



## BT's response to Ofcom's consultation document

### *"Next Generation Networks*

*Responding to recent developments  
to protect consumers, promote effective competition and  
secure efficient investment"*

24th September 2009

BT welcomes comments on the content of this document, which will also be available at  
<http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Consultativeresponses/Ofcom/index.htm>

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## Executive summary

BT recognises that the deployment of Next Generation Networks (NGNs), both by BT and by other network operators, while they will bring significant benefits to customers also raise a number of challenges for Communication Providers (CPs) and end-users. There must be sufficient certainty regarding the regulatory regime such that efficient investment is encouraged, while at the same time providing customers, whether CPs or end-users, with the best possible products. The consultation document raises a wide range of issues and we welcome the opportunity to comment on the best way that Ofcom and industry can work together to deliver the most appropriate networks and products for the UK.

We welcome the overall position adopted by Ofcom in this consultation, in particular that the majority of the issues identified are best dealt with by the existing regulatory framework, forthcoming market reviews, industry bodies and commercial negotiation. We agree that there is no compelling case for separate regulatory intervention in relation to the matters raised in the document.

We have answered the specific questions raised by Ofcom in the main body of this response, but the following summarises BT's general position on the issues raised in the consultation document:

- In general we support the theme of the consultation document that there are already effective mechanisms, processes and dialogues in place with industry and other key stakeholders. Regulatory intervention should not be necessary, and indeed should be avoided unless explicit and demonstrable market failures emerge. Although the consultation often refers to Internet Protocol (IP) networks in general terms, we understand that Ofcom's intention was to focus on the migration from legacy PSTN and broadband services to their NGN successors, and we have focussed our response on those areas. In any case, Ofcom needs to be wary of any unintended consequences for other IP-based networks as a consequence of subsequent assessment and conclusions.
- **Interconnection:** Mechanisms already exist to allow industry to make informed decisions about investments in NGNs and to negotiate appropriate commercial and technical interconnection arrangements, including those for the conversion between IP and Time-Division Multiplexing (TDM). We therefore agree that Ofcom should not intervene in relation to voice interconnection issues.
- **End-user experience and migrations:** We do not believe Ofcom needs to consider intervention in relation to end-user NGN experience associated with the migration from existing networks to BT's NGN. The existing "Switched-on" arrangements for engagement with end-users regarding issues arising during migration processes are already in place and working well. With regard to end-user initiated switching between services and CPs once the user is on NGN, as discussed with Ofcom and industry, BT is developing a proposal for a new single migration process for all mass market voice and broadband products and bundles. The aim of the framework is to provide high levels of protection and a good customer experience, and it would apply whether a user was served via NGN or a legacy network. We are pleased that Ofcom has recently announced that it is carrying out a wider review of end-user initiated migrations, and we would encourage Ofcom to consult on a new single process as soon as possible.
- **Terminal equipment:** While existing industry discussions are making good progress in resolving issues arising from the use of existing equipment with BT's NGN, Ofcom should encourage other industry players, network operators, equipment manufacturers and user groups to take a more active and forward-looking role in ensuring terminal equipment is tested and confirmed as ready to migrate well in advance of planned changes to BT's and other CPs' networks.

- **Development of NGNs:** The market is the best mechanism to decide how NGNs (or any other type of investment in network infrastructure) should be deployed and how they should evolve. Ofcom should not therefore seek to unduly influence the technical or commercial development of NGNs, or the speed of migration to NGNs, other than in response to regulatory and competition law issues should they arise. Economic and technical factors will be key in determining the most efficient mix of technologies and the most appropriate timing for relevant investment. BT believes that although all-IP networks are technologically desirable and operationally efficient there are many factors that will complicate the evolution of network design and implementation, including the need to ensure continuity of end-user experience and the need to optimise firms' investments within their capital expenditure constraints. The market will enable downstream products to be developed based on the evolving wholesale product ranges.
- **xMPF:** We agree that Ofcom should not mandate BT to supply xMPF or any similar low-frequency copper access Unbundled Local Loop (LLU) product. We believe that demand for such a wholesale product would be low because the economics of products based on it would be unattractive compared with existing products. Furthermore, existing Openreach products provide ample opportunity for CPs to offer competitive voice products. The Undertakings already set out the role of WLR as the furthest upstream product in the voice access value chain, and BT would not support a change to this.
- **SMPF in BT's 21CN:** We believe that it should be possible to develop a pragmatic solution that would enable BT to deploy combi-cards for the provision of voice and broadband products in a technologically and cost-efficient manner.

Question 1: How do you envisage the model of competition changing over the next 3-5 years, and what sort of input products will be needed to support this competition?

It is very likely that the recent trend towards bundled service offerings will continue, both in the consumer and business markets. In mass market consumer markets the trend is particularly important as it now incorporates other services not traditionally linked with fixed line communications: typical bundles range from fixed line voice and broadband to bundles including mobile broadband, mobile telephony, linear, catch-up and on-demand TV (all three of which are already being provided over broadband services, even before widespread availability of fibre-based access products).

These bundles are already being supplied into a highly competitive retail market on the basis of existing input products from BT, notably Metallic Path Facility (MPF) for LLU operators and the existing range of wholesale fixed line broadband and voice products sold by BT. Similar bundles are also offered by mobile operators and by cable and new fibre-optic access network operators. In relation to end-users who currently receive services via fixed copper lines, the key change in the next few years is likely to be that fewer customers will choose to buy broadband services separately from their fixed line voice.

