-C96, March 2002

> Government. This allows the market to determine the commercial value of scarce radio spectrum. The amount that operators will bid is determined by their overall business plans and the expected prices for 3G services and not the other way round."[98]

A14.11 It would be incorrect to assume that market prices would be determined by the sum paid for the licence. Therefore, in seeking to reflect cost recovery, it is unclear whether, in principle, the costs incurred in acquiring spectrum should be included in the cost base for regulated charges, except to the extent that they are also justified by their relationship with the opportunity cost of the spectrum.

A14.12 The scale of the concern about distorting future auctions is related to (amongst other factors) the proportion of cost recovery expected to be accounted for by regulated services. In some of the future spectrum awards it may be expected that there will be no subsequent regulation. However, even if future regulation of mobile termination is anticipated, it may only be expected to contribute a relatively small proportion of total cost recovery and therefore concerns over distorting future auctions may not be significant.

A14.13 In considering the extent to which cost recovery may be affected by regulation of mobile call termination it is important to note how the cost of spectrum may be allocated across mobile services including mobile voice termination. Ofcom considers that 3G spectrum costs should appropriately be allocated according to drivers reflecting the opportunity cost, such as 3G network cost drivers. This does not result in any explicit allocation of 3G spectrum costs to 2G services as some respondents have suggested is appropriate. Ofcom's overall policy in this review is to set a single charge for termination based on the average cost of an MNO (with two networks) using its 2G and 3G networks to terminate calls. In light of this policy Ofcom does not consider it a particularly relevant point whether any of the 3G spectrum costs are allocated to 2G services.

A14.14 Ofcom has explored three approaches to allocation of 3G spectrum costs – these are discussed below, with allocation in proportion to:

- Total traffic across different services carried on an MNO's 3G network (This relates to the Total Traffic cost driver in Ofcom's cost model i.e. each MB of traffic attracts the same cost);
- Demand on spectral capacity by different services carried on an MNO's 3G network. (This relates to the Radio Traffic[99] cost driver in Ofcom's cost model i.e. different services attract different costs per MB); or
- Revenue derived from different mobile services.

A14.15 The costs of assets can be allocated to services according to their use of the assets' capacity. In the case of spectrum, mobile traffic services demand the use of spectrum as traffic is carried across the 3G radio network. Therefore the cost of spectrum can be allocated to mobile traffic services according to their use of the radio resource. Alternatively spectrum costs can be allocated in proportion to consumers' demand for different traffic services. The table below sets out the lifetime traffic demand of the 3G spectrum by different 3G network traffic services

[98] See FAQ 4 at http://www.ofcom.org.uk/static/archive/spectrumauctions/3gindex.htm
[99] A measure of the use of spectrum as different traffic types (voice and data) is carried in the radio network.

under Ofcom's medium case traffic forecasts. Ofcom's cost model allocates costs according to routing factors. These routing factors can be set to provide consistency of allocation with the shares of traffic set out in the table below:

Figure A14.2 Share of lifetime 3G network traffic by service

Service	% of lifetime Total traffic	% of lifetime Radio traffic
Total voice	56%	75%
Voice termination	***19%***	***26%***
Outbound voice	*37%*	*49%*
Total Data	44%	25%

A14.16 The figures above highlight the difference in the actual quantum of different traffic types being consumed and how those different traffic types demand spectrum capacity. Data is more spectrally efficient than voice traffic and when this is taken into account the proportion of traffic by use of spectrum diverges from the absolute shares of traffic by consumer demand. This is shown in the second column in the figure above.

A14.17 On this basis only about 20%-25% of the appropriate cost of 3G spectrum should be allocated to mobile voice termination:

- Over the lifetime of the network voice and data are forecast to account for about 75% and 25% respectively of the demand for spectrum by the MNOs; and voice termination represents about 33% of voice services;

- Over the lifetime of the network voice and data are forecast to account for about 55% and 45% respectively of consumer demand; and voice termination represents about 33% of voice services.

A14.18 A further allocation approach could be to allocate spectrum costs in proportion to revenue. For example, mobile voice termination charges account for about 10%-15% of total mobile revenues currently and are expected in future to account for rather less, as the volume of data services grows more rapidly than voice services. Therefore following such an approach could lead to lower allocations of spectrum costs to termination charges.

A14.19 In all the approaches discussed above, the majority of the recovery of 3G spectrum costs would be expected to come from unregulated mobile services (services other than mobile voice call termination). Therefore, although the opportunity for recovery of efficiently incurred cost is a relevant consideration, in the context of mobile voice call termination it should not be given disproportionate weight compared to other objectives, and in particular the first objective to provide efficient price signals for consumers.

Incentives for operators to use spectrum efficiently

A14.20 Lastly, with respect to the third potential objective, it is important to note the primary objective of regulation of mobile termination is not to ensure that incentives exist for

MNOs to use spectrum efficiently. This is because there are other policy instruments that Ofcom is using to facilitate and incentivise efficient use of spectrum, such as Administered Incentive Pricing (AIP), or which are under active consideration, such as the introduction of trading and liberalisation. However, this objective is a relevant consideration to the extent that regulatory actions in relation to mobile termination charges might undermine or weaken incentives for efficient spectrum use.

A14.21 In this regard, a key consideration is whether spectrum is a fixed or marginal cost with respect to the production of mobile call services. In general, from a consumer pricing perspective, Ofcom recognises the desirable long term benefits of taking into account a firm's fixed costs when setting regulated prices. However, if spectrum is a fixed cost, allowing MNOs to recover this through termination charges may not promote efficient use of the spectrum. When MNOs are able to sustain prices that allow excessive profits to be achieved i.e. if the "water-bed effect" is not complete, a mark-up over the marginal cost of termination to allow for the recovery of a fixed cost of spectrum may simply serve to provide rents to MNOs and distort incentives to trade spectrum efficiently. However, in Ofcom's view spectrum is not a fixed cost of production in the context of the time horizon being modelled in Ofcom's cost model. From a long run perspective MNOs can vary the quantity of spectrum they use in line with demand for its capacity. Therefore this last potential objective is not a primary consideration.

Issues in assessing the costs of spectrum

A14.22 The previous discussion around Ofcom's objectives shows how there could be a number of different approaches to the treatment of 3G spectrum costs in the estimation of efficient mobile call termination charges. There are arguments for making no allowance for the fees in regulated prices and other arguments for including some positive allowance for spectrum costs right up to a fair share of the 2000 licence fees.

A14.23 From an efficiency perspective Ofcom is interested to understand the marginal opportunity cost of the spectrum – that is its earning power[100] in a competitive market. A focus on this approach would be consistent with Ofcom's treatment of the 2G spectrum and the general approach to costs using economic depreciation.

A14.24 MNOs pay annual AIP fees for this spectrum amounting to about £16m p.a. per operator. These fees are derived from estimates of the marginal opportunity cost of MNOs gaining an additional carrier of 2G spectrum: 2 x 200KHz. This small addition to their existing holdings (up to 2 x 30MHz) produces a cost saving but is assumed not to affect demand and pricing.

A14.25 In theory an analogous approach could be taken with respect to the 3G spectrum. However, the relevant increment of spectrum is significantly larger in quantum and in relative terms to a MNO's existing holding. A single carrier for 3G use is 2 x 5MHz and would represent an increase in MNOs holding of 3G spectrum of up to 50%. Therefore the value of this spectrum may be related to its impact on output as well as costs. Ofcom has not attempted to estimate explicitly the marginal opportunity cost of the 3G spectrum since it considers the complexity involved would be significant. However, such an approach is at least theoretically appealing. A different approach to understanding the value of the spectrum is to use the

[100] The discounted present value of expected future revenues from the output produced by the asset, less the present value of associated future operating costs

information from the 3G auction i.e. to proxy the opportunity cost of spectrum by the sums paid in 2000.

A14.26 However, whilst the sums paid in the 2000 auction[101] reflect an estimate of the present value of the spectrum to an MNO at the time of the auction[102] and therefore could be a measure of the spectrum's opportunity cost there are a number of considerations:

- Do the sums paid in 2000 represent the relevant opportunity cost today?
  - On a forward looking basis spectrum may not be worth the same as the amount originally paid.
  - The licence fees may not reflect the opportunity cost of the 3G spectrum.
  - The licence fees will reflect the average rather than the marginal opportunity cost of spectrum.
- Do the bids reflect the earnings power of the spectrum in a competitive market? The bids may include an element reflecting imperfect competition rather than pure scarcity rents.

A14.27 These issues are discussed below. First, on a forward looking basis the opportunity cost of the spectrum may not be equal to the licence fees - spectrum may not be worth what was originally paid: firstly, conditional on the prevailing market conditions at the time of the auction, MNOs may have paid more than the opportunity cost of the spectrum and second, market conditions may have changed since 2000 meaning that the spectrum is no longer worth what was expected at the time of the auction.

A14.28 At the time of the auction it was suggested by some commentators that MNOs had overpaid for their licences. The UK auction raised more per head than most other countries that subsequently held 3G auctions. This issue was investigated as part of the National Audit Office's (NAO) report on the UK 3G auction[103]. The NAO reached the view that the auction design was sound in comparison to other 3G auctions and therefore did not in its own right lead to MNOs potentially overpaying for their licences. However, the positive market conditions at the time may have contributed to the level of the bids. Under different market conditions MNOs may not have paid so much for their licences. Therefore, the forward looking value of the licences may be lower now in comparison to what was paid in 2000.

A14.29 Any material decline in the value of the licence may be reflected in the MNOs' statutory accounts. The licence is treated as an intangible fixed asset and under current reporting standards[104] MNOs have a requirement to undertake an impairment review of the asset to test for a reduction in the recoverable amount of the asset below its carrying value. The MNOs have undertaken impairment reviews in relation to their 3G licences. These impairment reviews compare the value of the entire UK business against the value of the UK assets. To date only O2 has

[101] For further background see http://www.ofcom.org.uk/static/archive/spectrumauctions/3gindex.htm
[102] The winning bids reflect the present value in 2000 of having a UMTS licence from the perspective of the marginal bidder i.e. the bidder with the second highest valuation of each licence.
[103] "The Auction of Radio Spectrum for the Third Generation of Mobile Telephones", National Audit Office, 19 October 2001. (Available at http://www.nao.org.uk/publications/nao_reports/01-02/0102233.pdf)
[104] See FRS 10 and 11

impaired their UK 3G licence: by £2.1bn in 2003 against a net book value (after amortisation) in the beginning of 2003 of £4.0bn[105]. The other MNOs continue to reflect the cost (after amortisation) of the 3G licence in 2000 as the forward looking value of their licences. Therefore, whilst market conditions may have changed since the time of the auction they have not changed to the extent that from an accounting perspective, necessitate an impairment of their licences. However, since the impairment review is based on the value of an MNO's entire UK business rather than the value of services explicitly related to owning the 3G spectrum this does not provide entirely unambiguous support for the opportunity cost of the 3G spectrum being what was paid in 2000.

A14.30 Second, a related issue is that the MNOs' actual licence payments in 2000 may have reflected a payment relating to the expected impact of a 3G licence on 2G profits. If this is the case the sums paid in 2000 may be considered an overstatement of the opportunity cost of the 3G spectrum.

A14.31 Third, the licence fees may reflect the average opportunity cost of the spectrum rather than the marginal opportunity cost. From the perspective of efficient pricing it is the marginal opportunity cost that is the relevant cost to include in regulated prices. It is likely that the average opportunity cost is higher than the marginal opportunity cost and therefore the licence fees may represent an overstatement of the marginal opportunity cost.

A14.32 Lastly, if the auction fees are used to inform the cost of spectrum to be used when setting regulated prices, to the extent that they may reflect profits associated with imperfect competition (even in the absence of individual SMP) they are over-estimates of opportunity cost in a competitive market. If so, profit above the normal rate of profit would be incorporated into prices through regulation. However, it is difficult to establish whether or not the bids implicitly reflect only scarcity rents.

Scenarios to explore the impact of different licence fee treatments on the costs of mobile voice call termination

A14.33 The discussion above of the different objectives and issues in assessing the costs of spectrum illustrates the difficulty in deriving a precise estimate of the appropriate cost of 3G spectrum for inclusion in regulated termination charges. In such circumstances, rather than exploring complex modelling to estimate, for example, the marginal opportunity cost of 3G spectrum on a forward looking basis (which might prove to be inconclusive), Ofcom is minded instead to explore the bounds of the impact of different licence fee treatments on Ofcom's cost benchmarks i.e. the costs of a 2G/3G MNO with 900/1800 MHz spectrum, a 2G/3G MNO with 1800 MHz spectrum and a 3G only operator. The appropriate cost of spectrum is expected to lie within these bounds. The uncertainty of where within this range, is a factor that Ofcom takes into account in deriving its proposed charges based on its analysis of costs.

A14.34 Ofcom has therefore explored a number of scenarios for the treatment of licence fees. The scenarios outlined below have varying impacts on the costs of mobile voice call termination and aim to reflect a reasonable upper and lower bound impact on the cost of mobile voice call termination.

A14.35 There are four key factors to each of the scenarios:

[105] For further information see http://www.o2.com/media/company_presentations_762.asp and Note 12 of http://www.o2.com/media_files/2003_pg65-92.pdf

a) Spectrum – the allocation of spectrum assumed

b) Cost – the level of total spectrum cost included in the model

c) Market share in 2020/21 – the ultimate market share of the MNO in 2020/21

d) Allocation approach – cost allocated in proportion to lifetime radio or total traffic volumes

A14.36 The tables below outline the scenarios modelled and the ppm impact.

Scenario 1: Auction payments and spectrum allocations in 2000 with a) radio and b) total traffic cost allocations

A14.37 In this scenario Ofcom models the total licence costs with the associated spectrum allocations and forecasts competitively neutral market shares. This scenario is modelled with radio traffic and total traffic cost allocations.

Cost benchmark	Spectrum	Cost	Market share in 2020/21
2G/3G MNO with 1800 MHz spectrum	2 x 10MHz	£4.0bn	20%
2G/3G MNO with 900/1800 MHz spectrum	2 x 10MHz	£4.0bn	20%
2G/3G MNO with 900/1800 MHz spectrum	2 x 15MHz	£6.0bn	20%
3G only MNO	2 x 15MHz	£4.4bn	20%

Scenario 2: Auction payments and spectrum allocations in 2000 with adjusted market shares and a) radio and b) total traffic cost allocations

A14.38 A key issue with Scenario 1 is that the benefit of using additional spectrum is not fully captured. For Vodafone and H3G the additional 2 x 5MHz comes with additional cost. The benefits of an additional carrier will lead to cost savings. However, it is also possible that Vodafone and H3G were prepared to pay more for their three carrier licences because they perceived this as giving them a competitive advantage. This advantage can be proxied by making an adjustment to market shares. An indication of the scale of the advantage can be given by modelling market shares in proportion to spectrum holdings.

Cost benchmark	Spectrum	Cost	Market share in 2020/21
2G/3G MNO with 1800 MHz spectrum	2 x 10MHz	£4.0bn	17%
2G/3G MNO with 900/1800 MHz spectrum	2 x 10MHz	£4.0bn	17%

2G/3G MNO with 900/1800 MHz spectrum	2 x 15MHz	£6.0bn	25%
3G only MNO	2 x 15MHz	£4.4bn	25%

Scenario 3: Auction payments and spectrum allocations in 2000 of a two carrier licence with a) radio and b) total traffic cost allocations

A14.39 Scenario 3 differs from scenarios 1 and 2 in that the ownership of a third carrier by Vodafone and H3G is ignored from the perspective of estimating the costs of mobile voice call termination. The implicit assumption is that its capacity is not required to offer voice call termination and its additional cost is therefore recovered from other mobile services.

Cost benchmark	Spectrum	Cost	Market share in 2020/21
2G/3G MNO with 1800 MHz spectrum	2 x 10MHz	£4.0bn	20%
2G/3G MNO with 900/1800 MHz spectrum	2 x 10MHz	£4.0bn	20%
3G only MNO	2 x 10MHz	£4.0bn	20%

Scenario 4: Auction payments taking into account O2's write-down and spectrum allocations in 2000 of a two carrier licence with a) radio and b) total traffic cost allocations

A14.40 Scenario 4 differs from scenario 3 in that the average cost of a two carrier licence is adjusted to take into account O2's 2003, £2.1bn write-down. (This is the average of two £4.0bn, two carrier licences and one £1.9bn, two carrier licence).

Cost benchmark	Spectrum	Cost	Market share in 2020/21
2G/3G MNO with 1800 MHz spectrum	2 x 10MHz	£3.3bn	20%
2G/3G MNO with 900/1800 MHz spectrum	2 x 10MHz	£3.3bn	20%
3G only MNO	2 x 10MHz	£3.3bn	20%

Scenario 5: Spectrum allocations in 2000 with no spectrum costs

A14.41 Scenarios 1-4 aim to model an upper bound for the impact of spectrum costs. Scenario 5 seeks to explore the lower bound of the ppm with respect to spectrum costs.

Cost benchmark	Spectrum	Cost	Market share in 2020/21
2G/3G MNO with 1800 MHz spectrum	2 x 10MHz	£0.0bn	20%
2G/3G MNO with 900/1800 MHz spectrum	2 x 10MHz	£0.0bn	20%
2G/3G MNO with 900/1800 MHz spectrum	2 x 15MHz	£0.0bn	20%
3G only MNO	2 x 15MHz	£0.0bn	20%

Scenario 6: Spectrum allocations in 2000 with no spectrum costs

A14.42 Scenario 6 looks at the ppm without the cost savings associated with a third carrier.

Cost benchmark	Spectrum	Cost	Market share in 2020/21
2G/3G MNO with 1800 MHz spectrum	2 x 10MHz	£0.0bn	20%
2G/3G MNO with 900/1800 MHz spectrum	2 x 10MHz	£0.0bn	20%
3G only MNO	2 x 10MHz	£0.0bn	20%

Summary of the output of different spectrum cost scenarios

A14.43 The figure below sets out the range of estimates for the ppm impact on mobile voice call termination under the different licence fee scenarios outlined above under Ofcom's medium traffic assumptions. The figure shows the ppm impact in 2010/11 (in real 2006/07 prices) relative to the base level cost where no allowance for 3G spectrum costs is made but consistent assumptions are made about market share and carriers.

Figure A14.3: Summary of 3G spectrum costs scenarios for combined 2G/3G operators

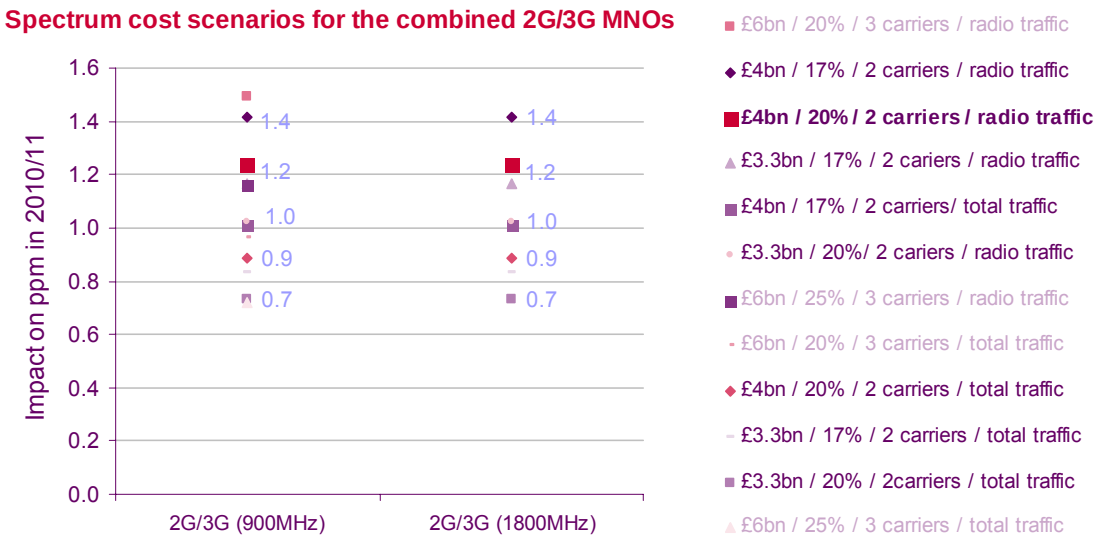
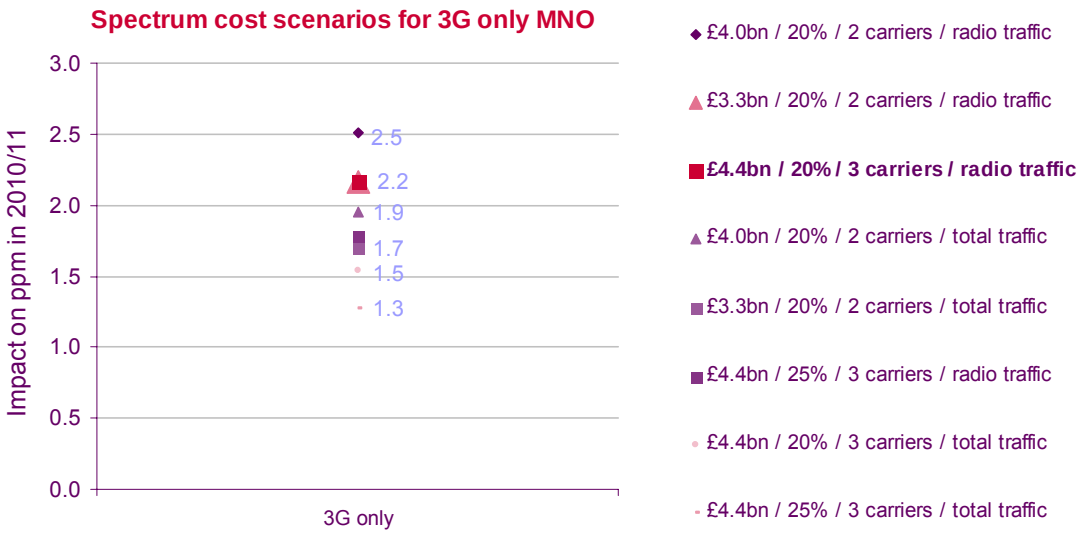


Figure A14.4: Summary of 3G spectrum costs scenarios for 3G only operator



A14.44 The impact of different licence fees scenarios is less material for the combined 2G/3G operators compared to the 3G-only operator. On average, Ofcom's licence fee scenarios amount to an additional ppm cost of about 1.1ppm in 2010/11 for the 2G/3G MNOs and 1.9ppm in 2010/11 for the 3G-only operator. However, this difference is due to the averaging of the 2G ppm with the 3G ppm benchmark in the case of the combined operators. In 2010/11 2G/3G MNOs are still assumed to be terminating a significant proportion of calls using their 2G network and therefore the impact of the licence scenarios on the 3G costs is diluted when looking at the average 2G/3G ppm benchmark.

