Commission for
Communications Regulation

Response to Consultation on the Proposed Release of the 400 MHz band

Non-confidential Submissions to Document 18/92

Reference: ComReg 19/23s

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Content

1 The 450 MHz Alliance

450 MHz Alliance

Response to ComReg Document 18/92

'Further Consultation on the Release of the 400 MHz Sub-band'

The 450 MHz Alliance welcomes the opportunity to respond to ComReg's further consultation on release of the 400 MHz Sub band in Ireland. The 450 MHz Alliance exists to promote the global use and harmonisation of the 450 MHz band and more widely all spectrum in the 'sweet spot' between 380 and 470 MHz. Members and participants of the 450 MHz Alliance include leading equipment vendors, end user communities, regulators, standards organisations and chip set manufacturers. The 450 MHz Alliance works with partners across all three ITU regions to foster a productive and healthy eco-space to allow spectrum in the 400 MHz region to be utilised as cost effectively as possible to allow delivery of robust communication systems for applications in sectors such as transportation, petrochemicals, PPDR, agriculture, rural broadband and smart grids (a key area covered in this consultation).

Further details can be found at https://450alliance.org

General View

The overall principals and proposals indicated In the ComReg document are broadly in line with those of the 450 MHz Alliance. We echo the views and opinions highlighted in the work completed by Plum Consulting - they are well aligned with messages which have emerged from the Utility Community (including EUTC) over the previous decade. Many electricity utilities across Europe now benefit from comparatively broadband communications technology (either CDMA or LTE) which support both current operational requirements and future smart grid aspirations which are likely to see an increase of at least two orders of magnitude in the number of devices (RTUs / IEDs) requiring connectivity and a significant increase in required bandwidth. The majority of these systems are deployed in the 450-470 MHz region. However (as noted in the consultation), several countries including Ireland and the United Kingdom are unable to use this band due to legacy band fragmentation and hi-low frequency reversal issues. The proposed release of spectrum in the 410-426 MHz region by ComReg represents the only realistic opportunity for Ireland to benefit from the unique advantages of the 400 MHz band

which is already available to most other European states for delivery of critical national infrastructure communication.

Evolution of electrical transmission and distribution networks to smart energy systems is dependent on availability of resilient, robust and secure communications infrastructure. Without a suitable fit for purpose communication fabric, aspirations for increased renewable generation and electrical vehicle adoption will be severely hampered. A private, standards based wireless communications system in the UHF band represents a key component of such a communications network, as recognised by utilities globally and research projects such as the EU 'Energise' programme (2016-2017).

Insofar as our response to this consultation is concerned, the 450 MHz Alliance remains operator and vendor neutral. In simple terms, we recognise that the timely availability of spectrum in suitable frequency bands is a key enabler for realising communications requirements for smart energy systems and ensuring the security and reliability of energy networks in the future.

We are in agreement with ComReg and Plum's initial conclusions that, in Ireland at least, other applications (broadband, PPDR, PMR etc) are already more than adequately resourced from a spectrum perspective with multiple existing delivery methods ranging from public MNO connectivity, fibre delivered services, the emergency services TETRA network and dozens of narrow band channels in the UHF & VHF range. The 450 MHz Alliance appreciates the approach which ComReg is proposing - to split the spectrum auction into two sections – A (2 x 3 MHz) and at a later date 'B' for the remaining 2 x 2.5 MHz split into paired 100 kHz blocks. This allows the Utility sector ample scope to acquire a large enough allocation to support a 2 x 1.4 MHz or 2 x 3 MHz deployment (dedicated for utilities) whilst simultaneously allowing other players to acquire one or more 'narrow band' allocations should they wish. This approach also allows a Utility to bid for additional spectrum beyond the initial 3 MHz which could provide additional flexibility during the deployment phase. Assuming that the auction progresses in the manner proposed by ComReg it will be interesting to observe which party (if any) can justify investment in some of the 100 kHz allocations with their associated coverage obligations – particularly when most applications which would benefit from that size of allocation appear to be satisfied already in other bands. One interesting possibility is that some of the existing 'narrow band' uses within the current 450-470 MHz allocations could be migrated to the 'Part B' spectrum. This could allow gradually migration of those services away from the existing 450-470 MHz range and (after several decades) the realignment of that band with the rest of Europe.

The following sections to the response contain comments with regard to some specific elements of the consultation which we intend ComReg could consider to further refine the eventual award process.

Duration of Award {*Section 5.13-5.18 ComReg 18/92}*

ComReg's proposed duration of the spectrum allocation is currently 15 years. Whilst this duration is relatively long (in comparison with commercial Telco allocations) it is not as long as a Utility may desire – especially considering the long duration of investment cycles in the Utility sector, large investment required, and the fact that any network is likely to take approx. 3 -5 years to design, implement and integrate (leaving only 12 years of 'useful' service before spectrum rights could potentially be terminated). Therefore, 450 MHz Alliance suggest that a term of 20 or 25 years would be more appropriate (at least for the part A allocation of 2 x 3 MHz). Furthermore, we suggest that there should be a clear indication at the start of the award process outlining the method by which an extension to the 20 years would be granted when approaching the end of the initial term (this will be essential in order that any uncertainty around the extension does not inadvertently become a dis-incentive for further investment in the network from (for example) year ten onwards).

Initial Roll out Obligations *{Section 5.41-5.47 ComReg 18/92}*

In connection with the item above, the 450 MHz Alliance would also suggest that the period of time to satisfy the initial rollout obligation be extended by two years. This will allow sufficient time for any protracted procurement exercise to be satisfactorily completed prior to deployment (Utility sector procurement exercises tend to be quite slow due to their complex legal and regulatory requirements).

Guard Band Consideration *{Section 5.24-5.30 ComReg 18/92}*

Depending upon the choice of RF channel bandwidth (the most obvious of which are currently either 1.4 MHz or 3 MHz) it may be necessary that one or two of the lowest 100 kHz allocations in Part B are required to be held by the operator in the Part A spectrum in order to prevent interference to other potential users in the adjacent Part B allocations. It would be possible to avoid this scenario by constraining the deployment in the Part A allocation to a 1.4 MHz deployment but this would be highly wasteful of the remaining 3 MHz. It seems probable that there will be an oversupply of 100 kHz blocks in the 'part B' auction so this may not be a major issue. However, consideration should be given to this scenario and mitigation options considered.

MOU and NIE *{Section 5.56-5.60 ComReg 18/92}*

The 450 MHz Alliance notes that mention is made of the Memorandum of Understanding between Ireland and the UK especially around the interface with Northern Ireland. It would be interesting to understand in more detail how the detail of this MOU would evolve especially given the current developments and analysis of options for use of 400 MHz spectrum on mainland UK by Ofcom. Additionally, if ESB were to be successfully awarded the 2 x 3 MHz allocation (part A) then it could be sensible to consider a solution for the whole of Ireland which could also serve Northern Ireland Electricity (a subsidiary of ESB) as well as other Utilities (water and gas). This would have implications for any revised MOU. The section on maximum EIRP (50 Watts) will also need to be reflected in any adjustments to the MOU with due consideration to spectral power density limits at geographic boundaries.

FDD vs TDD *{Section 5.19-5.23 ComReg 18/92}*

ComReg's proposal for an FDD rather TDD allocation is in line with the general view of the 450 MHz Alliance. It is true that at present TDD variants of LTE technology exist in this band and have been successfully deployed in a number of small isolated instances. However, TDD variants are currently somewhat proprietary and in the longer term it appears that global markets will evolve towards FDD variants of 400 MHz products as these offer the greatest alignment with the largest number of local country regulators (who have FDD pairs available) and the direction of 3GPP in the lower (sub 1 GHz) bands. The eventual license holder(s) could be left to choose whether to deploy FDD or TDD variants but the current 3GPP WI (http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_89/Docs/R4-1814981.zip) proposes an FDD band plan. A TDD approach appears to be better suited to more efficient use of spectrum in the higher frequency (>2 GHz) bands. By opting to align with an FDD approach, ComReg is creating an environment in which a potential operator can have the largest choice of interoperable hardware vendors to choose from with all the associated competitive market benefits during any procurement exercise. (Support from multiple vendors is critical in order to avoid any exposure to a 'vendor lock-in' scenario).

Auction Process *{Section 4.1-4.110 ComReg 18/92}*

The review of options for the auction and award process by DotECon is quite thorough and clearly indicates the pros and cons of each type of auction process. The 450 MHz Alliance is in agreement

with the initial proposal from ComReg to use an SCA (Simple Clock Auction) - this approach will minimise complexity and create the greatest clarity for potential bidders. The use of an SCA will also reduce the cost and effort required by ComReg in releasing the spectrum. We feel that ComReg has appropriately recognised the significant differences between the auction of the 400 MHz spectrum and the more frequent MNO auctions (which justify Simultaneous Multiple Round Auctions and other variants) Spectrum auctions in the MNO sector generally involve very significant sums and are far more competitive than is likely to be the case with the award of the spectrum under consideration here.

End of Document

2 EirGrid Group

EirGrid Response to

Further Consultation on the Release of the 410 – 415.5 / 420 – 425.5 MHz Sub-band

Reference: ComReg Consultation 18/92

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1. Introduction

EirGrid welcomes the opportunity to respond to the document 18/92 'Further Consultation on the Release of the 410-415.5/420-425.5 MHz sub-band', published by the Commission for Communications Regulation (ComReg). From the point of view of the development of a Smart Grid in Ireland, this is an important and timely consultation paper.

2. EirGrid

EirGrid holds licences as independent electricity Transmission System Operator (TSO) and Market Operator (MO) in the wholesale trading system in Ireland, and is the owner of the System Operator Northern Ireland (SONI Ltd), the licensed TSO and market operator in Northern Ireland.

The EirGrid Group of companies includes:

EirGrid plc: A leading Irish energy business, dedicated to the provision of transmission and market services for the benefit of electricity consumers. It is a state-owned commercial company, committed to delivering high quality services to all customers, including generators, suppliers and consumers across the high voltage electricity system and via the efficient operation of the wholesale power market. It puts in place the grid infrastructure needed to support competition in energy, to promote economic growth, to facilitate more renewable energy, and to provide essential services. In its role of TSO in Ireland, EirGrid operates and maintains a safe, secure, reliable, economical and efficient transmission system, as well as developing key infrastructural projects which are vital for the socio-economic development of the State. As TSO, EirGrid is regulated by the Commission for Regulation of Utilities (CRU).

SONI Limited: SONI Ltd is the licensed transmission system operator (TSO) in Northern Ireland and has the responsibility of ensuring the safe, secure and economic operation of the high voltage electricity system in the north of Ireland. It is regulated by the Utility Regulator Northern Ireland.

SEMO Joint Venture: The Single Electricity Market Operator (SEMO) is part of the EirGrid Group, and operates the Single Electricity Market on the island of Ireland. SEMO is a joint venture between EirGrid plc and SONI Limited. SEMO is regulated by the SEM Committee.

EirGrid Interconnector Designated Activity Company: EirGrid has developed a High Voltage Direct Current (HVDC) electricity interconnector with 500 MW transmission capacity linking the British and Irish Electricity markets. This is known as The East West Interconnector (EWIC). EirGrid Interconnector Limited is the 100% wholly owned subsidiary company of EirGrid plc which manages the interconnector.

EirGrid Telecoms Designated Activity Company: is a 100% subsidiary of EirGrid plc, established to manage fibre optic cables laid with EWIC.

For further details on EirGrid plc or any of the EirGrid Group companies please visit www.eirgrid.com.

3. Response

The consultation document is very comprehensive and provides a significant amount of detail in relation to Comreg's views on the release of spectrum in the 400 MHz sub-band. EirGrid appreciates the effort involved in producing the consultation paper and is responding to those sections of the paper which are most relevant to EirGrid.

4. Smart Grids (Section 3.22 of ComReg Document)

In general EirGrid agrees with the definitions of Smart Grids provided in the consultation paper and confirm that EirGrid is actively working towards the implementation of a Smart Grid in Ireland. The Smart Grid will be characterised by:

- Increased use of renewable energy and further decarbonisation
- Market Integration
- Maintaining security of supply, including system adequacy
- Maintaining competitiveness and affordability
- Energy Efficiency
- More Interconnection

At the heart of the Smart Grid is the application of digital technology on our electricity grid and increasing the share of renewable energy on the system. Supporting innovation in new grid applications is critical and will ensure that the electricity grid works more efficiently and economically in the future.

To meet the government target of having 40% of electricity generated from renewable sources by 2020, additional wind and solar farms will continue to be connected. To incorporate renewable generation (solar, wind etc.) onto Ireland's electricity network, EirGrid is undertaking an Enduring Connection Process (ECP). At present in Step 1 of ECP there are 142 applicants for 1,000 MW of generation. Step 2 (in two years time) is expected to generate similar interest.

The vast majority of these renewable generators will be in remote locations where at present suitable telecommunications infrastructure is relatively poor. All these renewables will require advanced supervisory and control systems along with appropriate telecommunications infrastructure to enable the data to be transferred to central sites for analysis and to enable our Control Centres to operate the Transmission system and to dispatch generation.

At present where telecommunications bandwidth is available, EirGrid obtains data from devices such as Disturbance Recorders (DRs) and Phasor Monitor Units (PMUs) which provide very detailed information on the 50 Hz waveform. This information has a number of uses including analysis to determine how generators react in fault conditions. Smart Grids require devices such as these to be deployed throughout the electricity network.

