Ofcom
OFFICE OF COMMUNICATIONS

New opportunities in radio spectrum 2005-08

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Introduction

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Partner, Competition & Strategic Resources

Agenda

10:30	Ofcom's approach to releasing spectrum into the market *Philip Rutnam – Partner, Competition & Strategic Resources*
10:50	Spectrum opportunities at lower frequencies (up to 3GHz) *Peter Bury - Director of Strategic Resources*
11:30	Spectrum opportunities at higher frequencies (above 3GHz) *Joe Sonke - Manager, Broadband Wireless and Auctions*
12.00	Q&A
12.20	Summary and close
12:30	Sandwich lunch

Ofcom's Spectrum Management Agenda

The Given:
Fulfil our statutory duties

- Ensure optimal use of the spectrum
- Take account of the needs of all spectrum users
- Maximise economic benefits of the spectrum

The Ambition:
Make the UK the leading country for wireless investment & innovation

- A better signposted approach to spectrum, giving more certainty in the market
- A flexible approach to spectrum, providing opportunity for innovation
- A competitive communications market, providing opportunity for returns on investment

There are three possible ways to manage spectrum

Command & Control Zone Very prescriptive	**Market Forces Zone** Licensed with minimum regulation	**Licence-exempt Zone** General permission + conditions
Approach historically adopted for about 94% of the spectrum	Approach advocated by Cave and implemented by trading and liberalisation and releases to market	Approach currently adopted for 6% of spectrum, some argue for radical increase

- Ofcom plans to shift balance decisively towards market-forces.
- Small increase also in licence-exempt.

SFR: Implementation Plan

Addresses two important areas of implementation for Ofcom's Spectrum Vision

- Release of spectrum into the market over the next few years
- Transition to spectrum trading and liberalisation in relation to mobile services

Various other issues to implement long-term vision outside scope, eg:

- Technology-neutral spectrum usage rights
- Power levels for licence-exempt use in rural areas

More fundamentally…

To help to deliver on our ambition for the UK, as a world leader in wireless communications, by promoting:

- More effective use of spectrum
- Greater certainty for the market
- Reducing barriers to entry and promoting competition

It is explicitly not an objective to release spectrum in order to raise revenue - this does not feature in our statutory duties.

Scope

Ofcom undertook a trawl in 2004 of all spectrum holdings to identify under-used spectrum that we expect to become available:

- approx 15 bands identified, of which 12 have provisional dates identified in SFR:IP, by end-2008
- 3 other bands (digital switchover ‘dividend’, 3.6-4.2GHz, Band III)

SFR:IP sets out:

- Proposals on our *general approach* to releasing spectrum into the market
- Specific proposals for the *programme* of releases and for *individual bands*

General approach (1)

Our objective is to make spectrum available for use by the market, with the minimum constraints necessary, and as soon as reasonably practicable.

- The market is generally better placed to judge the optimum use of the spectrum than the regulator

- Spectrum trading and liberalisation facilitate greater flexibility, and reduce need for prescriptive regulation

Historically regulators have tended to take a different approach – identify the "optimum use" and delay availability until demand for that use appears.

We consider this risks excessive intervention and artificially reduced supply, with adverse effects on competition and efficient use of spectrum.

General approach (2)

In general, market mechanisms also likely to be more efficient as a mechanism for assigning spectrum, ie more likely to get spectrum quickly to person who can make most efficient use of it.

Alternatives to auctions:

- First come, first served – fails to address excess demand
- Beauty contest – subjective judgments

Auctions generally superior as (1) yield more reliable information about most efficient user (2) more robust and transparent process

Caveats – need to consider licence-exempt use *before* any licensing. Also, exceptionally, policy considerations may also justify more intervention.

General approach (3)

Market-based approach does not absolve regulator from work!

Obligations to promote most efficient use of spectrum, to promote competition, and other duties. These require:

- an understanding of likely potential uses of any particular band
- so that we can design *packaging* of spectrum and *award process* to facilitate efficient use – not to mandate a particular use

But some proposals in SFR:IP for simplifying process compared to past, eg:

- possible scope for simpler auction process (SMRA used in all 3 UK auctions to date); also proposal on licence *term*

Programme (1)

Several criteria to be balanced in designing programme, viz:

- Economic significance of spectrum
- Market interest
- Time required for preparation
- EU and international environment
- Potential substitutability of bands
- Ofcom's resources

All dates indicative only.

