SUPPLEMENTARY JRC Response to Ofcom's review of the management of spectrum currently used for point to point fixed links and other services that share this spectrum.

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SUPPLEMENTARY SUBMISSION

- Submitted an initial response to the Ofcom Spectrum Review of Fixed Links on 7 February 2012.
- Subsequent to the publication of this response, a number of issues have been raised which merit further consideration.
- JRC is grateful to Ofcom for the opportunity to supplement the original submission.

Response to 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?

With special relevance to the energy sector, the government's drive for increases in renewable generation will require significant increases in electricity network monitoring and control, particularly in remote areas where much of the renewable energy is sourced. Robust communications are required to rural and remote locations where fibreoptic cables are not cost effective.

Although it is unclear at present what access technology will be required for smart grid, it is likely that radio will play a major part.

In addition, the demise of digital over copper services to remote locations as commercial telecoms operators migrate to next generation networks may necessitate increased deployment of fixed link infrastructure to replace legacy services which cannot be supported over non-deterministic circuits.

A further unknown is the extent to which demand for fixed links in the utility sector will be enhanced by more rigorous security requirements for Critical National Infrastructure (CNI). Some utilities in the US are coming to the conclusion that the only practical way to mitigate increasingly onerous security standards is by means of private networks, which for remote areas will require more microwave links.

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?

No additional comments.

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?

At present, utilities do not share networks or services with public safety. However, there is much debate regarding whether for the next generation of mobile networks, especially in the context of LTE being mandated for public safety in the USA, utilities and other responders encompassed by the Civil Contingencies Act will be required to share a common network, placing greater demands on fixed microwave services to support the mobile network.

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?

No additional comments.

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 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?

No additional comments.

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?

No additional comments.

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?

DAB expansion in VHF spectrum leaves the 1.5 GHz band unneeded for DAB.

Historically, the 1.5 GHz band was heavily used by utilities for microwave links which have now been migrated to other bands. However, the essential characteristics of the 1.5 GHz band set it apart from general commercial and consumer applications and generate the need for special utility applications to provide:

- an essential service to deliver safe and economical smart utility networks (energy grids – electricity and gas, water supply networks).

- required resilience of the grid system (which depends on the communications network to operate effectively) which delivers essential services.

- required confidence level for the priority of the communication for operational applications. That is, if certain smart grid communications were congested above a given level, the grid service would be impacted and could partially fail or fail over a wide area.

- required deterministic propagation delays and or very short end to end propagation delays for some services (for example 10 ms maximum 'end-to-end' delay for electrical protection on some elements of the high voltage network).

- investment cycles of equipment are long in comparison to consumer or general business applications. The main driver for this in the future is extremely high cost of end-point equipment replacement. This is due to the remote locations of the many end points, and the intrinsic hazards involved with utility operational locations. Thus provision for safe working necessarily adds very significantly to cost of changes.

- service at remote and inaccessible locations frequently not served by other networks.

- application data rates at low levels (seldom greater than 1 Mb/s) where projections do not indicate this changing significantly over time.

The wireless access aspect of the application is needed for the following reasons:

- To economically provide service to a large number of remote locations, many of which, for utility grids, are located remote from major areas of population.

- In order to meet the time-line of rollout required to achieve utility contribution to the EU 2020 agenda the use of wireless connectivity as the major part of the access method to the lower level (more numerous) end-points is required.

- Implementing smart utility grids requires communications services to be provided to many grid locations that are not served up to now with operational communications.