Due to the remoteness and lack of suitable telecommunications infrastructure, at present EirGrid has no option but to use satellite communication to approx. 50 wind farms. The available bandwidth is both restricted and expensive and limits our management and supervision capability. The allocation of spectrum in the 400 MHz band will enable higher

capacity and cost effective telecommunications which would allow Smart Grid devices such as DRs and PMUs to be deployed.

5. Telecommunications for Smart Grids (Section 3.41 ComReg Document)

EirGrid agrees with the technical requirements outlined and is of the view that telecommunication services provided via radio are essential for the implementation of Smart Grids. EirGrid is a significant user of radio based telecommunication services for the day to day operation of the Transmission system and so welcome the proposal to allocate 2 x 3 MHz of spectrum in the 400 MHz band specifically for Smart Grid services. The allocation of spectrum will enable the additional and enhanced telecommunications services needed to support Smart Grids.

6. Viable Alternatives to support Smart Grids (Section 3.47 ComReg Document)

We agree with the view of Plum in section 3.55 and support the rationale for a dedicated network. Telecommunications services are critical to EirGrid for the control and safe operation of the electricity Transmission Network. Utility grade telecommunications networks are required to carry the critical Supervisory Control and Data Acquisition (SCADA) data and voice traffic between the Generation and Transmission station and our NCC on a day to day basis. In the event of a widespread electricity blackout or in the extreme case of a Black Start where the whole country is without power, electricity services cannot be restored without telecommunication services. In such a situation EirGrid cannot depend on public communications networks as these may be compromised by a widespread and prolonged power outage.

In particular we give our experience of storm Darwin (Feb 2014) and storm Ophelia (Oct 2017) where purpose built utility communications networks reliably supported the control and operation of the electricity Transmission network. During these storms, there was widespread disruption to public fixed and mobile networks and relying on those networks would have significantly impacted our ability to manage electricity Generation and the Transmission network.

7. National Licence (Section 5.2 of ComReg Document)

In recent times we are seeing the move from a small number of large centralised electricity generators to a large number of small distributed generators. With Smart Grid this trend will continue and intensify. In order to serve the future large number of generators dispersed throughout the country the licence should be granted on a national basis. It is only in this way that the same quality of service can be delivered on an equal and non-preferential basis.

Our view is that the allocation of 400 MHz spectrum on a national basis will enable the provision of the necessary telecommunications infrastructure to support the development of Smart Grid including renewable generation throughout Ireland.

8. Channel Bandwidth (Section 5.3 of ComReg Document)

As outlined in Section 5 above, EirGrid agrees that ComReg's proposal for channel bandwidth Part A 2 x 3 MHz channel (the minimum to enable LTE services on a national basis) and Part B, 2 x 2.5 MHz in lots of 2 x 100 kHz. This would provide spectrum allocations which will enable telecommunications services for Smart Grid and also meet ComReg's objectives with regard to efficient use and allocation of spectrum.

9. EIRP Limit (Section 5.36 of ComReg Document)

EirGrid considers the proposed EIRP limit of 50 W to be reasonable as his will allow for the deployment of a national network (as outlined in Section 7 above) utilising a reasonable number of sites while taking account of interference concerns with the UK.

10. Licence Duration (Section 5.4 of ComReg Document)

Investment in electricity infrastructure is very expensive and time consuming and the assets of necessity have long durations, typically 50 years for Transmission stations and lines. Also due to the nature of the telecommunications network services (as outlined in in section 3.41) revenue streams will be orders of magnitude smaller than for commercial mobile operators, so the investment can only be justified over a much longer time period than would normally be considered appropriate. With these factors in mind the proposed licence duration at just 15 years is considered too short. A licence period of 25 to 30 years is considered more appropriate.

11. Mode of Operation (Section 5.5 of ComReg Document)

The proposal is to licence both Part A and Part B as FDD. EirGrid considers this to be too restrictive and may not lead to the most efficient use of spectrum. Both FDD and TDD types of equipment are available in the proposed band. For Smart Grids the volume of information in the 'up' direction i.e. from the remote station to the central node will be much greater than in the 'down' direction. This is due to the functions and devices mentioned earlier such as Disturbance Recorders and Phasor Monitor Units. These will be installed at the remote locations and will upload their information to a central control site. Given the asymmetry in the upload/down load, there is a case to be made that TDD may result in greater spectral efficiency when compared to FDD.

12. Roll out obligations (Section 5.7 of ComReg Document)

Regarding roll out, ComReg proposes a licence condition that within 3 years, 50% of Utility Network will be covered. EirGrid consider that this is too stringent. To provide the services a totally new network will need to be built. Our experience of obtaining new telecommunications services and services to remote locations would indicate that roll out takes considerably longer than for commercial networks. Commercial networks are aimed at

population coverage with large volumes of data transfer, whereas services for Smart Grid are of a much more specialised nature, widely dispersed over wide large geographical areas and with relatively small data transfer volumes. Revenue streams will be very low compared to commercial operations. Also the telecommunications network will of necessity follow the development of the Smart Grid. This will not result in an even spread of development e.g. the vast bulk of wind generation is located in the western part of Ireland. Therefore a longer period for roll out is considered more appropriate without the emphasis on an even geographical spread.

13. Third Party Use (Section 5.9 of ComReg Document)

We also agree with ComReg's further proposal on allowing licensees to provide services to third parties throughout the country without the need for individual licensing for specific geographic sites or by each third party user. At present EirGrid avails of telecommunications services from licenced providers and envisages being an end-user of the new telecommunication services which will enable Smart Grid.

3 Electricity Supply Board Networks Limited

Energy for generations

Networks Telecoms, ESB Networks

ESB Networks' response to ComReg's Further Consultation on the Release of the 410-415.5 / 420-425.5 MHz Sub-band (ComReg Document 18/92)

21/11/2018

Contents

1. INTRODUCTION

ESB Networks (ESBN) welcomes the opportunity to respond to the Commission for Communications Regulation (ComReg) further consultation in relation to the release of the 410-415.5 / 420-425.5 MHz sub-band[1].

Radio spectrum is a hugely important natural resource, enabling both critical and non-critical services to be deployed and made available for all citizens. It is a key enabler for the provision of wireless services which in turn generates significant economic, technological, social, environmental and safety benefits. In that regard, it is vital that appropriate radio spectrum is made available in a timely manner which brings the maximum benefit for the people of Ireland.

The electricity industry is undergoing unprecedented change, and the methods by which electricity is produced and consumed are fundamentally altering. Secure telecommunications are fundamental to this change and to the safe and efficient operation of the grid. In Ireland we are already transitioning to a low carbon electricity system. Ireland is a world leader in the adoption of renewable energy. Through the successful development of our wind farm industry we now have the third highest wind penetration world-wide. However more work is needed to further increase renewable generation and also to decarbonise our transport and heat systems.

ESBN is committed to supporting Ireland's target of becoming a low carbon system. Securing spectrum is a key to ESBN and Ireland realising this target. ComReg has presented admirable analysis on what Smart Grid is, its requirements and the benefits that can be realised from its deployment. ESBN believe that it would be beneficial to have a long term stable platform on which it can base its Smart Grid investment program.

If Smart Grid investment can replace physical telecommunications capacity provided for 40 years by, for example, a new Transformer, then the Smart Grid investment must also be available for this period at a calculable and known economic cost. In order for ESBN to invest heavily in the usage of this spectrum (increasing spectrum efficiency), it must be certain that the spectrum will be available for a duration consummate with the investment associated with deploying a purpose built national network.

In using the spectrum fully as a Smart Grid platform, ESBN would expect to obtain 'network effects'. This effect means that increasing usage and standardisation over time associated with concentration on one approach yields increasing benefits. ESBN believes that the licence duration associated with the spectrum being released (particularly for Smart Grid) needs to be much longer to enhance the investment and benefits associated with Smart Grid.

ESBN is strongly supportive of ComReg's proposals, particularly with respect to reserving 2 x 3 MHz of spectrum in the 400 MHz band for Smart Grid. ESBN agrees with ComReg that Smart Grid can derive significant benefits in Ireland and that there are no alternative suitable solutions or spectrum bands available. Provision of access to this spectrum in the long term would provide a stable platform for high levels of long term investment in Smart Grid.

[1] https://www.comreg.ie/publication-download/further-consultation-on-the-release-of-the-410-415-5-420-425-5-mhz-sub-band

2. INTRODUCTION TO ESB NETWORKS

ESB Networks Ltd. (ESB Networks), a regulated subsidiary within ESB Group, is the licensed operator of the electricity distribution system in the Republic of Ireland. ESB Networks is responsible for building, operating, maintaining and developing the electricity network and serving all electricity customers in the Republic of Ireland.

The electricity distribution network includes all distribution stations, overhead electricity lines, poles and underground cables used to bring power to more than 2 million domestic, commercial and industrial customers connected to the electricity network nationwide. ESBN also maintains the high voltage transmission network in Ireland on behalf of the Transmission System Operator (TSO) EirGrid.

Secure telecommunications is vital to the safe and efficient operation of the grid. The electricity network depends heavily on having high quality and high availability communications infrastructure (meeting specifications for back up; redundancy; resilience; low delay and jitter). ESBN deploys and operates extensive fixed and wireless telecommunications infrastructure to provide ESB and EirGrid with necessary real time information for operational purposes (i.e. to control and monitor the distribution and transmission networks). Such critical communication cannot always be provided by public communications networks, as these networks do not satisfy the network requirements.

ESB Networks' telecommunications network requires connectivity in a significant number of locations throughout the country, often in remote areas where propagation of high frequency signals is limited (e.g. within High Voltage substations). A significant proportion of ESB Networks' telecommunications network relies solely on wireless for several reasons, including situations where it is technically difficult to use cables to connect devices to the network, or where it is not economically feasible. Radio spectrum is a fundamental component of ESB Networks' existing safe and resilient narrowband network.

The levels of renewable generation to be connected to the distribution and transmission networks is set to increase significantly by 2030, with approximately 5800 MW of wind based generation and 2400 MW of solar PV generation estimated. Generation of renewable (particularly wind) energy can be unpredictable, with quantum of energy generated and available at any time depending greatly on prevailing atmospheric conditions. Another unpredictable and increasing energy source is solar energy. There has been and continues to be significant investment in solar energy in Ireland[2], which is also a low-carbon energy source. Solar energy will contribute increasing amounts of energy to the Grid in the future[3], and this can only be achieved with additional intelligence in the electrical network. Both of these energy sources creates the opportunity for 'prosumers'[4] to participate in the energy market. This hugely complicates the electrical network, as there will be significant variances

[2] http://www.irishbuildingmagazine.ie/2016/02/01/kingspan-completes-the-largest-solar-pv-project-in-ireland/

[3] http://www.irishtimes.com/business/energy-and-resources/future-looks-bright-for-irish-solar-power-1.2507134

[4] Large amount of small generating units feeding a smart grid that can both supply power to consumers and take it back from them.

and unpredictability in supply and demand of electricity to and from the network. Decentralised intelligence and control is necessary to support such innovation[5].

ESBN's Information and Communication Technology (ICT) requirements to manage the power system is changing due to new software and hardware based technologies and platforms, combined with the challenge of cost effectively managing the large amount of renewable (and low carbon) technologies being connected to the power system. ESBN uses such new technologies to maximise the efficiency and operation of existing assets in a more controlled and precise manner, freeing up additional capacity from these assets. These technologies provide real time data about the health and performance of ESBN assets. This innovative approach to incorporating different data sources allows ESBN to develop real- time models of the distribution systems which will enable investments in network assets in a more efficient and environmentally friendly manner. Key tools which will be heavily reliant on a secure, stable and reliable Smart Grid infrastructure include;

- Condition based maintenance by incorporating real time sensor data into ESBN's maintenance management and SCADA systems.
- Variable access management tools which allows existing embedded generators release additional capacity from the existing network connections. This is achieved by having more detailed control of the generator output combined with real time weather and loading information (via deployment of technology in network).
- Safely manage the participation of ESBN customers in providing flexibility onto the network without overloading the different components. Flexibility is a customer's ability to modify generator or load in response to a signal. This flexibility can be provided by customers changing their behaviour or using technologies such as smart charging and energy storage. In Ireland, ESBN are already facilitating large commercial customers who are already assisting the operation of the transmission system by providing flexibility from the distribution network. These numbers are expected to increase in the future increasing complexity and the capacity required from ESBN's electrical network.
- Bi-directionally share information with EirGrid and ESBN customers so that the TSO and DSO can work together to maximise the efficient operation of the entire energy system.
- Provide additional monitoring across ESBN assets so that better operational and planning decisions can be made.

The development of new ways to collect data from existing assets, and to incorporate this data into ESBN systems with other data sources will unlock hidden potential for our customers. It allows deferment of investment costs, speeds up interactions with customers and enables customers to flexibly use the electrical network to positively contribute to climate change targets.

Safe, efficient and reliable integration of this amount of renewable generation on the electricity system and gathering of data requires sophisticated and robust real time telecommunications infrastructure. To meet these challenges it is imperative that ESBN develops and enables an integrated energy system which requires substantial amount of communications. A key enabler of Smart Grid is radio spectrum.