Programme (2)

2005-06		
410-415 MHz/420-425 MHz	Ex-Inquam	2x4 MHz
872-876 MHz/917-921 MHz	Ex-Inquam	2x4 MHz
1781-1785 MHz/1876-1880 MHz	DECT guard bands	2x3.3 MHz
2010-2025 MHz	Licence-exempt 3G TDD band	15 MHz
2290-2302 MHz	Ex-MoD, possibly paired with 2010MHz	12 MHz
28 GHz	Some licences available	2x112 MHz
40 GHz	May not be via auction	2x250MHz
2006-07		
2500-2690 MHz	Expansion band	190 MHz
1452 -1492 MHz	L-Band	40 MHz
10 GHz		2x100 MHz
32 GHz		2x500 MHz
2007-08		
1790-1798 MHz	Possible awards in GB and all-Ireland	8 MHz

Other sources of spectrum

- Digital Switchover
  - 112 MHz of spectrum expected to be freed up by the transition from analogue to digital TV
  - The Regional Radio Conference of the ITU is currently discussing an international plan for broadcasting spectrum – conclusion in mid-2006
- Other bands: 3.6-4.2GHz and Band III.
- Cave Review of public sector spectrum holdings
  - Prof Martin Cave commissioned by the Government to review public sector holdings of spectrum, with a view to making more available for the civil market
  - Expected to address longer-term issues
  - Report expected towards end 2005

Spectrum Framework Review: Implementation Plan – bands below 3 GHz

Peter Bury

Director of Strategic Resources

DECT guard bands (1781.7-1785 MHz paired with 1876.7-1880 MHz)

- Bands previously unassigned to protect services in neighbouring bands
- New technical work indicates that this protection is unnecessary

- Only 3.3 MHz of spectrum – but most of the 60m UK mobile phones can tune to it
- Opportunities include:
  - low-power GSM services – eg private GSM services for buildings, or campuses
  - higher-power conventional GSM service

DECT guard bands (1781.7-1785 MHz paired with 1876.7-1880 MHz)

- Licensing rather than licence-exempt seems the most appropriate approach. Co-ordination between users will be essential
- The re-use pattern suggests 3-6 concurrent licences would be suitable

- Ofcom plan to award this band in 2005/6
- The auction approach will be neutral between one high-power and several low-power concurrent licences
- There is some MoD usage of the band, but we believe sharing with civilian users will be possible.

Note – all dates are indicative only

410-415 MHz paired with 420-425 MHz

- 2x4 MHz returned to Ofcom when the Dolphin service ceased in 2004
- This is an MoD managed band, where capacity is made available subject to co-ordination with MoD uses

- VHF spectrum useful for applications including: business radio, programme making, emergency services
- Some of these applications would be a business opportunity for a Band Manager

- Ofcom plan to award in 2005/6
- A single national licence might be the appropriate packaging

Band Management Organisation

- A commercial organisation whose purpose is to manage spectrum:
  - Adding value by packaging, hiring and support
  - Existing organisations already do some of these functions (eg JFMG, JRC)
- Some preliminary experience in USA, Australia and New Zealand
- Benefits:
  - Small companies can get access to spectrum without having to go through complex auctions
  - Spectral efficiency can be improved: commercial incentives to use spectrum efficiently
  - Re-structuring of bands can be achieved where economically desirable (eg PMR in Band III)
  - Costs to end-users can be lowered
- Licensing arrangements
  - Ofcom will devise licences which can accommodate the requirements of Band Managers, with additional clarity if needed

L-Band (1452-1492 MHz)

- Fixed links in the band are due to migrate by 2007
- European plan agreed in 2002 to use 28MHz for terrestrial DAB and 12MHz for satellite DAB, including detailed coverage plans for UK
- Identified across Europe for digital broadcasting

- Clearly valuable for digital radio and used for this elsewhere in Europe
- But also has great potential for mobile multimedia applications – a suitable balance between coverage and capacity – including TV to mobile phones

L-Band (1452-1492 MHz)

- Ofcom plan to award in 2006/2007
- The award would be technology and application neutral
- But separate awards of the 28 MHz and 12 MHz blocks would make it possible for satellite applications to compete
- DAB, DVB-H, DMB, MediaFLO and other contending technologies would be free to compete