A14.45 In terms of the four factors that are changing (in combination) between the scenarios i.e. the allocation of spectrum, the level of total spectrum cost included in the model, the ultimate market share of the MNO in 2020/21 and the approach to cost allocated (in proportion to lifetime radio or total traffic volumes) it is possible to make inferences about the relative impact of these combination of factors:

- Whether licence costs are allocated on the basis of radio or total traffic has a material impact on the ppm level. On average in the case of the combined operators, scenarios on the basis of radio traffic cost allocation lead to increased ppm licence fee costs of approximately 0.4ppm compared to total traffic cost allocation. In the case of the 3G-only operator the impact is larger (owing to the absence of 2G-3G averaging as discussed above) and is approximately, 0.6ppm.

- The difference between the absolute costs for spectrum in combination with spectrum allocations and final market shares set out in the different scenarios above is less material. In the case of the combined operators, assuming £3.3bn compared to £4.0bn leads to a decrease in the ppm licence costs of approximately 0.2ppm. Scenarios based on £6bn for spectrum compared to £4bn lead to very small difference of less than 0.1ppm on average reflecting the offsetting effects of additional spectral capacity (additional 2x5MHz) and higher market share in some scenarios that is assumed to also be experienced in combination. In the case of the 3G-only operator the difference between £4.4bn and three carriers and £4.0bn and two carriers demonstrates that extra spectrum offsets the additional costs with the former resulting on a lower ppm licence fee cost by approximately 0.3ppm.

A14.46 Overall the scenarios discussed in this section are used to inform the range for proposed charges for MNOs and are discussed further in this context in Annex 13. In determining the appropriate range for charges Ofcom, as discussed in Annex 5, proposes to follow a competitively neutral approach to market shares. Therefore, for consistency Ofcom has focused on licence fee scenarios that are based on a consistent assumption regarding market shares – that 20% market share is achieved in 2020/21.

Annex 15

Non-network costs

Introduction

A15.1 In order to estimate the total cost of MCT it is necessary to consider whether any share of non-network costs should be added to the network costs discussed in Annex 5. This Annex sets out Ofcom's analysis of MNOs' non-network costs and how these are allocated across different mobile services including MCT.

A15.2 Non-network costs are costs of all activities that are not directly associated with enabling calls to be made. As discussed in Annex 6 these can be grouped into three categories:

- Customer acquisition, retention and service costs (CARS) – comprising advertising and marketing, handset costs, discounts and incentives, customer care, billing and bad debts;
- Administrative costs – to include general overheads; and
- Other costs – costs that Ofcom considers are irrelevant to a consideration of the costs of MCT.

A15.3 The figure below summarises the MNOs' non-network costs in the three categories above based on the MNOs' average accounting costs (excluding H3G and for H3G separately).

Figure A15.1 Summary of MNOs' non-network costs for 2004

	Average costs excluding H3G (£ million)	H3G (£ million)
CARS costs[1]	1,534	[✂]
Administration costs	275	[✂]
Other[2]	948	[✂]
Total	2,757	[✂]

Source: Ofcom based on information from MNOs

[1] CARS costs are shown in the figure before taking account of offsetting revenue, such as the proceeds of handset sales and any part of periodic subscriptions from contract customers.

[2] Other costs include items such as interconnect costs and amortisation.

A15.4 H3G is at a different stage in its business development compared to the other four MNOs. [✂] Ofcom's intention is to estimate the costs of an average efficient operator on a forward looking basis and Ofcom expects that H3G's costs are likely to tend towards this average over time. Therefore Ofcom proposes to base its analysis of non-network costs, to apply to all five MNOs, on the figures set out above in the first column in the figure above.

A15.5 It is Ofcom's view that CARS costs should not be recovered from MCT. These costs should be recovered from the prices paid for mobile retail services. Ofcom considers that administration costs are common across all an MNO's activities and therefore a share should be included in the costs of MCT. This is consistent with the approach taken by Ofcom in its last market review and by the Competition Commission[106].

A15.6 The Competition Commission did not consider that any non-network costs were incremental to mobile voice call termination. The Competition Commission concluded that CARS were not common costs (save for a very small element of customer service costs that was not explicitly estimated) and therefore did not include any element of these costs in the mark-up for termination. The Competition Commission found that administration costs were common costs and allocated these costs in proportion to the MNOs' costs in each of their business activities. Ofcom adopted a similar approach in its last market review and considers that this continues to be an appropriate approach (taking into account H3G's position as a new entrant) and its reasoning is discussed in detail below.

Customer acquisition, retention and service costs

A15.7 Customer acquisition and retention costs are not incremental to the provision of MCT. This is because cost causality rests on a supply side analysis: the costs that are incurred in order to supply a given service or volume. The Competition Commission defined LRIC as:

> "…LRIC considers the additional cost that the firm incurs in the long run by providing a service (alternatively, the cost that the firm would avoid in the long run if it decided not to provide a service) …"[107]

A15.8 On this basis, CARS costs cannot be regarded as incremental to call termination, since they are not caused by, or incurred in, the supply of MCT. The Competition Commission noted:

> "It was apparent that little, if any, non-network cost was directly caused by callers to mobiles…" [108]

A15.9 These costs are only incurred because MNOs provide retail mobile services and vary in relation to the number of subscribers acquired.

A15.10 Ofcom also considers that CARS are not a common cost between wholesale voice call termination and retail services[109]. It has been discussed in the course of this consultation and previous reviews that CARS are incurred in order to obtain subscribers. These subscribers have a demand for different mobile services. It has been argued by some respondents that this means that CARS are a common cost

[106] Paragraphs 2.320 – 2.333 of the CC's 2003 Report (see footnote 13 above)
[107] See para 2.248 of the CC's 2003 Report
[108] See para 2.330 of the CC's 2003 Report
[109] An element of customer service costs may be described as common across traffic - in particular, customer call centre costs incurred in helping to resolve technical problems that affect incoming calls. However, this element of customer service costs is likely to be very small, as most customer service costs vary with either retail usage services or the number of subscribers and so are not common costs relevant to termination. Due to the absence of any robust calculation of the size of these costs and their likely immateriality, as noted by the Competition Commission, Ofcom sees no strong case for making any adjustment to the costs of termination to take them into account.

between different mobile services (retail and termination services). However, in Ofcom's view this is incorrect.

A15.11 CARS are incurred in the retailing of subscription. Potential mobile subscribers purchase mobile subscription and this enables them to access other mobile retail services and to receive calls. However, subscription is a service in its own right with a distinct demand and cost. Subscription has an option value, i.e. the option of being contactable and of contacting other telephone users. CARS are an incremental cost causally related to supplying subscription services.

A15.12 These costs can be efficiently recovered from charging mobile subscribers for subscription (notwithstanding the network externality surcharge discussed below). It is an MNO's commercial choice how to recover these costs and an MNO may choose to recover these costs through the prices of its unregulated retail services: to recover CARS solely through subscription prices or through charges for other retail mobile usage services or through a combination of the two.

A15.13 The customers of originating operators who make calls to mobiles have no choice of the terminating operator once the mobile subscriber they are calling has made their choice of mobile network. There would seem to be no costs necessarily incurred by an MNO to acquire and retain its customers of call termination (i.e. originating operators and indirectly callers to mobiles). Fixed operators and other MNOs should not be expected to pay for costs such as advertising and marketing incurred by an MNO to acquire and retain its own subscribers.

A15.14 However, callers to mobiles can be expected to make a contribution to the recovery of these costs through the subscription subsidy they fund via the network externality surcharge. The network externality surcharge, discussed in Annex 16, accounts for the benefits that callers to mobiles derive from CARS, in terms of the external benefits generated with the acquisition and retention of subscribers. The externality surcharge is not derived from a cost allocation exercise, but from an analysis of economic efficiency related to demand side factors. The network externality is not directly related to the recovery of CARS in as much as the network externality surcharge results from a view that it is efficient for callers to mobiles to partially subsidise the costs of mobile subscription. However, the network externality surcharge can be interpreted as an allowance in termination charges of a contribution to the recovery of CARS costs.

H3G and CARS

A15.15 A further consideration raised during the consultation relates to the relationship between CARS spending, subscribers and traffic. It has been argued that if this relationship is not appropriately taken into account then this could penalise a new entrant operator whose relatively high expenditure on CARS, relative to its established competitors, has driven their entry into an already mature market.

A15.16 It has been discussed that Ofcom's cost model assumes that traffic forecasts are exogenous with respect to the level of CARS. However, MNOs are able to influence their customer numbers and the speed with which customers are acquired, and therefore the traffic carried on their network, by increasing (or decreasing) their CARS.

A15.17 A new entrant could spend relatively heavily on CARS, increasing their customer numbers quicker than if they had spent less. Increasing their customer numbers leads to increased traffic and lower average ppm costs. If this ppm cost were used

as the basis for setting a regulated charge this would not take into account that an MNO had only achieved this level of cost through relatively higher expenditure on CARS. Conversely, if spending on CARS had been lower, customer growth and traffic would have been lower but average ppm costs higher. Regulation in this context would have resulted in a higher regulated charge. This trade-off suggests that there is an optimal level of CARS spending for a new entrant whereby overall profits of an MNO are maximised across all their activities. A balance is struck between increased expenditure on CARS relative to competitors and better overall network utilisation.

A15.18 It has been argued that regulation could penalise a new entrant for seeking to reach this optimal balance of CARS spending and network utilisation. Consider the following two examples:

- If the same termination charge were to be applied to all MNOs - because their average termination ppm costs were the same (same lifetime network utilisation) - this may not recognise that the new entrant had to spend relatively more in terms of CARS in order to reach this level of average cost compared to its competitors. In this case competition in the retail market would not allow the new entrant to recover this additional CARS expenditure (compared to its rivals) through higher prices for retail services and the new entrant would be unable to recover all their costs.

- If all MNOs spent the same on CARS it might be expected that the new entrant would have higher average ppm costs than the incumbents because it may not achieve the same lifetime network utilisation as its competitors – taking longer to reach a competitively neutral market share. In this case regulation based on costs would result in different charges between MNOs. However, in this case since all MNOs have spent the same on CARS and termination charges are regulated at cost all MNOs are able to recover CARS through retail prices.

A15.19 In reality these two examples represent the extremes of the situation with regards to H3G's expenditure on CARS relative to its rivals and its achievement of comparable lifetime utilisation. As already discussed, Ofcom considers that CARS are incremental to retail services and therefore should not be recovered from wholesale voice call termination. Moreover, if CARS spending is relatively higher, were this contingent on earning excessive profits from MCT by setting an excessive charge, the overall level of CARS would not be efficient and this would not be a sound basis for setting a higher termination charge. In Ofcom's view the key issue is that Ofcom should consider whether the forecast traffic volumes applied to H3G are reasonable.

Administrative costs

A15.20 Ofcom considers that administration costs, consisting of overheads for non-network depreciation (IT, furniture and office equipment), property costs, human resources, finance and legal costs and IT overheads, are a common cost between all a MNO's activities. These costs should therefore be recovered across all areas of an MNO's business that they help to support.

A15.21 The figure below sets out Ofcom's approach to estimating the share of total administration costs that are allocated to network activities.

Figure A15.2 Allocation of administration costs to network activities

	Average costs (excluding H3G[1]) in 2004 (£ million)	H3G's costs in 2004 (£ million)
Network depreciation (A)	377	[✂]
Network opex (B)	340	[✂]
Net Book value of Network assets (C)	1,811	[✂]
Cost of capital (pre tax nominal)[2] (D)	14.1%	[✂%]
Cost of capital on Network assets (E = C x D)	255	[✂]
Total annual network costs (F = A+B+E)	972	[✂]
Total cost of retail activities (CARS[3]) (G)	1,534	[✂]
Total costs[4] (H= F+G)	2,506	[✂]
% network costs (I = F/H)	39%	[✂%]
Administration costs (J)	275	[✂]
Share of administration costs allocated to network activities (I x J)	107	[✂]

Source: Ofcom based on information from MNOs

[1].[✂]

[2] Based on 11.3% pre tax real cost of capital and 2.5% inflation

[3] CARS costs are shown before taking account of offsetting revenue, such as the proceeds of handset sales and any part of periodic subscriptions from contract customers. This is the appropriate measure of CARS rather than taking the net cost in which revenues are offset. The gross handset cost is a genuine cost in contrast to the lower net 'cost' that is effectively a price since it is a function of the underlying gross costs and the extent to which MNOs seek to recover revenues from customers. The resource cost is the gross handset cost, even if the whole of this cost is not charged directly to customers because MNOs choose to provide a subsidy. It would be inconsistent in estimating the allocation of administration costs to use cost for all other services, but a figure for CARS that is below the cost.

[4] Other costs such as interconnect and roaming costs and amortisation are excluded from this analysis. This is consistent with Ofcom's and the Competition Commission's approach in previous reviews. However, Ofcom notes that administration costs may support activities related to interconnection and roaming. If administration costs were allocated across these activities (in addition to network and retail) the share of administration costs allocated to network activities would be lower than estimated in the figure above.

A15.22 Ofcom estimates that £107m in 2004 terms (estimated to be £112m in 2006/7 terms) should be allocated to network activities as a share of administration costs for the average operator. Ofcom proposes that the absolute level of MNOs'

administration costs would remain relatively constant with changes in traffic. In addition Ofcom also assumes that the proportion of total costs that are network costs is constant over time. Therefore, Ofcom proposes that this estimate should remain constant in real terms on a forward looking basis.

A15.23 The administration cost in each year is allocated across network activities e.g. incoming calls, outgoing calls and data services in proportion to the share of total network costs that these services account for. This calculation is included in Ofcom's costs model (see Workbook – Economic depreciation). The figure below sets out the allocation of administration costs to MCT under Ofcom's base case assumptions. Further details of the ppm impact on MCT are set out in Figure A13.2.

Figure A15.3 Allocation of administrative costs allocated to network activities, to, MCT in 2010/11 (in real 2006/07 prices) under base case assumptions

	Combined 2G/3G operator	3G only operator
% of network administration costs allocated to termination	29%	26%
% of total administration costs	11%	10%
£m allocated to termination	£32m	£29m

Annex 16

The network externality surcharge

Introduction

A16.1 Users of both fixed and mobile communication networks benefit from having a large number of mobile subscribers with whom they can communicate. In general, however, when consumers decide whether or not to subscribe to a mobile network, they take their own private benefit into account but not the benefit that fixed and other mobile subscribers derive from contacting and being contacted by them, and from the ability to contact and be contacted by them. This discrepancy is the source of a "network externality"[110].

A16.2 In the presence of a network externality, not enough consumers may choose to become mobile subscribers from the perspective of society as a whole. This is because consumers (referred to below as "marginal subscribers") may choose not to join the network because their private benefits do not cover the price of becoming a subscriber, even though economic welfare would be enhanced if they did, because of the benefits obtained by others.

A16.3 In some cases, consumers internalise the network externality. For instance, this occurs when consumers contribute to the cost of subscription of others with whom they expect to communicate or with whom they desire having the ability to do so. However, it is reasonable to expect that not all of the network externality is internalised and, therefore, that social welfare can be increased by providing a subsidy to some of those consumers who are not willing to pay the full price of subscription.

A16.4 To the extent that any such subsidies need to be funded by MNOs, it would be optimal to collect revenues by raising the price of all services supplied by MNOs. Ofcom believes that it would therefore be appropriate for wholesale mobile termination charges to include a contribution towards the recovery of these subsidies via an "externality surcharge".

Deriving the optimal surcharge in theory

A16.5 If the termination charge is set above cost, MNOs obtain revenues in excess of costs from terminating calls on their networks that can potentially be used to provide subsidies to marginal subscribers thereby promoting economic efficiency.

A16.6 The relationship between the revenues obtained from the externality surcharge and the subsidies provided to marginal subscribers depends on a variety of factors and most notably on:

- The extent of the waterbed effect i.e. the intensity of competition between MNOs in the mobile retail market; and
- The ability and incentives of MNOs to target subsidies to marginal mobile subscribers.

[110] Notice that the definition of the network externality presented encompasses also the "option value", i.e. which is related to the ability to contact and be contacted by the new subscriber as opposed to actually making calls to and receiving calls from the new subscriber.

A16.7 The intensity of price competition affects the extent to which surcharge revenues are passed through to consumers in the form of lower retail prices rather than being retained by MNOs in the form of excess profits.

A16.8 Targeting affects instead the extent to which the reduction in retail prices is directed at marginal mobile consumers rather than other consumers.

Waterbed effect

A16.9 The intensity of competition determines the extent to which competitive pressures drive MNOs' excess profits to zero (i.e. MNOs make a return no greater than their cost of capital).

A16.10 If competition fully removes excess profits, then any excess profit from terminating calls to mobiles would be competed away in an efficient manner through lower retail prices ("waterbed effect"). In this case all revenues in excess of costs obtained by MNOs from termination would be passed through to consumers in the form of lower retail prices for mobile services.

A16.11 If competition between MNOs is imperfect and it does not completely remove excess profits the waterbed effect is likely to be reduced. In this case, some of the revenues obtained by the MNOs from a surcharge on termination charges may be passed through to consumers in the form of lower retail prices but some may be retained by MNOs as profits.

A16.12 However, even if the retail market(s) were monopolised, one could expect the surcharge on mobile termination to have some impact on retail prices and in particular the price of subscription. This is because even in this extreme scenario the termination surcharge affects the profits that the marginal subscriber will generate and therefore the conditions that determine the optimal (monopoly) price of subscription.

A16.13 The effect that the intensity of competition has on the optimal externality surcharge is important. There is a welfare trade-off from the introduction of an externality surcharge. On the one hand there are marginal welfare benefits arising from the subsidy to marginal mobile subscribers. However, there is at the same time there is a marginal welfare cost to callers to mobiles who pay the surcharge. Therefore the intensity of competition is important because it affects this trade-off and the impact is ambiguous. On the one hand, when competition is less intense surcharge revenues are partly "wasted" in the sense that they are not fully used to fund subsidies to marginal subscribers – this is referred to as "leakage". Therefore more revenues need to be raised to fund a given pot of subsidies - which on its own would suggest raising the optimal termination charge. Off-setting this effect is the adverse impact of higher termination charges on welfare. Specifically, raising termination charges above resource cost results in an increased deadweight loss[111] in the termination market and so when surcharge revenues are "wasted" the optimal number of subscribers falls, which would point to a lower optimal termination surcharge (other things equal).

[111] Deadweight loss refers to the loss in welfare which arises because the higher termination charge results in a level of output such that willingness to pay exceeds marginal resource cost - i.e. there remains output which it would be efficient to supply

Targeting

A16.14 In the presence of effective competition (i.e. when the waterbed effect is strong), it is reasonable to expect that the revenues that the MNOs obtain from the termination surcharge will be largely competed away through lower retail prices for mobile communication services, including lower subscription prices.

A16.15 The extent to which the surcharge can improve efficiency by increasing the number of subscribers to a level closer to the socially optimal one depends on the ability and on the incentives of MNOs to actually use the surcharge revenues to provide subsidies (i.e. to reduce retail prices) to marginal subscribers.

A16.16 At one extreme there is the situation in which MNOs use all revenues obtained from the termination surcharge to subsidise marginal subscribers, for instance by providing them with handsets at prices below cost. In this case targeting is "full" and the surcharge is an effective instrument to improve economic efficiency.

