

# CABLE&WIRELESS WORLDWIDE RESPONSE TO POINT-POINT SPECTRUM REVIEW

Cable&Wireless  
Worldwide

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## INTRODUCTION

Cable&Wireless Worldwide (CWW) welcomes the opportunity to comment on Ofcom's "Review of the management of the spectrum currently used for point to point fixed links and other services that share this spectrum".

CWW is a key-user of the spectrum bands being considered, to provide communications services for our wholesale and enterprise customers.

## ANSWERS TO OFCOM QUESTIONS

### **Question 1**

***What are likely to be the key underlying factors influencing changes in demand for this spectrum (in terms of quantity of spectrum or preferred bands) over the next 5 to 10 years? Please provide band specific evidence to support your view.***

Spectrum requirements will inherently be driven by customer demand. In the enterprise customer space, CWW envisages that our customers will routinely demand access speeds of 1-2Gbit/s, necessitating radio-access systems that will accommodate this.

The launch of 4G (LTE) services by mobile operators, facilitated by the combined 800MHz/2.6GHz auction process, will require that point-point backhaul services to support base stations will similarly need to accommodate higher bandwidths. CWW understands that the architecture of LTE systems will lead to greater use of small cells, leading to a greater volume of links.

In certain spectrum bands, the larger frequency bandwidth required to support these higher bit-rates will constrain the speeds that can be offered. In the case of mobile backhaul, however, we foresee opportunities in that the smaller cells will facilitate usage of higher frequency bands, for example 60-80GHz.

### **Question 2**

***Will the reducing trend in the numbers of fixed links in the spectrum under review to support mobile backhaul continue? If so, in which bands will this reduction be most apparent and how will link capacity/bandwidth requirements change? What factors will have the biggest influence on the outcome? In your view, what will be the impact, on spectrum demand, of deploying next generation mobile networks for example using Long Term Evolution (LTE) standards?***

CWW is not entirely convinced of this. As noted in our response to Question 1, CWW understands that the basestation architecture for LTE may increase the number of links required when compared to 2G/3G mobile services, but this presents an opportunity to use other frequency bands.

We believe there will be a reduction in the number of channels available in existing spectrum bands, due to the use of larger frequency channels being required to support the bit-rates involved. However, it is likely that efficiency gains could be possible to mitigate this as new technology should emerge to enable larger bandwidth requirements being squeezed into smaller channels.

Additionally, we believe that existing allocations may be under-utilised, and it may be appropriate for Ofcom to audit this.

Finally, as with any application the choice of technology (wireless vs wired) will of course be driven by economics : clearly the issues identified in our response to Question 10 will play a large role in the take-up of spectrum for mobile backhaul applications.

### **Question 3**

***How might the changes to current or future public safety networks influence the existing and future requirement of the spectrum under review for fixed link backhaul for public safety applications over the next 5-10 years? In which spectrum bands is demand most likely to arise and how much spectrum would be required? May demand for bands currently used by public safety applications decrease? Is it likely that the public safety services may require access to the spectrum under review for other data networks or for alternative uses?***

CWW understands that current public safety applications are constrained by having relatively small amounts of spectrum assigned, which in turn restricts the applications that can be supported. We are sympathetic to this and believe an expanded allocation may be appropriate, but controls should be put in place to ensure that any applications are public-safety-related and, for example, that it should not be possible for the allocations to be subsequently used to provide commercial services in competition to the wider open market : this is particularly pertinent where public safety applications are outsourced to commercial third parties.

### **Question 4**

***How likely is it that use of CCTV by local authorities will significantly increase overall demand for fixed link infrastructure spectrum over the next 5 to 10 years? If so, in which bands is the additional demand most likely to be required and why? Do you have any information about the relative costs of wired and wireless CCTV links in urban and rural areas?***

CWW believes that it is likely that CCTV-usage will increase significantly, but is unable to provide any quantitative evidence in support.