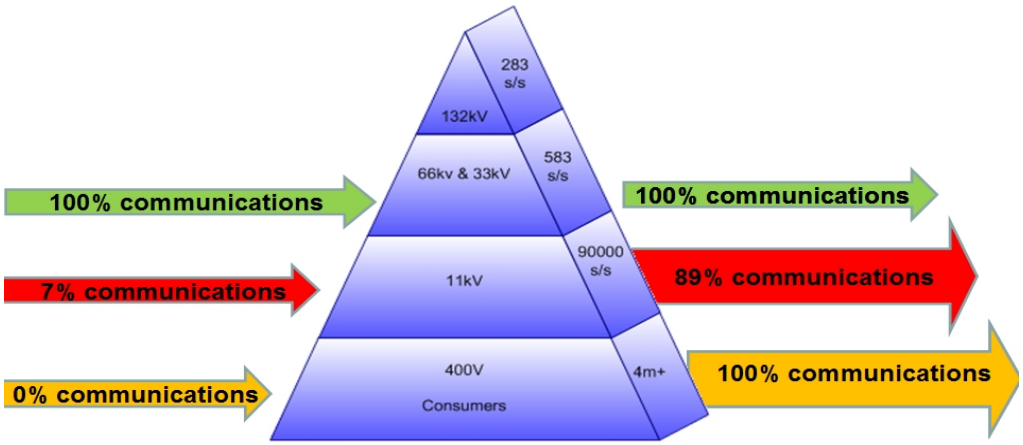
Typical service types, based on the electricity network case, for the smart utility application are shown in the table below.

Table 1: Typical service types for smart utility application

Service type	**Description**	**Data rate**	**Comment**
Data acquisition and control services (SCADA and related services)	Information is collected from the electrical network, generator units and major loads. Automatic control actions are communicated to maintain the system within required operational limits and to optimise network performance	9.6 kb/s to 64 kb/s in general, with an increasing number of locations requiring higher data rates - up to 2 Mb/s.	In many cases these communications services are mission critical, loss of the service could result in power outages. When power has been lost in a network due to a fault, SCADA systems enable the network to be reconfigured remotely to restore supplies to many customers within a few minutes without field workers having to visit sites. In other cases loss of communications will cause sub-optimal grid performance thereby wasting energy.
Electrical protection	Communications services used to protect major parts of the electrical network in fault conditions	Typical data rate 64 kb/s	Failure of communications service could lead to damage to the electrical network

A suitable architecture for the communications network consists of an access layer that provides narrowband access over a wide coverage area with many end points (for example corresponding closely to the two lowest layers of the pyramid in the figure below). This layer will generally be provided over a wireless network in non-urban areas. There will be significant country differences in the detail of how this is implemented.

Increase in connection nodes for electricity distribution networks



	Quantity of sites requiring comms (% increase over 2011)	
	2021	2031
Total	775%	1199%

Above this there is a “middle mile” communications system which aggregates narrow band service at collection points and also provides higher data rate (1 to 2 Mb/s) service to the middle layers of the utility network. A suitable wireless access technology is the best choice, from the point of view of cost and speed of roll-out, for a large proportion of this layer.

Finally there is a high bandwidth trunk layer that connects the “middle mile” access points together and also provides high data rate connectivity to the top layers of the utility network. This layer will generally be carried on a combination of fibre optic and point to point microwave radio links.

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 considers 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?

No additional comments.

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?

No additional comments.

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).

Where new backhaul is required within rural and remote areas, new fibreoptic cables are not economically viable. Lower capacities and security of service can be provided via digital microwave radio.

In other areas, the need for enhanced resilience is perceived as the major the stimulus for growth in microwave links, together with the ability to roll out new services more quickly with radio than fibre or copper connections.

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?

Regulated industries, especially utilities, but also public safety and transportation would be very concerned if access to microwave radio spectrum were to become more reliant on commercial services. As industries regulated to deliver guaranteed services, access to suitable and sufficient spectrum is vital.

Previous auctions of spectrum have left valuable spectrum fallow, unused or underused for long periods. In the case of fixed links, this is most clearly illustrated in the auction of 1.5 GHz spectrum which had historically been a fixed links band much used by utilities. It is difficult to see how any convincing case for further auctions of fixed links spectrum based on spectrum efficiency could be justified on the evidence to date.

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.