A16.17 At the other extreme there is the situation in which MNOs use none of the revenues obtained from the termination surcharge to subsidise marginal subscribers ("zero targeting"). This would arise, for instance, if MNOs would compete away the surcharge revenues by offering better deals to non-marginal subscribers only.

A16.18 In between these two extremes there is a continuum of scenarios with different levels of targeting. In practice, the actual degree of targeting depends on the ability and on the incentives of MNOs to price discriminate and to target subsidies to marginal subscribers[112].

A16.19 In theory, the effect of imperfect targeting on the optimal termination surcharge is ambiguous. This is because targeting has two contrasting effects on the optimal termination surcharge. On the one hand, when MNOs do not target marginal subscribers, the surcharge required to provide the subsidy to any given level of marginal subscribers increases. On the other hand, however, when targeting is imperfect the optimal number of marginal subscribers to be subsidised (and therefore the optimal surcharge) is lower because the higher surcharge on termination raises the welfare cost of the subsidy.

A16.20 In the extreme case where no subsidy is provided to marginal subscribers , 'zero targeting', however, given the welfare loss associated with raising termination charges above cost, it is clear that the optimal externality surcharge would be zero: if the externality surcharge is entirely wasted on infra-marginal subscribers, the justification for a surcharge falls away entirely.

Deriving the optimal surcharge in practice

A16.21 Estimates of the optimal termination surcharge can be derived from a variety of applied modelling approaches.

[112] The ability to target subsidies depends on MNOs being able to design tariffs which induce marginal subscribers to join or remain mobile subscribers without inducing non-marginal subscribers to take such tariffs. The incentive to attract marginal subscribers depends on the net profitability of attracting such customers against the net profitability of attracting non-marginal customers. That is MNOs would be expected to compete for customers which offer greater net profitability – i.e. cost of acquiring the customer against the profits earned (e.g. from calls made and received, plus profits on subscription charges in the case of non-marginal customers).

A16.22 Ofcom does not consider that any single model is, on its own, sufficiently accurate to provide a point estimate of the correct optimal surcharge due to the uncertainties in some key parameter values and to the inability to capture the complex interactions between all the factors that affect the level of the optimal surcharge. However, by placing different weights on a range of factors, each estimate provides useful, albeit incomplete and imperfect, information on the level of the optimal externality surcharge.

A16.23 More specifically, in order to gather analytic evidence on the level of the optimal externality surcharge, Ofcom has considered two main modelling approaches:

- an explicit externality model; and
- a Ramsey-type approach.

A16.24 A Ramsey model that accounts for the existence of network externalities can in theory provide an estimate of the optimal externality surcharge on termination alongside estimates of the "efficient" mark-ups for common costs. The main advantage of a Ramsey-type model is its ability to account, at least in theory, for the complex demand inter-relationships, feedback effects and multitude of mobile communications services. However, in Ofcom's view, as discussed in Annex 17, Ramsey analysis involves substantial uncertainties and does not consider that it is appropriate to conduct an applied Ramsey analysis.

A16.25 A different approach to estimate the externality surcharge is to develop a specific model that directly determines the optimal number of subscribers and the revenues that must be raised in order to provide subsidies to these subscribers. This is an approach similar to the one followed by the Competition Commission in 2003. It is a simplified approach compared to Ramsey models, however, it is able to capture a number of complex issues (such as targeting) in a relatively straightforward way. While a Ramey-type model could be adapted to capture some of these factors it is not possible to do this in a straightforward way and given the existing complexities with applied Ramsey analysis, such further augmentation of a Ramsey-type model is unappealing. Another significant advantage with this approach is that the number of parameters to be estimated is reduced and the necessary computations are more transparent than the complex interactions and dependencies present in a Ramsey-type model

Calculation of the optimal surcharge

A16.26 In the model described in this sub-section, the optimal termination surcharge is explicitly calculated as the increase in the termination charge necessary to provide MNOs with enough revenues to fund the subsidies required to support the socially optimal number of subscribers.

A16.27 The following sub-section explains the calculation of the termination surcharge necessary to achieve a desired target number of marginal subscribers accounting for various forms of price discrimination and for various degrees of "leakage". The derivation of the optimal number of marginal subscribers (which is also affected by price discrimination and leakage) will be discussed in the subsequent sub-section.

From the optimal number of subscribers to the optimal termination surcharge

A16.28 In order to increase subscription over and above the (socially inefficient) level that would be achieved in a competitive market (in which the price of subscription

reflected the cost of subscription) it is necessary to provide some marginal consumers with subsidies.

A16.29 The total amount of subsidy that must be provided to support any given level of subscription depends on the ability and on the incentives of MNOs to: first, target marginal subscribers (leakage); and, second, to offer different subsidies to different marginal subscribers ("price discrimination"). It is useful to consider two extreme scenarios of price discrimination.

A16.30 In the first scenario price discrimination among marginal subscribers is not possible in the sense that all marginal subscribers receive the same subsidy. In this case, the total subsidy required can be calculated by multiplying the subsidy that must be provided to the last marginal subscriber by the total number of marginal subscribers:

> Total subsidy required = Number of marginal subscribers * Subsidy to last marginal subscriber

A16.31 In the second scenario, price discrimination is perfect in the sense that each marginal subscriber is given a subsidy exactly equal to the amount necessary to induce her to subscribe. In this case the total subsidy required is lower and in the case of a linear demand function is half of the subsidy necessary when there is no price discrimination:

> Total subsidy required = ½ * Number of marginal subscribers * Subsidy to last marginal subscriber

A16.32 In practice, price discrimination may actually be neither perfect nor impossible but the two scenarios above conveniently capture the two extreme cases and therefore contribute to the understanding of plausible upper and the lower bounds to the optimal externality surcharge.

A16.33 Once the total amount of subsidy that must be provided has been calculated, it is possible to determine the revenues that MNOs need to raise from termination in order to fund these subsidies. The relationship between surcharge revenues and subscription subsidies crucially depends on the level of "leakage".

A16.34 Leakage refers to the ability/incentives of MNOs to use the surcharge revenues to provide subsidies to marginal subscribers. In general, leakage can be interpreted as capturing both imperfect price competition (in retail services) and imperfect targeting (between marginal and non-marginal subscribers).

A16.35 In the model, leakage is captured by a parameter that specifies the proportion of revenues generated by the termination surcharge that are "wasted", i.e. that are not actually used to provide subsidies to marginal subscribers. By taking leakage into account, the total amount of revenues that must be raised in order to provide the required subsidies is thus specified as

> Total revenues required = total subsidy required / (1- α)

A16.36 Where the parameter α (which takes values between 0 and 1) is the proportion of surcharge revenues that are not used to subsidise marginal subscribers. For instance, if leakage were 0%, total revenues required would be the same size as the required subsidy, whereas if leakage were 75%, α would be equal to 0.75 and total revenues required would be four times the level of subsidy.

A16.37 Finally, given the total revenues required to fund subsidies to achieve the target number of subscribers, the surcharge can be calculated by dividing the total surcharge revenues required by the total number of minutes terminated by MNOs:

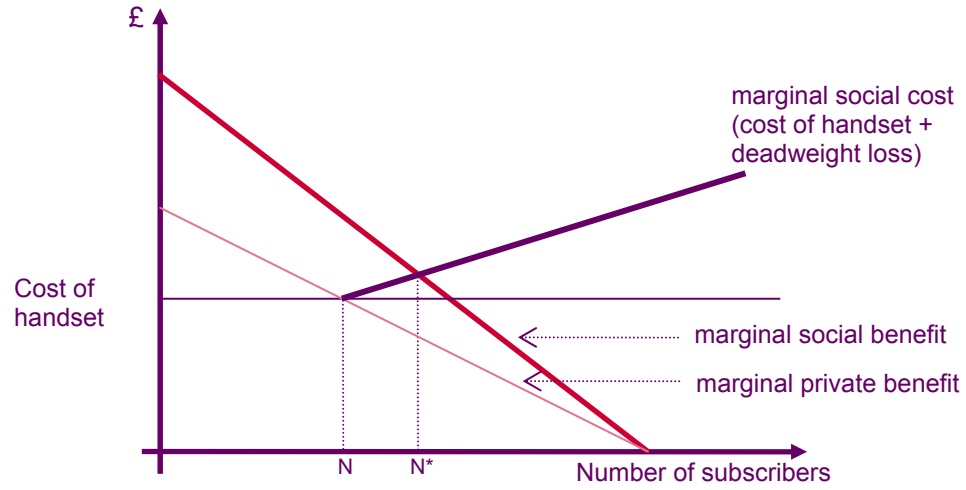
> Surcharge per termination minute = total revenues required / termination minutes[113]

A16.38 In principle all mobile services should contribute to the funding of the subsidy, not just termination. Therefore the omission of other traffic services leads to a significantly higher surcharge on termination. This approach implies that, when there is an externality surcharge on termination, both off-net and fixed-to-mobile termination minutes, and not fixed-to-mobile minutes only, generate revenues that can be used to subsidise marginal subscribers; this is the same approach followed by the Competition Commission.[114] It is correct to consider all termination minutes rather than fixed-to-mobile minutes only because if the network externality surcharge is passed on to off-net mobile callers by the originating MNOs, it is a source of net revenues for the industry as a whole. Therefore, notwithstanding a potential degree of leakage, MNOs can use the revenues obtained from terminating off-net mobile calls, as well as the revenues obtained from terminating fixed-to-mobile calls, to subsidise marginal subscribers.

The optimal number of subscribers

A16.39 The optimal level of subscription is determined at the point at which the marginal social benefit of subscription is equal to the marginal social cost.

Figure A16.1 The optimal number of subscribers



A16.40 The marginal social benefit of increasing subscription measures is the change in social welfare generated when a new subscriber joins the network, i.e. the sum of marginal private benefit and marginal external benefit. The marginal private benefit is the benefit that accrues to the subscriber herself; the marginal external benefit is instead the benefit that accrues to fixed-line and infra-marginal mobile subscribers, i.e. existing subscribers' valuation of contact with the new subscriber.

[113] The total number of termination minutes is calculated by considering how the demand for mobile termination decreases when the surcharge per termination minute is increased. It is assumed that pass-through is full, i.e. the retail price of termination increases by the same amount of the surcharge.
[114] Paragraph 8.217 of the CC's 2003 Report

A16.41 The private benefit of mobile subscribers is measured by the amount they are willing to pay to subscribe, which is captured by the (inverse) demand schedule for subscription.

A16.42 The external benefit generated by subscription is not observed but it can be conveniently expressed as a proportion of the individual benefit. Following established terminology, the size of the marginal social benefit relative to the marginal private benefit is referred to as the Gross Externality Factor or the Rohlfs-Griffin factor (the R-G factor)[115]. It is reasonable to assume that the value of the R-G factor lies between 1 and 2. Applying a value of 1 for the R-G factor would imply that there are no external benefits (or that there is no need to correct for externalities because they are fully internalised). A value of 2 would imply that the external benefits to existing subscribers are as large as the private benefits obtained by the marginal subscriber.

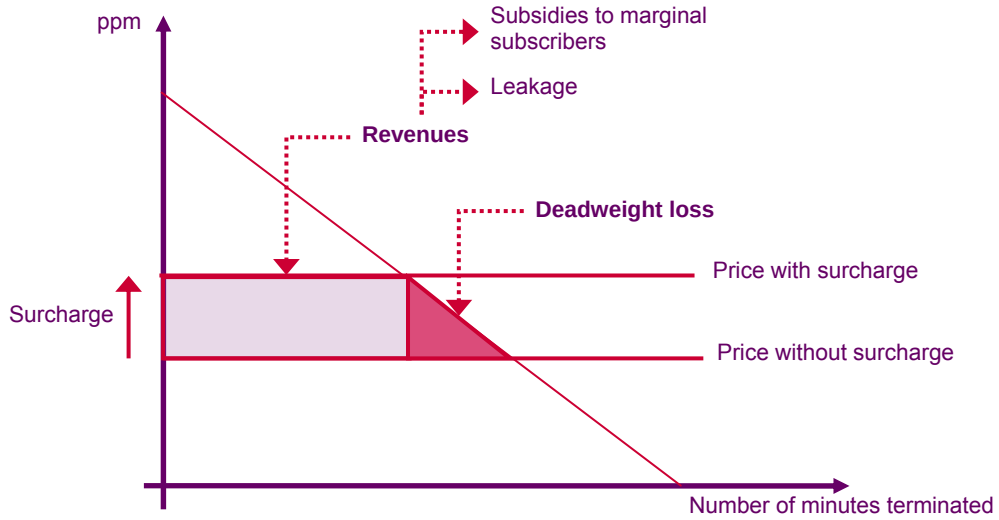
A16.43 The marginal social cost of increasing the number of subscribers by providing subsidies funded by a surcharge on termination of calls to mobiles comprises two elements:

- the cost of the handset necessary to access mobile networks; and
- the reduction in welfare due to the decrease in the volumes of calls to mobiles caused by higher prices for calls to mobiles (i.e. the "deadweight loss" in termination).

A16.44 The deadweight loss associated with any given level of subscription can be calculated by considering how the demand for calls to mobiles is affected by the surcharge per termination minute required to fund the necessary subsidies. As was explained above, the surcharge required depends on both the extent of price discrimination and on the degree of leakage.

A16.45 The graph below shows the impact of the termination surcharge on the market for calls to mobiles.

Figure A16.2 The market for calls to mobiles



[115] See for example para 8.108 of the CC's 2003 Report and latest Ofcom statement/condoc where this is discussed.

A16.46 The surplus of callers to mobiles is equal to the difference between how much callers are willing to pay for a given number of calls (the area below the inverse demand) and the price they pay to make those calls (the area below the price line).

A16.47 When the price of fixed to mobile calls increases, demand for fixed to mobile calls declines and the total number of minutes terminated decreases. The total cost to callers to mobiles from a surcharge on termination to fund subscription subsidies is equal to the area of the shaded trapezoid In Figure A16.2, i.e. the total revenues raised from the surcharge plus the deadweight loss.

A16.48 The total revenues generated from the termination surcharge are transferred to mobile subscribers in the form of subscription subsidies (assuming no leakage) and/or to MNOs. Therefore, even though they represent a cost to callers to mobiles, they do not represent a cost to society as a whole.

A16.49 However, as noted above, in addition to generating revenues, the termination surcharge reduces the total number of minutes terminated. The resulting deadweight loss is the cost to society as a whole of raising subsidies through the termination surcharge.

Calibration of the model

A16.50 In order to use this model for applied analysis to estimate the optimal externality surcharge in 2010/11 (real 2006/07 prices), it is necessary to specify:

- the size of network externalities, i.e. the R-G factor[116];
- the degree of price discrimination;
- the degree of leakage;
- the handset cost;
- the number of marginal consumers;
- the demand for termination; and
- the level of retail termination prices without the externality surcharge.

A16.51 Different combinations of assumptions about the R-G factor, the degree of price discrimination and the degree of leakage are captured by two different scenarios:

- Scenario 1 captures the case in which network externalities are low (R-G factor equal to 1.3), there is perfect price discrimination and no leakage. It provides a lower bound to the optimal externality surcharge.
- Scenario 2 captures the case in which network externalities are large (R-G factor equal to 1.7), there is no price discrimination and leakage is very large (75%). It provides a potential upper bound to the externality surcharge.

[116] It should be noted that the model captures both 2G and 3G services. Therefore, because private values for subscription will pick up the value of all 2G and 3G services (by virtue of the buy-through model of subscription), applying the R-G factor to the marginal private value to obtain the marginal social value, means that externalities arising from either 2G or 3G subscription will be captured.

A16.52 The specification of the two scenarios reflects the fact that, because of the way the model has been specified, the optimal surcharge is larger when the degree of leakage is larger. However, this is not a general result and different specifications of the model – and in particular different non-linear demand functions for subscription and termination – may in principle reverse this result.

A16.53 The cost of subscription has been considered to be equal to £70. This is the same estimate used by the Competition Commission (in nominal terms) and is consistent with the current price of an unsubsidised entry-level handset.

A16.54 Marginal consumers include current mobile users and consumers who currently do not own a mobile phone who are interested in (re-)subscribing but are not willing to pay at least £70 to do so (and those who are not interested in (re-)subscribing because of high handset prices).

A16.55 The number of marginal consumers has been estimated on the basis of standard population statistics sourced from the Office of National Statistics and on the basis of the results of a bespoke market-research survey commissioned by Ofcom to estimate consumers' willingness to pay for subscription ("Mobile call termination Report of market research findings" published by Ofcom simultaneously with this consultation.[117]

A16.56 The Office of National Statistics forecasts that the UK population aged 15+ in 2011 will be about 51m. This population has been partitioned between subscribers and non-subscribers and between marginal and non-marginal consumers on the basis of the results of the survey commissioned by Ofcom. These results and those used by the CC in 2003 are summarised in the figure below.

Figure A16.3 Marginal vs. non-marginal consumers (%)

	Ofcom (2006 survey)	**Competition Commission (2002 survey)**
Mobile subscribers as a proportion of population	78%	68%
Marginal current subscribers as a proportion of total subscribers	34%	34%
Non subscribers as a proportion of population	22%	32%
Marginal non subscribers as a proportion of total non-subscribers	14%	23%

A16.57 The figure below shows the estimated number of marginal consumers derived from the combination of UK population forecasts and the results of the survey commissioned by Ofcom.

[117] See Mobile Call Termination – Report of market research findings published by Ofcom on 13 September 2006 http://www.ofcom.org.uk/consult/condocs/mobile_call_term/marketresearch

Figure A16.4 Marginal vs. non-marginal consumers (millions)

	Ofcom (2006)	Competition Commission (2002)
Subscribers	39.8[118]	34.15[119]
Marginal current subscribers	13.4	11.6
Non subscribers	11.2	15.9
Marginal non subscribers	1.5	3.7
Total number of marginal consumers	14.9	15.3

A16.58 Since the analysis of the optimal termination surcharge is based on an annual model it is necessary to derive estimates of the annual number of marginal consumers. In order to determine the annual number of marginal non-subscribers to subsidise each year, the total number of marginal non-subscribers has been divided by the length of the charge control, i.e. four years. The annual number of marginal existing subscribers has, instead, been estimated as the total number of marginal existing subscribers divided by three, where three is the average handset life revealed by the survey[120].

A16.59 In the absence of better information it is assumed that marginal subscribers are uniformly distributed between £0 and £70 according to their net private benefit of subscription, which is equivalent to assuming a linear demand for subscription.

A16.60 The demand for termination is also modelled as a linear demand function, there are a range of different demand functions and Ofcom considers that a linear function is a reasonable approach in the absence of detailed information concerning this demand function. It has been calibrated for a volume of 82 billion incoming minutes (consistent with Ofcom's cost model assumptions in the medium traffic scenario) to be generated at a price equal to 10.9ppm (in 2006/07 real terms). The own-price elasticity of demand at the calibration point has been assumed to be 0.3 (consistent with Ofcom's approach in the last market review).

A16.61 The level of retail termination prices without the externality surcharge is estimated at 8.6 ppm. This is the level of the charge control plus the retention by fixed-line operators estimated to be 3.51ppm[121].

Results

A16.62 The figure below sets out the results of the model in the two scenarios described above:

[118] Those aged 15+
[119] Those aged 12+
[120] The CC considered 4 years and 3.5 years
[121] Estimated based on Ofcom's analysis of fixed retail prices and regulated MCT charges.

Figure A16.4 Results

Scenario	Estimated optimal termination surcharge (ppm)
Scenario 1 R-G=1.3 perfect price discrimination no leakage	0.01
Scenario 2 R-G=1.7 no price discrimination 75% leakage	0.25

A16.63 We have conducted two types of sensitivity analysis. First of all, we have considered the impact on the level of the optimal externality surcharge of a lower forecast of the volume of calls to mobiles. The figure below sets out the results of the model when it is assumed that the volumes of minutes of calls to mobiles generated is equal to 55 billion (consistent with Ofcom's cost model assumptions in the low traffic scenario) rather than 82 billion minutes.

Figure A16.5 Sensitivity analysis (low traffic)

Scenario	Estimated optimal termination surcharge (ppm)
Scenario 1 R-G=1.3 perfect price discrimination no leakage	0.02
Scenario 2 R-G=1.7 no price discrimination 75% leakage	0.36

A16.64 Second, Ofcom has derived estimates of the surcharge by replicating the analysis undertaken by the Competition Commission using updated data. This provides a comparison of Ofcom's and the Competition Commission's models. We have considered two different approaches:

- Approach 1 is the one described in Appendix 8.1 of the Competition Commission's report. This approach is very similar to the one used by Ofcom, but it does not consider either the deadweight loss or leakage. Further, it assumes imperfect price discrimination (i.e. all marginal subscribers get the same subsidy).

- Approach 2 is the one that the Competition Commission ultimately used to set the termination surcharge as discussed in paragraphs 2.372 – 2.384 of the Competition Commissions report. This approach assumes that it is optimal to maintain all current subscribers.

A16.65 The figure below shows the optimal termination surcharge estimated on the basis of these two approaches, assuming that the R-G factor is equal to 1.5.