### **Question 5**

***(a) What are the main factors (technical or regulatory) that determine preferences for one band over another for satellite applications? Do these factors vary between different types of satellite applications (Mobile, Fixed, Broadcasting and Science services)? In which bands will we see the most significant changes in demand in the next 5 to 10 years, and why?***  
***(b) A number of the frequency bands under review are currently used for satellite Permanent Earth Stations (PESs), for example to feed Direct to Home satellite broadcast services. What***

***are the continued and future spectrum requirements for satellite PESs (E-s & s-E) likely to be and in which bands? Please provide evidence to support your views.***

***(c) During recent years, some commentators have forecast significant demand for spectrum to support satellite consumer terminals. To date this demand has been slow to materialise.***

***Do you have information which would help inform a more Spectrum Review accurate assessment of future demand for spectrum in bands currently shared with fixed links?***

***(d) Are there factors specific to the satellite based communications sector which mean that it faces particular difficulties evidencing and satisfying demand for spectrum? If so, how might these be overcome?***

- a) Primarily the factors affecting the choice of frequency band are:
  - i. Existence of satellites in orbit that provide the required coverage and connectivity for the service needs.
  - ii. Price charged by the satellite operator for capacity
  - iii. Feasibility of providing the required link performance on any given satellite, taking into account any constraints imposed by inter-system coordination agreements through the ITU.
  - iv. Feasibility of providing required uplink and downlink earth station access to the selected satellite
  - v. Regulatory aspects (including any fees) of providing service at either end of the required links

These factors apply in almost all cases irrespective of the particular application. While there are satellite systems which are predominately targeted at a given application (maritime, broadcast), there is no specific demarcation which restricts them as such.

In the next 5-10 years it is anticipated there will be a substantial growth in Ka-band satellite capacity in orbit. However it must be recognised that based on the capabilities of satellites in all orbit-levels (whether in existence, just deployed or under construction) the present levels of both C-band and Ku-band coverage and capacity will be maintained at the very least. Satellites currently being built and launched have nominal full manoeuvre lifetime in the order of 17-20 years, and many deployed in the last 10 years have such lifetimes in the order of 12-17 years. As these investments have to be recovered, there is unlikely to be any diminution of the “traditional Bands” capability in orbit although the use may change from country to country.

- b) CWW considers it incorrect to characterise the use of PES within the UK as driven by a single market sector such as DTH.

The history of satellite communications in the UK is that the initial provision was at C-band and then Ku-band when subsequently introduced. None of the C-band was used for “intra-UK” services such as DTH, a market which subsequently developed using Ku-band. The C-band stations in the UK were used – and still are – to provide access to capacity in orbit that provides a variety of coverages and connections to other geographies. As C-band usage grew globally and capacity on the available satellites became scarce, the satellite operators began providing dual payload of C and Ku-bands so that additional capacity could be supplied.

The advent of Ku-band was not, however, simply to offer Ku-Ku connections but also in many cases additional flexibility through C-Ku connections. This is now also happening with the advent of Ka-band where already dual Ku/Ka band payloads are being launched to provide additional flexibility in service delivery options.

Thus in the UK the requirement for PES's is likely to continue to require C-band station access as well as probably more growth in the Ku and Ka bands for PES, reflecting the changes slowly manifesting in orbit.

- c) Industry commentators are often guilty of "Wishful thinking" – which is not a criticism but simply the nature of their environment – the developments they foresee are feasible but their predictions are ahead of their time. In the case of Satellite Consumer terminals, as is often the case for any new technology, initial costs and design also put them out of the realm of the mass consumer.

The advent of Ku-band technology development has got the population accustomed to the idea of Satellite TV, and with emerging use of Ka-band technology and capability, the Ka-band terminal size and cost is now rapidly approaching the point where a large number of UK households could use such a terminal providing two-way service for Internet access as well as TV, plus as yet unknown services/applications that may develop and will probably overtake the existing Ku-band TV DTH environment in the period being considered.

It would therefore be beneficial if Ofcom could avoid complicating the regulatory environment at Ka-band from having multiple 'co-primary' spectrum allocations. Indeed the more that spectrum could be exclusively allocated and thus made licence exempt, the greater the stimulus to satellite system planners and equipment manufacturers to provide more and better capability.

- d) The difficulties facing the satellite communications sector in evidencing and satisfying demand for spectrum haven't much changed since the first GEO satellites were launched in the late 1960s. The investment in time and money to build and launch even one satellite is significant as it takes about 3-5 years to design and build a satellite. Because they can't be reached once in operational orbit, they are designed with high levels of on-board redundancy to enable long lifetimes as described above in (a). So having identified a probable need, if a satellite operator can gather enough investment to commence building a satellite and securing a launch vehicle, it is probable that at least 3-5 years may elapse before the resource is available in orbit during which time the originally identified market will of course be changing due to external factors. The nascent O3b system is a good example of the extent of the "gestation period" in getting a satellite to orbit after the concept has been identified and sold to possible investors.