- The configuration of the available capacity is defined by European agreement

2010-2025 MHz and 2290-2302 MHz

- 2010-2025 MHz harmonised for 3G TDD licence-exempt use across Europe.
- No equipment has reached the market and the band is unused
- 2290-2302 MHz released by MoD in 2004 for re-assignment for civilian use
- Bands could be paired to provide FDD service

- Potential for new mobile communications technologies
- WiMAX and numerous proprietary systems are emerging to provide services of this kind

2010-2025 MHz and 2290-2302 MHz

- Ofcom plan to award in 2005/2006
- Technology and application neutral award
- One or more licences

- Respecting the IMT-2000 spectrum mask and channel plan for 2010 MHz band so cross-Europe applications not disadvantaged
- Award process would be designed to allow bids for either or both of the bands but would not pre-suppose pairing

- EU harmonisation obligations are likely to be removed in the near future

2500-2690 MHz

- 190 MHz of spectrum ideal for mobile applications
- Compare 3G auction of 2000 (140 MHz); digital switchover dividend (112 MHz)
- Identified for expansion in mobile communications in all European countries
- Currently used for ENG and Outside Broadcast video links – users are migrating and the band will be clear by 2007

- Highly appropriate for mobile services, including IMT-2000, WiMAX and systems beyond 3G
- Common band plan across Europe supports FDD and TDD technologies

2500-2690 MHz

- Ofcom plan to award in 2006/2007
- Ofcom would like to make it available on a technology and application neutral basis consistent with a UMTS band plan and emission mask
- A number of designs for an auction could be possible. Ofcom's objective would be to introduce market mechanisms into the award as much as possible

- European harmonisation provisions are currently under discussion in CEPT and the European Commission. Ofcom is working with colleagues to reach a conclusion which minimises constraints on UK approach

1790-1798 MHz and 2302-2310 MHz

- Bands currently used by the emergency services for fixed link communications
- Two parcels of 8 MHz – but no essential reason why they should remain associated

- Possible uses include wireless broadband applications – fixed, nomadic and potentially mobile

- Timetable driven by emergency services migration plans – current plan to award in 2007/8
- Bands are clear in Northern Ireland: Ofcom and ComReg are investigating potential for an All-Ireland award

872-876 MHz/917-921 MHz

- 2x4MHz returned to Ofcom after the cessation of the Dolphin service in 2004
- Adjacent to spectrum used for 2G mobile – some potential interference problems being investigated

- Uses are likely to be low-power applications which meet the required limits

- Ofcom plans to award in 2005/6

Transition issues

- European harmonisation
  - Harmonisation measures apply to certain bands
  - Ofcom is working within European forums to ensure that spectrum is available for award on a technology and application neutral basis

- Liberalisation to allow 3G services in other bands
  - SFR:IP also considers whether there should be any restrictions on ability to use bands not presently designated for 3G services

- Extending trading and liberalisation to existing 2G and 3G spectrum
  - There may be special circumstances around liberalising 2G spectrum
  - Ofcom is undertaking detailed analysis about the likely impacts of liberalisation and different methods of implementing it, in parallel with the public consultation.

Opportunities at higher frequencies

Joe Sonke

Manager, Wireless Broadband & Auctions

Bands above 3 GHz

- The bands are:

  - 3.6-4.2 GHz - 2 x 180 MHz national
  - 10 GHz - 2 x 100 MHz national
  - 28 GHz - 2 x 112 MHz regional
  - 32 GHz - 2 x 500 MHz national
  - 40-43 GHz - provisional 500 MHz regional

Each band has distinctive characteristics

- They offer a variety of opportunities for services and technologies – ranging from WiMAX, network infrastructure links, point to multipoint links, wireless access, outside broadcast links and high bandwidth multimedia

- Aim to have simple award processes

- Open up to a variety of opportunities for self management or band management etc.

‘Shop window’ award – phase 1

A potential operator applies for a licence and lodges a deposit. This “triggers” the start of the licensing process.