Figure A16.6 The updated Competition Commission approaches

Approach	Estimated optimal termination surcharge (ppm)
Approach 1	0.05
Approach 2	0.22

A16.66 In 2003, the estimates of the optimal termination surcharge obtained by the Competition Commission were 0.11ppm (approach 1) and 0.45ppm (approach 2). The reason why the new estimates obtained from the updated Competition Commission's model are significantly lower than those obtained in 2003 is mainly due to the increase in total incoming minutes: while the Competition Commission considered 30bn minutes to be terminated in 2005/2006, the current model considers 82bn minutes to be terminated in 2010/2011 in the medium traffic scenario (and 55bn minutes in the low traffic scenario).

Proposed externality surcharge

A16.67 Where there are network externalities that are not fully internalised by consumers, providing subsidies to (some) mobile subscribers can increase economic efficiency and Ofcom believes that it is appropriate for wholesale mobile termination charges to include a contribution towards the recovery of these subsidies (i.e. an "externality surcharge").

A16.68 The level of the optimal termination surcharge, i.e. the surcharge that maximises social welfare, depends on a variety of economic factors. Because of the modelling uncertainties and difficulties in capturing all these relevant factors it is not possible to quantify the optimal externality surcharge without considering a range of estimates.

A16.69 As discussed above, Ofcom considers that in practice the estimation of the optimal externality surcharge on the basis of Ramsey-type analysis involves significant complexity and ignores some important features of the markets for mobile services (such as leakage and price discrimination). For this reason, Ofcom has considered the range of estimates available from its more flexible yet analytically simpler externality model, although recognising that this model also has limitations and needs careful interpretation. Ofcom considers that there are sound reasons why the surcharge should be lower for the forthcoming charge control than the current and previous controls. Taking these considerations into account, Ofcom proposes that the externality surcharge should be set at 0.3ppm.

Annex 17

Common costs and Ramsey prices

Introduction

A17.1 There are two potential sources of common costs relevant to MCT: non-network and network common costs. This annex sets out Ofcom's approach to the allocation of these costs to MCT.

A17.2 In the last market review common costs were estimated explicitly and allocated across all services (traffic and subscription) in proportion to the total costs of those services. This was an EPMU approach and therefore all services, including subscription contributed to the recovery of common costs.

A17.3 Annex 15 set out Ofcom's approach to estimating and allocating relevant non-network common costs to MCT. Ofcom proposes to allocate non-network common costs (administrative overheads) according to EPMU.

A17.4 However in the case of network common costs, in Annex 5, paragraph 18, it was highlighted that Ofcom's network cost model does not explicitly identify or estimate the level of network common costs. As discussed in paragraphs A17.33- A17.34 below identifying and estimating network common costs reliably is difficult. To the extent that common costs exist, in Ofcom's new cost model, these are allocated to service increments according to routing factors.

A17.5 In Ofcom's new cost model all network costs are allocated to services according to routing factors. This results in few network costs being allocated to the subscription service. The only cost allocated to the subscription service in Ofcom's cost model is the cost of mobile handsets. Other network costs that are driven by the number of subscribers e.g. location updates are explicitly allocated to traffic services.

A17.6 Therefore, to the extent that network common costs may exist they are implicitly allocated solely to traffic services. This is a particular form of network common cost allocation and is not the same as the EPMU approach to allocation of network common costs taken in the last market review in which network common costs were explicitly identified. Ofcom considers that this approach is reasonable. However, this approach compared to the EPMU approach in the last market review implicitly leads to a relatively higher (disproportionate) mark-up for network common costs on mobile termination.

A17.7 It has been argued in the past and in the consultation that EPMU (as implemented by Ofcom in the last market review) is an inappropriate approach to allocating common costs and common costs should be allocated to services according to Ramsey pricing. Therefore in this annex Ofcom sets out its view the appropriateness of applying Ramsey pricing in practice to set regulated charges MCT.

Using Ramsey prices as a basis for regulated charges

A17.8 Economic theory suggests that in general static efficiency is maximised when prices are set equal to marginal costs. However, in the presence of fixed and common costs of production, firms can break even only by setting prices that are higher than

marginal costs. Ramsey prices are defined as those prices that maximise static efficiency under the constraint that firms recover all costs of production.

A17.9 Ramsey prices are "efficient" because they account for the impact that increasing prices above marginal costs has on demand. This matters because the demand for some services may be more responsive to changes in prices (i.e. more "elastic") than the demand for other services. This is because when demand is elastic, increasing the price causes a larger reduction of the quantity consumed and therefore a larger deadweight loss and in order to recover the common costs efficiently, it is optimal to increase the prices of those services with a relatively elastic demand less than the prices of those services that are not very sensitive to price changes.

A17.10 These considerations are reflected by the Ramsey pricing rule whereby (if demand inter-relationships between the goods/services considered are ignored) efficient mark-ups over marginal costs are inversely proportional to the own-price elasticities of demand.

A17.11 When cross-price effects are considered, it is necessary to account for the impact that increasing the price of one good has on the demand for other goods/services (in addition to the impact that it has on own demand). This is captured by the concept of "super-elasticity", which measures the effect on the demand for a good/service of small changes in the prices of all goods/services in the market. Formally, a super-elasticity is the sum of the service's own and cross-price elasticities weighted by relative revenue shares[122].

A17.12 The Ramsey pricing rule in the presence of cross-price effects is similar to the one obtained when there are no cross-price effects: the ratio between the Ramsey prices of two goods/services is equal to the ratio between the inverse super-elasticities of the two goods/services. The intuition behind this result is also similar: it is efficient to have larger mark-ups on goods/services the consumption of which is less sensitive to price changes.

A17.13 By definition, Ramsey prices maximise static efficiency under the constraint that firms recover all costs of production. However, even though a set of Ramsey prices maximise efficiency, setting one price, in this case the wholesale termination charge, at the Ramsey level may not sufficient to achieve efficiency.

A17.14 Even if the price of fixed-to-mobile calls is set at the Ramsey level, the retail prices of the other services that share the same common costs may not be set by MNOs at the corresponding to uniform Ramsey levels. A more complicated Ramsey model would be required to reflect more closely price setting in practice. For instance, to capture that this may occur because retail competition between MNOs is not fully effective and because different users are charged different prices for subscription and for different units of usage (price discrimination).

Imperfect competition

A17.15 In a standard Ramsey model, efficient prices are derived under the assumption that firms do not earn any excess profits, which is an outcome equivalent to that resulting from perfect competition.

[122] See for instance Brown and Sibley (1986), The theory of public utility pricing, Cambridge University Press.

A17.16 However, if competition is imperfect, MNOs are likely to set retail prices that are higher than Ramsey prices. In addition, also the structure of prices set by MNOs may not be consistent with a Ramsey termination charge because, even if firm were to set prices according to Ramsey principles, the relativities between firm-level super-elasticities may be different from the relativities of market-level super-elasticities. For instance, while it is possible that firm-level elasticities could be close to market-level elasticities, this requires perfectly symmetrical (i.e. undifferentiated) firms.

A17.17 In general, theory suggests that the impact of "imperfect" competition on the level of welfare-optimal charges is unclear, i.e. the welfare-optimal charge may be either higher or lower when competition is imperfect.

Price discrimination

A17.18 In a standard Ramsey model it is normally assumed that all mobile users pay the same prices for mobile subscription and for each unit of usage. However, the price structures for mobile communications services show a significant degree of price discrimination, i.e. different users pay different prices for subscription and for different units of usage.

A17.19 MNOs achieve price discrimination by offering a variety of price plans from which consumers self-select the one that is expected to minimize their bill given their expected usage. A typical price plan is a multi-part tariff with a monthly access fee and prices per units of usage.[123] Such tariffing is known as non-linear pricing since price per unit does not vary in direct proportion to usage.

A17.20 The use of price discrimination is not surprising since MNOs can increase their profits by charging different prices to consumers with different willingness to pay for mobile services. Price discrimination may also increase total welfare since increasing the prices paid by some consumers allows MNOs to charge lower prices at the margin, which can increase subscription and the consumption of mobile communications services.

A17.21 Even though price discrimination is an important feature of the market for mobile communications services, its impact on the (average) level of welfare-optimal termination charge is not clear. However, there might be good reasons to expect that ignoring price discrimination by MNOs may tend to overstate the efficient wholesale termination charge.

A17.22 Ramsey prices solve the trade-off between increasing the price of fixed to mobile calls and increasing the price of mobile retail services in order to recover the fixed and common costs of production. Efficiency is maximised when the welfare cost of marginally raising the contribution from one market is equal to the welfare cost of marginally raising the contribution from the other market(s).

A17.23 Compared to the simple case of uniform prices, a nonlinear pricing structure for mobile subscription and usage tends to reduce the welfare costs of extracting any amount of revenues from these retail markets. This is because discrimination allows MNOs to increase the price to some users while maintaining the price paid by other users close to marginal cost.

[123] The monthly charge often includes a certain amount of usage and is equal to zero in the case of pay-as-you-go subscribers.

A17.24 Compared to the benchmark case of uniform prices, therefore, when nonlinear mobile retail prices are taken into account, it may be efficient to extract more revenues to recover the common costs from retail services such as calls and messaging rather than from termination (where the scope for price discrimination is relatively limited). Hence, the efficient level of the termination charge may be overestimated by an applied model which does not capture price discrimination.

Estimating welfare-optimal prices in practice

A17.25 In order to estimate the level of welfare-optimal termination charges (i.e. charges that maximise expected welfare), it is necessary to account not only for the impact that prices have on demand, as in a basic Ramsey model, but also for a variety of other important factors such as externalities, imperfect competition and price discrimination. Developing a reliable applied modelling framework that captures all these relevant features, however, cannot be done robustly, in Ofcom's view, due to the difficulties and uncertainties inherent in dealing with such complex market environments.

A17.26 In some cases, this problem is alleviated by the fact that economic theory suggests what impact the factors that cannot be explicitly captured by the applied model have on the level of charges. However, this is not always possible and, in the absence of clear theoretical guidance, relying on "partial" models to set efficient termination charges (i.e. models that capture some of the relevant factors and not others, may be misleading).

A17.27 Some parties have argued that even if a partial Ramsey approach will almost certainly not be precisely correct, it will nevertheless almost certainly be better than taking a different approach, such as allocating common costs across all services in proportion to the costs they account for on a service by service basis (EPMU). In particular, it has been put to Ofcom that efficiency could be improved if termination charges were set on the basis of a partial Ramsey approach whereby EPMU principles are used to allocate common costs among different groups of services and Ramsey principles are used to refine the allocation of common costs among those services the demand of which is relatively less uncertain.

A17.28 However, in general, it is not clear why a partial approach to setting welfare-optimal termination charges would necessarily be more efficient than alternative approaches to the recovery of common costs such as EPMU. When all price effects are taken into account and, more generally, when other factors such as price discrimination are also considered, it cannot reliably be presumed that EPMU charges are further from the welfare-optimal termination charges than the estimates obtained from a partial and incomplete Ramsey model.

A17.29 The derivation of reliable estimates of welfare-optimal termination charges is also complicated by the difficulties and the significant uncertainties in estimating the parameters of the model used for applied analysis, and in particular in estimating demand elasticities and production costs.

A17.30 Since the conditions of demand are important to determine the level and the structure of efficient prices, estimates of welfare-optimal termination charges may be very sensitive to the particular way in which the demand system is specified and it is estimated/calibrated.

A17.31 Obtaining reliable estimates of demand elasticities, however, is extremely difficult and it is often infeasible[124]. For instance, historic data are unlikely to be very useful in estimating the elasticities of the demand for data services in 2010/2011. More generally, the estimation of demand elasticities on the basis of historic data and/or cross-sectional variation is very sensitive to the particular econometric specification of the demand system and it is not uncommon that different empirical studies produce very different estimates of the same parameters and as discussed Ramsey models can be very sensitive to small changes in their parameters.

A17.32 The derivation of welfare-optimal termination charges requires also the specification of the costs of production. Despite the development of a detailed cost model, however, the estimation of the marginal and of the common costs of production is also subject to significant uncertainties.

A17.33 Ofcom's cost model does not explicitly identify and estimate the level of network common costs. Estimating the level of network common costs robustly is not straightforward since it depends on whether modularities in network deployment give rise to excess capacity and from a long run perspective whether the opportunity cost of traffic in some parts of the network is zero.

A17.34 The initial deployment of assets experience periods where their full capacity is not exploited. If the same assets (with the same capacity) are deployed across all geo-types this may be particularly the case in rural areas where traffic demand is less. Over time as demand increases assets whose capacity was not fully exploited may become fully utilised and it will become necessary to deploy further assets. However, it may remain the case that it some areas and for some assets the initial deployment is never added to. This is due to the modularity of the initial deployment. In Ofcom's view, whether or not this excess capacity caused by the modularity of initial deployment should be considered a real common cost or the result of modelling simplification is not clear. If MNOs were able to efficiently deploy assets with lower capacity or to charge for traffic services on a geographic basis in order to exploit excess capacity the identification of excess capacity in Ofcom's cost model would not be real network common cost. Therefore, Ofcom considers that are significant uncertainties in identifying and estimating the level of network common costs.

A17.35 In the light of these significant obstacles, it is not surprising that there is a lack of use of applied Ramsey pricing in regulatory practice. Indeed, Ofcom is not aware of any instance in which regulated termination charges have actually been set on the basis of a quantitative Ramsey model of efficient pricing. Because of all the difficulties and uncertainties in undertaking applied Ramsey analysis, it is infeasible to derive sufficiently reliable estimates of welfare-optimal prices upon which regulated charges can be based. Therefore Ofcom is of the view that it is inappropriate to undertake to estimate Ramsey prices and considers that its approach to allocation of common costs according to routing factors is a reasonable.

[124] For a detailed discussions of the problems in estimating demand elasticities, see Chapter 8 of the CC's 2003 Report.

Annex 18

Cost of Capital

A18.1 A firm's cost of capital is the weighted average of its costs of debt and equity finance, and is referred to as a company's weighted average cost of capital ("WACC").

A18.2 The cost of capital can be expressed in real terms (after adjusting for inflation) or nominal terms. It can also be expressed in post or pre-tax terms. A pre-tax cost of capital should be compared with returns calculated on a pre-tax basis and a post-tax cost of capital with post-tax returns. In the context of this review, Ofcom's cost model estimates real pre tax cash flows and therefore it is appropriate to apply an estimate of the MNOs' pre-tax real cost of capital.

A18.3 Ofcom has recently set out its views in relation to cost of capital estimation, both in terms of the mobile sector and more widely, in the following publications:

- Ofcom's 2005 consultation, Ofcom's approach to risk in the assessment of the cost of capital (henceforth collectively referred to as "the risk consultation"):
  - o January 2005 – first consultation[125];
  - o June 2005 – second consultation[126]; and
  - o August 2005 – final statement[127]:
- Ofcom's previous market review of MCT concluded in 2004 ("the 2004 statement")[128]; and
- Ofcom's statement and notification extending the charge controls on wholesale mobile voice call termination in 2005, ("the 2005 statement") [129]

A18.4 This annex sets out Ofcom's view of an appropriate WACC for use in Ofcom's analysis of the costs of mobile termination in this market review. It discusses, in the light of Ofcom's previous estimates of the cost of capital for mobile networks and the risk consultation, the following issues:

- asset pricing models – Ofcom proposes that it is appropriate for it to continue to use the Capital Asset Pricing Model (CAPM) to estimate the cost of capital for mobile operators
- variations in risk across mobile activities – Ofcom proposes to apply a single WACC estimate to all the companies and activities within the sector;

[125] See http://www.ofcom.org.uk/consult/condocs/cost_capital/
[126] See http://www.ofcom.org.uk/consult/condocs/cost_capital2/main/
[127] See http://www.ofcom.org.uk/consult/condocs/cost_capital2/statement/
[128] See December consultation http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/mct_consultation/ and June statement http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/wmvct/
[129] See June consultation http://www.ofcom.org.uk/consult/condocs/wholesale/ and December statement http://www.ofcom.org.uk/consult/condocs/wholesale/wmvct_statement/

- CAPM parameters – Ofcom proposes a set of parameters, and hence a WACC estimate, within the CAPM framework; and

- project specific risks and real options – Ofcom concludes with a discussion of the extent to which its analysis of the costs of mobile termination should explicitly reflect these issues.

Asset pricing models

A18.5 A number of different asset pricing models exist for calculating the cost of capital. The CAPM, which is a single factor model, measures economy-wide influences through the risk of an individual asset relative to a market portfolio. There are also multifactor models which include factors that capture the risk of other economic factors not captured in the single factor model.

A18.6 Ofcom has previously expressed a preference for using the CAPM, on the basis of its clear theoretical foundation, simplicity, and continued wide use by both the UK's economic regulators and practitioners.

A18.7 Some mobile stakeholders have argued in the past that Ofcom should at least partly base its analysis on figures calculated using alternative asset pricing models, i.e. models other than the CAPM. For example, during the 2002 Competition Commission enquiry, T Mobile calculated estimates of its own cost of capital based on an Arbitrage Pricing Theory ("APT") approach.

A18.8 There are many alternative approaches to estimating the cost of capital, for example:

- APT models (e.g. that of Chen, Roll, and Ross);

- The Fama-French three factor model;

- Analysis of the third and higher moments of the distribution of returns; and

- The literature arising out of Merton's work on the intertemporal capital asset pricing model ("ICAPM").

A18.9 Ofcom continues to take an interest in the emerging academic literature regarding alternatives to the CAPM but does not think that it would be appropriate for it to depart from reliance on the CAPM in this review. A departure from the CAPM would set a significant precedent for Ofcom and requires a thorough review of the possible successors to the CAPM. In making this assessment there are a number of criteria to consider, for example:

- theoretical underpinning;

- empirical robustness;

- consistency with intuition;

- availability of data;

- track record & regulatory precedent; and

- stability of results over time.

A18.10 Whilst there are a number of candidate alternatives to CAPM, it is not clear to Ofcom which, if any, of these, should be areas of key focus at this time. Ofcom considers that it would not be balanced or appropriate for it to selectively put significant amounts of weights on, for example, one or two of the available alternatives whilst the relative merits of each of the alternatives have yet to be fully established. The approach taken by the other UK regulators and the Competition Commission would be an important factor in determining Ofcom's approach in this regard.

A18.11 Ofcom considers that a review affecting only the mobile sector would not be the appropriate means by which to start to tackle these issues. Ofcom considers it unlikely that an independent study carried out at this time would be able to reach any firm conclusions as to whether alternative asset pricing models should be explored.

Variations in risk across mobile activities

A18.12 In the risk consultation, Ofcom disaggregated BT's group equity beta and hence its estimate of BT's WACC, into two distinct categories, in order to reflect some of the most important variations in risk across BT's activities. Ofcom disaggregated BT's group equity beta of 1.1 into:

- a "lower risk" category (access related services), with a beta of 0.9; and
- a "higher risk" category (the rest of BT's services), with a beta of c. 1.2.

A18.13 It is important to consider whether, given this precedent, it would be appropriate to depart from Ofcom's previous approach of basing its analysis on a single "UK mobile WACC". Such a departure could be appropriate since it might be argued that advanced data services (such as music downloads and web browsing) that are expected to become widely available to mobile subscribers entail more systematic risk than more traditional voice services because, for example, consumption of the former is characterised by a greater level of discretionary spend and therefore subject to greater income elasticity of demand. If this were true then the beta used for regulatory purposes (in the case of call termination) should be lower than group betas obtained via analysis of company level returns, since the latter will partly reflect the higher risk associated with the companies' advanced data services.

A18.14 However, Ofcom continues to propose to use an aggregate company level estimate of an MNO's WACC. This view has been arrived at by considering the criteria that were set out in the risk consultation with the intention of identifying those cases in which a disaggregated approach to risk assessment would be appropriate. For example, paragraph 5.24 of the final statement stated that:

> "…Ofcom's view, based on stakeholder responses and the principles outlined in the first consultation, is that the case for assessing risk on a project-specific basis is likely to be stronger under the following circumstances …
>
> - there are strong a priori reasons for thinking that the systematic risk faced by the project was significantly different from that faced by the overall company (e.g. different income elasticities of demand and/or stability of cash flows);

- there is evidence which can be used to assess variations in risk, e.g.
  - it is possible to identify benchmark firms that are close to "pure play" comparators in terms of having similar risk characteristics to individual projects within the firm;
  - it is possible to use other quantitative analysis (such as quantified risk assessments or the analysis carried out by PwC on behalf of Ofcom to assess variations in risk);
  - data on the firm are available at a disaggregated level (e.g. via separated accounts); and
- correctly identifying variations in risk, and reflecting this in an adjusted rate of return, is likely to bring about significant gains for consumers."

A18.15 Based on this set of criteria it is possible to compare the BT and mobile cases. Firstly, the strength of a priori reasoning may be considered weaker. In the case of BT, there was a relatively stronger a priori reason for distinguishing between voice and line rental volumes since voice volumes are likely to vary with GDP and whereas line volumes tend not to. In the mobile case a different issue is under consideration, there may be some intuitively appealing arguments to suggest that, for example, the demand for advanced data services may be more strongly correlated with aggregate demand, and hence market returns, than that for voice services. However, the exact nature, take-up and importance of these services as sources of return for MNOs are uncertain in many cases.