If a satellite operator takes a short cut by taking over ownership of a satellite already in orbit, while their costs will be lower and RFS time shorter than for a 'new build', such a satellite might have a less-than-ideal payload for the market segment intended, it also might have pre-existing "sitting tenants" that mean its full capacity is not available, and may also be subject to Inter-system coordination constraints agreed by the original owner which themselves limit the new owners' "opportunity".

These factors combine to ensure that it is difficult for satellite operators (and thus by association service providers who use them) to have a clear evidence of demand and how it may be satisfied over any extended period of time.

**Question 6**

***What is the likely timetable for rollout of Smart Grids and what impact will these developments have on demand for spectrum in the bands covered by this review?***

Smart Grid rollouts are being planned at small scale now, but this will only be seen to increase over the new few years. At this time, much of the industry's attention is focussed on the DECC SMIP procurement although this is also highly relevant to the provision of Smart Grid data – especially given the recent Public Accounts Committee recommendation that no Smart Metering Network should be rolled out which is not capable of also supporting the requirements of the Smart Grid on the same infrastructure.

Network performance demands for smart grids vary depending upon the specific application being supported – There will be on-going demand for low-latency PTP links across standard frequency ranges, however a number of less latency-sensitive applications will also continue to be utilised & specific spectrum will be required to support both these and the SMIP requirement.

CWW has engaged with OFCOM and other entities regarding this requirement and looks forward to an ongoing dialogue.

**Question 7**

***What impact will DAB expansion have on demand for the spectrum under review? Are there any other demand drivers that Ofcom should consider in relation to broadcasting use or services related to broadcasting?***

CWW has no specific input on this question.

**Question 8**

***a) What is the likely demand for broadband wireless access applications in the spectrum under review and which bands is this likely to specifically impact? How should Ofcom consider the demand for backhaul to support such applications and is such backhaul demand likely to arise in the spectrum under review?***

***b) Do you consider that the emergence of rural broadband fixed wireless access will influence overall demand for the spectrum under review and to what extent? Which bands is this likely to impact most?***

CWW believes that there will be a demand for point-multipoint basestations, capable of supporting in excess of 250Mbit/s. This will require bandwidth for the access network itself, but also point-point capacity to serve backhaul from these basestations, falling within the scope of this review. We envisage the point-point links involved will be medium distance bands, i.e. in range 13-38GHz.

**Question 9**

***Do you consider that there will be a material additional demand from the PMSE community for access to the spectrum under review? Which bands under review is this likely to impact most and to what extent?***

CWW has no specific input on this question.

**Question 10**

***How might the economics of new fibre provision (with or without reliance on regulatory remedies – whether active or passive), as compared with wireless provision of both terrestrial and satellite based services, impact on the requirements for wireless backhaul? We are interested in the possible impact, in terms of the extent of possible substitution for wireless links and in terms of the nature of wireless links affected (urban v. rural, lower / higher frequency bands).***

Any point-point link is driven by a commercial business case to determine the most economic method (if any) of provision. This could be deployment of fibre by the communications provider, leasing of third party capacity (whether on a dark fibre or bandwidth basis), or usage of wireless (satellite or terrestrial) links. Typically wireless is used only where it is uneconomic to serve the requirement using fibre infrastructure.

Any regulation of spectrum that seeks to secure economic value from the allocation process (e.g. by auction or license fees increased in excess of the administrative cost of award), will clearly slant the economics. However, it is important to distinguish between a slanting that affects technology choice, from one which could prevent service being economically provided at all. On the one hand, it could mean that wired approaches become more economic than radio access : this is more likely the case in urban/extra-urban areas where 3<sup>rd</sup> party fibre may exist but it previously proved more economic to serve customer demand by radio access. On the other hand, the increased cost of spectrum could lead to there being *no* economic means of meeting an access requirement, hence the prospective service opportunity being left unfulfilled : this is more likely to occur in rural areas. The first case is arguably an economically desirable outcome : the second is probably not. However, we believe it will be difficult to devise a spectrum pricing approach which does not capture both scenarios and characterising the difference based upon urban vs rural geography is problematic.

Further, CWW notes that ultimately any charges for spectrum which are in excess of the administrative costs of allocation represent a tax on UK industry, which could consequently affect our international competitiveness.