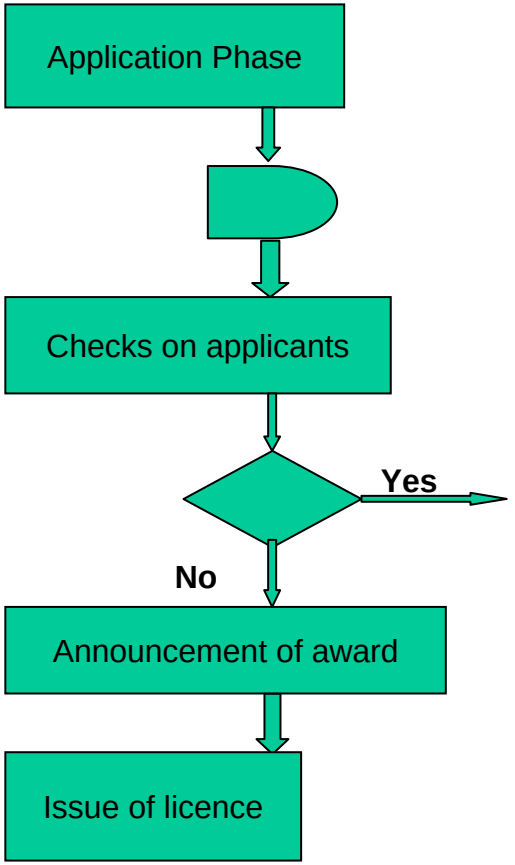
During the following 20 business-day period other operators may apply for the licence. Details of all applicants are posted on Ofcom website.

Day 20. Applications close in that region. Ofcom completes any necessary checks on links between bidder(s).

Have two or more applicants applied for the licence?

Day 30 Announcement of award of licence

Payment and issue of licence



Licensing process moves to stage 2 – see next slide

‘Shop window’ award – phase 2

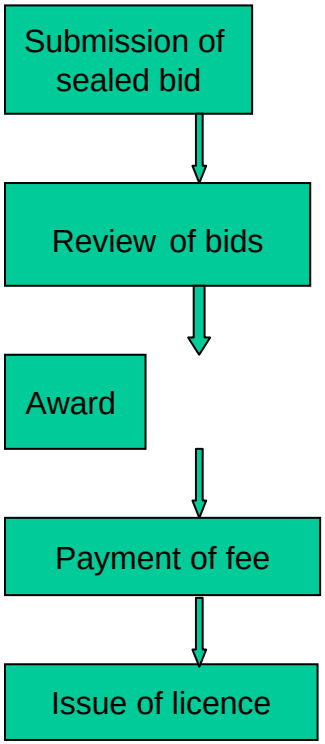
Day 30. Applicants are invited to submit sealed bids at or above the reserve price.

Day 40. Receipt of bids. Selection of successful licensee based on highest bid.

Announcement of successful application.