A18.16 Secondly, the standard of evidence available for mobile is more challenging to assemble. For example published estimates of income elasticities of demand are much less widely available than in the BT case, where the well-established higher elasticity for calls than access was an important indicator. In addition Ofcom is not aware of any countries in which there are examples of separately listed mobile operators that offer obviously different mixes of data and voice services. It might be possible to carry out a cross-sectional regression analysis (such as the one carried out on Ofcom's behalf by PwC in the BT case) investigating whether players with different mixes of, e.g. 2G and 3G subscribers since this may reflect different mixes of voice and data services, have different equity betas. However, this would be a difficult exercise because many of the main European mobile operators operate as part of a bigger parent group, offering services in a number of countries; and one of the key activities of interest, namely 3G data activities, differs significantly from traditional mobile activities in that they currently generate relatively modest revenues (expected to grow at a relatively high rate in the coming years), making it difficult to estimate the proportion of a company's market value is accounted for by 3G data services.

A18.17 Lastly, in considering whether it is appropriate to disaggregate the WACC, as discussed in Ofcom's 2005 consultation it is important to consider the risks of making Type I and Type II errors:

- Type I error, i.e. incorrectly using a single beta figure when the difference in risk between for example voice and data is significant:
  - Allowing excessive returns on MCT; and

- Allowing insufficient returns on the rest of a MNO's activities if these were to be regulated.

- Type II error, i.e. incorrectly using a disaggregated beta when the difference in risk between for example voice and data is not significant:

  - Allowing insufficient returns on MCT; and

  - Allowing excessive returns on the rest of a MNO's activities if these were to be regulated.

A18.18 In assessing the risk of these errors it is relevant to consider firstly, the likelihood of making each type of error i.e. whether it is more likely that the risks associated with voice and data services are different and secondly, the costs associated with each type of error. As discussed above, the strength of a priori reasoning that the risk across a MNO's activities is different is relatively lower than in the case of BT. Therefore it is less clear whether in disaggregating Ofcom would be more likely to be making a Type I or Type II error. In addition it is difficult to assess which of these outcomes, should they arise, is likely to be most damaging to consumers. A Type I error is likely to be harmful to consumers since this error would lead to excessive prices on MCT and an inefficient structure of prices (as discussed in Section 7). However, a Type II error, whilst also leading to an inefficient structure of prices, may not allow MNOs to earn sufficient returns on MCT and this may affect their incentives to invest in new innovative services that would have brought benefits to consumers in the long term.

A18.19 On the basis of the available evidence of differences in risk between a MNO's activities, Ofcom proposes not to take a disaggregated approach to mobile WACC estimation.

CAPM parameters

Introduction

A18.20 The CAPM methodology was discussed in detail in Ofcom's risk consultation. The cost of equity is built up from three main factors. These are:

- the risk free rate;

- the expected market equity risk premium; and

- the value of beta for the company in question.

A18.21 The risk free rate is simply the expected rate of return on a risk free investment. The expected equity risk premium is the expected return on equities over and above the risk free rate (that is, it is the expected reward for holding equities compared with the reward for holding risk free assets). The value of beta reflects the variability of returns of the equity of the company in question compared with the variability of returns on the equity market.

A18.22 The cost of debt is built up from the

- The risk free rate; and

- The debt premium

A18.23 The debt premium is the company specific risk premium for corporate debt above the risk free rate.

A18.24 The WACC takes account of the cost of equity and the cost of debt by weighting each of these by the proportion of equity and debt respectively in a company's financial structures in the following way (where Gearing = Debt / (Debt + Equity)):

WACC = (Cost of equity x (1 – Gearing)) + Cost of debt x Gearing

A18.25 There is an element of uncertainty, and hence a need for regulatory judgement, in arriving at an appropriate value for each of the parameters set out above. Ofcom's proposed values for these parameters are discussed below.

Risk free rate

A18.26 Ofcom proposes to use a real risk free rate of 2.0% and a nominal rate of 4.6%[130] (Based on an explicit assumption for inflation of 2.5%). These are the same assumptions that were used previously by Ofcom in the risk consultation and in the December 2005 Statement. Ofcom continues to take the view that these are reasonable assumptions.

A18.27 The basis on which these assumptions were arrived at can be found in the risk consultation. The figures below set out updated data that were used in the previous reviews to inform these assumptions. The figure below sets out the time series of 5 year rates in nominal and real terms, and the implied inflation rate over time.

Figure A18.1 Real and nominal (5 year) gilt rates since January 2000

A18.28 In the figure below, historic averages of nominal and real rates are presented under different averaging periods.

[130] Based on the product of real risk free rate and inflation i.e. (1+real risk free rate) x (1+inflation) -1

Figure A18.2 Historic averages of nominal and real gilt rates (averaged across gilts ranging from 1-15 year maturities)

Averaging period	Nominal	Real	Implied inflation
25th July 2006	4.6	1.6	2.9
1 week	4.6	1.6	2.9
1 month	4.6	1.7	2.9
3 month	4.6	1.7	2.9
6 month	4.4	1.5	2.8
1 year	4.3	1.5	2.8
2 year	4.4	1.7	2.7
3 year	4.5	1.8	2.7
4 year	4.4	1.8	2.6
5 year	4.5	1.9	2.5

Source: Bank of England and Ofcom analysis

A18.29 Based on this current information the proposed nominal rate of 4.6% is broadly consistent with estimates based on long and short run averages. However, 2.0% as an estimate of the real risk free rate is above averages based on shorter term averages but broadly consistent with longer term averages. Ofcom highlighted in the risk consultation that market estimates are volatile and this was a key reason for looking at longer term averages. Ofcom therefore considers that 2.0% is an appropriate estimate of the real risk free rate.

Equity risk premium

A18.30 The equity risk premium is the difference between the overall return on equities and the nominal risk free rate. Its value in the UK reflects the risk of investing in UK equities generally. There is considerable debate about the appropriate method of estimating the value of the equity risk premium, with different methods producing different values.

A18.31 In the final statement of the risk consultation, Ofcom concluded that a figure of 4.5% represented an appropriate value for this parameter.

A18.32 This range of values reflected a variety of evidence, both historical and forward-looking. Ofcom's view remains the same as the one expressed in the risk consultation, namely that an estimate of 4.5% is sufficiently on the side of high estimates without unduly compromising the objective of ensuring that access to monopoly services is fairly priced. During the consultation period of the risk consultation, Ofcom was supplied with and took into account the views of most of the main stakeholders that have an interest in mobile termination rates in reaching its view that 4.5% was appropriate, and would be unlikely to change this view unless important new evidence or arguments that had not been considered during the course of that review were submitted.

Optimal gearing

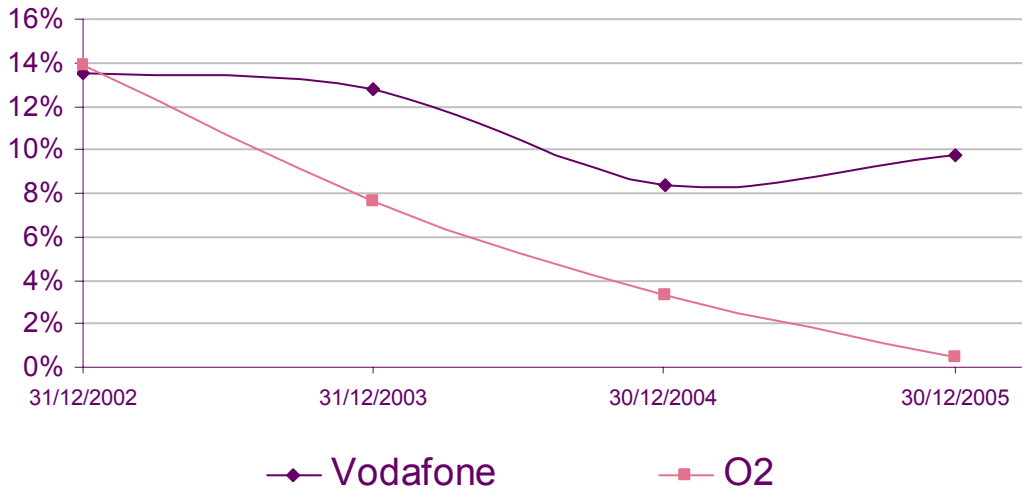
A18.33 The gearing ratio measures the extent to which a company is financially leveraged, and is typically estimated by calculating the ratio of the book value of a company's debt to the sum of this value and the market value of shareholders' equity.

A18.34 Under the standard Capital Asset Pricing Model, a firm can potentially lower its overall cost of capital by increasing its gearing. This is because debt is generally cheaper than equity as a result of tax advantages to debt. This consideration must be weighed against the fact that, other things being equal, highly leveraged companies will be at a greater risk of bankruptcy if they are unable to make payments on their debt; and may also find it more difficult to find new lenders in the future.

A18.35 Ofcom has previously (e.g. see the 2004 statement) assumed a range of 10% to 30% as its estimate of the optimal gearing ratio of an MNO. This assumption was based primarily on the historic averages of the MNOs.

A18.36 In recent years, the gearing ratios of both Vodafone and O2, calculated as the ratio of the book value of net debt to the combined book value of net debt and market value of equity, have been some way below the top of the range previously identified by Ofcom. This is shown in the figure below.

Figure A18.3 MNOs' gearing over the past four years



Source: Thomson DataStream and Ofcom analysis

A18.37 In the absence of any other reliable means by which to assess the optimal gearing ratio of an average efficient UK MNO, Ofcom is inclined to put a significant amount of weight on the historic gearing of the MNOs to estimate a value for this parameter. Based on such evidence, Ofcom's view is that it is appropriate to base its estimate of WACC for an MNO on an assumption of a gearing ratio of 10%.

Equity beta

A18.38 The value of a company's equity beta measures the movements in the return from its shares relative to the movement in the return from the equity market as a whole. It will rise with an operator's debt/equity ratio (gearing), since a higher level of

gearing implies higher volatility in the returns to shareholders. A company's asset beta controls for this factor, and measures the systematic riskiness of a firm or project before allowing for gearing.

A18.39 The equity beta captures exposure to systematic risk (risk that cannot be diversified away by investors). Following the approach of the Competition Commission and its previous market reviews Ofcom considers that it is appropriate to estimate an equity beta to represent the systematic risk of an average efficient UK MNO. Previously this represented the systematic risk of the then, four UK MNOs. However, Ofcom considers that the concept of an average efficient UK MNO also applies to H3G and that the same estimate of systematic risk can be appropriately applied to all five MNOs in this review. (Issues of specific risk are discussed at the end of this Annex).

A18.40 In the past Ofcom has used a range of 1.0 to 1.6 at 10% gearing as a value for the equity beta of an average efficient MNO, corresponding to a an asset beta range of 0.9 to about 1.45. These values were the same as those used by the Competition Commission in its inquiry into mobile termination. These values were based on putting weight on a number of different estimates, reflecting the many uncertainties inherent in arriving at beta estimates.

A18.41 Equity beta estimation is usually carried out in order to estimate what the relationship between a firm's returns and those of the market will be on a forward-looking basis. Expectations of this sort are very difficult to measure so equity beta values for a company are typically calculated by regressing data on past returns against the past returns associated with an appropriate market index.

A18.42 In using historical data to estimate a company's beta on a forward-looking basis, there are a number of potentially contentious issues to consider in appraising the usefulness of beta estimates (aside from the issue of estimating the disaggregated risk of different services within a company, discussed earlier). These issues must sometimes be traded off against each other, since no single estimate will typically score highly against all criteria. Contentious issues include the following:

- the statistical properties of estimates, for example:
  - reliability of estimates (for example, lower standard errors can be obtained by, using a sample containing more data points via higher frequency data or longer data windows, and estimates calculated using monthly data can be susceptible to significant variations depending on which day of the month is used for beta estimation);
  - parameter stability – if beta estimates change over time, then it may not be appropriate to use estimation methods that rely on long run historical data windows. This will be particularly true if, for example, data windows span important events such as major acquisitions and divestments; and
  - other technical issues – for example heteroscedasticity, autocorrelation, and asynchronous trading bias.
- the need to measure risk relative to an appropriate index (e.g. domestic or international);
- isolating relevant activities (e.g. it might be argued that it would not be appropriate to use a group beta estimate as a basis for setting charges for UK

termination services, and that adjustments should be made to strip out the contribution to group equity betas of one or both of overseas activities and unregulated activities); and

- other issues that are relevant from a policymaker's point of view, e.g.:
  - issues relating to the stability of estimates e.g. if some estimation methods provide results that are very unstable over time, then putting a relatively large amount of weight on estimation methods that provide more stable results may be desirable in order to provide a stable climate for investment; and
  - the usefulness of relying on well known, published, data sources such as the LBS Risk Measurement Service ("RMS") data or similar.

A18.43 Taken together, these issues mean that a wide range of estimation methods may be used in beta estimation. Ofcom's preferred approach is to give weight to a number of different estimation techniques, which, it believes, strike an appropriate balance amongst the issues outlined above.

A18.44 Some of the key practical estimation issues that arise based on the objectives identified above are:

- choice of data frequency (daily, weekly, or monthly);
- estimation period (how many years' worth of data to use, and over which period); and
- the need to measure risk relative to an appropriate index (i.e. regressing company returns against either a domestic or international market index).

A18.45 Each of these issues is discussed at some length in the risk consultation. The estimates set out in the next subsection draw on the principles established in these earlier reviews.

A18.46 The range used by Ofcom in the past on mobile termination was based on putting most weight on beta estimates that were calculated on Ofcom's behalf by The Brattle Group ("Brattle") using:

- returns data for O2 rather than Vodafone, since doing so limits the difficulties associated with the impact of overseas activities;
- daily data[131], since doing so maximised the precision of estimates; and
- relatively short data windows (e.g. one year), making use of the most recent available data, because of statistically significant changes to beta estimates over time.

A18.47 Most weight was put on results calculated using the FTSE All-Share index, rather than a global equivalent such as the FTSE All-World index, reflecting the approach most commonly used by most practitioners. Ofcom additionally placed some weight (albeit less than that placed on Brattle's estimations given the greater statistical merit of these) on estimates supplied by the LBS RMS, given their status as a widely-recognised, published, set of estimates.

[131] Including any appropriate adjustments for heteroscedasticity and autocorrelation

A18.48 Ofcom's view is that this approach remains appropriate, and has updated its analysis based on new research carried out on its behalf by Brattle during the course of the review in early 2006. These estimates are summarised in the figure below.

Figure A18.4 Equity beta estimates for O2 and Vodafone at actual gearing levels

Company; Estimated by	Details, e.g. data frequency	Index	Period	Estimate (standard error)
O_2; The Brattle Group	Daily (1 year)	UK	Year to 31st October 2005*	1.26 (0.14)
Vodafone; The Brattle Group	Daily (1 year)	UK	Year to 14th December 2005	0.95 (0.13)
O_2; The Brattle Group	Daily (1 year)	World	Year to 31st October 2005*	0.92 (0.20)
Vodafone; The Brattle Group	Daily (1 year)	World	Year to 14th December 2005	0.69 (0.14)
O_2; LBS RMS	Monthly (5 years), Bayesian adjusted	UK	5 years to Q3 2005	1.12 (0.23)
Vodafone; LBS RMS	Monthly (5 years), Bayesian adjusted	UK	5 years to Q3 2005	1.12 (0.19)

* O2 daily beta estimates are based on data sets ending 31st October 2005, Ofcom's view, and that of the Brattle Group, is that estimates based on data following this period are unlikely to provide a reliable basis for calculating forward-looking beta estimates. This is due to the announcement on 31st October 2005 of Telefónica's takeover bid for O2 that represented an offer of a 22% premium on the closing O2 share price of the previous Friday. This offer prompted an immediate 25% gain in O2's share price by the close of trading on October 31 2005 and has a material impact on regression estimates of O2's beta.

A18.49 These estimates are broadly lower than the ones used to support the 2004 statement (see Table 2 and Table 3 of the December 2003 Consultation). Equity betas (and implied asset betas) calculated using one year of daily data for both Vodafone and O2 have fallen fairly significantly. Based on this evidence there may be reason to revise the top end of Ofcom's previous range of 1.0 to 1.6 down to reflect the change in more recent estimates. However, given that beta estimates are subject to volatility and change over it may be appropriate to continue to use the same range as the previous market review. It is not possible to judge whether the lower betas measured today reflect a long term trend or a short term market fluctuation.

A18.50 Ofcom's view is that the range used in the 2004 and 2005 statements remains appropriate. The low end of Ofcom's range is an equity beta of 1.0, which, at a gearing ratio of 10%, corresponds to an asset beta of 0.9. The high end of Ofcom's range is an equity beta of 1.6, which corresponds to an asset beta of just below 1.5. The midpoint of this range is an equity/asset beta of 1.3/1.2. These estimates are very close to the one-year O2 beta measured against the FTSE All-Share index shown in the top row of the figure above, i.e. an equity beta of 1.26 at a gearing

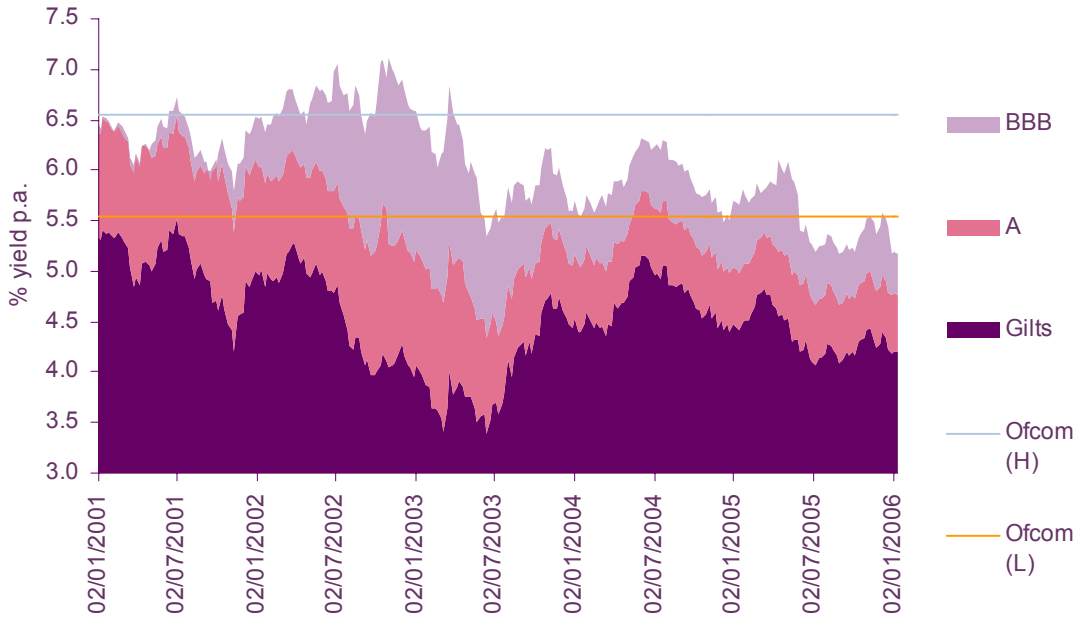
ratio of about 3%, i.e. an asset beta of roughly 1.2. Therefore Ofcom proposes to continue use a range of 1.0 to 1.6 at 10% gearing its estimation of the cost of capital.

Debt premium

A18.51 The cost of corporate debt is made up of a risk free component and a company specific risk premium. Historical evidence suggests that blue chip corporate debt, such as that of mobile operators, commands a small risk premium, although estimates of this premium vary considerably. In the 2004 and 2005 statements, Ofcom used a range of 1% to 3.5% for the debt premium of an MNO.

A18.52 The figure below shows the yields on average A and BBB-rated corporate bonds (and also on 5-year gilts) since the beginning of the year 2000. These correspond to the credit ratings of Vodafone[132] and O2[133] respectively. It shows that having peaked at about 3% in late 2002/early 2003, the yield on BBB (medium risk) rated corporate bonds has varied between about 1.0 and 1.5 percentage points above the risk free rate, with the corresponding figure for A rated bonds having been between about 0.5% and 1.0%.

Figure A18.5 Yields on government & corporate debt



Source: Thomson DataStream and Ofcom analysis

A18.53 Based on this more recent evidence, Ofcom considers that it would be appropriate for it to adopt a range of 1.0% to 2.0% for the debt premium for an MNO. Given the low proposed optimal gearing ratio proposed (10%), this change has a fairly small impact on Ofcom's final WACC estimate.

[132] See http://www.vodafone.com/article/0,3029,CATEGORY_ID%253D408%2526LANGUAGE_ID%253D0%2526CONTENT_ID%253D230922,00.html

[133] See http://www.o2.com/investor/bond_holder_information.asp

A18.54 The figure above shows Ofcom's high and low estimates of the pre-tax cost of debt based on a nominal risk free rate of 4.6% and low/high debt premia of 1.0%/2.0%, compared with recent returns on government and corporate debt.

Cost of capital estimates

A18.55 The figure below sets out Ofcom's proposed WACC estimates. They lead to an average pre-tax real WACC estimate of 11.3%. This is very close to the central value of 11.2% used in the 2005 statement.