[5] http://www.irishtimes.com/sponsored/future-shock-esb-powers-towards-transformation-1.2376405

3. COMMENTARY

ESB Networks has responded with comments on the sections of consultation document which ComReg did not provide any questions on. These comments are outlined below:

Definition of Smart Grid

The term Smart Grid means different things to different people. ESBN agrees with ComReg's description of Smart Grid as contained in paragraphs 3.22 – 3.25 of its consultation. Smart Grid allows for Utilities to access much more granular information on its network which helps significantly in controlling, monitoring and restoration of the electrical network. Smart Grid requires information to be gathered from significantly higher number of points on the network than heretofore. Smart Grid derives numerous significant benefits as outlined elsewhere in this document.

Network Utility Operators without real time control telecommunications have to plan and operate their Utility Networks on a conservative 'worst case basis'. By definition, this leads to excessive costs, inefficiencies and sub-optimal use of assets. By utilising telecommunications which provides real time information on actual system conditions, and allowing real time analysis and associated control, a much more economic and efficient 'Smart' Electrical Network can be enabled.

Smart Grid technology is being deployed worldwide (e.g. Alliander in the Netherlands[6], various utilities in Canada[7]), whilst there are developments in this area in Brazil, Spain and Portugal. In addition, ComReg has correctly identified (as per paragraph 2.10 of the consultation document) that regulators in Germany and Poland have made comparable spectrum (450 MHz) available for deployment of Smart Grid.

Both the Dutch and Canadian Smart Grid deployments have been hugely successful in operating an efficient and low carbon electricity network. These Smart Grid deployments have allowed increased control of the electricity network, but more importantly they have allowed optimisation of electricity generation (e.g. peak load management) and electricity consumption (e.g. balance of supply and demand to improve quality of power).

Smart Grid requirements

ESBN agrees with CEPT and ComReg's definition of requirements for a Smart Grid as contained in paragraph 3.42 of ComReg's consultation. Smart Grid requires stringent technical performance of the underlying telecommunications network that is being utilised. Smart Grid requires almost instantaneous communications with certain applications, extremely high availability of telecommunications channel, coverage from designated base stations as well as robust cybersecurity. ESBN agrees that there is no alternative solution available to ESBN and no alternative spectrum which could deliver on Smart Grid requirements.

ESBN currently uses public and private wireless solutions to deliver on its telecommunications requirements. ESBN's private narrowband network provides a robust, mission critical service which has proven its resilience in its availability (particularly during the numerous recent storms and extreme weather). This network provides the resilience,

[6] Explanatory video on Alliander's network available here, https://www.youtube.com/watch?v=JlL0WDK8YKk
[7] http://www.nrcan.gc.ca/energy/electricity-infrastructure/smart-grid/4565

coverage and guarantee of service required. However, this solution is capacity limited and is not scalable.

ESBN utilises third party telecommunications networks to provide cost effective 'best effort' communications in instances where it is appropriate (i.e. low critical services with less stringent requirements) or where ESBN does not have alternatives currently.

ESBN notes that it has encountered at least 35 faults with regards to services provided from [✂ [redacted]] third party provider [✂ [redacted]] since 2016. Some of these faults are ongoing, unexplained and in instances there are no reassurances or preventative steps taken [✂ [redacted]] to ensure such faults do not reoccur again. It is also worth noting that these faults do not include the general outages suffered during extreme weather conditions where wide-scale coverage issues were encountered. ESBN is particularly dependant on telecommunications from assets during such severe weather incidents when the offering network is at its weakest point. This is a major reason why third party networks do not meet requirements for Utility communication.

It is worth noting that there is precedent in Ireland in this area. TETRA services were procured by Irish Government in 2008 as there was a requirement for mission critical, highly available services to be made available nationwide. It was deemed that a purpose built network was the optimum solution to meet requirements. It appears that the TETRA service will continue to be utilised for some time, proving that third party networks cannot meet requirements of a mission critical, highly available service.

Reservation of Spectrum for Smart Grid

ESBN strongly agrees with ComReg's analysis and RIA which concludes that there is a requirement to reserve spectrum to enable Smart Grid. Although it cannot be a metric of actual interest in spectrum, it is notable that there has been limited interest in ComReg's consultations on this spectrum other than organisations promoting this spectrum be used for Smart Grid. ComReg has correctly identified that other applications which have been discussed in relation to this spectrum band have alternative spectrum (e.g. 450 – 470 MHz, licence exempt spectrum) or alternative solutions available (e.g. MNOs offerings).

ComReg has correctly identified the potential technology (LTE) which is most suitable for the delivery of Smart Grid services. Given the LTE channel sizes (1.4 MHz, 3 MHz and 5 MHz) which can be facilitated in the band, ComReg is correct in taking the advice from ETSI, EUTC, JRC, ESBN and CEPT FM54 that 2 x 3 MHz of spectrum is the minimum amount of spectrum required for Smart Grid.

Research carried out by ESRI recently[8] has outlined how the Irish state and citizens would be liable to a 15 fold increase in carbon tax rates if targets were not achieved, costing each household over €4,000 per annum. This is yet another reason why Smart Grid must become a reality.

ComReg has provided excellent analysis (in paragraphs 3.26 – 3.37 of its consultation document) on why Smart Grid meets objectives and targets of ITU, UN, EPRI, SEAI, EC (and its Electricity Directive), DCCAE (and its NDP and NECP) and Irish Government

[8] https://www.independent.ie/irish-news/households-face-3000-tax-bill-on-fuel-and-energy-to-cover-climate-costs-37550460.html

(National Planning Framework, National Migration Plan). This comprehensive analysis outlines how Smart Grid is a fundamental prerequisite in achieving a wide range of important objectives, both nationally and globally. These benefits that will be realised give justification to ComReg in its reservation of spectrum for Smart Grid.

ESBN agrees that on the balance of things, Option 3 as presented by ComReg best meets its objectives of reserving 2 x 3 MHz for Smart Grid, whilst enabling the market to determine the optimum winner of remaining spectrum. This is notwithstanding ESBN's preference for reserving 2 x 5.5 MHz of the available spectrum to future proof Smart Grid network and maximise benefits.

Access to Smart Grid from other Network Utility Operators

ComReg state in paragraph 3.89 that "*reasonable and necessary request to access the Smart Grid*" service should be granted to a Network Utility Operator from a deployed Smart Grid (which was deployed by the successfully licensed Network Utility Operator).

ComReg's objective with regards to spectrum auctions is to set minimum prices for spectrum which discourages collusive and anti-competitive behaviour. The proposal to apply undefined ex-post service access conditions is concerning on a number of fronts.

This proposal on first consideration appears reasonable and fair, but in practices creates difficulties for a prospective Bidders for Part A spectrum;

(a) Valuation of Spectrum no longer based purely on value to Bidder: Any Network Utility Operator interested in Part A spectrum will define its own Smart Grid network requirements, and its associated spectrum valuation will be based on the associated costs and benefits for its particular network. In fact, the funding allowed by CRU to a Network Utility Operator for spectrum purchase will be based on the benefits provided by the use of this spectrum for that Bidders customers alone.

(b) Difficulty in scoping requirements of other potential users in advance of bid: Scoping a telecoms network to meet other Network Utility Operator's proposed Smart Grid requirements (which may be undefined at present) would result in discussion and sharing of commercially sensitive strategies. This may result in unintended presentation of information relevant to bidding strategies for Part A and Part B spectrum.

Equally, the proposed Smart Grid services required from a Network Utility Operator wanting access to the Smart Grid network may change and not come to fruition. Therefore, it is difficult for a successful Smart Grid licensee to be aware of actual requirements of a different Network Utility Operator in advance of the spectrum award. This vacuum of accurate information creates ambiguity for a bidder with regards to potential location, volume and throughput of services required by another Network Utility Operator.

This uncertainty presents a significant concern for participants for Smart Grid spectrum as valuation of spectrum is based on a number of unknowns. Also, as suggested, the gathering of necessary information could well fall foul of ComReg's rules regarding collusion between bidders at auctions. Additionally, other factors (cyber security matters, firmware upgrades etc.) may be difficult to

manage when a network is utilised by a number of entities with differing specific requirements.

(c) Difficulties in Roll-out coordination with other parties: It will take some time for a successful winner of Smart Grid spectrum to get services established. The roll out strategy is something that will have been prepared in advance of the auction by Bidders and will affect bidding strategy and price valuation. A bidder's network deployment strategy should not be hindered or impacted by a request for services from another Network Utility Operator, e.g. a Network Utility Operator requesting services in Location A whereas this Location was not intended to be covered by the licensee or intended to be covered at a much later time.

(d) Accommodation of other utility users: In principle ESBN is willing to facilitate fair and reasonable service requests from other Network Utility Operators. In practice ESBN already provide EirGrid with extensive connectivity over ESBN's existing telecommunications network and is required to do so by existing Regulatory agreements. The two other Network Utility Operators (Irish Water and Gas Networks Ireland) may also have access needs that could be less stringent than those of EirGrid or ESBN as their networks do not have the same requirements for continuous real time data and instantaneous control.

ComReg needs to appreciate that there is an opportunity cost associated with provision of network capacity to another Network Utility Operator and this should be grounds for refusing a request, i.e. if Network Utility Operator A requested services off Smart Grid network owner (Network Utility Operator B) today and the network owner had plans to provide services to itself in that area in the near future.

Accordingly, ESBN suggests that any ex-post competition analysis on access to a Smart Grid network should take into account the lack of information regarding other Network Utility Operator's requirements, and how any requests should not impact negatively on the licensees deployment plans or cause service access issues for the licensee themselves. ESBN agrees with the principle of providing reasonable access to services from Smart Grid, but has concerns about the practicality in instances discussed above.

Auction

Without prejudice to its preferred position of administrative assignment (as contained in previous responses), ESBN agrees that an auction provides an objective, transparent and non-discriminatory means of issuing spectrum. In absence of administrative assignment, ESBN agrees with ComReg's proposal to release this spectrum via auction.

Sequencing of award processes

ESBN agrees with ComReg's proposal to host two separate auctions for Part A (Smart Grid) spectrum and Part B. This facilitates the base requirements of a Smart Grid operator initially whilst providing flexibility for a Smart Grid operator and/or any other interested users to compete for remaining spectrum.

Format

ESBN agrees that the SCA format as proposed best meets ComReg's objectives whilst providing a simple and fair method of participation. The proposed SCA, with Exit Bids and Combinatorial closing rule, encourages the most efficient auction outcome.

ESBN agrees that a minimum of 2 x 3 MHz reserved for Smart Grid is a positive proposal. ESBN agrees that spectrum reserved for Smart Grid is best located at the bottom of the available spectrum band (i.e. 410 – 413 MHz paired with 420 – 423 MHz).

Assignment stage

ESBN agrees with ComReg that there is likely to be no material value difference between spectrum locations in the band, so a software tool which selects specific locations in the band (whilst ensuring contiguity of spectrum assignments) is a good proposal. ESBN encourages ComReg to ensure that any unsold lots are located between a Smart Grid licensees spectrum assignment and any winner(s) of (any remaining) lots in Part B. This will reduce potential interference issues between a wide band Smart Grid user and potential narrowband applications.

Spectrum Caps

ESBN agrees that this spectrum award does not merit the imposition of a spectrum cap. This spectrum award differs from recent ComReg awards (e.g. MBSA, 3.6 GHz). The quantum of spectrum being released in those awards was much larger, as well as the potential for competition affecting outcomes in the absence of spectrum caps. The amount of spectrum being made available in this process approximately corresponds with the smallest Lot (2 x 5 MHz) available in recent awards. This suggests that ComReg believe that typically the smallest meaningful Lot size for wider band solutions is 2 x 5 MHz.

As opposed to other recent awards from ComReg, a Bidder who was successful in winning all the available 400 MHz spectrum would not cause competition issues downstream. The amount of spectrum being released is typically the minimum required to roll out a wide band nationwide data network. ComReg has other means it is proposing in this spectrum release to encourage efficient use of spectrum (proposed SUFs and Roll out conditions).

Taking into account the amount of spectrum being made available, the inability for an outcome of this award to cause downstream competition issues and the fact ComReg has other tools included in the award to ensure efficient use of spectrum, ESBN believes there is no need for a Spectrum cap in this award.

Unsold Lots

ESBN agrees that ComReg should not provide much detail on potential plans for unsold lots in the award in advance of the award as this could encourage strategic demand reduction. ComReg's proposal encourages truthful bidding and encourages the most efficient outcome.

ComReg should ensure that any unassigned spectrum is contained in the middle of the band (i.e. adjacent to Part A spectrum) so that there is an effective guard band between different users and networks.

Fees

ESBN agrees that it is important to specify appropriate spectrum fees to discourage frivolous bidding, but not so high as to choke demand.

ESBN agrees that a Minimum Price which includes a Spectrum Access Fee and Spectrum Usage Fee best meets ComReg's objectives. This proposal encourages more efficient use of spectrum as it allows a successful Bidder initially allow more funding for the deployment of a network, whilst also providing the incentive (through SUF) for successful Bidder(s) to hand back spectrum it may not be using.

ESBN notes that ComReg has not proposed the implementation of a second price 'opportunity cost' rule in this spectrum release. This differs from recent ComReg award processes, where a successful Bidder pays the corresponding opportunity cost price of the spectrum. Opportunity cost based pricing achieves ComReg's objective in spectrum awards, whilst also ensuring that a successful Bidder does not overpay for the spectrum won. ESBN encourages ComReg to consider opportunity cost based pricing for the proposed SCA.