BT is investing considerable sums in Next Generation Access (NGA) in the next few years, which will make fibre-based local access available to many end-users in the UK. Where fibre local access is available alongside existing copper infrastructure (e.g. where Fibre to the Cabinet (FTTC) is deployed or where Fibre to the Premises (FTTP<sup>1</sup>) is available as an overlay network) the current set of copper-based local access products will remain important, giving CPs choice of how to supply both broadband (via existing SMPF or MPF based solutions or BT's wholesale NGA broadband products) and voice. Although it is clear that copper local access products will in due course become somewhat less relevant for broadband in NGA areas, we believe that the current set of local access products will

<sup>1</sup> FTTP is sometimes referred to as FTTH or Fibre to the Home.

continue to be important for some time, and will complement NGA-based products. We expect Ofcom to consider a wide range of options in the forthcoming Wholesale Local Access and Wholesale Broadband Access market reviews, and it would be inappropriate to pre-empt the result of these reviews. Nonetheless, Openreach will continue to consult widely with industry on NGA products to take account of the development of the market and CPs' requirements, and Ofcom should not need to mandate new services in this area. At the same time that BT provides access to its NGA product set to other CPs, it will also be vital that all other firms investing in NGA allow access to their networks to other CPs, so that end-users have a genuine choice of supplier and that they are fully able to benefit from the range of innovative products that NGA will deliver.

The speed with which CPs will migrate from traditional analogue (low frequency) voice to voice services over broadband connections remains to be seen. As broadband connections become commonplace there is an opportunity to move voice services to Voice over Internet Protocol (VoIP) over end-user broadband connections, using CPs' own call servers. The speed of such a migration will depend on a range of issues, such as end-user home wiring arrangements, ability to maintain good quality voice services, and the overall economics of the proposition. CPs may transition only slowly away from a set of voice services that are reliable, well-understood and which deliver end-users with an experience they are very comfortable with. In any case, we believe that the current set of inputs available provide CPs with ample opportunity to make sensible commercial decisions. CPs that already use MPF as the basis for their offerings can already move voice services to VoIP; many broadband CPs also already offer Voice over Broadband services.

In our view the regulatory frameworks do not fully reflect the competitive environment that has existed for some time. In particular, it is hard to argue that there is not a single market for voice services that is being addressed by fixed, mobile, cable and Voice over Broadband operators. Going forward this trend towards a single market across different technological approaches will increasingly apply to the broadband market, but this will depend on the technology deployed by mobile network operators and the amount of bandwidth made available to mobile users. Just as mobile has become a major force in voice it is possible that mobile could become an extremely significant part of the broadband market. As technology evolves there is significant potential for platform-based competition, but because regulatory frameworks tend to be backward- rather than forward-looking, this may disincentivise investment in fixed networks. There needs to be greater recognition of platform-based competition within the regulatory frameworks. It is no coincidence that a considerable volume of commercially driven FTTP and FTTC deployments have taken place in the USA, where it seems that the regulatory frameworks do recognise platform-based competition.

### **SMPF and combi-cards**

BT's intention to use combi-cards to supply both voice and broadband services to end-users has been well-known for several years. The financial, technical and operational benefits of such an approach are likely to be significant, compared to using separate combi-cards and MSANs for each type of service.

When combi-cards are used in this way the existing downstream parts of BT could no longer consume the existing Openreach SMPF product as an input to the 21CN wholesale broadband product (Wholesale Broadband Connect (WBC)), because of the way end-users are connected to combi-cards. BT will discuss further with Ofcom how WBC will be deployed via combi-cards that are also used to supply customers with voice services over BT's 21CN.

As a matter of record, we do not agree with part of the statement in paragraphs 1.18 and 3.9 of the consultation paper regarding BT consumption of Openreach Eol products. Ofcom says that *"This implies not only that Openreach make the products available on exactly the same terms and conditions for BT and other CPs alike, **but also that BT's downstream divisions***

**use these products.**" (our emphasis). It would, in our view, be inappropriate to assume that every time a new product is offered on Eol terms by Openreach or BT Wholesale there is some general obligation on BT to consume these products, or to change the way BT operates so that it consumes such products.

Ofcom raises a specific example of this in para 1.18, where it says "*The Undertakings require that BT use an Equivalence of Inputs ('Eol') product from Openreach in producing its wholesale services.*" It should first be noted that SMPF will continue to be made available by Openreach on Eol terms, and where BT does not use combi-cards to deliver both voice and broadband services BT will continue to consume SMPF where it is required to do so (i.e. for IPstream and IPstream Connect, as per Annex 1 of the Undertakings), and for WBC when converged combi-cards are not used. There is no explicit requirement for WBC to consume any particular input, and the Undertakings do not actually require BT to use an Eol product in all cases.

Question 2: Do you agree with our analysis of the requirement for xMPF?
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### Overview

We agree with Ofcom's conclusion that there is no need for Ofcom to mandate the supply of any of the potential local access arrangements described in paragraph 3.49. It would be particularly inappropriate to consider changing relative pricing of existing products (e.g. Wholesale Line Rental (WLR), MPF) in order to make an xMPF product commercially attractive - this would amount to artificially skewing the market to encourage inefficient investment - this could have serious adverse consequences elsewhere in the market, and Ofcom should not inject such unnecessary disruption. Furthermore, the Undertakings have already set WLR as the furthest upstream input to the voice value chain, and BT would not support a change to this arrangement.

We believe that the existing set of wholesale BT products gives ample opportunity for CPs to develop effective competitive copper-based broadband and voice (whether traditional PSTN-like or derived Voice over Broadband) offerings, and the roll-out of BT's NGA network over the next few years will deliver further opportunities.

We believe that bundled products will increasingly be important in the development of competition in the consumer mass market, and the market for voice-only services is likely to diminish, further weakening the argument for a new voice-only local access input. The use of MPF, potentially coupled with the migration of end-users to CP-managed VoIP services over broadband connections, is likely to increase CPs' scope for innovation; xMPF does not appear to offer material new opportunities, other than enabling an LLU operator to develop low frequency voice-only products to compete with WLR, which is already available on fully Eol terms. Introducing new products is costly, since new processes and systems need to be developed, and given the likely impact of NGA products it seems very unlikely that demand would justify such development costs.