Figure A18.6 Proposed WACC estimate

	Low	**High**
Nominal Risk-free rate	4.60%	4.60%
ERP	4.5%	4.5%
Asset beta	0.90	1.46
Equity beta @ 10% gearing	1.00	1.60
Cost of equity (post tax)	9.1%	11.8%
Debt premium	1.0%	2.0%
Cost of debt (pre tax)	5.6%	6.6%
Corporate tax rate	30%	30%
Cost of debt (post tax)	3.9%	4.6%
Gearing	10%	10%
WACC (post tax nominal)	8.6%	11.1%
WACC (pre tax nominal)	12.3%	15.8%
Inflation	2.5%	2.5%
WACC (pre tax - real)	9.5%	13.0%
Average WACC (pre tax - real)	**11.3%**	

Other risk related issues

A18.56 T-Mobile suggests that forward costing requires estimates of a number of highly uncertain parameters (e.g. demand and MEAs) and therefore there is a risk of over or underestimating future cost levels. Charges should be set so as to provide a high degree of confidence that they will cover costs. This is the appropriate balance between static efficiency gains to consumers and long run benefits of further investment. In balancing potentially higher charges for mobile telephony against reduced investment the consumer is better off incurring higher charges to reduce the risk of setting prices too low and deterring investment.

A18.57 For example, MNOs are multi product firms and face competition in the retail market from other MNOs and increasingly from new communications providers. If the termination charge is regulated at a price level that is lower than might be

achieved in a competitive market there is a risk that this could prevent MNOs from earning a sufficient return on capital. This would be the case if retail prices were constrained by competition from other communications providers e.g. fixed operators or new mobile operators and/or if some MNOs were regulated less stringently enabling them to earn a sufficient return when charging relatively lower retail prices.

A18.58 Ofcom is mindful of the uncertainty in trying to forecast a number of parameters in its cost model. As a result and as discussed in Annexes 5 and 13, Ofcom seeks to model a range of different scenarios for these assumptions rather than relying on a single set of forecasts and estimate of future costs. In relying on scenarios Ofcom intends to reduce the risk of denying cost recovery due to forecast error.

A18.59 T-Mobile also argues that Ofcom's approach to risk does not properly take into account project-specific risks. The cost of capital only takes into account systematic risk. In general it is Ofcom's view that investors do not expect to be compensated for specific risk because (as discussed in Ofcom's risk consultation):

> "In theory, investors should be indifferent to the level of specific risk involved in a particular project, since this can be diversified away…"

A18.60 Investors are able to diversify project specific by trading off underperforming investments against out-performance on others. However, when prices are regulated it has been argued by T-Mobile that regulation may prevent firms from earning the upside of successful investments whilst exposing them to the downside. This implies that overall firms' rate of return could fall below that required by investors in a competitive market and this may harm incentives to make further investments.

A18.61 Ofcom does not consider that this is correct. In setting regulated prices Ofcom seeks to set charges on the basis of expected costs and the cost of capital (that is the expected rate of return required by investors). Ofcom considers that this is an appropriate approach and does not limit the opportunity to diversify project specific risk. In setting charges based on expected costs and returns Ofcom applies a symmetric approach in that firms are able to earn higher or lower returns depending on future demand and costs. Whilst the price they may charge is fixed by regulation this does not prevent them from earning higher or lower returns than their cost of capital[134].

A18.62 T-Mobile considers that this is a relevant argument to the issue of 3G spectrum cost recovery. They argue that the full value of the payments made by the MNOs in 2000 for their 3G licences should be included in the cost base for regulated charges This issue is discussed in more detail in Annex 13.

A18.63 In addition, a number of stakeholders have raised issues in relation to real options and how these should be taken into account in setting charges.

A18.64 One stakeholder has raised the issue of "wait and see" real options. They suggest that MNOs' have the option to reframe from "growing new service markets" while they gather intelligence on consumers' willingness to pay for the new services. In

[134] Ofcom notes that whilst charge control regulation my not enable firms to vary price depending on future demand and costs may potentially affect returns, Ofcom considers that the cost of capital already reflects the impact of regulation on MNOs' pricing freedom through market estimates of MNOs' cost of capital.

this framework, “growing new service markets” relates to charging low prices for new services (and charging higher prices for others e.g. mobile termination) by recovering proportionately less in terms of common costs from new services (and more from existing ones e.g. mobile termination). However, it has been argued that whilst this is efficient, MNOs are not incentivised to follow this approach to pricing and instead take a more cautious approach. The alternative is to recover common costs in relatively higher proportions from new services leading to higher prices and lower demand. It is argues that MNOs are incentivised to follow this more cautious approach because of a combination of uncertainty of consumers’ willingness to pay for new services and because prices are sticky (i.e. they cannot increase). If MNOs charge low prices for new services this may grow new service markets. However, if consumers’ willingness to pay turns out to be high and if at the same time prices are sticky, MNOs are not able to increase prices accordingly. Therefore, MNOs take a cautious approach, setting higher prices and waiting to see what consumers’ willingness to pay is like. It is argued that this leads to slower penetration of new service markets and therefore that a disproportionate mark-up on termination is required to allow for recovery of common costs in order to address this inefficiency leading to the quicker cultivation of new service markets.

A18.65 In Ofcom’s view real options are usually related to the management of irreversible investments in the face of uncertainty that is resolved over time. However, the framework discussed above relates to the recovery of common costs. The source of “option value” is the assumption that prices for new services cannot be increased, and the source of uncertainty that is resolved, is consumers’ willingness to pay for new services. However, it appears that the framework relies heavily on the assumption that prices (for new services) are sticky in that they cannot be increased. In the absence of robust justification for this assumption Ofcom does not consider this an appropriate framework by which to explore real options in the context of mobile voice call termination.

A18.66 Furthermore, T-Mobile argues that Ofcom’s approach to risk does not appropriately compensate investors for the option to delay that is given up when a sunk cost investment is made. Where an MNO makes a sunk cost investment in the face of uncertainty the MNO gives up an option to delay the investment in order to resolve future uncertainty. This option giving up is an opportunity cost that should compensated for in any regulated charge. If this is not taken into account MNOs will delay making investments.

A18.67 In Ofcom’s risk consultation it was noted that:

> “Ofcom seeks to promote competition, and to promote investment decisions that, as far as is practicable, mimic those that would be made in competitive or contestable markets, recognising that in doing so it is important to offer a fair reward for risk. In any adjustments to its approach that were made to take account of real options, Ofcom would be seeking to reflect the conditions that would prevail under competition, not to underpin the investment decisions and returns of a dominant firm…”

A18.68 In the context of competition Ofcom explained that in its view, allowance for the value of real options should not be made of the result is to provide firms with returns above their cost of capital. However, real options may be relevant in terms of how they impact the appropriate path of prices. Uncertainty of the outcome of an irreversible investment should be taken into account in setting prices. The price should be set to yield an expected return equal to the WACC. With the resolution of

uncertainty through time the price necessary to justify this condition would fall. Thus Ofcom agrees that a premium relative to the case of investing under conditions of certainty may be appropriate but that it should fall over time as uncertainty relating to the prospects for the market decreases. The premium should, in Ofcom's view be sufficient to ensure the equality of expected returns and WACC.

A18.69 An example raised in the consultation related to the uncertainty associated with technological change and the sunk cost investments that may result i.e. the risk that that a new technology will be more efficient in the future making an investment today in a certain technology redundant. Firms therefore require an additional return to compensate them for the option given up to delay their investments.

A18.70 In Ofcom's view it is important to note how this concept relates to its proposed approach to the timing of cost recovery. For example in the case of technological progress, Ofcom's cost model seeks to capture the MEA value of assets over time. Where the MEA declines this reflects the lower costs that a new entrant would face and therefore those costs of assets that an incumbent MNO might not be able to recover on a forward looking basis in a contestable market. Rather than deny MNOs the recovery of these costs – the concern expressed by T-Mobile, Ofcom proposes to use economic depreciation to set the level and path of regulated prices. Economic depreciation ensures that those costs that might not be recovered due to falling MEAs are recovered in earlier periods i.e. prices are higher to allow cost recovery to be brought forward. Ofcom therefore considers that it has appropriately taken into account the risks associated with technological progress.

Annex 19

Welfare analysis

Introduction

A19.1 Section 7 sets out Ofcom's views on the likely detriment to consumers if MCT charges are unregulated. These are:

i) Excessive prices overall;

ii) Inefficient structure of prices;

iii) Distortion of consumer choice;

iv) Inequitable distributional effects; and

v) Risk of anti competitive behaviour.

A19.2 In order to estimate the consumer welfare gain from regulating MCT charges Ofcom has carried out a simple welfare analysis that compares unregulated charges (charges absent actual regulation or the threat of regulation) against Ofcom's proposed regulated charges (set out in Section 9).

A19.3 The analysis seeks to provide an order of magnitude quantification of the welfare gain from moving from an inefficient structure of prices to an efficient price structure. In doing so it focuses solely on the ii) Inefficient structure of prices, the second source of detriment listed above.

A19.4 Ofcom's model assumes that the waterbed effect is complete and therefore it is assumed that MNOs do not make excess profits as a result of setting excessive MCT charges. Therefore Ofcom's welfare model does not capture the benefits to consumers if MNOs were to make excess profits in an unregulated scenario and these were removed under regulation. In addition Ofcom's estimate does not include any quantification of the welfare gains from regulation removing: a distortion of consumer choice, an inequitable distributional effects or the risk of anti competitive behaviour.

A19.5 It would be relatively simple to estimate the welfare gain from regulated MCT charges by comparing the impact of a reduction in MCT charges would have on calls to mobiles. However, this would overstate the welfare gain from regulation because there is an interaction between MCT charges and the mobile retail market. MNOs use profits from termination to reduce the prices of retail mobile services. This benefits mobile subscribers and potentially trades off against the detriment to callers of excessive charges. Therefore Ofcom has sought to capture the interrelationship between demand for calls to mobiles and for mobile retail services.

Welfare model

A19.6 Ofcom has estimated the welfare gain from regulation in 2010/11 using an updated version of a basic economic pricing model with interrelated demand originally developed by Dr. Jeffrey Rohlfs for Ofcom. This is a "standard" linear-pricing model

that accounts for the existence of network externalities.[135]. The updated model considers five services:

- subscription;
- mobile calls (on-net, off-net and geographic);
- messaging;
- data; and
- fixed-to-mobile calls.

A19.7 The model does not capture all the relevant services that are likely to contribute to the revenues of MNOs, such as international roaming and video calls.

Specification of demand

A19.8 The demand functions for the services considered are assumed to be linear and their position is calibrated by the combinations of quantities and prices described in the figure below.

Figure A19.1 Calibration of demand (figures in 2010/11, real 2006/07 prices)

Service	Annual volume	Price
Subscription	67.182m	£26 p.a.
Mobile voice calls	114,867m minutes	10.9 pence per minute
Messaging	87,981m	7.08 pence per message
Data	12,609m Mbytes	20 pence per Mbyte
Fixed-to-mobiles calls	28,827 m minutes	10.8 pence per minute

A19.9 The volumes used for the calibration of the demand functions are consistent with the 2010/2011 forecasts of demand in the medium traffic scenario of the cost model. In the absence of better information all prices are based on current prices forecast to be constant in nominal terms.

[135] A detailed description of the original model can be found at http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/main_report.pdf

A19.10 The elasticity of demand matrix has been specified following the approach proposed by Dr. Rohlfs, which relies on a combination of assumptions and theoretical restrictions. More specifically:

- The own-price elasticities of demand are assumed to be equal to -0.3.
- The cross-elasticities of subscription with respect to usage prices are derived so as to be consistent with the buy-through model (described in Dr Rohlfs description of the model). A parameter used to determine these elasticities is the ratio of the usage of the marginal subscriber to that of the average subscriber. This parameter has been specified as 0.3.
- The cross elasticity of subscription with respect to the price of fixed-to-mobile calls has been set equal to zero.
- The cross elasticity of fixed-to-mobile calls with respect to the price of subscription has been set so that the R-G factor is 1.5 and the net externality factor is less than 1.1[136].
- The cross elasticities of demand for mobile voice and for messaging with respect to the price of subscription are specified so as to be slightly larger in absolute value than would be implied by symmetry of the partial derivatives of demand to reflect the existence of network externalities. The cross elasticity of demand for data with respect to the price of subscription is instead specified so as to satisfy the symmetry of the partial derivatives of demand.
- The cross elasticities of usage demand with respect to usage prices have been specified so that the price that marginal consumers are willing to pay for one type of usage does not depend on the quantities of other types of usage.

A19.11 The resulting elasticity matrix used is shown below.

Figure A19.2 Elasticity matrix

		Prices				
		subscription	**voice**	**ftm**	**messaging**	**data**
Quantities	**subscription**	-0.30	-0.74	0	-0.37	-0.15
	voice	-0.10	-0.3	0	-0.12	-0.05
	ftm	-0.01	-0.01	-0.30	-0.01	-0.003
	messaging	-0.10	-0.25	0	-0.30	-0.05
	data	-0.10	-0.25	0	-0.12	-0.3

[136] The R-G factor is a measure of the network externality and is defined as the ratio between the social marginal value of subscription and the private marginal value of subscription. To a large extent this externality is reflected in the cross-elasticities of demand. The net externality factor is instead a measure of the network externality that is not captured by the demand system. It can be thought of as capturing the externality related to the option to call the marginal subscriber.

Specification of costs

A19.12 Estimates of the costs of production have been derived on the basis of the output of the cost model in 2010/11 (averaged across all five MNOs) in a traffic scenario consistent with the proposed regulated charges as follows (these costs therefore include a mark-up for the recovery of common costs):

- The cost of mobile calls is a weighted average of the costs of on-net, off-net and geographic calls. The cost of geographic calls includes also an estimate of the cost for fixed termination and transit derived from BT's charges for termination and transit.
- The costs for messaging and data have been set equal to the costs estimated by the cost model.
- The cost of fixed-to-mobiles calls has been set equal to the cost of incoming calls estimated by the cost model (excluding externality surcharge 0.3ppm) plus fixed retention, which has been estimated at 3.51ppm[137].
- The cost of subscription has been obtained by dividing the aggregate costs of customer acquisition and retention (CARS) by the number of total subscribers plus the total number of connections. This approach attempts to capture the fact that CARS are incurred by firms not only to increase the total number of subscribers but also to acquire customers from rival firms.

A19.13 All costs are weighted averages of the costs of 2G-3G and 3G operators. The estimates used in the model are shown below.

Figure A19.3 Costs of production

Service	Cost
Subscription	£ 87 p.a.
Mobile voice calls	7.78 ppm
Messaging	0.17 ppm
Data	18.96 pp Mbyte
Fixed-to-mobiles calls	5.09+3.51 ppm (excludes externality surcharge)

Results

A19.14 In order to estimate the welfare gain the MCT charge is constrained to be at the monopoly level (estimated by Ofcom to be 24.2ppm) and this is compared to Ofcom's proposed regulatory charge (weighted average of 5.4pppm across all five MNOs). All other prices and quantities are then set so as to maximise consumer welfare with MNOs profits constrained to be zero. The figure below shows the results of the analysis:

[137] Estimated based on Ofcom's analysis of fixed retail prices and regulated MCT charges.

Figure A19.4 Results of the Ramsey model in 2010/11 (real 2006/07 prices)

	Unregulated (MCT = 24.2ppm)	**Regulated (MCT = 5.4ppm)**
Consumer surplus	£79.3bn	£80.7bn
Consumer gain	£1.4bn	

A19.15 The analysis compares an unregulated termination charge of 24.2 ppm based on Ofcom's estimate of the monopoly termination charge and a regulated termination charge of 5.4 ppm based on the weighted average (by termination volumes) of Ofcom's proposals for charges set out in Section 9.

A19.16 The welfare analysis estimates the change in consumption of calls to mobiles and mobile retail services following a move (via regulation) to a more efficient price structure. The welfare gain amounts to £1.4 billion in 2010/11 (in real 2006/07 prices) and over four years of a hypothetical charge control, under the assumption of a smooth glide path down to the target charge from the monopoly charge amounts to approximately £3.3billion in present value terms[138] at the beginning of 2007/08.

[138] Assuming a real discount rate of 3.5% as per the Treasury's Green Book and discounting at mid year intervals.

Annex 20

Responses to March 2006 Consultation

A20.1 The March 20067 consultation asked interested parties to respond to the following questions;

> **Question 1**: Do respondents agree with Ofcom's view that there are separate markets for wholesale mobile voice call termination on the networks of Vodafone, O2, T-Mobile, Orange and H3G?
>
> **Question 2**: Do respondents agree with Ofcom's view that, given the market definition proposed in Section 3, above Vodafone, O2, T-Mobile, Orange and H3G each have prima facie SMP in the respective market for wholesale mobile voice call termination on their network(s)?
>
> **Question 3:** Do you feel that Ofcom has understated the benefits to consumers of a mandated move to an RPP charging regime? Ofcom is particularly interested in hearing from consumer groups.
>
> **Question 4:** Do you agree with Ofcom's position that a mandated form of technological intervention to address the underlying cause of SMP is not currently feasible, and that the development costs relative to the benefits would be unlikely to pass a cost-benefit analysis?
>
> **Question 5:** Do you agree that an attempt to rely on a general obligation that mobile voice call termination charges should be "fair and reasonable" or "cost oriented" would be highly likely to result in a period of commercial and regulatory uncertainty followed by the ad hoc imposition of charge controls in response to individual disputes ?
>
> **Question 6**: Do you agree that the direct setting of charge controls is an efficient and proportionate remedy for SMP in the market for wholesale mobile voice call termination?
>
> **Question 7**: Do you agree that, from the perspectives of both practical implementation and economic efficiency, a technology-neutral charge is strongly preferable to separate controls across different technologies?
>
> **Question 8**: Do you believe that the factors listed below paragraph 7.99 are relevant in assessing the appropriate level(s) of technology-neutral call termination charge(s)? Are there any other key relevant factors?

A20.2 Eight responses were received, one of which was confidential, non confidential responses were received from Vodafone, O2, T-Mobile , Orange, H3G, BT and C&W. Some of these respondents also supplied further confidential material. [✂]. Ofcom has responded, in the relevant section of this consultation document, to the specific issues raised by respondents. Ofcom is summarising responses, without comment, in this Annex. Non confidential responses have also been published on Ofcom's website.

General views of fixed network operators

A20.3 BT and C&W broadly agreed with Ofcom's initial views, as expressed in the March 2006 Consultation, on market definition, SMP, detriments and approach to remedies. BT proposed that, in view of the uncertainty over 3G unit costs, Ofcom should benchmark all termination charges to 2G costs and that Ofcom should impose an RPI-X charge cap based on anticipated efficiency savings over the period of the charge cap . BT also called for an end to the network externality surcharge which BT characterised as a tax on fixed network users to subsidise mobile services. C&W too was in favour of a price cap to apply uniformly to 2G and 3G termination. Although C&W expressed no view on how the level of that cap should be set, it argued that Ofcom's updated 2G model shows that charges today are above cost.

A20.4 [✂].

General view of MNOs

A20.5 Responses from the 2G/3G MNOs all disagreed with Ofcom's market definition which, those MNOs argued, was too narrow and should be widened to include a cluster of related markets including those for outgoing retail services. In the view of the 2G/3G MNOs, these broadened markets are competitive (as evidenced, in large part, by competition to supply retail outgoing mobile services). Vodafone, Orange and T-Mobile further argued that, even if Ofcom's narrow view of market definition is accepted, the ability to exercise SMP is constrained, variously by binding contractual undertakings, the availability of statutory dispute resolution and/or the risk of consumers substituting to services not reliant on MCT. Vodafone and T-Mobile also noted that unbalanced pricing is not uncommon in two-sided markets and should not be viewed as evidence of a lack of competition.

A20.6 H3G did not provide detailed comments on Ofcom's market definition, beyond noting that the market research which Ofcom had relied on was not operator-specific, despite the proposed market definitions being operator-specific. In H3G's view, there may be factors specific to H3G, including the claimed high levels of dual handset ownership among H3G customers, which mean that market definition may be different in respect of termination by H3G. H3G also argued, as did T-Mobile, that there is a wide variety of services which some consumers may use some of the time as substitutes for services reliant on MCT, including converged fixed mobile services, calls to fixed lines and SMS. H3G argued that these factors mean that Ofcom's initial view of market definition may not be robust over the period under review.

A20.7 The 2G/3G MNOs noted that, as Ofcom had not yet completed its analysis of CBP, they were unable to comment on whether SMP is constrained by CBP. In H3G's view it faces CBP such that it does not have SMP.