Should Ofcom rely on commercial decisions to allocate spectrum, then blocks within specific bands should be reserved specifically for CNI (including utilities), Public Safety and Local Authorities for non commercial gain to be managed by Ofcom or an independent 3rd party. This mechanism has proven satisfactory not only in the case of JRC for the energy sectors, but similar arrangements for the UK water industry, and also for aviation through the Civil Aviation Authority and National Air Traffic Control System.

Question 13

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

In the current economic climate, Ofcom should not make any changes which would impose a significant capital spend and/or ongoing operational expenditure on regulated industries or public services which ultimately have to be paid for by all consumers and citizens.

However, more efficient use of spectrum could be made and network planning facilitated if Ofcom deployed competent technical staff to assist with network planning where access to the assignment database is essential; and also to make engineering judgements where the computerised planning system will not allow assignments, but experienced specialist staff can make detailed investigations of the local clutter environment to judge whether additional assignments can be accommodated or not.

(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?

Where MNO's, ISP's, Telco's and broadcasters are reaching more rural areas and deploying next generation technologies, the increase in demand for bandwidth is quickly going to exceed the capabilities of fixed link technologies and the deployment of fibre becomes more commercially viable. CNI, Public Safety and local authorities, representing only 10% of the market, are also increasing their bandwidth requirement, but at a significantly lesser rate making fixed link technologies the only economical solution. Flexibility is welcome as long as there is a safeguard for these critical applications.

(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?

Because of their density of sites and no requirement for sustained resilience, MNO's can migrate relatively easily to higher frequency bands. In contrast, critical users have restricted access to key hub sites for backhaul connectivity, and resilience requirements restrict the choices for suitable sites. Furthermore, the complexity and cost of incorporating resilience into a network increases greatly as the number of sites multiplies.

For critical users, spares holdings are essential to guarantee resilience, which becomes more complex and expensive if multiple frequency bands have to be accommodated within the microwave network.

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?

This will depend on the predicted profile of demand for spectrum. Historically demand has been very high in densely populated areas where use of spectrum has been more economically viable than deploying fibre. As the demand for bandwidth increases, the resilient fibre infrastructure in these areas is also increased therefore, reducing the reliance on spectrum. There is more likely to be an increased demand in rural areas due to the lack of fibre infrastructure along with increased demand for capacity.

When pricing was originally determined for microwave fixed links, it was by reference to consultancy studies. Since then, a number of auctions have taken place which we believes shows that the current 'Administrative Incentive Pricing' (AIP) is greater than the market price for the spectrum, leaving spectrum underused in rural and remote areas. When spectrum pricing was introduced, assurances were given that prices would be reviewed in due course to reflect prices established through market mechanisms.

Ofcom needs to publish data showing the income from microwave fixed links compared to the costs of administering the spectrum, hence the scope for price reductions in less used parts of the spectrum.

Thus, in our view, there is likely to be a shift from previous high demand areas to low demand areas, and if accompanied by a price reduction in uncongested areas, would encourage more use of microwave in remote areas and help to stimulate economic growth and enhance social benefit in rural areas.

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?

Migration of equipment from fixed links bands can be a lengthy process if equipment is not to be written off prematurely. Investment cycles for strategic microwave routes can be measured in 15-25 year time frames. When the 1.5 GHz microwave link band was to be closed, notice was first given in the early 1990s. However, in the Ofcom consultation published in 2006, over 10 years after the band was closed to new assignments, it was noted that the band still contained around 500 fixed link assignments. At an approximate replacement cost of £25,000 per installation at the time, this amounted to roughly £12.5 million to replace existing infrastructure by the then operators.

Another aspect of later auctions of fixed links spectrum relates to geographic regions. Many of the critical users referred to in this response are public sector bodies or regulated industries with clearly defined – but different - areas of operation. Thus, when Ofcom conducted the previous auction of fixed link spectrum in geographic blocks, organisations such as JRC did not participate as there was a significant risk of ending up with microwave spectrum which would not allow a utility to provide links over the whole of their licensed area; or with large amounts spectrum in areas where that particular utility did not wish to use

microwave – for example if that utility no longer had access to suitable radio towers.