### Detailed consideration of issues raised

BT should not be mandated to supply xMPF. Any request for a new product must be reasonable, and it is essential that there are practicable and economically viable commercial and technical solutions, and that there is likely to be material enduring demand. The first three concepts described in paragraph 3.49 do not meet these criteria. Openreach has considered the industry SoRs for xMPF and has not found sufficient justification to proceed with the development.

The four options identified in paragraph 3.49 would, in practice, be quite different. Only the fourth option is being actively pursued by Openreach, as part of current NGA proposals.

We agree with Ofcom that the first option is unlikely to be a long-term prospect, as end-users increasingly move towards bundles that include both voice and broadband, and as broadband penetration continues to increase it is likely that voice-only end-users will become a diminishing minority.

A key difference between BT and LLU operators is that BT is obliged to allow SMPF on its WLR lines, whereas LLU operators are not similarly obliged to allow SMPF on MPF; the second option would effectively require the initial MPF LLU operator to allow another CP to use the broadband frequencies subsequently. In practice, all MPF lines would need to become susceptible to a request for SMPF (or indeed, FTTC-GEA (Generic Ethernet Access)).

The third option is already possible - either by the CP buying WLR and a wholesale broadband product (and choosing not to use the WLR), or by the CP buying MPF and choosing to only provide broadband-enabled services. In any case the charge to the CP would need to cover the cost of the copper line, which currently either MPF or WLR do. Although one argument for this "naked DSL" product is that CPs will develop innovative voice products, MPF operators already have such opportunities, and there is little evidence of compelling new baseband voice offerings. It is hard to see why this or any other variety of xMPF would drive voice innovation.

Regarding the fourth option, Openreach is working with industry to identify and prioritise end-user scenarios; the overlay of FTTC on to MPF is one such scenario. However, as there is no material difference to the MPF exchange wiring, there is no need to define a new exchange product. Openreach does not therefore regard this as an xMPF scenario. MPF CPs can already choose to add FTTC-GEA broadband to their MPF lines as part of the NGA scope. Also under consideration is a proposal to allow other CPs to add GEA to the MPF line, which would potentially offer the division of baseband voice and broadband services described. However, the demand for this scenario is questionable given the acknowledged strength of bundled propositions.

Question 3: What additional technical standardisation work is required to support NGN deployment?
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For clarity, although this question appears to be very broad, the text preceding the question in the consultation relates only to voice interconnection; our response is thus also in respect of voice interconnection. Issues relating to terminal equipment are addressed in answer to questions 11 and 12 below.

Standards bodies will continue to play a key role in addressing any areas where lack of agreed standards may be holding back the deployment and use of NGNs. However, as far as voice interconnection is concerned we believe that there is no pressing need for additional standards work in support of PSTN/ISDN services; BT will develop a next generation call conveyance capability using the already agreed SIP-I protocol. We will consider supporting alternative forms of signalling, subject to commercial and technical feasibility, and remain committed to providing interoperability using our IP Exchange product. Where new standards are required, the current working arrangements in the Network Interoperability Consultative Committee (NICC) are that they must be supported by three NICC members who are willing to support and resource the work to develop the standards. The onus must be on the operator making the change to gather this support.

Question 4: What policy positions do you believe Ofcom ought to adopt in relation to interconnection between IP and TDM networks?

There are over 75 million mobile and 30 million fixed line end-users in the UK, and consequently any migration to NGNs cannot happen overnight. Operators will inevitably have to manage a mix of technologies and architectures over a prolonged period, both within their own networks and with their interconnect partners.

The only way to entirely avoid interworking costs would be for all fixed and mobile operators to convert their entire base to NGN, simultaneously and instantaneously. This is clearly impossible, and so investment in interworking capability is unavoidable. The peak demand for interworking is not significantly impacted by the length of migration. If all end-users start on TDM but end on IP, at some point half will be on the new technology which will require the maximum amount of interworking with the half that remain on TDM. This is a capital-intensive business so by far the bulk of the costs will be investment in new equipment such as media gateways. If the migration occurs over one year or ten it makes no difference to the maximum amount of TDM/IP conversion capacity needed during the transition period, so the timescale for BT's deployment of 21CN has no significant impact on the investment costs for interworking.

The conjecture that interconnection costs may inhibit the adoption of new technology is flawed in our view. A number of CPs have already invested to some degree in IP infrastructure and in each case they are faced with the costs of interworking between their new platforms and their own traditional TDM networks. If these costs were prohibitive there would be no business case to invest in the new technology, regardless of the additional interconnection costs. Clearly this is not the case.

In terms of NGN networks, the incremental cost of signal conversion via a media gateway is a relatively insignificant proportion of the call costs, and certainly not sufficient to deter operators from investing if they perceived it to be in their commercial advantage. The early mover would still benefit from the cost advantages of the new technology and have that advantage for a longer time if other operators were slower to catch up. New entrants with an all-IP network also have the advantage over incumbents with an existing TDM base that calls which begin and end on their network do not incur conversion costs.

Minimisation of interworking costs in the mixed technology world requires that origination and termination are matched wherever possible e.g. calls between TDM end-users should remain on TDM for inter- and intra-network routing, and calls between IP users should remain via IP.

Where conversion is required, this should be regarded as a market opportunity rather than a problem requiring regulatory intervention. Conveyance in the TDM world between the Tandem and Local switch is competitive, as a number of operators have invested in infrastructure to connect at BT's Digital Local Exchanges (DLEs). These operators could add gateways to their infrastructure and offer IP interconnection to BT TDM-based number ranges. It is for the operator adopting NGN technology to decide whether to self-provide interoperability with legacy networks or to pay someone else to provide it.