A20.8 In respect of Ofcom's initial view of remedies for SMP, all MNOs questioned whether a cost benefit analysis would support the imposition of intrusive regulation such as controls on charges. Vodafone, Orange and T-Mobile saw more merit, than had the March 2006 Consultation, in an alternative condition requiring that charges should be "fair and reasonable" or "cost oriented", particularly if such conditions were supported by guidelines published by Ofcom. This view was also held by H3G, which argued that charge controls are insufficiently flexible in the presence of possible regulatory forecasting errors. O2, however, was strongly against the alternative use of a fair and reasonable charges or cost orientation condition,

arguing that it would be exploited by some MNOs which would set high charges in the knowledge that legal process to reduce these would be time consuming, and that other MNOs would be forced to follow suit. 2G/3G MNOs agreed, however, that, where direct charge controls are demonstrated to be necessary, such controls should be technology-neutral. H3G, however, took the opposite view, arguing that any charge regulation should fully take into account differences between technologies, and that Ofcom should regulate with the objective of providing appropriate incentives aligned with a set of public policy objectives, particularly with respect to 3G investment incentives.

Responses to specific questions

Question 1: Do respondents agree with Ofcom's view that there are separate markets for wholesale mobile voice call termination on the networks of Vodafone, O2, T-Mobile, Orange and H3G?

A20.9 BT, C&W all agreed with Ofcom's view. [✂]

A20.10 Vodafone, O2, T-Mobile and Orange all disagreed with Ofcom's view, arguing instead that mobile voice call termination forms part of a cluster of markets including outbound mobile services. In support of this view, O2 provided some data relating to the behaviour of those of O2 Germany's customers which use the Genion service. This service provides mobile phone users with two numbers on which callers may contact them; one which callers may use to make a call at geographic rates (a supplement being paid by the mobile called party) and the other which costs callers mobile call rates. O2 claimed that large numbers of mobile users are sufficiently sensitive to the cost to others of calling them that they make the "geographic" number widely available to possible callers. Vodafone and T-Mobile both remarked that mobile call termination is a two-sided market characterised by two distinct groups (callers and called parties) who need each other to complete a call, and the mobile network acts as a platform to bring these two groups together; as such, Vodafone and T-Mobile argued that it is not appropriate to consider mobile call termination in isolation from outbound mobile services.

A20.11 H3G also disagreed with Ofcom's view, although it did not present an alternative market definition. H3G argued that Ofcom's market research on which Ofcom's view of the market definition was based, was deficient in failing to distinguish between the different MNOs. [✂]

Question 2: Do respondents agree with Ofcom's view that, given the market definition proposed in Section 3, above Vodafone, O2, T-Mobile, Orange and H3G each have prima facie SMP in the respective market for wholesale mobile voice call termination on their network(s)?

A20.12 BT, C&W all agreed with Ofcom's view. [✂]

A20.13 Vodafone, O2, T-Mobile and Orange all disagreed with Ofcom's view, arguing that, even if Ofcom's market definition is accepted, they do not have SMP. Each presented various arguments to support this view, but all reserved their position on the impact of any CBP until Ofcom had completed its own analysis.

A20.14 T-Mobile argued that it faces multiple potential substitutes to calling a person on their mobile phone (including email, WiFi/WiMax and converged fixed/mobile

services) which, when taken together, mean that T-Mobile is constrained in its ability to levy monopoly charges. T-Mobile claimed that this effect is exacerbated by the existence of closed user groups which care about the cost of incoming calls. T-Mobile further argued that fixed and mobile users are becoming increasingly close competitors and, consequently, fixed network operators are reluctant to pass-through reductions in mobile call termination charges to reduced retail prices for calling mobiles, as to do so would serve to underline the viability of substituting to mobile services. T-Mobile also expressed concern that the emergence of fixed/mobile converged services will greatly reduce mobile call termination revenues as converged handsets will increasingly route incoming calls over fixed or WiFi networks when the phone is within range of such networks. In T-Mobile's view VoIP too presents a risk to MNOs' voice termination revenues.

A20.15 Orange pointed to the existence of contractual arrangements which, it argued, constrain its ability to increase charges.

A20.16 Vodafone argued that the availability of dispute resolution by Ofcom is itself a manifestation of CBP which constrains its ability to levy excessive charges, particularly where cost modelling work by Ofcom conditions the industry's understanding of what might be considered a cost oriented charge. Vodafone also noted that, in assessing whether an MNO has SMP, Ofcom must consider whether, absent regulation, prices would be constrained to a level consistent with a competitive outcome; in the view of Vodafone, that level is not necessarily the same as the output of a LRIC model.

A20.17 Beyond noting that Ofcom had yet to complete its analysis of CBP, O2 made no specific comments on the existence of SMP other than to remark that the extent of SMP held by each MNOs in their respective market is identical.

A20.18 H3G questioned the basis of Ofcom's "prima facie" conclusion about the existence of SMP, particularly as Ofcom has not yet completed its analysis of CBP and the impact of dispute resolution. In H3G's view, it faces CBP such that it does not have SMP. In H3G's view, the key purchaser of MCT is BT, as the availability of transit services from BT effectively establishes a ceiling on what other originating operators will pay for MCT. Further, H3G argued that it has no ability to obtain an unreasonable price for termination from BT as BT always has the ability to refer an unreasonable price to Ofcom for a price determination. H3G also argued that Ofcom's initial analysis of CBP failed to give sufficient weight to consideration of the asymmetry of effects of non agreement between BT and H3G. In H3G's view, it would have absolutely no credible threat not to interconnect with BT and this should be taken into consideration in an assessment of the relative size of the different credible threats which the parties may make during negotiation. H3G also criticised Ofcom's analysis of the impact of reciprocity of trade between MNOs offering MCT to each other; in particular, H3G questioned Ofcom's view that it is possible that this reciprocity may afford MNOs purchasing MCT a stronger bargaining position than is enjoyed by fixed network operators.

Question 3: Do you feel that Ofcom has understated the benefits to consumers of a mandated move to an RPP charging regime? Ofcom is particularly interested in hearing from consumer groups.

A20.19 Ofcom received no responses from consumer groups. Responses from fixed networks operators and MNOs were all against a mandated move to RPP. O2, Orange, T-Mobile and C&W all specifically warned that such a change would be disruptive to retail markets [✂].

Question 4: Do you agree with Ofcom's position that a mandated form of technological intervention to address the underlying cause of SMP is not currently feasible, and that the development costs relative to the benefits would be unlikely to pass a cost-benefit analysis?

A20.20 All respondents agreed that such technical intervention is not currently feasible, and that costs were likely to outweigh the benefits.

Question 5: Do you agree that an attempt to rely on a general obligation that mobile voice call termination charges should be "fair and reasonable" or "cost oriented" would be highly likely to result in a period of commercial and regulatory uncertainty followed by the ad hoc imposition of charge controls in response to individual disputes ?

A20.21 BT and C&W both agreed with Ofcom's view, and BT draw attention to what it perceived as a failure of such an approach during the 1990s which led to charges being referred to the MMC in 1998. [✂]

A20.22 The views of mobile network operators were more varied. O2 agreed with Ofcom's view and argued strongly that such as approach would be abused by some MNOs which would exploit the uncertainty by setting high charges, prompting others to follow suit. Vodafone, T-Mobile and Orange, however, all noted that such a framework could be made to work provided that Ofcom issued appropriate guidelines. That view was also shared by H3G. T-Mobile also drew parallels with Ofcom 's proposal to withdraw BT's retail price controls, despite BT's continuing high market share in the access and calls markets.

Question 6: Do you agree that the direct setting of charge controls is an efficient and proportionate remedy for SMP in the market for wholesale mobile voice call termination?

A20.23 BT and C&W both agreed with Ofcom's view. [✂]

A20.24 The mobile network operators expressed varied views. Vodafone and Orange, while rejecting the need for charge controls in this market, and while arguing that an approach based on an obligation that charges should be "fair and reasonable" could be made to work, also recognised that charge controls can be an efficient mechanism for controlling charges (where such controls are fully justified). O2 made no specific comment on the generic merits of charge controls in this market, although O2 provided detailed comments on the way in which the level of any charge controls should be set and how they should be applied to different MNOs. T-Mobile, while warning of the adverse impact of charge controls set at too low a level, and while favouring deregulation, noted that a safeguard cap set at an appropriate level would be a proportionate approach. H3G strongly favoured what it characterised as an "ex post" approach to price controls, be that based on competition law or on an obligation that charges should be cost oriented or "fair and reasonable". In H3G's view charge controls fail to provide adequate flexibility at a time when costs may be uncertain.

Question 7: Do you agree that, from the perspectives of both practical implementation and economic efficiency, a technology-neutral charge is strongly preferable to separate controls across different technologies?

A20.25 All non confidential responses, from fixed network operators and MNOs except H3G, agreed that, if a charge control can be justified, the control should apply without differentiation between termination on the 2G and 3G networks of an MNO which uses both types of network to terminate voice calls. [✂] T-Mobile, O2 and Vodafone each agreed that a single control would create appropriate incentives for MNOs to adopt traffic loading and migration strategies consistent with cost minimisation. Orange did not comment on this proposal. Vodafone caveated its response, however, with a concern that Ofcom may have conflated the idea of technological neutrality with a view that the technology neutral charge should be based on 2G costs. (Ofcom has clarified its position in section 9 above). With the same concern in mind, Vodafone also sought to draw a number of inferences from Ofcom's stated views on charge controls in the context of BT's NGN.

A20.26 H3G expressed strong concern about the basis on which the level of a technology-neutral control might be set. H3G also claimed that Ofcom's March 2006 Consultation had failed to consider the full range of possible approaches to setting and implementing charge controls on 2G and 3G networks. In particular, H3G claimed that the document had failed fully to consider the possibility that distinct controls on 2G and 3G termination could be implemented either by (a) requiring each call to be charged for on the basis of whether it is terminated on 2G or 3G or by (b) allowing the same charge, calculated on the basis of a traffic weighted blending of the two charge caps, to be applied to all calls. H3G also claimed that the document had failed fully to consider the theoretical possibilities that a single control (to apply uniformly to both 2G and 3G termination) could be set variously by reference to only 2G costs, only 3G costs or some blend of the two based on the cost modelling work.

A20.27 H3G also expressed particular concern that, in H3G's view, Ofcom had dismissed, on the basis of flawed reasoning, a possible approach based on separate controls for each of 2G and 3G termination being blended together for the purpose of charging for each call. H3G argued that Ofcom had failed adequately to explain its view that the information asymmetry between MNOs and Ofcom is such that, where distinct charge caps are set in respect of 2G and 3G termination, one or other cap will be viewed by MNOs as less stringent than the other, and thereby allowing a higher profit margin than the other form of termination. H3G argued that Ofcom had failed to explain the theory and practice behind this view. H3G further argued that Ofcom's view that it is important that profit maximising and cost minimising outcomes should be congruent, and that such congruence may be disrupted where either 2G or 3G caps are not perceived to afford the same level of profitability, unduly focuses on achieving cost minimisation and profit maximisation for voice call termination (when mobile networks are used to provide a wider bundle of services). H3G also warned that the approach takes a short term view, implicitly ignores the need for cost recovery, prejudges the outcome of the cost modelling and, in practice, is not technology neutral. H3G further argues that a single charge presents MNOs with distorted incentives to delay or accelerate migration to 3G networks, reflecting whether 3G or 2G is the cheaper technology.

Question 8: Do you believe that the factors listed below paragraph 7.99 are relevant in assessing the appropriate level(s) of technology-neutral call termination charge(s)? Are there any other key relevant factors?

A20.28 The factors listed below paragraph 7.99 were

- Controls imposed only on 2G voice call termination provide MNOs with both the incentive and opportunity to set high unregulated charges for 3G, and so above-cost blended charges

- Separate controls on 2G and 3G voice call termination would present a material incentive for MNOs to migrate traffic between 2G and 3G networks to reflect any perceived imbalance in the stringency of each control, thus distorting the commercial decisions of the MNOs.

- A technology-neutral control to apply to both 2G and 3G voice call termination (for a given MNO) would present incentives for MNOs to invest in and migrate traffic to the most cost effective technology, thereby introducing the appropriate congruence of profit maximising and cost minimising outcomes.

- There are likely to be small, or non-existent cost differences between the 3G operations of the five MNOs that are borne of circumstances outside of their control (exogenous cost differences).

- Exogenous cost differences may persist going forward between the 2G operations of, on the one hand, Vodafone and O2 and, on the other, T-Mobile and Orange, but can be expected to reduce as the proportion of 3G termination increases.

- Any continuing exogenous cost differences may be overshadowed by the uncertainties and complexities associated with cost modelling in the face of 3G network deployment and traffic migration. As a consequence, some perceived differences across operators may be borne of inherently uncertain analysis and assumptions about future volumes of 2G and 3G voice call termination.

- The current arrangements for MNP result in differences between the 'effective' call termination charge faced by operators, and their imposed charge control, which may exacerbate the uncertainties surrounding the detailed cost modelling and the implications for the appropriate levels of cost oriented charges and how these feed through into the termination set by each operator in

A20.29 BT agreed that charge controls should be imposed on all MNOs with SMP and that the controls should be imposed on a technology neutral basis. BT said it had no grounds for believing that, where controls are set on 3G termination, different controls should be set for different MNOs, except where an MNO has been charging very high rates for call termination while this technology has been unregulated; in BT's view account should be taken of any over-recovery of costs to date. C&W agreed with the list of factors set out by Ofcom. [✂].

A20.30 O2 also agreed that all of the factors listed by Ofcom are relevant in determining the approach to charge setting. O2 underlined its view that all MNOs face the same exogenous market conditions even though they may choose to adopt different strategies in response, including when bidding for spectrum. O2 did argue, however, that 2G/3G MNOs face additional efficiently incurred costs in migrating to 3G which are not faced by new entrant 3G MNOs. O2 was strongly of the view that

the charge cap differential between 900/1800 MHz and 1800MHz MNOs is unjustified. O2 added, however, that any charge controls should be capable of taking into account any changes in 2G spectrum charging and in legislation relating to international roaming.

A20.31 O2 also recorded its view that it would not be appropriate for Ofcom to use charge controls as a means to promote the migration of customers from 2G to 3G ,as that is a matter for the market to determine. O2 proposed that, in view of the likely uncertainties in 3G cost modelling, Ofcom should peg 3G termination charges to 2G costs.

A20.32 Vodafone agreed that a single charge cap will present the correct investment incentives and that there is no robust evidence to suggest that there are, or will be, material differences between the costs of termination faced by the MNOs in the UK. Vodafone also added that, in its view, the average of 2G and 3G costs lie above the standalone 2G rate for the period covered by the consultation, and that if MNOs are prevented from recovering their costs they will delay investment in 3G handsets and infrastructure.

A20.33 Orange's response was limited to agreeing that a technology neutral approach is the appropriate way forward, but that Ofcom must take into account cost differences due to the differences in 1800 MHz and 900 MHz spectrum. Orange also noted Ofcom's recognition that it will need to ensure that the approach does not adversely affect prospects for future investment.

A20.34 T-Mobile agreed that controls should be based on a uniform rate across technologies. T-Mobile shared Orange's view that the charge differential between 1800MHz and 900MHz networks should be retained, but T-Mobile agreed that exogenous differences in relation to 3G spectrum are likely to be much smaller.

A20.35 As noted above, in relation to responses to question 7 of the March 2006 Consultation, H3G's response expressed strong reservations about a technology neutral approach to charge controls and the basis on which the level might be determined. H3G was particularly concerned that any charge cap should enable MNOs to recover their efficiently incurred costs. H3G also expressed particular concern about Ofcom's observation that, from an end user perspective, call termination is a homogenous service for which, in a competitive market, suppliers might be unable to maintain different charges; in H3G's view, Ofcom had failed to consider the more relevant question whether conditions of demand and supply are homogenous (particularly with regard to new entrants). H3G also observed that, as it is Ofcom's view that there are separate markets for termination of voice calls on the network(s) of each MNO, then the price of termination on other networks is not relevant.

A20.36 H3G claimed that it was unclear how Ofcom could propose, before completing its cost modelling work, that controls imposed only on 2G voice call termination present MNOs with an opportunity to set high unregulated charges for 3G termination and, where an MNO terminates calls on 2G and 3G networks, above cost blended rates.

A20.37 In responding to Ofcom's concern that separate controls on both 2G and 3G termination would present material incentives for MNOs to migrate traffic between 2G and 3G networks to reflect any perceived imbalance in the stringency of each control, H3G argued that in setting a single charge level on both 2G and 3G termination there will always be an imbalance in the stringency of the control

between 2G and 3G networks, and this will create distorting incentives. In H3G's view, whether a single control to apply to both 2G and 3G termination presents incentives to invest in, and migrate traffic to the most cost effective technology depends on the way in which the control is implemented.

A20.38 H3G disagreed that there are likely to be small or non existent cost differences between the 3G operations of the five MNOs that are borne of exogenous cost differences, and questioned how Ofcom could reach this view before completing its cost modelling. H3G also stated that in its view it is "inconsistent" to say that exogenous cost differences between the 3G operations of the five MNOs are likely to be small or non existent while arguing that some exogenous costs differences may persist between MNOs using 1800MHz and 900 MHz 2G networks.

A20.39 H3G noted that any view as to exogenous costs differences between MNOs must be based on cost modelling, and that, having modelled those costs, it is not sufficient merely to observe that there is a point where the ranges of uncertainty in respect of each MNO's costs intersect and set a common control at that point.

A20.40 In noting Ofcom's observation that arrangements for mobile number portability exacerbate the uncertainties surrounding the detailed cost modelling, H3G argued that Ofcom should be addressing the causes of this further uncertainty.

A20.41 H3G requested further clarification on how the factors listed in paragraph 7.99 of the March 2006 Consultation align with Ofcom's objectives, and also stated that the list omits certain key factors. In H3G's view, any charge controls should apply separately to 2G and 3G terminations, although MNOs should be permitted to meet these individual caps by setting a blended rate. The levels of any charge controls should take into account, inter alia, the position of new entrants versus incumbents, and should consider the short and long run incentives on operators including investment in new technologies and migration to 3G.

A20.42 In H3G's view, MNOs which terminate calls on both 2G and 3G networks should be permitted to levy termination charges which reflect migration costs, or which reflect higher costs of 3G, only to the extent that migration has actually taken place.

Other issues

A20.43 All MNOs recommended that Ofcom should consider the position of future new entrants vis a vis mobile voice call termination, including BT Fusion. H3G argued that, as a minimum, Ofcom should commit to conducting a further market review as soon as BT starts to operate services or has effective control over the termination rate to its numbers.

A20.44 Vodafone and T-Mobile also commented that the decision to deploy 3G networks was not taken solely or primarily with a view to achieve lower costs for voice call termination. Vodafone observed that the reasons have to do with the facts that 3G spectral efficiency will provide capacity for growth in voice and non voice services, that 3G enables higher bandwidth services to be provided (and provided efficiently on the same network as lower bandwidth services) and that, potentially, 3G may enable voice transmission quality comparable to that of a fixed network. Vodafone emphasised that once a decision is taken to deploy 3G it is practically necessary and economically advantageous to use it eventually for all services (including voice), even though it may or may not be cheaper for voice when considered alone.

Annex 21

Notifications and proposed SMP conditions

Proposals for the revocation of notifications, identification of markets, the making of market power determinations and the setting of SMP services conditions in relation to H3G, O2, Orange, T-Mobile and Vodafone

1. The Office of Communications (OFCOM) in accordance with sections 48(2) and 80 of the Communications Act 2003 (the "Act") hereby makes the following proposals for identifying markets, making market power determinations and the setting of SMP services conditions by reference to such determinations ("SMP conditions").

2. OFCOM is proposing to identify the following markets for the purpose of making market power determinations:

(a) wholesale mobile voice call termination provided to other Communications Providers by H3G;

(b) wholesale mobile voice call termination provided to other Communications Providers by O2;

(c) wholesale mobile voice call termination provided to other Communications Providers by Orange;

(d) wholesale mobile voice call termination provided to other Communications Providers by T-Mobile; and

(e) wholesale mobile voice call termination provided to other Communications Providers by Vodafone.

3. OFCOM are proposing to make market power determinations that the following persons have significant market power in relation to the markets referred to in paragraph 2 above:

(a) in relation to the market in sub-paragraph (a), H3G;

(b) in relation to the market in sub-paragraph (b), O2;

(c) in relation to the market in sub-paragraph (c), Orange;

(d) in relation to the market in sub-paragraph (d), T Mobile; and

(e) in relation to the market in sub-paragraph (e), Vodafone.

4. OFCOM are proposing to set SMP conditions on the persons referred to in paragraph 3 above as set out in the Notification.

5. The effect of, and OFCOM's reasons for making, the proposals to identify the markets set out in paragraph 2 above are contained in the explanatory statement published with this Notification.

6. The effect of, and OFCOM's reasons for making, the proposals to make the market power determinations set out in paragraph 3 above are contained in the explanatory memorandum published with this Notification.

7. The effect of, and OFCOM's reasons for making, the proposals to set the SMP conditions set out in the Schedule to this Notification are contained in the explanatory statement published with this Notification.

8. For the avoidance of doubt, the notifications at:

(a) Annex A in the *Wholesale mobile voice call termination market review*, published by OFCOM on 1 June 2004, and any subsequent modifications to the SMP services conditions set by those Notifications, and

(b) Annex 3 in the *Assessment of whether H3G holds a position of SMP in the market for wholesale mobile voice call termination on its network* published by Ofcom on 13 September 2006:

shall be revoked by this proposed Notification when it takes effect under sections 48 (1) and 79 (4) of the Act.