**Question 11**

***What issues relating to spectrum access for different services do you think Ofcom should review? How might Ofcom start to rely more on commercial decisions when determining allocations of spectrum in the bands covered by this review?***

In the responses to the previous questions, CWW has noted that communications providers will be faced with ever-growing demands for bandwidth, be it from enterprise customers for data networks, mobile network customers for backhaul for LTE services, backhaul for community-based wireless



access networks, or backhaul for utility smartmetering and smartgrids. This demand for data bandwidth will be reflected in spectrum bandwidth requirements, which to a degree will be mitigated by new technologies improving efficiency. CWW recognises that spectrum is finite, and some means of allocating the available channels in an economically efficient manner is required.

The review will provide a starting point for addressing this quandary. However, reliance purely on economic levers such as auctions would be inappropriate, because national policy issues must also come to the fore. For example, it could be that allocation of spectrum for smart-utilities is considered to have greatest importance because of the need to meet international climate change agreements, or there could be a policy imperative to bridge the digital divide. Notwithstanding this, it could be felt that a “command-driven” approach of assigning spectrum to particular strategic applications could be inappropriate as it implies that the relative importance of for example smart-utilities versus widespread mobile broadband coverage is universally understood and agreed.

Further, any economic measures to drive efficient allocation of spectrum must take account of existing usage : in CWW’s view it would be inappropriate if existing users were to be penalised for their usage of spectrum unless a viable exit strategy was provided to allow them to avoid any increased charges.

#### **Question 12**

***We would welcome views on the potential for more widespread use of market based approaches to the spectrum under review such as third party band management, and the regulatory steps which would need to be taken to facilitate this.***

While CWW acknowledges the benefit in at least investigating such approaches, it is our view that a core role of Ofcom is to efficiently manage the wireless spectrum : other than potentially outsourcing purely administrative functions, we need to be convinced of the benefits of giving this statutory role to third parties.

#### **Question 13**

***(a) Do you consider that any changes should be made to the Ofcom licence fixed link product set?***

***(b) Might a more flexible approach to licensing, in bands where demand is unlikely to exceed supply for the foreseeable future, enable more intensive use of these bands? If so, what form might the licensing take and in which bands would this be appropriate?***

***(c) Are there other actions which Ofcom could take to improve spectrum efficiency by encouraging migration to or use of higher, less heavily used, bands, with a view to freeing up spectrum in popular lower frequency bands?***

CWW considers that the current Ofcom product set is still fit for purpose and, in most case offers sufficient protection from other users/links in order to avoid interference. However, in the case of a specific communication provider holding its own allocation of spectrum, some of the criteria may be relaxed as potential interferences and victim links will be under the same provider. Hence, there is scope for slightly modified wanted-to-unwanted ratios in order to assign a link that would otherwise not be assigned by Ofcom. Adaptive Coding & Modulation should be more and more widely used as

there are significant benefits to communication providers but Automatic Transmission Power Control will only really be widespread in new bands, if any.

The light licensing approach is still acceptable in most cases although it relies on the registrations of CPE and base station equipment by the assignee. Whilst this is the norm in most cases there are issues with interferers in urban areas particularly at 5.8GHz where it is now impractical to consider such deployments. The opposite is true in the more remote parts of the UK where there is still sufficient spectrum for multiple operation.

As legacy radio links still operational are reaching end of service most assignees will need to apply for a variation to an existing licence. This may mean that a 13GHz 15 year old radio is to be replaced but could possibly now be replaced by an 18GHz or 23GHz radio which has more system gain and increased throughput. Tighter control on such variations may force communications providers to use higher frequencies thus relinquishing spectrum in the more popular lower frequency bands.

#### **Question 14**

***What is your view on the impact of geographically uniform fees for spectrum bands included in this review? If you consider that a geographic fee modifier would promote more efficient use of spectrum, how might that modifier be constructed?***

CWW's network footprint, both current and future, is very much governed by customer requirements and location. Changing the licence fees would not necessarily mean that network rollout would have a dependency on Ofcom licence fees for a particular area, although clearly it could affect the economics of fibre versus radio links. However, we do not believe that it would be a major factor that would influence network rollout.

The more efficient use of spectrum will be governed by maximum data rates per MHz for certain radio equipment, for example where typically 155Mbit/s was a maximum per 28MHz channel historically, rates in excess of 200Mbit/s of Ethernet are now achievable therefore bringing down the cost per bit

#### **Question 15**

***Are there other aspects of the review on which you have evidence that would help inform our consideration of these issues and formulate proposals for consultation?***

CWW has no specific input on this question.

#### **Question 16**

***Is the proposed list of bands to be included within the review (as set out in Figure A.5.1 in Annex 5 appropriate?***

CWW believes the list is comprehensive.