Payment of licence fee

Announcement of award of licences



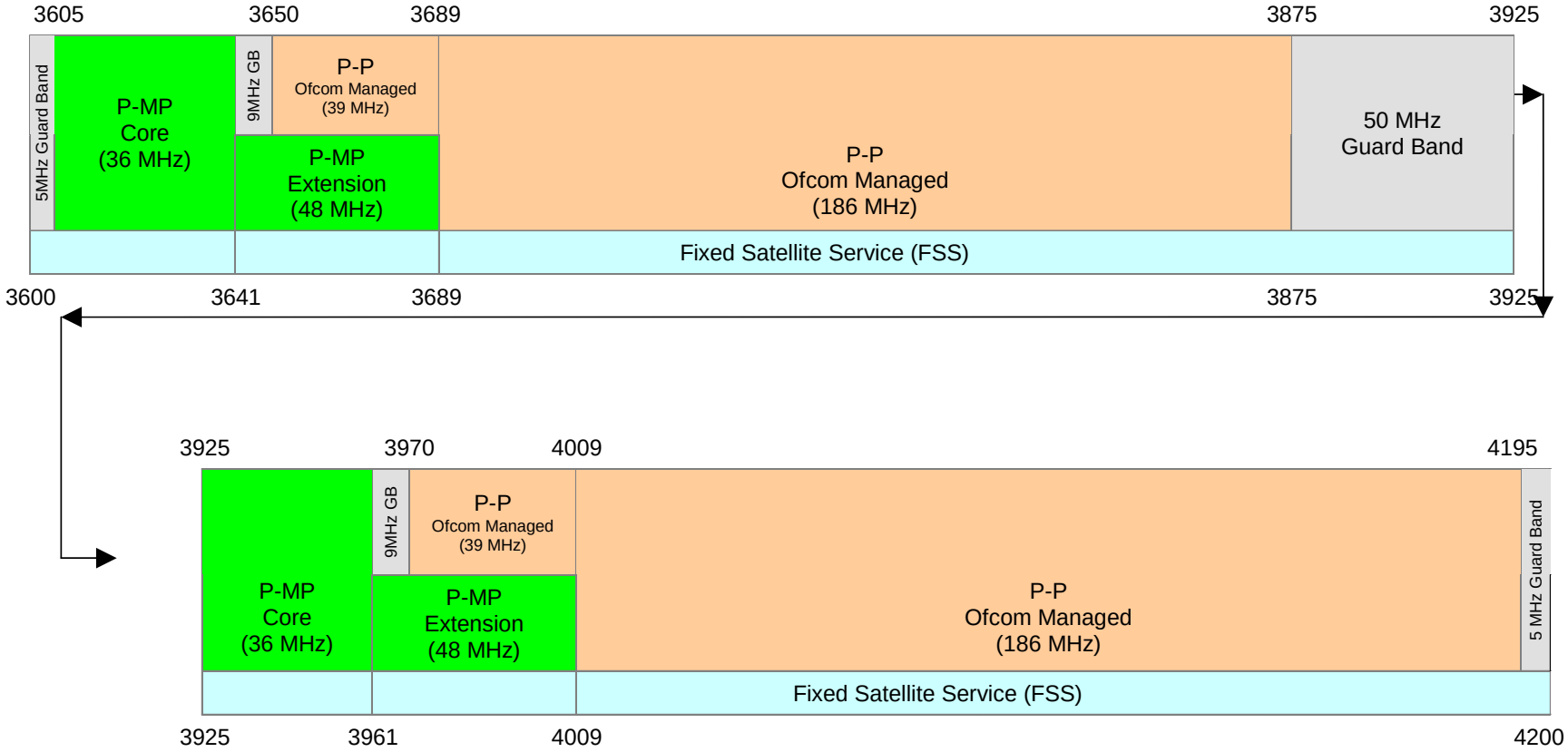
3.6 GHz (3.69-3.87 GHz paired with 4.01-4.19 GHz)

- Potentially the band could be used for
  - WiMAX technologies
  - Wireless access technologies
  - Other fixed services

- Ofcom examining current use of the band
  - Currently shared between fixed point to point services, fixed satellite services and fixed wireless access
  - Much of FSS use is for satellite receiving stations, which are not licensed
  - Band may be affected by UWB if permitted

- Proposal:
  - Clarify and regularise current use of the band
  - Any further use of the band would recognise existing users
  - Explore how to accommodate further use

UK USE OF THE BAND 3600 - 4200 MHZ



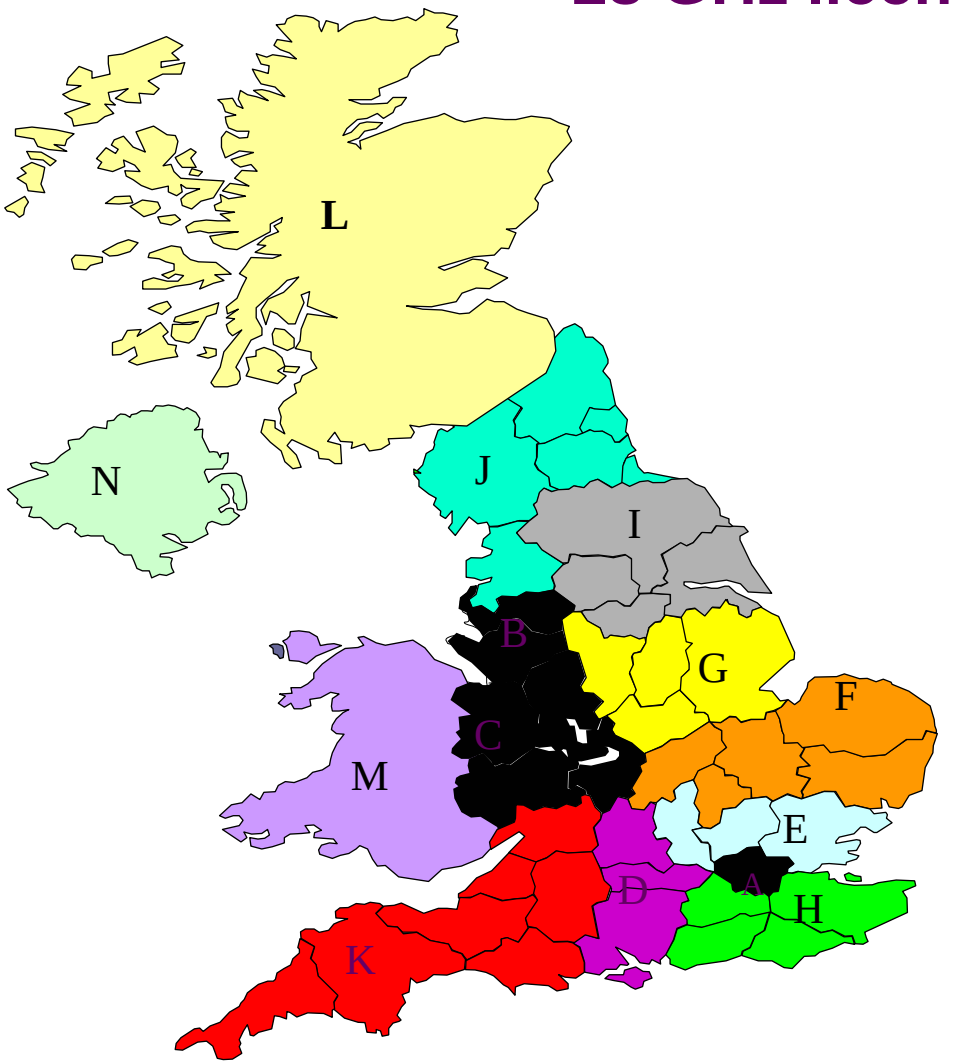
10 GHz (10.12-10.22 GHz paired with 10.47-10.57 GHz)