Ofcom asks how things might be different in a "hypothetical fully competitive" market and postulates how interdependent investments might be managed. Commercial agreements normally seek to share risk and reward between the parties. If both parties' costs were minimised by synchronised investments it could make sense to enter into an agreement whereby some costs of one party were met if the other party failed to maintain its programme. However in the case where an early mover has taken a commercial risk and invested in order to obtain a cost advantage over the other party, it is hard to imagine the other party agreeing to compensation if the first party failed to achieve the cost advantage it

was seeking. Having a dominant position in a market is irrelevant to the attractiveness of such a deal.

With any technological change early adopters take the risk that the technology proves successful and enables them to reap the benefits of early adoption. The onus must therefore rest on them to ensure interoperability with existing networks, and to bear the cost of doing so. As many call servers use a variant of SIP peculiar to the manufacturer, the onus must be on the operator using it to ensure interoperability and bear any additional interworking costs. It would be unfair and unreasonable for one operator to impose this cost on other operators either initially or on an ongoing basis.

We agree with Ofcom that the NGN all-IP voice technology is unproven. The benefits of NGNs for delivering the full range of voice services have yet to be established in practice. In the voice world mobile operators already carry more minutes than fixed and will have greater influence over interconnection. Ofcom should not intervene in relation to voice interconnection, and should rely on the market to deliver appropriate arrangements. If the new technology can deliver lower cost, then market forces will lead to the most efficient use of resources without intervention. If not, then it would be damaging to incentivise inefficient investment.

Question 5: Do you have any comments on our analysis of investment uncertainty in relation to BT's 21CN plan?

Many CPs, including BT, have been investing in NGNs, but BT's plans are just one part of a complex commercial and technological environment. There is bound to be investment uncertainty in the current economic environment across all CPs, and for many infrastructure players this is heightened by proposals (sometimes by the same CPs) to deploy NGAs at the same time that NGN investments are being made.

The current fast-moving environment, from both network operator and end-user needs perspectives, means that the traditional long planning horizons previously enjoyed are no longer sustainable. Ofcom correctly recognises the need for planning flexibility. BT's re-focus of the 21CN programme to be more customer-driven than engineering-led, and influenced significantly by the recent prioritisation of fibre deployment, has significantly affected the previous plan for rapid end-user migration of traditional voice. It is important to balance the priorities of NGN roll-out and NGA developments to deliver optimal benefits to end-users, to CPs and to BT itself.

BT has changed the emphasis of its 21CN implementation plan, putting new product deployment (e.g. Ethernet, ADSL2+ broadband, NGA) ahead of rapid "like-for-like" voice migration. As Ofcom notes, the pilot phase of voice on 21CN continues to make progress, with some 75,000 lines already transferred to 21CN, rising to up to 350,000 lines by summer 2010. Any larger scale voice migrations will happen at a slower pace than previously planned. The advent of accelerated NGA roll-out by BT and other CPs means that end-users may still migrate to alternative voice services. The speed of this end-user migration is, however, far from clear at this early stage.

Given this uncertainty, clear and timely communications within the industry are vital. BT has a well established mechanism of sharing information with CPs, end-users and other key stakeholders. However, BT itself requires a sufficient degree of certainty and confidence as to the future market direction and regulatory framework before it can provide such information. When BT itself has information that is sufficiently robust to share, it does so. In the meantime, BT has been open and honest with industry in making explicit the level of uncertainty in its own plans, so that CPs are aware of the possible impacts on their own investment decisions. BT has now provided CPs with a list of the first post-Pathfinder candidate DLEs scheduled to migrate further end-users to 21CN, representing over one



million end-users. In due course BT will provide more specific timeframes for these migrations, with additional named DLEs as plans become more certain.

Question 6: How do you think Ofcom should take forward considerations relating to switching involving next generation access and core networks, and which areas should we focus on?

We firmly agree that effective migration processes are needed for migrations between mass market voice and broadband products by consumers and SMEs. Migration processes for business customers are very different, both in number and complexity, because of the type of products businesses buy, and will often be on a bespoke, negotiated basis. It is appropriate for Ofcom to focus on consumer/SME migrations for these mass market products.

The combination of both new NGN products and the impending availability of NGA products means that the number of end-users wanting to switch service and/or provider, and the ensuing complexity for the CPs involved, will increase. BT supports initiatives to improve the customer experience during these voluntary switches, and Ofcom should ensure that CPs co-operate in defining the requirements to make it simple and painless for end-users to move, and implementing those requirements.

End-user migrations processes must provide a good customer experience, protect against inappropriate sales and marketing activities (e.g. "slamming"), and ensure that end-users are able to take informed decisions. A process which meets these objectives will give citizen/consumers the confidence to switch and therefore benefit from competition.

We support the goal of harmonisation of processes across different services. The current situation, in which the Advice of Transfer (AoT) process is used for voice and MPF, while the Migrations Authorisation Code (MAC) process is used for SMPF-based broadband, is confusing for consumers, inefficient for the industry and unsustainable in a world of increased take-up of (and migration between) bundles.

As already discussed with Ofcom and industry, BT is developing a proposal for a new single migration process for all mass market voice and broadband products and bundles. This new process is designed to avoid the drawbacks of both existing processes; initial contact with the losing provider would enable the validation necessary to prevent the mis-selling which is endemic under AoT, and the process would provide a better customer experience than today's MAC process. The new process would be used for bundle-to-bundle migrations, as well as where individual services are being migrated.