ESBN agrees with ComReg's proposal to split the SAF and SUF in a ratio of 40:60. This split achieves the objectives of deterring frivolous bidding (by applying reasonable SAF), not choking demand (by not requiring all fees upfront) and efficient use of spectrum (60% SUF is large enough to encourage any winning Bidders to hand back spectrum). Another benefit of a larger SUF is that it allows a winning Bidder more funds to develop the network, which meets ComReg's objectives regarding spectrum efficiency and investment in innovation.

ESBN notes that the discount rate proposed by ComReg (8.63%) "*is the discount rate used by ComReg for recent spectrum awards, for example, the 3.6 GHz award*". ESBN understands why this is a starting point for ComReg in proposing its Discount Rate. However, ESBN contends that this spectrum release is a lot different than recent ComReg auctions, which ComReg appears to agree with. Given the small quantum of spectrum available, low frequency band (hence low bandwidth available, larger reuse areas, larger antennas required) and standardisation status of band; this release is not comparable to those previous releases. Previous ComReg releases contained vast amounts of spectrum which was acquired by commercial operators for providing fixed and mobile voice and data solutions to end users and enterprise, hence generating significant revenues to offset the investment in spectrum, equipment and infrastructure.

An appropriate discount rate is one which is comparable to the expected return on investment to that licensee for money it does not need to spend today. The discount rate of 8.63% is best suited for spectrum releases for the likes of MNOs as it reflects the higher equity returns required from private operators in the telecommunications market. ESBN believes that a Weighted Average Cost of Capital of 4.95% (as calculated by CRU for investments in Network Infrastructure) is a much more appropriate figure for spectrum assigned to a Network Utility Operator. Applying a Discount Rate of 4.95% means a Network Utility would spend over €425k in today's terms as opposed to the required SUF of €350k. Applying the correct Discount Rate means that the annual SUF should be €32,000 as opposed to the proposed €39,000.

ESBN's proposals are without prejudice to ESBN's position that the licence duration should be longer (i.e. 25 years or more).

ESBN agrees with the principle of applying CPI to SUFs. ESBN currently pay spectrum fees with CPI applied.

National Licences

ESBN agrees that national licences should be issued by ComReg in this spectrum award process. ESBN has provided robust statements in response to Question 3 of ComReg's consultation 17/105. ESBN believes these statements have been considered in ComReg's decision making. ESBN's position and reasoning has not changed since its answer to Question 3 of ComReg's previous consultation. ESBN accordingly refers to its previous response rather than reproduce its reasoning.

National licences enhance the business case for a successful Bidder and creates investment opportunities and incentives. Equally, spectrum issued nationally reduces coordination issues between licensees of the same spectrum in different areas. Sub-national licensing of spectrum creates inefficiencies with regards spectrum usage as there will be areas in the country where spectrum will not be utilised due to interference- minimising coordination and network deployment. As identified by ComReg, Smart Grid is a service which would be deployed nationally, therefore it is imperative that spectrum is issued on a national basis.

Channel Bandwidth

ESBN agrees that ComReg's proposal to release a single 2 x 3 MHz channel for Smart Grid and lots in part B in 2 x 100 kHz as the optimum solution which best meets its objectives. This allows for 2 x 3 MHz for Smart Grid with a flexible outcome facilitated by auction of Part B spectrum.

This is without prejudice to ESBN's belief that an reservation of 2 x 5.5 MHz for Smart Gird would future proof the network and provide higher societal return at lower cost and less risk.

Licence Duration

ESBN encourages ComReg to consider a licence duration of at least 25 years. It is important to note that the 400 MHz spectrum band doesn't have the same characteristics as other spectrum bands (like 3.6 GHz and MBSA). As ComReg correctly identified, Smart Grid can provide significant benefits.

Plum consulting propose a **minimum** term of 15 years, whilst recognising that the service and networks that would use Smart Grid have a lifetime of 15 years or longer. Plum also recognise that networks will not be replaced as long as they continue to meet operational and economical requirements, noting scanning telemetry was introduced in the UK over 20 years ago and is still operating. Investments made by Network Utility Operators in deploying a network that meets operational requirements is relatively expensive, with this cost not offset by commercial revenue. Accordingly, the payback term is longer than that of commercial networks.

ESBN considers a different approach is more suitable for the 400 MHz spectrum band. Should an organisation get access to this 400 MHz spectrum band, it is likely to have plans to utilise it as effectively as possible and deploy a network as intensively as required to meet its needs. In order to do so, that organisation will need to have the ability to invest in its network. In order to invest in a vast network, a user needs to factor in the life time of the asset. As opposed to MNOs, a wide-band user of this spectrum will not have a significant

revenue stream available to it to rapidly deploy a network and rapidly realise the fiscal benefits of roll out. In order to make investment in technology, a wide-band user of this spectrum would need assurances that this spectrum will be available to the user for a long time. The benefits of Smart Grid need to be realised over a longer period to justify investment.

It is worth noting that it may take ESBN numerous years to deploy a Smart Grid network. For example, the deployment of devices nationally requires a continuous process of installation and maintenance which is likely to be aligned with regular work being conducted by ESBN staff who will install such devices. The more extensive the deployment of Smart Grid, the greater ESBN's dependence is on the technology. This results in a situation where it is less possible for ESBN to replace units in the face of a change/cessation in licence, there would simply be too much work and cost to change out Smart Grid devices. This in turn means that the shorter the licence period, the less investment that can be committed due to the uncertainty and short term available to realise the benefits of deployment.

Electrical assets have long physical lifetimes, for example:

- 50 years for an overhead line;
- 55 years is the technical minimum life of a Substation (including associated switchgear, protection relays etc.,). Note substation deployment incurs significant investment;
- over 80 years for underground cabling; and
- 40 years for transformers.

Unlike telecommunications equipment, technological obsolescence does not occur before physical obsolescence, so there is nothing to prevent the assets being utilised for the full length of their natural lives.

If ComReg issued a national licence for 15 years this would create investment issues for a National Utility Operator deploying a network. Other than MNOs, other users of spectrum do not have access to such amounts of capital to invest in deploying a network. Therefore the full roll out of a network can take many years to allow for cost benefits to be accrued which enables additional investment. For example, at year 10 of a 15 year licence, the incentive to invest is significantly reduced if there is only 5 years remaining. Therefore a 15 year licence is unsuitable for this spectrum band. A longer licence of at least 25 years or more enables and incentivises more investment in a network. A 25 year licence is consistent with ComReg's objectives regarding spectrum efficiency and investment in innovation.

Investment cycles dictated by CRU (Price Review) will influence investment cycles. As stated later in this response, ESBN encourages a longer time to meet roll out conditions for reasons set out. A Smart Grid network is very different to commercial public networks. There is a much slower refresh of end equipment as opposed to public networks. User trends and available services results in users changing devices on a regular basis. End equipment used in a Smart Grid network would be installed and left operational for a long period of time without replacing, as the underlying application being monitored/controlled has fixed and defined requirements which does not change often or ever.

ComReg correctly argue that Smart Grid is a valued service offering hence its proposal to reserve spectrum for this purpose. A Smart Grid network in some form will be needed indefinitely and increasingly over the coming years. ComReg applies a defined licence duration so that licensees have sufficient time to deploy a network and provide services,

whilst allowing ComReg to identify the most efficient use and/or user at certain points in time (when licences expire). The 400 MHz spectrum has been correctly identified as suitable for Smart Grid. There are only three Network Utility Operators who can access this spectrum, and any winner of the licence must provide reasonable access to the other two parties. Therefore, the rationale for applying short licence (i.e. 15 years) does not exist for this spectrum. Smart Grid is the optimum usage for the Part A spectrum as ComReg has identified.

The duration of the licence is a critical issue for ESB because to maximise societal benefits, ESBN will require certainty that investments in equipment and devices will not be stranded. Equally, the incentive for other Network Utility Operators to invest in equipment and services from a Smart Grid are dependent on the availability of the network in the medium-long term. Other Network Utility Operators would not be in a position to make short term investments in services, therefore this is another reason why the licence needs to be made available for a period longer than 15 years.

Additionally, there would be significant effort, time and cost associated with migrating Network Utility Operators from a deployed Smart Grid network to another solution when licence expires. This further decreases the incentives for investment from Network Utility Operators when such a short licence is proposed.

Accordingly, to maximise the use of spectrum, the licence period should be indefinite or sufficiently long as to allow investment certainty (e.g. 25+ years). With certainty over the spectrum availability ESBN and other Network Utility Operators could make long term strategic decisions on how Smart Grid devices would be developed as there would be no 'cliff edge' effects during their deployment caused by pending licence expiry. Without a long licence period, usage of the Spectrum could still be made but would be limited to those investments which could make a return within the licence period, with little investment in the period coming up to any change in licence.

Mode of Operation TDD/FDD

ComReg has proposed to licence the spectrum (Part A and Part B) in FDD mode of operation. This is based on Plum's recommendation that FDD appears to most likely equipment available in this band. ESBN notes that Plum did not provide evidence of their opinion. This proposal is also based on the potential for interference between FDD and TDD systems in adjacent spectrum lots.

ESBN is aware that there is TDD and FDD equipment available in this band. With this in mind, ESBN believes that there needs to be flexibility in mode of operation if the benefits of Smart Grid are to be realised. ComReg accepts that most/all other uses have alternative spectrum and/or solutions available to it. Therefore, it should be incumbent on other potential uses and users in the 400 MHz band to coordinate/work around the Smart Grid operator rather than the other way around. By eliminating flexibility regarding suitable technology and mode of operation, there is a risk that a sub-optimum solution is used by a Smart Grid operator, or worse again no network is deployed due to the limitation. ESBN accordingly urges flexibility with regards to mode of operation.

[✂ [redacted]

[redacted].

A Smart Grid network by design would be more upload centric than download. This contradicts typical public commercial networks where users download content to their devices much more than they upload. [✂ [redacted]] In addition, future requirements may arise regarding the need to regularly mass reconfigure or download new software to end device. [✂ [redacted]]

ESBN and potentially any other interested Network Utility Operator at this time are not fully decided on optimum mode of operation (FDD or TDD).

With this in mind, ESBN encourages ComReg to consider the following;

- ESBN believes there needs to be flexibility regarding mode of operation used by Winning Bidders;
- There is evidence of TDD and FDD equipment available in this band, [✂ [redacted]];
- Should [✂ [redacted]] win all the available 2 x 5.5 MHz of spectrum, it should be able to use spectrum in FDD or TDD as interference issues with other users would not exist;
- A Network Utility Operator successful in acquiring 2 x 3 MHz of Smart Grid spectrum should have option to purchase additional contiguous spectrum which it could use as guard band for interference;
- There is arguments for both TDD and FDD modes for Smart Grid at this time. FDD is utilised more often for wide-band services, whilst TDD has capability to set the uplink/downlink ratio which can be useful when there's asymmetry in usage;
- ComReg has correctly identified that Smart Grid does not have alternative solutions or spectrum available, whilst the other potential use cases for this band do have alternatives. Therefore it is more important for Smart Grid to be given primacy in this spectrum band regarding usage and for other services to protect that service rather than the other way around;
- There should be a method for coordination between Smart Grid operator and other users if potential interference issues arise; and
- ComReg has identified Smart Grid is important. ComReg should not determine the optimum Smart Grid solution to be used via prescriptive rules. ESBN notes that the 3.6 GHz spectrum release made spectrum available in TDD mode (primarily will be used for LTE services).

Interference mitigation

Plum recommend using CEPT defined Block Edge Masks (BEM) (from CEPT Reports 240, 283 and ECC Decision (19)02)), with one BEM defined for narrowband (up to 200 kHz) and another for technology using channels of 1.25 – 5 MHz.

ESBN notes that compatibility studies conducted for the 450 – 470 MHz spectrum band in ECC Reports 240 and 283 were based on the 3GPP standardised Out Of Band Emission levels and found to provide compatibility with other services for most cases. ESBN therefore recommends ComReg apply base station emission levels as presented in Table 120 of CEPT Report 283 (-36dBm) as opposed to those presented in Document 19(02) (-43dBm).

ESBN encourages ComReg to consider options that can overcome potential FDD/TDD issues (e.g. coordination guidelines, guard band etc.). ESBN believes that any unassigned spectrum should be in the middle of the band between Smart Grid licensee and other users, assists with any potential interference issue. This needs to be addressed in the assignment section.

EIRP Limit (Section 5.6 of ComReg document)

ComReg has reiterated its proposal from previous consultation (which ESBN previously agreed with) that 50W EIRP is a suitable limit. ESBN still believes this limit is appropriate.

ESBN believes that ComReg should allow for a great User Equipment output power than the 23dBm being proposed. ESBN is aware that ECC Deliverable Draft Decision (19)02 is closing for input shortly. The Draft Decision mentions fixed terminals in rural areas as an example of deployment scenarios in which higher UE power values may be allowed by administrations. ESBN encourages ComReg to consider allowing higher UE power levels, as this will enable the design and build of an optimised network. ESBN does not believe the low power level proposed provide any significant benefits yet could cause significant issues with regards to potential inefficient and more expensive network deployment. ESBN encourages ComReg to permit an EIRP from the UE of at least 30dBm.

Roll out obligations

ESBN understands why ComReg wish to attach roll out obligations to spectrum licences to ensure efficient use of spectrum. ESBN is in agreement with the principle of roll out obligations. However, there is a significant difference between the economic benefits of spectrum allocated to public commercial operators and those assigned to Smart Grid. Should a Network Utility Operator win access to spectrum, it is in its own interests to deploy services as soon as possible in as many locations as feasible to optimise the efficiencies of a Smart Grid soonest and as widely as possible.