A secondary issue is that microwave fixed links are assigned on the basis of availability, and this is reflected in the price charged. A mechanism needs to be introduced whereby is a link is planned at a certain availability – say 99.999%, but is only delivering a lesser availability – say 99.991%; then either additional power should be assigned to enable the link to achieve the declared capacity; or the fee should be reduced to reflect the lower achievable maximum availability.

[In JRC experience, this problem arises mainly on shorter links in areas of heavy rainfall where climate change is resulting in fewer but higher rain-rate incidents, causing degradation where the entirety of the link is affected by intense rainfall; whereas for longer links which are assigned proportionately higher rain-fade margins, the entire link path is rarely all affected by extreme rain-rate incidents.]

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?

It is important to utilities to have access to a range of wide range of microwave spectrum to facilitate construction of high capacity compact resilient networks in suburban complemented by medium capacity long haul networks for rural areas; plus lower frequencies for access networks in difficult or sparsely populated terrain.

Any proposals for changes to the management of the fixed links bands must respect the principle that not all microwave band are substitutable for one another.

ANNEX: JRC'S ORIGINAL RESPONSE DATED 7 FEBRUARY 2012

Key Points

- JRC welcomes the opportunity to respond to this consultation and the Aegis Report which presents an excellent analysis of the current situation and potential scenarios for the future.
- The fixed links market is a relatively stable part of the radio landscape, with changes being evoltui0onay rather than revolutionary.
- Microwave fixed links provide diversity and resilience in a communications infrastructure, a feature which should not be undervalued as our economy become more dependent on electronic communications in every aspect of life.

Response to 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?

One might expect to see a number of countervailing influences on the growth and decline in demand for radio fixed links:

A. The geographic spread of fibre-optic cables is likely to reduce demand for radio fixed links as more communications migrate to cable.

B. The ubiquity of IP networks and 'cloud computing' makes it almost impossible to assess resilience and ensure redundancy in communications provision unless one route is fibre and the alternative route is radio, leading in growth in demand for radio fixed links for resilience purposes.

C. The general increase in need for responsiveness in a globally competitive market places a premium on being able to introduce or reconfigure services very rapidly in response to changing demand, an inherent characteristic of radio based networks, generating increased demand.

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?

No view.

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?

No view at present.

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?

No view at present.

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 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?

Utilities use a limited amount of satellite services, predominantly fixed satellite services. The most important differentiating characteristic from a utility perspective is weather related performance. Utility infrastructure is most highly stressed during severe weather events, and it is therefore important that any non-availability of utility telecommunications does not correlate to severe weather, eg rain fading on the communications links.

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 Grids and intelligent utility networks are likely to generate growth in the demand for radio fixed links. The most important element of this network growth is likely to be at the lower end of the frequency spectrum, where the longer hops and slightly obstructed paths are achievable. This facilitates resilience as resources can be concentrated on fewer nodes in the networks. The lower frequencies are also generally less prone to weather related outages which correlate with the times when utilities need to rely on communications most.

The lower data rates available at these frequencies are not always an impediment as growth is likely to be in terms of geographic reach, not substantial increases in data rates from individual nodes.

Growth in this area is also driven by a need for diversity and resilience. Utilities have requirements for power independence in the communications networks and guaranteed redundancy.

In March 2004, a fire broke out in a cable tunnel in Manchester and put 130,000 land lines out of action, affecting internet services and disrupting several parts of the emergency services communications network including Derbyshire and Cheshire police forces and the Greater Manchester ambulance service. Many bank cash machines in the area were closed since they make security checks over phone lines and local shops could not use credit and debit card machines.

The incident highlights the vulnerability of parts of our communications infrastructure, and demonstrates how a single failure can cascade across multiple areas and services. At the same time, some organisations which had thought they had back-up communication routes in place should the BT services go down, found that these alternative routes used duct space in the same cable tunnel, and so were lost as well.