Our proposal would use "transfer codes" to increase customer protection. These codes would be given to customers in real-time (supplemented by an optional alternative, such as text message or e-mail). The customer would control the dialogue with their current provider, including being able to decline a 'save' or 'best offer' discussion. Providers would be required to adequately resource code-issuing channels. Transfer codes would be simpler than today's MAC codes, and this would make them more user-friendly and reduce the risk of errors. We also propose that there should be penalties for service providers that do not comply fully.

We are pleased that Ofcom has now indicated, in the latest consultation on mis-selling, that it is carrying out a wider review of migrations processes which will lead to the publication of a document in the first half of 2010. We would encourage Ofcom to accelerate this timescale if possible. We believe that it is essential that there is minimum delay in moving to a new fit-for-purpose migration process to the benefit of consumers and CPs.

## **NGN consumer protection and CPE issues**

### **General comments**

BT agrees with the consumer protection principles and the approach described by Ofcom in paragraphs 4.5 and 4.6. We agree that the introduction of NGNs has the potential to bring real benefits to consumers, but it is vital that consumer experience particularly during the period of transition is as trouble-free as possible. BT has taken an active role in ensuring that end-users and CPs are aware of potential issues arising from migration to NGN-based services, and the Consult21 and "Switched-on" programmes (see <http://www.switchedonuk.org/>) have been effective in supporting this need for timely communication.

The introduction of both NGNs and NGAs raise consumer protection issues, and the concerns are therefore not just related to BT's 21CN, or indeed just NGNs. There are many aspects relating to the migration to new technologies that can be resolved through commercial negotiation. However, in some areas of consumer protection and CPE compatibility Ofcom should consider taking a broader role to facilitate public stakeholder debate, and to identify and address unresolved issues, in particular those that may result in consumer detriment and adverse impacts on vulnerable groups.

Such an Ofcom-facilitated approach could enable an informed debate about the likelihood that trade-offs may be needed in the way that NGNs and NGA are implemented. For example, perhaps some of the current (sometimes historical) services are anachronistic or can be delivered in a different way. Insisting on the retention of some current or "legacy" characteristics on the basis of consumer protection may stand in the way of developments which are themselves central to future consumer benefits and innovation in this area. A transparent public debate would provide a forum for bodies (including special interest groups, as well as charities), to debate and resolve issues allowing guidance to be developed and made available to all, including operators, service and application providers, manufacturers and indeed consumers themselves.

A wider public debate would help to identify those issues which are expected to be part of the transition to "next generation" technologies, and those which are likely to be more permanent. It may also help to prevent important sections of society being "caught out" by developments in the future. This is particularly important in relation to consumer terminal equipment since consumers and in some cases service and applications providers have far greater choice and responsibility here. It is therefore important that all stakeholders have sufficient information both to make those choices and also where appropriate to initiate change in a timely manner to mitigate the effects of the transition and thus to avoid disruption.

We also believe that there should be a thorough wide-ranging debate about what characteristics future voice services themselves should have. We do not believe it is reasonable to always assume that existing features should be replicated on new platforms, whether on NGN or NGA. While new technologies (e.g. ATAs, SIP-based voice call servers) should enable new services to be developed, it is likely that some existing features will be more difficult or more costly to deliver. There is already divergence between what is offered by traditional fixed line operators, VoIP operators and mobile operators - some features are absent from some offerings, some features are implemented in different ways, and some new services have been developed that are not available from all CPs.

The most obvious issue is the expectation that there should be uninterrupted access to emergency services (with the associated line powering vs. battery backup question) but we are aware of a number of other features that affect either the calling party, the called party or other stakeholders. We believe that there should be consideration of a regime requiring

every CP (whether they use fixed line copper, cable, NGA, NGN or VoIP) to deliver a core set of "must supply" features, and that anything beyond these should be a matter for customer choice. It would be inappropriate for CPs, in particular those with either SMP or USO status, to be forced to continue providing functionality that is anachronistic, excessively costly to provide or that could be provided in a more efficient, but not identical way. While the markets should play a role in this, in order to ensure end-users and other key stakeholders (e.g. emergency services) have certainty about at least a core set of functionality, we believe that Ofcom could play a key role in such a UK-wide debate.

Overall, such an approach would provide Ofcom with a credible platform on which to develop a clear set of requirements for industry to follow, as it moves towards more general implementation, together with greater clarity as to the penalties which may be imposed for disregarding them.

**Question 7: Do you agree that the consumer protection principles and our approach to addressing consumer protection issues are still valid?**

In general we believe Ofcom's 2006 consumer protection principles remain appropriate, although we would suggest that "equivalence" of services should not be too tightly interpreted, since it is important to avoid an expectation that there will be no change. Replication of existing services and features may prevent the full benefits of next generation technology being built into next generation services.

As indicated above BT believes that in the matter of consumer protection and Customer Premises Equipment (CPE), any distinction between NGN and NGA is both harder and less important to maintain. In practice, we believe that compatibility issues are likely to be of greater significance, and more likely to arise from NGAs. Ultimately consumers or end-users are less interested in the technology, and far more concerned with the services delivered, the "end-user experience" characteristics, and in particular understanding how these can be put to best use in fulfilling their own personal requirements. Although we believe all three of Ofcom's main principles remain appropriate, customer education is key, i.e. that new or evolved services are fully and clearly documented, including key end-user characteristics and changes compared with previous versions, in particular any that require a change to the way they can be used, or those requiring a new network terminating interface.

**Question 8: Do you agree with our assessment of how the alarm equipment incompatibility problem should be addressed?**

We agree that industry organisations, such as the BSIA (British Security Industry Association) for alarm systems and TSA (Telecare Services Association) must be encouraged to work closely with other stakeholders in their respective industries and market sectors. This will help to ensure that all aspects, both positive and negative, of potential impacts are recognised and communicated, and thus that informed conclusions are reached.