ESBN consider that the requirement as set by ComReg is unreasonable, and this is one of the reasons ESBN encourages ComReg to consider a longer licence duration. ESBN, as well as other Network Utility Operators, are bound by numerous factors and regulation which can impact on the speed of deployment. ESBN and other Network Utility Operators are bound by funding rules set out by the CRU. Price reviews are conducted by CRU every 5 years to grant approval for an agreed spend for the proceeding 5 years. ESBN was successful in being granted approval for some funding for the initial deployment of an access radio network within the existing Price Review (PR) period. The next PR period will begin in 2021. Therefore, the funding schedule could make it difficult for ESBN to meet the onerous proposed roll out conditions.

ESBN is bound by European procurement rules. The tendering procedure for OJEC is quite demanding and can take some time. This in itself could cause a delay to the beginning of network deployment, and procurement is something that can only begin once the auction results are known.

Additionally, it may be necessary for a Smart Grid network operator to procure new transmission sites which in itself can take time. For any new site, a Smart Grid operator would need to arrange for backhaul, site access, power resilience, installation of equipment and rigging of antennas.

ESBN has experience of rolling out narrowband telemetry services as well as point to point links. ESBN operates in a specialised environment where safety is off the utmost important given the environment and risks that exist at ESBN asset locations. Planning and deployment of services in a safe manner in this environment needs proper planning and mobilisation of personnel with the experience and approvals to carry out such work. Mobilisation of available resources is something that can only be acted upon when auction result is known. ESBN also has to address unpredictable workloads which can arise and cause strain on resources, e.g. significant electrical outages due to increasing amount of storms.

ESBN believes that ComReg should apply less onerous roll out conditions on a successful Network Utility Operator who wins spectrum for Smart Grid. ESBN believes that ComReg should treat spectrum successful licensee akin to new entrants in ComReg's 2012 MBSA. ComReg in that auction appreciated a new entrant would need more time to deploy a network. ESBN does not disagree with the requirement for effective spectrum use and ComReg is correct to apply roll-out conditions to ensure spectrum is being used. However, ESBN believes it is more reasonable to provide more time (i.e. 7 years, same as a new entrant in ComReg's 2012 MBSA) for a successful Network Utility Operator to roll out a Smart Grid. ESBN has other measures (application of SUFs) to encourage efficient use of spectrum.

ESBN considers that ComReg should therefore allow 7 years for a Network Utility Operator to achieve specified coverage, with licence duration extended as suggested previously.

ESBN would like ComReg to provide clarity on what roll out conditions apply if a licensee of Part A spectrum also is successful in winning access to Part B spectrum also. ESBN assume it is the one condition as contained in Part A spectrum that would cover entire licence. To clarify.

Memorandum of Understanding (MoU)

ESBN agrees that it is appropriate to revisit MoU between UK and Ireland. The existing MoU is not fit for purpose given existing proposals. Additionally, the existing MoU does not factor in the entirety of the 414.0 – 415.5 MHz & 424.0 – 425.5 MHz spectrum range being released. ESBN encourages ComReg to engage with Ofcom soonest, as contents of the MoU could have a material impact on network configuration and location of base stations for a licensee. This in turn affects an interested bidder's interest and valuation on spectrum. Accordingly, work on MoU should begin soonest. ESBN is happy to provide recommendations should ComReg facilitate such feedback. ESBN encourages ComReg to consult on proposed MoU.

4. SUMMARY

Radio spectrum is a vital natural resource which must be managed efficiently to facilitate economic, social, technological and environmental advances within Ireland. ESB Networks welcomes the opportunity to respond to this consultation

Securing spectrum is a key to ESB Networks developing and operating a reliable smart network necessary to meet Ireland's decarbonisation targets. Smart Grid produces significant benefits for every electricity user in Ireland, specifically economically and environmentally. A fundamental requirement of Smart Grid is the availability of dedicated radio spectrum.

ESBN is broadly supportive of ComReg's proposals and congratulates ComReg on presenting well researched reasoning and arguments regarding the benefits of Smart Grid, and for making dedicated spectrum available for this use case. ESBN encourages ComReg to consider ESBN's statements regarding requirement for a longer licence duration (25 years or more), longer roll out period and flexibility regarding mode of operation of spectrum for Smart Grid. In order to fully future proof the level of capacity required for Smart Grid, ESBN believes that 2 x 5.5 MHz should be set aside for Smart Grid deployment.

ENDS

4 Huawei Technologies Co. Limited

Augustin Yinlifan
Huawei Technologies
Spectrum Policy Team

ComReg

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21 November 2018

ComReg 18/92, consultation on the Release of the 410 – 415.5 / 420 – 425.5 MHz band

Dear Sir,

Huawei would like to thank ComReg for the opportunity to comment on the release of the 410 – 415.5 / 420 – 425.5 MHz band.

Huawei is the leading supplier of infrastructure equipment for the telecommunications industry in Ireland and globally, as well as a major manufacturer of mobile handsets and other electronic consumer goods.

Huawei would like to submit the comments below for your consideration on a number of aspects covered in your consultation document. Please do not hesitate to contact us if you have any question.

Yours sincerely,
Augustin Yinlifan
Huawei Technologies

Comments from Huawei to ComReg´s Further Consultation on the Release of the 410 – 415.5 / 420 – 425.5 MHz Sub-band

Huawei would like to commend ComReg for considering release of this band. With this initiative, ComReg is putting Ireland ahead of most of European countries in allocating spectrum for broadband communications in this valuable frequency range. ComReg´s Consultation document covers in details a large number of topics, including service and technology aspects, and award design. We limit our comments to the points where Huawei can bring value.

Use of the band for smart grids

We agree with ComReg that best use of the band is for broadband communications for electricity utilities. Furthermore, we do not see a need to reserve part of the 2x5.5 MHz for narrowband communications. We think that other parts of the UHF spectrum already provide sufficient capacity for narrowband private mobile radio. In this regard, we welcome the possibility that the winner of Part A spectrum can also bid for Part B.

Following are some detailed suggestions for the allocation of 410MHz spectrum

- To allocate Part A and Part B as continuous as possible
- If discrete allocation is inevitable, the combination use of the spectrum should be permitted.
- Part B should have a lot size of 2x200kHz or above
- Due to the small bandwidth, 410MHz does not provide much value for consumer MBB, so we suggest that the Network Utility Operator should have a higher priority than MNO to get this spectrum.

Duration of the licences

ComReg proposes a licence duration of 15 years. We think that this might not be fully aligned with the usual investment period for the electricity utility companies and suggest that a longer duration, of at least 20 years, should be considered. In addition, there is a

high likelihood that users of this spectrum would continue operations beyond the initial licence duration. We suggest ComReg should provide clarity about its approach to licence renewal, in order to remove uncertainty for the operator.

Technology availability

Huawei has the capability of developing both TDD and FDD products at 410MHz band. At present, we commercialise a TDD system capable of operating in the 410-430 MHz range, as well as an FDD system using 3GPP LTE band 31. The detailed FDD product roadmap @410M depends on the request from our customer and will be discussed case by case.

[✂ [redacted]]

Band plan

ComReg proposes a FDD band plan, with the uplink in 410-415.5 MHz and the downlink in 420-425.5 MHz. Whilst we understand the arguments put forward by Plum and ComReg, we think that ComReg should give the users the flexibility to deploy either FDD or TDD equipment provided that existing users are given the same level of protection.

In our view, TDD technology presents two key advantages for the utilities sector:

- Huawei TDD LTE based equipment is readily available, whereas we expect FDD to be developed only after 3GPP specifications are finalised. In practice, this will mean a few years before equipment is available to deploy
- TDD allows for a variable uplink/downlink ratio. Our understanding of the needs of the utilities is that traffic is highly asymmetric, and hence better supported by a

TDD system

Protection of existing users

ComReg has proposed to protect existing users by means of Block Edge Masks, which are based on the draft ECC Decision (19)02. In our view, the BEMs in this draft Decision are unnecessarily stringent. We are in particular concerned with the -43 dBm/100 kHz baseline level and the very steep slope in the BS emissions mask.

The coexistence studies captured in the draft ECC Report 283 use the assumption that the BS out of block emissions would comply with the requirements in 3GPP specifications for LTE band 31. These requirements are significantly more relaxed than the proposal in draft ECC Decision. The conclusion in ECC Report 283 is that interference to other services is unlikely in most scenarios, only the specific cases of coexistence with radiolocation and with radio astronomy present potential for interference. We understand that these services are currently not present in Ireland. Therefore, we think that there is no need to impose the stringent mask in the draft ECC Decision and that the 3GPP mask provides sufficient protection to existing PMR users. It is important to note that lowering the out of block emissions to the levels in draft ECC Decision would impose a significant cost on BSs, and hence we recommend ComReg to adopt the 3GPP mask instead.

Secondly, the 23 dBm in block limit for terminals seems too strict as well. It may limit the range of operation in particular for remote areas. We note that the ECC Decision includes a note to indicate that administrations may allow higher terminal power for special deployment scenarios such fixed terminal stations in rural areas, provided that protection of other services, networks and applications is not compromised.

5 Joint Radio Company Limited

ComReg Consultation – Ref 18/92

Further Consultation on the Release of the 410 – 415.5 / 420 – 425.5 MHz Sub-band

Executive Summary

The Joint Radio Company (JRC) welcomes the opportunity to respond to this consultation. JRC supports the actions of the Commission for Communications Regulation (ComReg) for the proposed release of the radio spectrum noted and in particular the recommendation to assign 2 x 3 MHz of the band on a service specific basis to enable 'Smart Grid' activities in Ireland.

JRC encourage ComReg to adopt an open approach to the operating mode that can be used and in so doing permit both TDD and FDD to be deployed in the band and in so doing allow the entity that wins the spectrum to deploy it in whichever mode best serves their operational requirements.

Whilst we welcome a minimum licence term of 15 years we advise ComReg to consider a term of 25 years to better align the spectrum access rights to the utility asset life and the time-frames that will be associated with the roll-out and utilisation of Smart Grid capability by Irish utilities.

The roll-out obligations proposed for the Part A lot require further consideration as they appear to be reflective of a typical mobile network roll-out where coverage drives revenue. The drivers behind the deployment of Smart Grid capability will be to establish enhanced asset utilisation, minimise customer outages, allow distributed generation to be connected quicker and increase availability – these are not revenue generating activities but rather act to reduce costs and environmental impact over the long term and hence a traditional roll-out obligation as suggested does not align well to the characteristics of use and outcomes being sought. Moreover, the complexity of funding associated with enterprises subject to price regulation as well as the practicalities of network roll-out considering the typical timescales for planning consent, infrastructure deployment and commissioning, plus time required to follow official procurement procedures (OJEC) all make the proposed obligation unrealistic. Perhaps a more nuanced approach to roll-out obligations which focuses on outcomes and which is developed in partnership with the Energy sector regulators may be more appropriate. This approach could be aligned to the requirements of reducing CO2 emissions, increasing network efficiency, reducing customer outages and enhancing the utilisation of renewables amongst other criteria which will be enabled as a result of the Smart Grid deployment.

Overall, we commend ComReg for its visionary approach to spectrum access as set-out in this consultation and welcome the opportunity to support ComReg and the Irish utilities in the realisation of the Smart Grid capability envisaged in this approach.

Background

Joint Radio Company 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 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 several large radio networks in the UK.

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. These networks provide

comprehensive geographical coverage to support installation, maintenance and repair of plant in all weather conditions on 24 hour/365 days per year basis.

JRC's Scanning Telemetry Service is used by radio based Supervisory 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.

JRC supports the European Utility Telecommunications Council's Radio Spectrum Group, and participates in other global utility telecom organisations. JRC participates in European Telecommunications Standards Institute (ETSI) working groups developing new radio standards, and European telecommunications regulatory groups and workshops.

JRC also manages microwave fixed link and satellite licences on behalf of the utility sector.

JRC works with the Energy Networks Association's Future Energy Networks Groups assessing ICT implications of Smart Networks, Smart Grids & Smart Meters and is an acknowledged knowledge source for cyber-security in respect of radio networks.

JRC's detailed response

JRC observes the following in response to the detailed proposals put forward by ComReg;

3 Draft Assignment RIA

JRC Response

JRC wholly support the analysis undertaken by ComReg with the assistance of its third-party advisors that has resulted in the acknowledgement by ComReg that 2 x 3 MHz of spectrum need be made available for Smart Grid deployment in Ireland. We also endorse Option 3 as the approach by which a minimum of 2 x 3 MHz of the spectrum will be made available to the utility operators in Ireland for Smart Grid capability.

4 Award Mechanism and Fee Structure

JRC Response

JRC welcome the proposed award sequencing whereby the Part A lot will be auctioned first followed by the Part B lot. In terms of the auction design we support the Simple Clock Auction format as it minimises complexity for the award. The proposed Minimum Fee structure appears proportionate to the use type and the charging structure, i.e. upfront + annual thereafter, is an economically rational approach to levying the fees on industry. The proposal to not impose a competition cap is also proportionate and to be welcomed.

If there were to be any unsold spectrum specific to the Part B lot auction then perhaps there would be merit in locating this adjacent to the Part A Smart Grid spectrum to offer the potential for this to be used for Smart Grid purposes.