As commercial telecommunications migrate towards IP networks and cloud computing, it may be virtually impossible to guarantee diverse routing and power independence from fixed 'wired' networks. Fixed radio links enable resilience to designed and – most importantly – tested regularly to demonstrate resilience.

In terms of timescale, growth in smart networks is driven primarily by other government policy goals. Most critically the "20-20-20" targets:

- At least 20% reduction in EU greenhouse gas emissions below 1990 levels.
- 20% of EU energy consumption to come from renewable resources.
- 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

In order to achieve these goals whilst maintaining energy security and affordability, much more intelligence will have to be incorporated into utility networks; this intelligence depends telecommunications; and increases in telecommunications capabilities on these timescales will necessitate more use of radio systems.

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?

No view.

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 considers 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?

No view.

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?

No view.

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).

We would anticipate a more ubiquitous provision of fibre-based broadband providing the capacity to accommodate the massive predicted growth in broadband data traffic, removing the requirement for radio-based backbone trunks, unless such services are provided from resilience.

It should be noted that fibre-based communications are not totally immune to weather related incidents. Storms can damage overhead lines, and underground cables can be disturbed as trees frequently break underground cables when uprooted by severe storms.

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?

See answer to Question 12.

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.

It must be noted that microwave fixed bands are not necessarily substitutable, especially at the lower end of the frequency band. The 1.4GHz band is especially important to utilities because its unique properties are not replicable at higher frequencies. Relatively long hops enable protected landscapes to be traversed without intervening radio towers, and terrestrial radio provides low latencies not available via satellite. The 1.4 GHz band is also relatively unaffected by weather-related incidents, making it ideal for utility teleprotection services which cannot be operated over the new generation of fixed IP-based commercial telecommunications networks.

That is why, why the concept of market based mechanisms for spectrum allocation was first debated in Parliament in October 1997, the Government spokes person gave assurances that "I entirely agree that the utilities, emergency services and the Environment Agency all perform vital safety of life services on which quality of life, and even safety of life, may depend. I also fully understand their dependence on radio for efficient communications, and that that is essential to the prompt and effective execution of their duties." ..."I therefore agree that it is right – indeed essential – that those services should continue to have access to the frequencies that they need to carry out their functions; I say that clearly and plainly. I am happy to repeat the assurance that the introduction of spectrum pricing should not affect the access of essential services to the radio spectrum they require."

JRC therefore considers it vital that, in whatever mechanisms are considered, utilities can continue to access spectrum at the lower end of the fixed link range of spectrum for essential radio links.

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?

In any consideration of changes in the fixed link licensing regime, it must be remembered that planning consent to erect radio masts suitable for fixed links is not a trivial issue. There is a general disposition against the erection of new radio infrastructure, which puts a premium at being able to access spectrum at existing radio hub sites.

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?

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?

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?

Background

A. JRC Ltd is a wholly owned joint venture between the UK electricity and gas industries specifically created to manage the radio spectrum allocations for these industries used to support operational, safety and emergency communications. JRC also represents gas and electricity interests to government on radio issues.

B. JRC manages blocks of VHF and UHF spectrum for Private Business Radio applications, telemetry & telecontrol services and network operations. JRC created and manages a national cellular plan for co-ordinating frequency assignments for a number of large radio networks in the UK.

C. The VHF and UHF frequency allocations managed by JRC support telecommunications networks to keep the electricity and gas industries in touch with their field engineers throughout the country. The networks provide comprehensive geographical coverage to support the installation, maintenance and repair of plant in all weather conditions on a 24 hour/365 days per year basis.

D. JRC's Scanning Telemetry Service is used by radio based System Control And Data Acquisition (SCADA) networks which control and monitor safety critical gas and electricity industry plant and equipment throughout the country. These networks provide resilient and reliable communications at all times to unmanned sites and plant in remote locations to maintain the integrity of the UK's energy generation, transmission and distribution.

E. JRC works with the Energy Networks Association's Future Energy Networks Groups assessing the ICT implications of Smart Networks, Smart Grids and Smart Meters.

Adrian Grilli
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