- Band is potentially for fixed point-to-point and point-to-multipoint links, fixed wireless access and outside broadcast video links. 2 x 100 MHz is available
- The band is managed by MoD. Military use would have no more than a localised and occasional impact on civil operations
- Ofcom's proposal
  - Award 1 national licence by auction – possibly 'shop window' or simple sealed bid
  - Timing of award - 2006-07

28 GHz (28.02-28.44 GHz paired with 29.06 GHz-29.45 GHz)

- Licences originally auctioned in November 2000 – 14 regions with 3 licences in each. Awards to four companies. 26 regional licences still available – see map on next slide
- Ofcom will re-assess reserve prices and intends to reduce substantially from the original prices set at £1m and £2m
- May be used for backhaul of other services as well as broadband fixed wireless access. Licences are tradeable. 15 year term.
- Proposal
  - Auction regional licences - scheduled for 2005-06
  - 'Shop window' process

28 GHz licence regions



	Region	Number of licences available	Price per licence
A	London	No licences available	-
B	Manchester & Merseyside	No licences available	-
C	West Midlands	No licences available	-
D	Home Counties – West	3	£2,000,000
E	Home Counties – North	3	£2,000,000
F	East Anglia	3	£2,000,000
G	East Midlands	3	£2,000,000
H	Home Counties – South	3	£2,000,000
I	Yorkshire	1	£2,000,000
J	Northern England	2	£1,000,000
K	The South West	3	£1,000,000
L	Scotland	2	£1,000,000
M	Wales	3	£1,000,000
N	Northern Ireland	1	£100,000

32 GHz (31.81-32.31 GHz paired with 32.62-33.12 GHz)

- Band suitable for self managed links or band management - point-to-point and point-to-multipoint links including access and mobile infrastructure
- Independent Review of Spectrum Management recommended moving from licensing individual fixed links towards converting fixed links spectrum to auctionable geographic licence blocks
- Proposal
  - One or two national licences (2x500 MHz or 2x2x250 MHz)
  - Shop window process
  - Scheduled for 2006-07

40 GHz (40.5-43.5 GHz)

- Band offers potential for high bandwidth services using new technologies. Harmonised in EU for Multimedia Wireless Systems, including Multipoint Video Distribution Systems. Band might also be used for point-to-point links

- 2 x 3 GHz available. Top 1 GHz is shared with radio astronomy, which requires protection across central England

- Consultation in 2002 supported opening the band when market developing for high bandwidth services

- Proposal to encourage new technologies and exploration of market opportunities by:

    - Opening part of the band (e.g. 500 MHz) for restricted geographic assignments
    - Technology and service neutral
    - Review the position after 5 years
    - Open for licensing 2005-06

Questions and answers

Summary and close