5.2 National Licences

JRC Response

JRC endorse the proposal that licences for the 400 MHz band should be awarded on a national basis as the opportunity to co-ordinate and deploy National networks is key to being able to cost effectively and efficiently enable Smart Grid developments in Ireland.

5.3 Channel Bandwidth

JRC Response

JRC supports ComReg's approach to not define the channel bandwidth and in so doing allow interested parties to aggregate spectrum to support their individual system needs.

With regard to the Block Edge Mask (BEM) proposals we note the observation by Plum that;

> *'there will be little interference between LTE and Private Business Radio (in this case Trunked Systems) if: (i) the normal out-of band emission masks are used for LTE;'*

This being the case we are concerned that tighter BEMs are being proposed which will likely result in higher equipment costs as a consequence of more stringent filtering, etc., and have a negative impact on equipment availability. If the established BEMs are 'fit for purpose' we see no reason to impose more restrictive technical characteristics on the 'Smart Grid' network that will likely result in higher network costs.

5.4 Licence Duration

JRC Response

JRC notes the need for certainty in terms of spectrum access to allow the Irish utility network operators the time to design, deploy and realise the benefits of Smart Grid functionality. To this end we welcome a minimum 15 year term as recommended by Plum but also encourage ComReg to consider a 25 year term this would align better to the operational life of the utility assets, take account of the regulatory funding cycle (as noted against the roll-out obligations), the need for official procurement processes to be followed (OJEC) and the long term planning horizons adopted by utility network operators.

5.5 Mode of Operation

JRC Response

JRC is concerned that to restrict this spectrum to FDD only use at this stage would potentially foreclose on flexibility of use for the band and prevent the industry from being able to exploit future technology developments and more importantly be in conflict with the characteristics of the traffic in the band.

In terms of technology developments, it is too early in the establishment of 'Smart Grid' capability to limit the functionality of the radio-based communications systems on which it will depend. Recently, Western Power Distribution have successfully undertaken a trial utilising a TDD based system in the 400 MHz band (within the frequency range being considered by ComReg) which demonstrates that TDD based solutions are being developed.

Moreover, Smart Grid traffic profiles are likely to be asymmetric with higher flows of data from the network assets to the centre than the other way around. To this end, with an FDD configuration the 'uplink' channels have the potential to be heavily loaded as they carry data from the network assets to the centre whilst the 'downlink' channels will be lightly loaded carrying commands from the centre to the network assets. As the functionality within the 'Smart Grid' network becomes enhanced over time there is a risk that the uplink channels will become overloaded resulting in a need to re-design / deploy the radio network on which the 'Smart Grid' functionality depends at considerable cost and disruption.

JRC therefore encourage ComReg to adopt an open approach to the operating mode that can be used and in so doing permit both TDD and FDD to be deployed in the band and in so doing allow the entity that wins the spectrum to deploy it in whichever mode best serves their operational requirements.

5.6 Interference Mitigation

JRC Response

As noted above we are concerned that tighter BEMs are being proposed than are necessary and will result in an unnecessary burden on Smart Grid developments in Ireland. If the established BEMs are 'fit for purpose' we see no reason to impose more restrictive technical characteristics on the 'Smart Grid'

network that will likely result in higher network costs and may have implications on equipment availability.

Protection of Radio Astronomy

JRC Response

JRC acknowledges that ComReg will attach a licence condition to the band to require the licensee to co-ordinate with any potential future Radio Astronomy user and we support this approach.

EIRP Limit

JRC Response

JRC endorses the maximum EIRP of 50W for the band as proposed and acknowledges that this is an upper limit and that the minimum EIRP to maintain the network shall be established and deployed in order to minimise interference into adjacent licensees, across border and to any future Radio Astronomy service.

5.7 Roll out obligations / usage conditions

JRC Response

Part A

In terms of the Part A spectrum whilst we welcome the commitment of this spectrum for Smart Grid developments in Ireland it is also important to acknowledge the practicalities as well as the economics behind the roll-out of such radio network capability. As a matter of priority the appropriate funding needs to be put in place in order to facilitate this type of network deployment. The utilities to which this spectrum will be assigned will need to secure the appropriate funding through their regulatory settlements in order to facilitate roll-out. The cycle of these funding rounds are likely to vary across sectors and at this stage in the process the necessary funding arrangements are not in place to pay for the roll-out. To this end, we encourage ComReg to liaise with the relevant Government Departments and Regulatory authorities to determine at what point the necessary funding will be in place to support such a roll-out. Once the timescales for funding are understood it is then worthwhile to consider the practicalities of network roll-out considering the typical timescales for planning consent, infrastructure deployment and commissioning, time required to follow official procurement procedures (OJEC) to further elaborate the appropriate timings for any roll-out obligations. Moreover, the drivers behind the deployment of Smart Grid capability will be to establish enhanced asset utilisation, minimise customer outages, improve power quality, allow distributed generation to be connected quicker and increase availability – these are not revenue generating activities but rather act to reduce costs and environmental impact over the long term and hence a traditional roll-out obligation as suggested does not align well to the characteristics of use and outcomes being sought.

Finally, in terms of the active Smart Grid that is deployed there may be considerable variances between the needs of the Electricity sector relative to those of the Gas sector and as such 50% of the utility network being covered may vary dramatically dependent on the 'actor' involved. Perhaps it will be possible to establish a more nuanced approach to roll-out obligations which focuses on outcomes and which is developed in partnership with the Energy sector regulators. This approach could be aligned to the requirements of reducing CO2 emissions, increasing network efficiency and enhancing the

utilisation of renewables amongst other criteria which will be enabled as a result of the Smart Grid deployment.

Part B

Relative to the Part A roll-out obligations those being proposed for Part B appear less onerous and hence easier to achieve. As per comments above we see merit in aligning roll-out obligations to specific outcomes in terms of the services that may be delivered rather than some arbitrary level of infrastructure deployment.

Measurement of Roll out obligation

JRC Response

Whilst we have no specific issues about the monitoring and reporting of network roll-out per-se we do have concerns with the appropriateness of the timescales being considered for Part A spectrum. As noted above we encourage the adoption of outcome-based roll-out obligations and hence suggest that the reporting framework should be aligned to the benefits that will be realised through the establishment of Smart Grid capability.

5.8 Memorandum of Understanding

JRC Response

We support ComReg's intention to re-visit the MoU with the UK to address any issues associated with the deployment of wideband technologies in the band under consideration. The extent to which this engagement will be straightforward is unclear at this stage so we encourage early engagement to ensure that the spectrum can be utilised in Ireland as early as possible after the award.

5.9 Third Party Use

JRC Response

JRC supports ComReg's proposal to allow third party use in Part B of the band in keeping with the existing arrangements for Third Party Business Radio.

5.10 Compliance with the RED Directive

JRC Response

JRC supports ComReg's position that all radio and telecommunications equipment must comply with the RED Directive.

5.11 Summary of Proposals

ComReg Proposal	JRC Response
Option 3: Limit some rights of use (2 x 3 MHz) for the provision of Smart Grid and the remainder (2 x 2.5 MHz) on a service and technology neutral basis.	*JRC wholly support the analysis undertaken by ComReg with the assistance of its third party advisors that has resulted in the acknowledgement by ComReg that 2 x 3 MHz of spectrum need be made available for Smart Grid deployment in Ireland. We also endorse Option 3 as the approach by which a minimum of 2 x 3 MHz of the spectrum will be made available to the utility operators in Ireland for Smart Grid capability.*
Part A of the spectrum would be technology neutral but service specific and restricted for use of Smart Grids as defined in para 3.22 of this document. Part B, the remaining 2 × 2.5 MHz would be awarded in a manner which respects the principles of service and technology neutrality	*JRC welcomes ComReg's proposal to offer the Part A spectrum on a service specific basis for Smart Grid deployments.* *We also welcome the release of the Part B spectrum on a service and technology neutral basis.*
To make 400 MHz spectrum available on a national basis	*JRC support the release of the 400 MHz spectrum on a national basis*
No restriction on bandwidth, but to allow licensees to use spectrum rights of use with whatever bandwidth they wish, provided that potential licensees operate within their spectrum holdings and comply with the Proposed BEMs discussed in section 5.6 and specified in Annex 2	*JRC support the proposed flexibility of bandwidth subject to the limitations of spectrum held.* *However, we are concerned that tighter BEMs are being proposed than are necessary and will result in an unnecessary burden on Smart Grid developments in Ireland. If the established BEMs for LTE systems are 'fit for purpose' we see no reason to impose more restrictive technical characteristics on the 'Smart Grid' network that will likely result in higher network costs and may have implications on equipment availability.*
A licence duration of 15 years	*We welcome a minimum licence term of 15 years but also encourage ComReg to consider a 25-year term to afford the energy utilities sufficient time to deploy and exploit the Smart Grid capability.*
To make the spectrum available for FDD operation only	*JRC encourages ComReg to adopt an approach that does not limit the band to one mode of operation to avoid foreclosing on technology developments. Moreover, it is important to recognise the asymmetric nature of the traffic and the resulting inefficiencies that would result if the Smart Grid network were limited to the FDD mode of operation. JRC therefore encourage ComReg to adopt an open approach to the operating mode that can be used and in so doing permit both TDD and FDD to be deployed in the band and in so doing allow the entity that wins the spectrum to deploy it in whichever mode best serves their operational requirements.*

A Block Edge Mask ("BEM") which licensees must conform to	*JRC are concerned that tighter BEMs are being proposed than are necessary and will result in an unnecessary burden on Smart Grid developments in Ireland. If the established BEMs for LTE systems are 'fit for purpose' we see no reason to impose more restrictive technical characteristics on the 'Smart Grid' network that will likely result in higher network costs and may have implications on equipment availability.*
ComReg's further proposal on allowing potential Third Party Use in the band is that the proposed scheme is likely to mirror the Third Party Business Radio licensing scheme	*JRC supports this proposal for Third Party access.*
Part B would be made available in lots of 2 × 100 kHz. To clarify, this represents the smallest building block that potential users may use to aggregate spectrum into larger amounts	*We support the proposal for lot sizes of 2 x 100 kHz for the Part B release.*
Roll-out Obligations for Part A, a roll-out obligation for a Network Utility Operator to provide communications to 50% of its utility network within 3 years of the commencement date of the licence	*Roll-out obligations are appropriate for mobile networks to enhance customer service, but less appropriate for fixed networks where the location of the assets is known and they do not move.* *Furthermore, in light of the complexity of funding associated with enterprises subject to price regulation. In addition to the inherent timing issues associated with network roll-out at scale, e.g. planning consent, infrastructure build and commissioning we suggest that the proposed roll-out obligations are likely to be unachievable. Rather we encourage ComReg to consider an outcome-based approach which could be developed in conjunction with the utilities to target the specific timing of Smart Grid capability that will be naturally aligned to regulatory objectives.*
For Part B of the spectrum, ComReg considers a reasonable roll-out obligation of no less than 10 base stations in each of the three areas as defined in section 5.7 by year 3. This obligation will be assessed after 3 years.	*As per comments above we see merit in aligning roll-out obligations to specific outcomes in terms of the services that may be delivered rather than some arbitrary level of infrastructure deployment.*
ComReg is of the view that a SCA is the auction format best suited to deal with the considerations outlined in the DotEcon Report.	*JRC endorses the proposed SCA auction format for the award.*
ComReg is of the preliminary view that lots in Part A should be made available on a frequency specific basis (that is, 410 – 413 MHz / 420 – 423 MHz) and Part B should be made available on a frequency generic basis	*JRC supports the proposed lot arrangements*
ComReg is of the preliminary view that a competition cap is not appropriate for this award process.	*We agree with ComReg's proposal that a competition cap is not appropriate.*

Any spectrum not taken up in the Part A auction will be included as part of the award for the remaining Part B.	*We support this approach.*
The fee proposals	*JRC welcomes the fee proposals for Part A and Part B spectrum and the establishment of the upfront and annual charging mechanism.*

END

6 Northern Ireland Electricity Networks Limited

Northern Ireland Electricity Networks

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Market Framework Division,
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D01 E4X0

21 November 2018

Dear Sir/ Madam

Reference: Submission re ComReg 18/92

Northern Ireland Electricity Networks (NIE Networks) Ltd. welcomes the opportunity to respond to the Commission for Communication Regulation (ComReg) consultation entitled, "Further Consultation on the Release of the 410 – 415.5 / 420 – 425.5 MHz Sub-band"(ComReg Reference 18/92), dated 24 October 2018.

NIE Networks owns and operates the electricity distribution network and owns the electricity transmission network in Northern Ireland, which transports electricity to over 870,000 customers. Telecommunications services are central to its ability to operate the electricity network safely as well as ensuring that security of supply is maintained for all its customers. NIE Networks fully supports the proposal by ComReg for the assignment of rights on a service specific basis to Smart Grid use. NIE Networks endorses ComReg evidence based approach of considering the various stakeholders and potential uses of this spectrum, recognising the importance for Network Utility Operator(s) to have access to radio spectrum and taking an approach that will deliver long term benefits to electricity consumers.

NIE Networks also agrees with ComReg's preliminary view that without assignment of rights on a service specific basis, Network Utility Operator either may not have any alternative frequencies or solutions to satisfy the technical requirements arising from the challenges brought about by transitioning to a low-carbon economy, or potentially lead to spectrum prices being artificially inflated by competition for monopoly rents (paragraphs 3.84 to 3.86). That approach does not benefit electricity consumers who may end up with increased cost, restrict opportunity for business growth due to increased energy costs and impact on the ability of Government to achieve targets in their national development plans to promote transition to a low-carbon economy and reduce impact on climate change.