While the longer transition to 21CN, and perhaps NGNs more generally, may limit the immediacy of the problem relating to alarm equipment, the acceleration of implementation of NGAs emphasises the need to seek appropriate solutions. NGNs and NGAs will exhibit many of the same characteristics, in particular the three mentioned in paragraph 4.25 of the consultation, namely round trip delay (which is what causes problems for alarms), echo cancellation and the presence of jitter buffers. The potential for problems will be magnified by the variability across the possible forms of NGA/FTTP/FTTC etc. platforms, not least because NGAs are being deployed by an increasing number of disparate operators.

**Question 9: What will be the impact on vulnerable consumers of replacing telecare and other alarm equipment?**

Unless care is taken to identify potential issues arising from the transition to next generation services, it is possible that there could be adverse impacts on the elderly, infirm and other vulnerable people. BT has been active in identifying issues and addressing them in conjunction with the various interested parties. However, it is also important to recognise the potential for new technology to enable new services which may be of significant value to such groups. It is therefore crucial to recognise and deal with issues in a balanced way, rather than to use them as reasons for rejecting otherwise positive changes simply to avoid the need to upgrade equipment, or to impose disproportionate burdens on the perceived “instigators” of the changes (i.e. the various operators rolling out NGNs and NGAs).

It is also notable that CPE is generally considered to be the end-user’s own responsibility, and it is not normally possible for a CP to control which CPE end-users choose to use. Consequently neither BT nor any other provider of NGNs can realistically be held responsible or liable for CPE which does not conform to the relevant standards and published interfaces. While third parties (including CPs) often advise on, or even provide such equipment as part of the service, and in these situations these bodies must bear immediate responsibility for ensuring that the CPE works properly, it is vital that the principle of customer choice is retained for this element of the communications market. Again it is the timely provision of information and the proper publication of network interface requirements which is key to the proper management of such challenges resulting from the transition to NGNs/NGAs. In the case of vulnerable sections of society it will be really important to engage representative organisations and expert bodies to both identify issues and help resolve them before they manifest as incompatibility problems.

**Question 10: Would it be appropriate to agree a common set of terminal equipment compatibility tests? What would be the most appropriate forum to develop these tests?**

We do not believe that it would be practicable or advisable to formally standardise a set of specific CPE compatibility tests. Such tests, including specific test parameters and pass/fail criteria, could not take account of the variability in NGN and NGA implementation. Standardisation of CPE test parameters would in practice require the standardisation of NGN and NGA design and implementation. However, there may be merit in agreeing some general guidance on best practice with respect to CPE compatibility testing. If this were to happen, it would most sensibly be done within NICC, as a companion document to one that they are planning to publish giving guidance on CPE compatibility on NGNs & NGAs.

All parties need to recognise the importance of participating in the necessary activities from the early stages. All NGN and NGA operators must publish clearly specified interface requirements, and do so in a timely manner.

Furthermore there will be a continuing need to develop and ensure in-house expertise, if not always in house capacity, to support Terminal Equipment testing by manufacturers. This can be time-consuming, laborious and costly, and therefore easily dismissed as unnecessary. However, we believe it is possible and necessary that there are test programmes which are both professional and diligent without necessarily being over-engineered.

For example, initial BT testing indicated that we should expect few problems with compatibility affecting current consumer terminal equipment, but did expose issues resulting in some changes to BT’s original 21CN echo canceller design which has avoided problems with PDQ card payment terminals and ATMs. The potential for these types of problems to arise from the implementation of NGNs and NGAs should not be underestimated.

It would be unrealistic to expect all future networks to support all legacy CPE. NGNs should enable evolution and innovation, and while emulation may have a part to play, NGN operators should not be obliged to design their networks so that all legacy equipment continues to work, no matter how old or obsolescent.

The principles which govern and ensure relevant equipment compatibility in legacy networks are already in place, and as BT has demonstrated by its approach to CPE testing, continue to be applicable to NGNs. The existing duties and obligations need to be taken seriously by all parties, and Ofcom has a role in making it clear where individual responsibilities lie and, where necessary, what the penalties might be for ignoring such requirements.

Question 11: What other steps could be taken to help manufacturers ensure terminal equipment is compatible with the QoS parameters of NGNs?

As indicated above, network operators should publish the network specifications necessary to enable manufacturers to design equipment that is compatible with the operator's network. BT continues to publish Supplier Information Notes (SINs, see <http://www.sinet.bt.com/>), which advise manufacturers of the key technical specifications of its services and interfaces. Similar transparency from all network operators, including those implementing either NGNs or NGAs, would help manufacturers to design equipment that takes into account the range of technical options and parameter values that are in place in UK communications networks.

Manufacturers must design their equipment to perform to the specified upper limit performance parameters specified by CPs and by relevant standards (NICC, ETSI, ITU etc). Many of the observed performance issues that are arising with CPE use with IP-based networks are due to the CPE being designed to function with the *observed* performance of networks as a limit, rather than the *specified* upper limit of performance. As a consequence some equipment may work in some circumstances because the network performance *exceeds* the specified upper limit, whereas the CPE may not work when the network operates *to* its specified level. Operators should be encouraged to make available upper operating design limits on network performance. For example, the BT SINs relating to ISDN advise manufacturers to design equipment to be compatible with the delay associated with a double satellite hop, although such delays would only be encountered on a small number of connections.

Manufacturers should also be aware of the published standards documents of the NICC (see <http://www.niccstandards.org.uk/publications/index.cfm>), and which of these documents are applicable to a particular operator's networks, interfaces and services. CPE should be designed to work up to the limits of network performance specified in *ND1701 - "Recommended Standard for the UK National Transmission Plan for Public Networks"* and *ND1704 - "End-to-End Network Performance Rules & Objectives for the Interconnection of NGNs"*.