9. In identifying and analysing the markets referred to in paragraph 2 above, and in considering whether to make the proposals set out in this Notification, OFCOM has taken due account of all applicable guidelines and recommendations which have been issued or made by the European Commission in pursuance of a Community instrument, and relate to market identification or analysis, as required by section 79 of the Act.

10. OFCOM considers that the proposed SMP services conditions referred to in paragraph 4 above comply with the requirements of sections 45 to 50 and sections 78 to 92 of the Act, as appropriate and relevant to each such SMP services condition.

11. In making all of the proposals referred to in paragraphs 2, 3, and 4 of this Notification OFCOM has considered and acted in accordance with the six Community requirements in section 4 of the Act as well as performed their duties under section 3 of the Act;

12. Representations may be made to OFCOM about the proposals set out in this Notification and the accompanying explanatory statement by 22 November 2006. Respondents are asked to provide representations in the manner set out in annex 1 of the explanatory memorandum accompanying this Notification.

13. Copies of this Notification and the accompanying explanatory statement have been sent to the Secretary of State in accordance with section 50(1)(a) of the Act, and to the European Commission and regulatory authorities of every other Member State in accordance with sections 50(3) and 81 of the Act.

14. Save for the purposes of paragraph 2 of this Notification and except as otherwise defined in this Notification, words or expressions used shall have the same meaning as in the Act.

15. In this Notification:

"**Act**" means the Communications Act 2003;

"**H3G**" means Hutchison 3G (UK) Limited (registered company number 3885486) including any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by section 736 of the Companies Act 1985, as amended by the Companies Act 1989;

"**O2**" means O2 Limited (registered company number 1743099) including any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by Section 736 of the Companies Act 1985, as amended by the Companies Act 1989;

"**Orange**" means Orange plc (registered company number 2178917) including any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by Section 736 of the Companies Act 1985, as amended by the Companies Act 1989;

"**T-Mobile**" means T Mobile Limited (registered company number 2382161) including any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by Section 736 of the Companies Act 1985, as amended by the Companies Act 1989;

"**Vodafone**" means Vodafone Limited (registered company number 1471587) including any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by Section 736 of the Companies Act 1985, as amended by the Companies Act 1989;

Steve Unger
Competition Policy Director

A person authorised by Ofcom under paragraph 18 of the Schedule to the Office of Communications Act 2002

13 September 2006

SCHEDULE 1

[DRAFT] The SMP services conditions imposed on H3G, O2, Orange, T-Mobile and Vodafone under sections 45, 87 and 88 of the Act as a result of the analysis of the market set out in this Notification, ("SMP conditions")

Part 1: Application, definitions and Interpretation of these conditions

1. The SMP conditions in Part 2 of this Schedule shall, except insofar as it is otherwise stated therein, apply to the markets set out in paragraphs 2 (a) to (e) above of this Notification.

2. In this Schedule:

"**2G Public Electronic Communications Network**" means a mobile Public Electronic Communications Network which operates using spectrum within the bands 880 to 915 MHz, 925 to 960 MHz, 1710 to 1785 MHz, or 1805 to 1880 MHz;

"**2G Call**" means a circuit switched conveyance of a speech teleservice only (as defined in the relevant standards of the European Telecommunications Standards Institute) which:

(i) originates in a Public Electronic Communications Network (whether fixed or mobile);

(ii) is conveyed via the gateway mobile service switching centre of the Dominant Provider and the 2G Public Electronic Communications Network of another Communications Provider (the "2G Provider");

(iii) is terminated using the GSM air interface of the 2G Provider, or by agreement, of another Communications Provider; and

(iv) terminates on a GSM mobile handset of a Customer of the Dominant Provider.

For the purposes of this definition:

(a) "the relevant standards of the European Telecommunications Standards Institute" means the European Telecommunications Standard (ETS) of ETS 300 905 (GSM 02.03 version 5.3.2), Third Edition, January 1998, which has been produced by the Special Mobile Group of the European Telecommunications Standards Institute; and

(b) "GSM" means the Global System for Mobile communications, as defined in the relevant standards of the European Telecommunications Standards Institute;

"3G Public Electronic Communications Network" means a mobile Public Electronic Communications Network which operates using spectrum within the bands 1900 -1980 MHz or 2110 -2170 MHz;

"**3G Call**" means a circuit switched conveyance of a speech teleservice only (as

defined in the relevant standards of the 3rd Generation Partnership Project) originating in a Public Electronic Communications Network (whether fixed or mobile) and which terminates on a mobile handset which is connected to the 3G Public Electronic Communications Network of the Dominant Provider.

For the purposes of this definition "the relevant standards of the 3rd Generation Partnership Project" means the following standards of the 3rd Generation Partnership Project-

(a) 3G TS 22.001 V3.2.0 (2000-03) (Technical Specification: Digital cellular telecommunications system (Phase 2+), Technical Specification Group Services and System Aspects, and Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLAN)) (Release 1999);

(b) 3GPP TS 22.002 V3.6.0 (2001-03) (Technical Specification: Technical Specification Group Services and System Aspects, and Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)) (Release 1999);

(c) 3G TS 22.003 V3.3.0 (2000-06) (Technical Specification: Technical Specification Group Services and System Aspects, and Circuit Teleservices supported by a Public Land Mobile Network (PLMN)) (Release 1999); and

(d) 3GPP TS 22.101 V 3.17.0 (2004-03) (Technical Specification: Technical Specification Group Services and System Aspects, Service aspects and Service principles) (Release 1999);

"**Access Charge Change Notice**" has the meaning given to it in Condition MA6.3;

"**Access Contract**" means a contract for the provision of Network Access;

"**Act**" means the Communications Act 2003;

'**Base Year**' means for each Relevant Year, the period of 12 months ending on 31 March immediately preceding that Relevant Year.

"**Call**" means either a 2G Call or a 3G Call;

"**Controlling Percentage**" means, in relation to any Relevant Year, the amount of change in the Retail Prices Index in the period of 12 months ending on the 31 December immediately before the beginning of that Relevant Year, expressed as a percentage (rounded to two decimal places) of that Retail Prices Index as at the beginning of that period reduced by:

(a) [ ] for H3G, [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*]

(b) [ ] for O2, [*see Figure 9.6of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*]

(c) [ ] for Orange, [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*]

(d) [ ] for T-Mobile, [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*] and

(e) [ ] for Vodafone, [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*]

"Charging Period" means any of the current charging periods published by the Dominant Provider;

"**Director"** means the Director-General of Telecommunications as appointed under section 1 of the Telecommunications Act 1984;

"**Dominant Provider"** means H3G, O2, Orange, T-Mobile and Vodafone;

"**Fixed-to-Mobile Call**" means a Call originating in a fixed Public Electronic Communications Network which is terminated on the Dominant Provider's network and where the Dominant Provider sets the charge

"**Fixed-to-Mobile Interconnection Charge**" means the charge published in accordance with SMP condition MA6 made by the Dominant Provider for the Interconnection of a Fixed-to-Mobile Call, excluding any discounts offered by the Dominant Provider, whether in respect of any particular Customer or any category of Customers or any category of Calls;

"Functional Specification" shall have the same meaning as in Condition 18 of the General Conditions of Entitlement or its equivalent;

"**General Conditions of Entitlement**" means those general conditions set by the Director by way of publication of a Notification under section 48(1) of the Act on 22 July 2003;

"**H3G**" means Hutchison 3G UK Limited whose registered company number is 3885486 and any Hutchison 3G (UK) Limited subsidiary or holding company, or any subsidiary of that holding company, all as defined by section 736 of the Companies Act 1985 as amended by the Companies Act 1989;

"**Mobile-to-Mobile Call**" means a Call originating in a mobile Public Electronic Communications Network of another Communications Provider which is terminated on the Dominant Provider's network and where the Dominant Provider sets the charge;

"**Mobile-to-Mobile Interconnection Charge**" means the charge published in accordance with SMP condition MA6 made by the Dominant Provider for the Interconnection of a Mobile-to-Mobile Call, excluding any discounts offered by the Dominant Provider, whether in respect of any particular Customer or any category of Customers or any category of Calls;

"**Network Access**" means the provision of Interconnection to the Public Electronic Communications Network provided by the Dominant Provider, together with any services, facilities or arrangements which are necessary for the provision of Electronic Communications Services over that Interconnection;

"**O2**" means O2 (UK) Limited, whose registered company number is 1743099 and any O2 (UK) Limited subsidiary or holding company, or any subsidiary of that holding company, all as defined by section 736 of the Companies Act 1985 as amended by the Companies Act 1989;

"OFCOM" means the Office of Communications;

"**Orange**" means Orange Personal Communications Services Limited, whose registered company number is 2178917 and any Orange Personal Communications Services Limited subsidiary or holding company of the companies listed in (a) to (b) above, or any subsidiary

of that holding company, all as defined by section 736 of the Companies Act 1985 as amended by the Companies Act 1989;

‘**Relevant Year**’ means any of the following:

(i) the period of 12 months beginning on 1 April 2007 and ending on 31 March 2008 (the “First Relevant Year”);

(ii) the period of 12 months beginning on 1 April 2008 and ending on 31 March 2009 (the “Second Relevant Year”);

(iii) the period of 12 months beginning on 1 April 2009 and ending on 31 March 2010 (the “Third Relevant Year”); and

(iv) the period of 12 months beginning on 1 April 2010 and ending on 31 March 2011 (the “Fourth Relevant Year”);

“**Retail Prices Index**” means the index of retail prices compiled by an agency or a public body on behalf of Her Majesty’s Government or a governmental department from time to time in respect of all items (which is the Office for National Statistics at the time of publication of this Notification);

“**Subscriber Number**” shall have the same meaning as in the Functional Specification;

“**T- Mobile**” means T-Mobile (UK) Limited, whose registered company number is 2382161; and any T-Mobile (UK) Limited subsidiary or holding company, or any subsidiary of that holding company, all as defined by section 736 of the Companies Act 1985 as amended by the Companies Act 1989;

"**Third Party**" means a person providing a Public Electronic Communications Network; and,

”**Vodafone**” means Vodafone Limited, whose registered company number is 1471587; and any Vodafone Limited subsidiary or holding company, or any subsidiary of that holding company, all as defined by Section 736 of the Companies Act 1985 as amended by the Companies Act 1989.

3. For the purpose of interpreting the SMP conditions in Part 2 of this Schedule:

(a) except insofar as the context otherwise requires, words or expressions shall have the meaning ascribed to them in paragraph 2 above and otherwise any word or expression shall have the same meaning as it has in the Act;

(b) the Interpretation Act 1978 shall apply as if each of the SMP conditions were an Act of Parliament; and

(c) headings and titles shall be disregarded.

Part 2: The SMP conditions

Condition MA1 – Requirement to provide network access on reasonable Request

MA1.1 Where a Third Party reasonably requests in writing Network Access, the Dominant Provider shall provide that Network Access. The Dominant Provider shall also provide such Network Access as Ofcom may from time to time direct.

MA1.2 Subject to SMP condition MA1.3, the provision of Network Access in accordance with SMP condition MA1.1 above shall occur as soon as reasonably practicable and shall be provided on fair and reasonable terms and conditions (including charges) and on such terms and conditions (including charges) as Ofcom may from time to time direct.

MA1.3 The charges for Calls as covered by SMP conditions MA3 and MA4 below shall be as set out in those conditions, but only for the duration of those conditions.

MA1.4 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

Condition MA2 – Requirement not to unduly discriminate

MA2.1 The Dominant Provider shall not unduly discriminate against particular persons or against a particular description of persons, in relation to matters connected with Network Access.

Condition MA3 – Control of Fixed-to-Mobile Interconnection Charges

MA3.1 Except in so far as Ofcom may otherwise consent under SMP condition MA3.7 below, the Dominant Provider shall take all reasonable steps to secure that, during any Relevant Year, the Average Interconnection Charge does not exceed the Target Average Charge for the provision of Network Access.

MA3.2 In this Condition, the Average Interconnection Charge means the average of the Fixed-to-Mobile Interconnection Charges during the Relevant Year in question, which shall be weighted according to:

> (a) the profile by Charging Period of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls; and
>
> (b) the corresponding volumes by month or part-month of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls,

in the Base Year.

MA3.3 For the purposes of calculating the Average Interconnection Charge where any Fixed-to-Mobile Interconnection Charges are in force during a part only of the Relevant Year (commencing or ending at a date in the course of the Relevant Year), the weighting shall be derived from:

> a) the profile by Charging Period of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls; and
>
> (b) the corresponding volumes by month or part-month of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls,

in the corresponding part of the Base Year.

MA3.4 For the purposes of this Condition, the Target Average Charge means:

(a) for the purpose of the First Relevant Year

(i) […] pence per minute for H3G [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*];

(ii) […] pence per minute for O2 [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*];

(iii) […] pence per minute for Orange [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*];

(iv) […] pence per minute for T-Mobile [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*]; and

(v) […] pence per minute for Vodafone [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*];

(b) for the purpose of the Second, Third and Fourth Relevant Years:

the Target Average Charge in the Base Year multiplied by the sum of 100% and the Controlling Percentage.

MA3.5 The Dominant Provider shall not make any Fixed-to-Mobile Interconnection Charge for:

(a) a Fixed-to-Mobile Call which terminates on a recorded announcement provided by the Dominant Provider informing the caller of an inability to complete that call so as to establish a two-way path where the mobile handset used by the called party is switched off, or rings and remains unanswered, or where coverage is not available from the Dominant Provider's Public Electronic Communications Network; and

(b) an unanswered Fixed-to-Mobile Call which is diverted in respect of the period before that call is answered.

MA3.6 Notwithstanding (and without prejudice to the generality of) the obligation imposed on the Dominant Provider by SMP condition MA3.1 above:

(a) if the Dominant Provider has failed to secure that the Average Interconnection Charge has not exceeded the Target Average Charge for the First, Second or Third Relevant Year, the Dominant Provider shall make such adjustments to its Fixed-to-Mobile Interconnection Charges and by such day in the following Relevant Year as Ofcom may direct for the purpose of remedying that failure. Such adjustments in the Second, Third or Fourth Relevant Year shall not be relevant for the purpose of establishing compliance with SMP condition MA3.1 above in that Relevant Year; and

(b) if it appears to Ofcom that the Dominant Provider is likely to fail to secure that the Average Interconnection Charge for the Fourth Relevant Year does not exceed the Target

Average Charge for that Year, the Dominant Provider shall make such adjustments to its Fixed-to-Mobile Interconnection Charges and by such day in that year as Ofcom may direct for the purpose of avoiding that failure.

MA3.7 Where the Average Interconnection Charge is less than the Target Average Charge for the First, Second or Third Relevant Year, the Dominant Provider shall not make such adjustments to its Fixed-to-Mobile Interconnection Charges in the following Relevant Year to recover the difference between the Average Interconnection Charge and the Target Average Charge for the First, Second or Third Relevant Year, unless Ofcom have given their prior written consent to such adjustments. Such adjustments in the Second, Third or Fourth Relevant Year shall not be relevant for the purpose of establishing compliance with SMP condition MA3.1 in that Relevant Year.

MA3.8 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

MA3.9 In this Condition:

'**Average Interconnection Charge**' has the meaning given to it in SMP condition MA3.2; and

'**Target Average Charge**' shall have the meaning given to it in SMP condition MA3.4;

Condition MA4 - Control of Mobile to Mobile Interconnection Charges

MA4.1 Except in so far as Ofcom may otherwise consent under SMP condition MA4.7 below, the Dominant Provider shall take all reasonable steps to secure that, during any Relevant Year, the Average Interconnection Charge does not exceed the Target Average Charge for the provision of Network Access.

MA4.2 In this Condition, the Average Interconnection Charge means the average of the Mobile-to-Mobile Interconnection Charges during the Relevant Year in question, which shall be weighted according to:

(a) the profile by Charging Period of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls; and

(b) the corresponding volumes by month or part-month of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls,

in the Base Year.

MA4.3 For the purposes of calculating the Average Interconnection Charge where any Mobile-to-Mobile Interconnection Charges are in force during a part only of the Relevant Year (commencing or ending at a date in the course of the Relevant Year), the weighting shall be derived from:

(a) the profile by Charging Period of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls; and

(b) the corresponding volumes by month or part-month of the Dominant Provider's sum of minutes of Fixed-to-Mobile Calls and Mobile-to-Mobile Calls,

in the corresponding part of the Base Year.

MA4.4 For the purposes of this Condition, the Target Average Charge means:

(a) for the purpose of the First Relevant Year

(i) […] pence per minute for H3G [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*];

(ii) […] pence per minute for O2 [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*];

(iii) […] pence per minute for Orange [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*];

(iv) […] pence per minute for T-Mobile [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*]; and

(v) […] pence per minute for Vodafone [*see Figure 9.6 of the explanatory memorandum accompanying this Notification for the range on which Ofcom is consulting*];

(b) for the purpose of the Second, Third and Fourth Relevant Years:

the Target Average Charge in the Base Year multiplied by the sum of 100% and the Controlling Percentage.

MA4.5 The Dominant Provider shall not make any Mobile-to-Mobile Interconnection Charge for:

(a) a Mobile-to-Mobile Call which terminates on a recorded announcement provided by the Dominant Provider informing the caller of an inability to complete that call so as to establish a two-way path where the mobile handset used by the called party is switched off, or rings and remains unanswered, or where coverage is not available from the Dominant Provider's Public Electronic Communications Network; and

(b) an unanswered Mobile-to-Mobile Call which is diverted in respect of the period before that call is answered.

MA4.6 Notwithstanding (and without prejudice to the generality of) the obligation imposed on the Dominant Provider by SMP condition MA4.1 above:

(a) if the Dominant Provider has failed to secure that the Average Interconnection Charge has not exceeded the Target Average Charge for the First, Second or Third Relevant Year, the Dominant Provider shall make such adjustments to its Mobile-to-Mobile Interconnection Charges and by such day in the following Relevant Year as Ofcom may direct for the purpose of remedying that failure. Such adjustments in the Second, Third or Fourth Relevant Year shall not be relevant for the purpose of establishing compliance with SMP condition MA4.1 above in that Relevant Year; and

(b) if it appears to Ofcom that the Dominant Provider is likely to fail to secure that the Average Interconnection Charge for the Fourth Relevant Year does not exceed the

Target Average Charge for that Year, the Dominant Provider shall make such adjustments to its Mobile-to-Mobile Interconnection Charges and by such day in that Year as Ofcom may direct for the purpose of avoiding that failure.

MA4.7 Where the Average Interconnection Charge is less than the Target Average Charge for the First, Second or Third Relevant Year, the Dominant Provider shall not make such adjustments to its Mobile-to-Mobile Interconnection Charges in the following Relevant Year to recover the difference between the Average Interconnection Charge and the Target Average Charge for the First, Second or Third Relevant Year, unless Ofcom have given their prior written consent to such adjustments. Such adjustments in the Second, Third or Fourth Relevant Year shall not be relevant for the purpose of establishing compliance with SMP condition MA4.1 in that Relevant Year.

MA4.8 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

MA4.9 In this Condition:

'**Average Interconnection Charge**' has the meaning given to it in SMP condition MA4.2; and

'**Target Average Charge**' shall have the meaning given to it in SMP condition MA4.4.

Condition MA5 – Requirement to publish Access Contracts

MA5.1 Except in so far as Ofcom may otherwise consent in writing, the Dominant Provider shall publish its Access Contracts and act in the manner set out below.

MA5.2 The Dominant Provider shall, within 28 days of the date that this Condition comes into force, send to Ofcom and to every person who reasonably requests a copy its existing Access Contracts.

MA5.3 Without prejudice to Condition MA6, the Dominant Provider shall send to Ofcom and to every person who reasonably requests a copy any amendments to its existing Access Contracts and any new Access Contracts within 28 days of the date on which those amendments, or new Access Contracts, come into force.

Condition MA6 – Requirement to publish charges

MA6.1 Except in so far as Ofcom may otherwise consent in writing, the Dominant Provider shall publish its charges for the provision of Network Access and act in the manner set out below.

MA6.2 The Dominant Provider shall, within 28 days of the date that this Condition comes into force, publish its charges on which it provides Network Access.

MA6.3 The Dominant Provider shall publish any amendment to the charges on which it provides Network Access or in relation to any charges for new Network Access (an "Access Charge Change Notice") not less than 28 days before any such amendment comes into effect.

MA6.4 Publication of the information in conditions MA6.2 and MA6.3 shall be effected by:

(a) sending a copy of such information or any appropriate parts of it to any person who may reasonably request such a copy; and

(b) placing a copy of such information on any relevant website operated or controlled by the Dominant Provider.

MA6.5 The Dominant Provider shall ensure that an Access Charge Change Notice includes:

a. a description of, and the proposed new charge for the Network Access in question;

b. where applicable, the current charge for the Network Access in question; and

c. the date on which or the period for which any amendments to charges will take effect (the "effective date").

MA6.6 The Dominant Provider shall not apply any new charge identified in an Access Charge Change Notice before the effective date.