It is uncertain that the roll-out obligations outlined in section 5.7 are suitable to be applied to Network Utility Operators as they stand. Although roll-out obligations are necessary to ensure spectrum is truly utilised by license holders, it is important that it is aligned with the investment plans Network Utility Operators are developing for smart grids. Network Utility Operators invest in the electricity grid, and by extension smart grid solutions, based on the allowances set by the Utility Regulator. These allowances are fixed until the next price review/control period. ComReg proposal in paragraph 5.49 that a reasonable roll-out obligation is for a Network Utility Operator to provide communications to 50% of its utility network within 3 years of the commencement date of the licence will very likely not be aligned with the investment plans the Network Utility Operator has already agreed with the Utility Regulator for those three years. It is crucial that ComReg re-examines this roll-out obligation and replaces or amends it to ensure a realistic, outcome centric approach is taken that will also be aligned with Network Utility Operators price controls and reflect the Network Utility Operator proposals in that price control period to deploy smart grid solutions. Following the assignment of the license, the Network Utility Operator(s) will

need a period of time to first agree the required investment with the Utility Regulator and then to build and deploy the network. ComReg's proposal of a license duration of 15 years in paragraph 5.18 is not sufficient time for the network to be in operation to begin delivering benefits to electricity consumers. NIE Networks proposes that a license duration upwards of 20 years is more suitable.

NIE Networks view is that it is too early to specify the mode of operation as proposed by ComReg in paragraph 5.23 due to the present lack of maturity in wideband radio smart grid telecommunication technology solutions. There are several technology trials being carried out at present which can help facilitate ComReg in making a more informed decision at a later date. Therefore, the prudent approach would be for ComReg to not propose anything restrictive at the moment to potential modes of operation the Network Utility Operator(s) deem is most appropriate based on the technology and smart grid requirements.

NIE Networks also note the importance of engagement between ComReg and Ofcom, the UK National Regulatory Authority, to examine the existing Memorandum of Understanding ("MOU") in relation to frequency coordination between the Republic of Ireland and the United Kingdom in the 400 MHz band, to ensure it is suitable based on the proposals contained within this consultation. Northern Ireland and the Republic of Ireland share a land border and any proposal being considered must not cause interference to radio services in Northern Ireland. As stated in paragraph 3.116, the Integrated Single Electricity Market (I-SEM) is a new wholesale electricity market arrangement for Ireland and Northern Ireland. The new market arrangements are designed to integrate the all-island electricity market with European electricity markets, enabling the free flow of energy across borders. There is an opportunity to establish an all-island smart grid telecommunications infrastructure both north and south of the border that will further facilitate these new market arrangements and ensure that the electricity grid can be managed with a smart grid that is designed to meet the challenges arising from transitioning to a low-carbon economy.

7 Nokia UK Limited

NOKIA

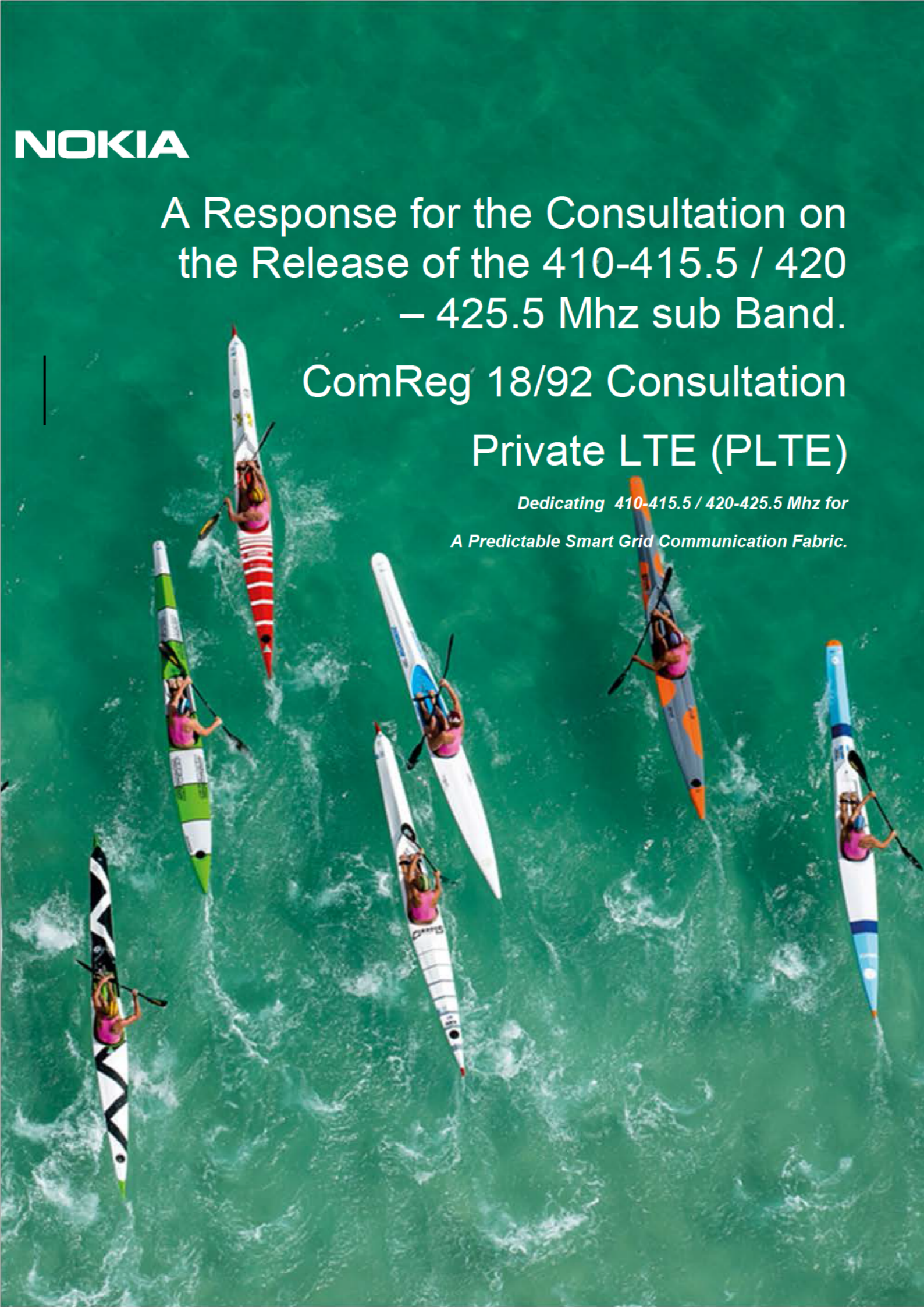
A Response for the Consultation on the Release of the 410-415.5 / 420 – 425.5 Mhz sub Band.

ComReg 18/92 Consultation

Private LTE (PLTE)

Dedicating 410-415.5 / 420-425.5 Mhz for

A Predictable Smart Grid Communication Fabric.



NOKIA

Nokia Executive Summary

Nokia is pleased to provide input to ComReg's further consultation for the employment of "the 400Mhz band" .

[1.3].Nokia is following the market, standards organizations and regulators for aligment of productization and eco system development that will employ this sub band (410-415.5 / 420 – 425.5 Mhz) . Nokia develop radio infrastructure and CPE for standardised bands that show a growing ecosystem. Nokia is also ready to develop custom made products with a confirmed demand. It is Nokia's intention to draw focus to the following overall key points as the main undertone to our further response:

Our Aim – to highlight that a mobile technology Private LTE (PLTE) based on 3GPP/GSMA standards and which is further supported by multiple vendors offers the best value and procurement eco system chain across a number of stakeholders for employment of this band ***[2.3]***. The immediate needs and growth requirement of the energy/ utility sector can be fulfilled through standardisation of these bands. Utilities such as ESB are now urgently tasked with on-boarding new low carbon generation and smart grid control applications (including the impact of EV's and DER) but are somewhat inhibited by lack of communication technology at the distribution levels.

[2.5] Since the last consultation a Drafted CEPT ECC (19) 02 work item initiative has started to formalise this sub band designation as seen in this response's Appendices / Exhibits . Nokia see this a major step in global ratification of the sub band for 2019 , in particular the FDD Duplex banding of 2 x 1.4 , 2 x 3 and 2 x 5 Mhz designations**.** **[2.2]** This FDD International standardisation (for the sub Band) is important because it can see the promotion of 2 x 3 Mhz and 2 x 1.4 Mhz LTE systems being assigned to the potential of COmRegs auctioned release. The consideration being for the employment of spectrum UL and DL channels for Smart Grid (2x3 Mhz LTE) and other (2 x 1.4Mhz LTE) Multi Service enablement (eg Water , Gas , and other critical asset designations) . This would employ 3Mhz + 1.4 Mhz from the 5.5 Mhz duplex channel . Leaving a remainder of 1.1 Mhz.

The remainder of the ComReg spectrum of the sub channel being left as 1.1 Mhz for the potential of narrow band continuity and services if warranted.

Many application scenarios will only be well served by the use of appropriate long range industrial mobile connectivity such as LTE/4G, this could by provided in a dedicated manner to the aspiring utility, either as a managed service or as procured /owned. It is also worth highlighting that all utilities can benefit from a common band deployment in this region due to the multi service capability of wider band LTE (1.4 Mhz and 3Mhz) ***[2.9 / 2.10]***. (Water, Gas, Heating Oil, and of course the Power sectors)

[*2.10]* In addition the ETSI and 3GPP alignment for ratification o fthe band can enable side band services such as NB-IOT, using newer signalling techniques within LTE access technology , NB-IOT can extend the application base beyond any initial data communication reach to serve downstream energy system requirements e.g. building control HVAC, and municipal street lighting monitoring, improved demand response systems . *(NB IOT uses specific narrow band signalling channels within wider LTE services for range and propagation of simplex data communication)*

Suggested application / benefits through 400mhz FDD LTE 3GPP secondary grid automation :-

- Real Time Charging (AMI) (EV/ PEV tariffs)
- Administration of micro grid including on boarding renewable sources and storage (eg for frequency/quality control)
- Potential of Micro level Feeder Tariffing – (Local district/community grid inputs including DER – Distributed Energy Resources)
- Improved rural resilience preventing CML (Customer Minutes Lost) due to improved telemetry
- Non Obtrusive Data communication overcoming urban rights of way to 11KV/415v transformers
- Inherent security through Primary Air Encryption/ Secondary Packet Core authentication

Consultation Indices and mapping into chapter narratives are shown as ref [n]

NOKIA

3 Draft Assignment RIA – Consultation

[3.1] the rise of standard LTE as a multi service IP technology (Internet Protocol) has significantly changed the dynamics of service provision for industrial use.

[3.3] In order to maximise the benefit to key utility services it is recommended to predicate multi service ethos. This can be achieved via employment of the band with the Western FDD LTE standards as much as possible.

Example of 2 x 3 Mhz and 2 x 1.4 Mhz for LTE services and remaining of 1.1 Mhz for any narrow band designations

[3.12] Nokia agree with the **Plum Report** although the consideration of LTE with narrow channels should also be considered for multi service enablement. Smart Grid is still predicated on serving connections in the realm of 64 kbps and whilst some higher bandwidth services are warranted (eg potential of Video streaming for access control on primary sites) we feel that scrutiny in how auction optionality may result could be warranted. Put another way it is feasible to re enforce the sentiments of our narratives against **[3.3]** and **[2.2]**

LTE 2 x 3 Mhz channels and LTE 2 x 1.4 Mhz channels with the remainder assigned for potential of narrow band services. It would not necessarily need specific 3gPP NB-IOT channels as these could exist within the LTE designations as part of inband or adjacent guard band employments. A nuance of employing

Using 2 x 1.4 Mhz can still offer theoretical throughputs of between 512 Kbps and 1 Mbps Ceteris Parabis which serves well for “Smart Grid” enablement at metropolitan , district and rural levels for a general asset digitalisation strategy.

[3.20] Nokia re iterate the unique standing of the ComReg consideration to foster enablement for industry and for Smart Grid Services through employment of “the 400 Mhz band”. The Energy and Societal benefits for the Republic of Ireland are significant for the low carbon initiatives that will be empowered. Indeed at the EUTC this year – Malmo the focus was recognized that the industry needs to callout specific spectrum as part of ITU-T workgroup and directives.

[3.20 (1)] Given the digital requirements of the Electricity , Water and Gas networks and the business plans to evolve to a low carbon. The Republic of Ireland is clearly intent on creating workstreams such as the NDP. Smart Grid requirements are clearly highlighted at national level.

[3.20 (2)] A Smart grid can only be pragmatically and economically built with a multi service radio fabric (LTE) Fixed networking technology can only offer credibility in metropolitan areas where fibre is prevalent. Other technologies like Business Power line offer very niche service enablement that cannot scale or offer the future proof enablement . So whilst niche solutions exist, none of which offer the cost benefit alternative to an industrious private LTE system in the UHF1 region of “the 400 Mhz” band.