NICC is aware of the issues arising with regards to CPE on NGNs and is drafting a set of guidelines on this matter, at the request of Ofcom. The NICC guidance document on CPE compatibility is expected to be published later this year, and manufacturers should be advised to take its recommendations into account when designing new equipment.

Key to resolution of CPE issues is timely provision of information to both consumers and manufacturers by all infrastructure providers about the characteristics of their networks, and in particular their network interfaces. We fully agree therefore with Ofcom's assessment of how this problem should be addressed and suggest that Ofcom may need to exercise the powers it already has to ensure that all CPs take seriously their responsibilities under the

Radio and Telecommunications Terminal Equipment Directive (RTTE) and Condition 2 of the General Conditions of Operation.

However, over-prescription must be avoided. Informed choice is key, since it should ensure that consumers have more control over the outcomes, and should allow for product differentiation and innovation. End-users should be able to make decisions based on their own circumstances and requirements, rather than having them imposed upon them, and they should be able to choose between fully-featured products and low cost alternatives.

Question 12: Do you have any other comments about compatibility of terminal equipment with NGNs and how they should be addressed?

The variety of companies becoming involved in the communications markets is increasing as the potential of NGNs and NGA touch more industries, whether in equipment manufacture, network operation or retail activities. Convergence, of both technologies and services, is a common theme throughout the industry. These factors make it important to ensure there is clarity as to responsibilities of, and also requirements for, all participants in the value chain to ensure that end-to-end operability can be achieved and users are able to make informed decisions and are properly protected. While the market is capable of developing a wide range of competitive products, it may be appropriate for Ofcom to take a more proactive role in ensuring that the key stakeholders work in a more coordinated way to ensure appropriate interoperability and customer protection.

Question 13: Do you think there is risk of terminal equipment incompatibility that warrants further SIP UNI standardisation? How should this be progressed?

There are already a large number of SIP implementations in products that use a User-Network Interface (UNI). On past experience, agreement of standards for UNI in the UK alone would take at least 18 months, during which time the number of UNI solutions in place will continue to grow. The impact of any UK standardisation activity would therefore be limited to new products rather than to the market as a whole. Although a single, mandated interface would appear to be sensible, having to move already launched services to such a standard interface could add costs, for little or no benefit.

Different SIP UNI issues face consumer and enterprise markets:

### **Consumer**

Consumer (mass market) devices include Analogue Terminal Adaptors (ATAs - sometimes called Analogue Telephone Adapters) and software clients for PCs, mobile phones and other portable networked computing devices. There are commercial services based on standalone software clients and ATAs, largely used for VoIP services (whether over fixed broadband or mobile internet access). These rely on pairing the consumer device or software client with the service provider's call server, to guarantee service behaviour, quality and to enable remote management and fault resolution. Whilst most SIP implementations will interwork to provide basic session establishment, the support of advanced features is dependent on such a pairing. The pairing of ATA and call server also allows the service provider to control the introduction of new services.

In typical FTTP implementations, such as that proposed by Openreach to support its Voice over NGA proposals, the ATA is embedded in the network termination equipment; the user-network interface for voice is in practice simply the conventional two wire analogue telephone socket. The technology and pairing issues are the same as for stand-alone ATAs, and to ensure service levels, interoperability and remote management these embedded ATAs are paired with dedicated call servers. FTTP products which are developed for international

markets assume this paired relationship in the management of IP addresses, ATA configuration and service operation. In FTTP deployment the pairing of the embedded ATA with a single call server is the most efficient and reliable way to deliver voice services. The resulting voice service could follow a wholesale access product model similar to copper-based WLR. The economics of fibre investment mean that it is unlikely that there will be NGA competition in the same geography, and so all FTTP infrastructure providers using embedded ATAs should be required to offer a similar wholesale access product for voice services. If other NGA network operators using embedded ATAs do not offer such a wholesale product then BT's voice USO should not apply to those areas.

While using embedded ATAs removes the immediate need for a standard SIP UNI in relation to embedded ATAs in industrialised FTTP deployment some CPs may want to address the ATAs directly, and Openreach will consider possible approaches to this in response to CP requests.

### **Enterprise**

In the enterprise space SIP UNI primarily relates to interfaces between IP-PBXs and the network. While there are a large number of IP-PBXs, each with its own characteristics, and many products offering enterprise IP connections to networks, this has not hindered the development of a competitive market. A standardised enterprise SIP UNI may have some medium to long term benefits as it would probably be included in future CPE developments, which would allow simpler network configuration for customer connections.

Regarding further standardisation, Ofcom could use the same approach that was used in relation to Ethernet Active Line Access (EALA) characteristics, which has identified the end-to-end characteristics that UK industry was prepared to support.

As indicated above, standards bodies have a key role to play in removing uncertainty and standards-related barriers to the deployment and use of NGNs.

Question 14: Do you have any other comments about compatibility of terminal equipment with NGNs and how they should be addressed?

**Note:** Question 14 duplicates Question 12 - see our answer to that question above

Question 15: Will a slower transition from TDM to NGN networks pose a risk to voice quality of service? How should such risks be addressed?

Transcoding delays already arise because of the transit between mobile and fixed networks, and between VoIP originated calls and fixed network destinations (and combinations of mobile, fixed and VoIP). NGNs may increase the scope for accumulated delays, which could result in noticeable impacts on call quality. This impact will not be made worse by the length of time that dual (TDM and IP) interworking is supported, although the likelihood of someone experiencing a reduced quality call is potentially higher than it might be if complete conversion to NGN could take place quickly. Carriers should implement routings that minimise the occurrence, or likelihood of occurrence, of delays while minimising any adverse commercial impacts.

Question 16: Do you have any comments on the long-term trends in the evolution of networks to next-generation architectures?

BT believes that the evolution of NGNs in the next few years should on the whole be driven by market forces. Network operators and users of those networks will make investment and technology-use decisions based on the prevailing market and technological potential, and the

underlying economics and prevailing regulatory regime. The current state of development reflects the effects of these factors in recent years, and in particular the need for firms to be able to achieve reasonable returns for their investments, and for these returns to reflect the technology and financial risks that they might take. There have been considerable uncertainties because of the worldwide economic situation, rapid advances in technology, and the evolution of the communications needs of consumers and business customers. We do not think there is a need for regulatory intervention but Ofcom has a role to play in encouraging efficient investment, and regulatory certainty will be a key factor in this.

The consultation document raises a number of issues that warrant specific comment:

### **Expectation of lower end-user prices**

Investments in NGN may be driven by the opportunity for reduced costs, improved quality and/or the potential for new services. BT expects that the move towards converged networks may, in due course, reduce the costs of providing some services, and that competition between operators should pass on some of these cost savings through to end-users. However, industry is still at the stage where the eventual impact of NGN investment on network costs is far from certain - new technology is often more complicated to implement than anticipated, either taking longer to roll out or costing more because of unforeseen technical issues. Replacing nationwide networks, and the need to maintain both old and new platforms over a number of years, amplifies the potential for such increased costs or delays in implementation, and the consequent delay in delivering cost benefits to other CPs or to end-users.

### **Potential end state - voice as an application over “dumb pipe” NGNs**

It should be pointed out that in the business markets there is already considerable use of what might be described as applications over “dumb” pipes - there are, in particular, many applications that take advantage of existing symmetric Ethernet products, allowing companies to use end-to-end Ethernet products for voice, video and data. The development of this approach in consumer and SME markets is far less advanced, for a number of reasons.

Given the uncertainty as to the timing and extent of cost saving from migration to NGNs, CPs will consider what services will be attractive to end-users. Although one might expect innovative services to emerge, this will only happen if end-users understand and appreciate the benefits of the new service, are prepared to pay for such services, and are happy to migrate from existing services that they like and understand. This is particularly true in relation to voice services - factors as fundamental as end-users wanting to be able to use their existing phones, or not wanting new electronic devices fitted in their homes are making CPs more cautious about launching new versions of existing voice services. These factors are emerging clearly in relation to NGA - end-users and many CPs want essentially the same voice services over fibre, even though there is potential to do new things that would possibly benefit end-users.

In practice, opportunities for such changes often arise when end-users have to make a decision about something costly. A clear example is where companies with ageing PBX equipment need to decide what to replace it with; in many such cases IP-based solutions (e.g. based on SIP trunking) may be attractive. Notwithstanding the potential for cost savings, in general the economic and operational benefits of such a significant change are unlikely to be strong unless a “break point” decision is needed. Such decisions are far less common for consumers (a reasonably common one is where students, used to only having a mobile phone, settle down - will they stick with mobile only or will they buy a fixed line, with broadband?).



Ultimately one can envisage a world where every service an end-user experiences is an application provided over a "dumb" pipe. But the incentives for CPs to make this sort of move depend on the impacts on end-users and end-users' willingness to pay for something that is either the same as before or slightly different (i.e. if there is a "hassle factor" consumers may want to pay *less* for the service, in compensation).

There is clearly considerable potential for competition based on value-added services that run over NGN/NGA networks, but Ofcom should adhere to its principle of focussing on enduring bottlenecks, and in ensuring interoperability in the context of NGN. Ofcom also needs to ensure that the regulatory framework, through uncertainty or inappropriate regulatory constraints, does not disincentivise investment and introduce distortions in the market place. Ofcom also needs to be forward looking and err on the side of the market itself delivering a competitive environment.

### **Reduced number of economic points of interconnection**

In a hypothetical NGN IP-only world the economics of aggregation and the economies of scale should mean that the number of points of interconnection will be far fewer than in today's legacy networks. For BT's NGN Call Conveyance, for example, 27+2 Points of Service Interconnect have been agreed with industry. However, the fact that NGN and TDM networks are likely to co-exist for longer than originally anticipated means that the number of TDM points of interconnect will remain close to today's levels for some time. NGA deployment may make the economics more complex; for a full voice service provided via a BT call server there are likely to be 27+2 Points of Service Interconnect as for NGN CC, to realise the benefits of aggregation and economies of scale for routing and border functions, whereas for access *without* the use of a BT call server, interconnection is likely to be at a much larger number of Openreach Handover Points, but still substantially less than the large number of current DLEs.

### **Dependence on effective competition in access markets**

We agree that access markets will continue to have a critical role not only in the development of effective competition in the UK but also in the development of a fit-for-purpose telecommunications infrastructure. It is essential that the regulatory framework allows investors in access networks to achieve an appropriate rate of return, recognising the financial risks they incur. Ofcom's role in relation to enduring bottleneck access markets is clear, and the current regime will evolve to take account of the increase of NGA in the mix of access technologies. In addition, it is important that there is access to other bottlenecks that are increasingly important to converged markets, in particular content (e.g. TV programming and films) and mobile networks.

### **Prioritisation of applications over networks including the Internet**

While we do not think consideration of prioritisation of internet-based applications is entirely appropriate in a consultation about NGNs, we recognise that there does need to be transparency for end-users regarding the quality of service that they can expect. Upstream network operators should allow any content to be carried on fair and equal terms, including services provided to their own respective downstream businesses. Any traffic shaping or prioritisation should be either a matter for the service provider or subject to open commercial arrangements, available to all CPs. In either case end-users should be able to understand clearly what quality of service they will get when making their purchasing decisions.

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