[3.34- 3.37] Nokia is actively discussing EU alignment for productising in the “the 400 Mhz band”

LTE channeling preference in the 410/430 MHz band				
Country	**Preference / MHz**	**Alternative / MHz**	**Usage (planned)**	**Tuning range MHz**
Slovenia	412–417/422–427	NA	WBB	5
Hungary	1) 411–416/421–426 **2) 410–415/420–425**	NA	BB PPDR	5
Bosnia and Herzegovina	**1) 410–415/420–425** 2) 411–416/421–426	NA	WBB	-
Czech Rep.	**410–415/420–425**	NA	WBB	5
Croatia	412–417/422–427	NA		

Lithuania	412–417/422–427	NA	WBB / BB PPDR	5
Ireland	**410-415.5/420-425.5**	NA	WBB/ BB PPDR	5
UK	414-417 / 424-427	NA	WBB	1.4, 3

The 410-430 Mhz is a key Critical infrastructure aspiration of many members of EU Utilities who cannot employ existing Band 31 or Band 72 designations. The use of alternate appropriate UHF frequency in the majority of Utility Member states is not possible for a variety of reasons and the implication is alignment onto the 410-430 Mhz for smart grid services

Reasons for not using B31 LTE include

1) Band reversal of services employed eg UK 450 Mhz designations (eg Band 31 LTE , Band 72)
2) PMR fragmentation within the band
3) Contiguous spectrum is unavailable due to ministry assignment of existing services

[3.44] – Whilst Nokia agree that 2 x 3 Mhz is the ideal designation for smart grid services the standards do permit 2 x 1.4 Mhz channels and this may allow auctioned lots to be partitioned further and create a more narrow LTE subsystem that could serve adjacent Utility needs (Electricity AMI, Water , Gas) . For example :-

It is suggested that the following partition may be considered.

- **2 x 3 Mhz (LTE) for Utility designation**
- **2 x 1.4 Mhz (LTE)**
- **2 x 1.1 Mhz (For Narrow Band Designation) FOR EXAMPLE NB-IOT the 3GPP standard is predicated on 200 Khz building blocks and this could allow for several smart grid / smart city enablers using 1.4 and 1.1 Mhz tranches**

[3.47] Viable alternatives to the economics and integrity of Private LTE are not really possible when we consider existing analysis of the landscape for telecoms digital services. LTE has already been deployed and matured for smart grid realisation and offers the best economics when contrasted with other smart grid mediums.

Access Technologies Analysis – Rural

	Importance	PLC	DLC	Mesh	WiMax	GSM/3G/LTE	WiFi	Fibre
Longevity	9	3	3	6	6	9	6	9
CAPEX Cost	10	4	4	5	6	8	6	1
OPEX Cost	8	4	4	5	5	8	7	8
Bandwidth	5	3	3	7	7	8	7	10
Maturity	8	3	4	5	5	8	6	3
Technology risk	9	5	6	6	6	7	6	2
Robustness	10	3	4	6	7	7	6	9
Openness	4	3	3	6	6	8	7	8
Usability	6	3	3	5	5	8	6	8
Industry Support	8	6	6	7	7	5	3	2
Standards support for Utils	6	9	7	7	7	8	6	1
Total (Unweighted)		46	47	65	67	84	66	61
Total (Weighted		31.4	32.7	44.1	45.9	57.3	44.6	35.5

[3.48- 3.51] UHF slow scan has been a pin point telemetry service and served well for isolated functions, however the proliferation of smart grid endpoints requires multi services and multiple channels. It is work considering NB-IOT channels which although narrow band and more latent in nature can scale to massive connectivity aspirations for simple telemetry purposes. This can leave wider channel employment for more stringent and real time services such as VVAR and DER management.

[3.52- 3.56] Mobile fabrics from an MNO use shared Resource blocks and it will not be until 5G architectures until those can be guaranteed in an absolute sense (slicing) event then power autonomy in the event of a black start is a key topic.

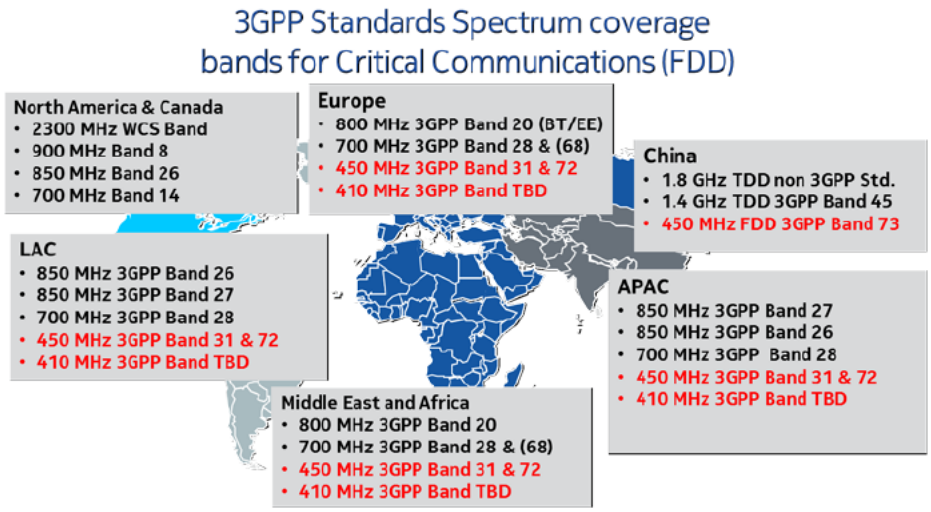
[3.82] Mobile devices for the 410-430 Mhz are limited to industrial CPE and certain PTT specialised apparatus therefore a traditional MNO would not achieve mass density of ARPU. It is feasible that a neutral host could service the spectrum but this would need to be caveated to prevent commercial monopoly of connecting public derived assets and costs.

[3.90] Nokia agree with Option 3 as an enabler of grid services and fair competition that could foster NB-IOT (200Khz) and normal UE channels such 2 x 3Mhz (LTE)

[3.92 – 3.96] Using a digital fabric can have significant enablement for consumers , either via intangible benefits of connected community enhanced power services and reducing CML , or direct benefits such as connected EV systems via use of the spectrum. In any case the consumer will not be directly in the loop at connectivity levels but possibly will be from an application stance.

[5.5] Nokia recommend that the adoption of modes follow the 3gPP aligment from a world wide stance . this means that FDD is the chosen mode of operation as this fosters a world wide eco system of vendors rather then proprietary systems that have differing modulation typically from the Asian pacific region.

Evidence to support the global standards of lower UHF standardisation is shown thus , The only region adopting TDD is Asia pacific in certain countries.

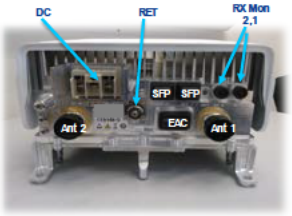


[5.23] FDD Nokia is able to share its wider initiatives on developing an eco system for the sub band that is applicable to a world wide theatre of operation.

Radio Head products – Existing product has been created aligned to the following standards . This product went live for GA release in Dec 2018.

FRAB Flexi RRH 2-Pipe 410-430 MHz 80W

- Full band 126 filtering
  - RX 410-415 MHz
  - TX 420-425 MHz
- instantaneous BW 5MHz, occupied BW 5MHz
- Single sector deployment 2TX MIMO
- Up to 2 x 40 W at the new 4.3-10 antenna connectors, configurable with 0.1<dB intervals
- Carrier BW: 1.4 / 3 / 5 MHz



- Convection Cooling
- <15liters, <16 kg (w/o cover)
- IP65
- -40 to +55 °C*
- <400W power consumption

*At constant high temperature and high traffic load at 40 Wmode Pout might be limited,
- Indoors 45 °C

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Nokia Temp Operating Band ~B126	Downlink			Uplink		
	F_{DL_low} [MHz]	$N_{Offs-DL}$	Range of N_{DL}	F_{UL_low} [MHz]	$N_{Offs-UL}$	Range of N_{UL}
126	420	130200	130200-130249	410	195736	195736-195785

UE Development Landscape

Eco system is developing , Nokia is working with Vendors such as :-

LP410_R1.0 (003).pdf

ATEL for chipset adaption into Band 126 for the sub band

Encore Networks for Rugged UE smart grid devices

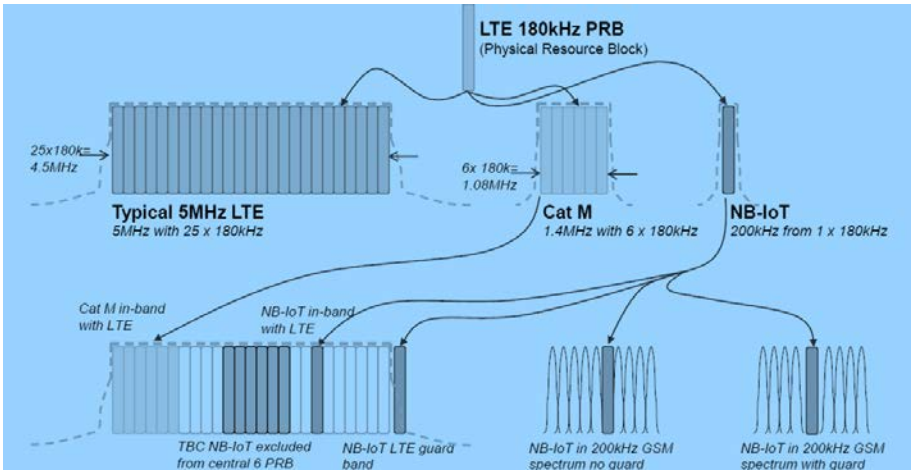
Virtual Access for dual band and rugged UE smart grid devices

Nokia are also developing PTT solutions with a wider eco system in this sub band

Recent ECC(19) (2) drafts also suggest the intention of FDD aligment into 3gPP for operational modes.

[5.25] Nokia suggest that some consideration is given to the use of block edge masking. The typical aligment in 3gPP is for 1.4, 3 or 5 Mhz duplex channels meaning that 0.5 Mhz from the sub band could be considered for both narrow band and block edge separation of services. This will allow clean use of resources when the sub channel is used across differing stakeholders/ future owners. The NB-IOT schema below shows the potential for BEM options but Nokia's view is this should not subtract from the ownership capacity but should be regulated in between band operators .

If additional consideration is given to the use of NB-IOT then some guarding will be necessary to not disrupt wider channel resources



[5.25] Example of using NB-IOT in sub carriers for potential of multi service IOT – [Source - Keysight]

Summary

An assured spectrum that offers multi service capability for a Smart Grid based on vendor agnostic LTE / 3GPP standards would serve the Republic of Ireland industry community well. Such an outcome has many tangible / intangible benefits for the next 15-20+ years in development of the RoI's modern energy /utility systems.

Nokia Support the following 6 principles in summary

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1- Safeguarding the spectrum for Smart Grid is key to the future of Irish Utilities and Grid service Innovation;
2- Some thoughts need to be applied to how stakeholders can co exist without interference and there should be consideration for BEM and guard bands along the lines of what has been suggested in 5.25
3- Nokia are already manufacturing radio head products in this band for Western aligned 3gpp FDD designation and are fostering wider eco systems with 3rd party FDD CPE/UE devices.
4- NB-IOT/CatM1 LTE and 3gPP standards have a role to play in creating a foundation outside of 2 x 3 Mhz and other PMR Narrow band concepts.
   Some consideration to NB-IOT (180Khz building blocks) should be considered
5- The UK is considering adoption of the sub band albeit with further restrictions. Some dialogue with the JRC and /or OfCom could be warranted to align on ROI and UK band 126 designation.
6- **[5.44 – 5.46]** Fostering long term investment behind the band is recommended. Investment in multiservice for 2 x 3 Mhz and 2 x 2.5 Mhz in small lots could allow for a real time smart grid fabric and allow for part B (smaller lots) to foster an NB-IOT or Cat M1 service enablement.

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About Nokia

Nokia is a global leader in the technologies that connect people and things. Powered by the innovation of Bell Labs and Nokia Technologies, the company is at the forefront of creating and licensing the technologies that are increasingly at the heart of our connected lives.

With state-of-the-art software, hardware and services for any type of network, Nokia is uniquely positioned to help communication service providers, governments, and large enterprises deliver on the promise of 5G, the Cloud and the Internet of Things.

https://networks.nokia.com/power-utilities || http://networks.nokia.com

8 Western Power Distribution

Extracts from Section 5 where ComReg states its position alongside the WPD perspective

5.2 National Licences

5.7 ComReg maintains its proposal that licences for the 400 MHz band should be awarded on a national basis.

WPD Perspective

WPD endorse this perspective as the opportunity to co-ordinate and deploy National networks is key to being able to cost effectively and efficiently enable Smart Grid developments.

5.3 Channel Bandwidth

5.12 ComReg therefore remains of the view that licensees should have the flexibility to use whatever bandwidth their technology requires, noting that potential bidders may be required to aggregate enough spectrum to satisfy their spectrum needs. Nevertheless, licensees must operate within their spectrum holdings and comply with the Block Edge Masks discussed in Section 5.6 and specified in Annex 2.

WPD Perspective

WPD supports ComReg's approach to not define the channel bandwidth and in so doing allow interested parties to aggregate spectrum to support their individual system needs.

5.4 Licence Duration

5.16 Plum therefore recommends that a licence duration of no less than 15 years would be appropriate.

5.18 ComReg proposes a licence duration of 15 years.

WPD Perspective

WPD notes the need for certainty in terms for spectrum access to allow the utility network operators the time to design, deploy and realise the benefits of Smart Grid functionality. To this end we welcome a 15 year minimum term as recommended by Plum but also encourage a 20 year term to align better with the long term planning horizons adopted by utility network operators.

5.5 Mode of Operation

5.23 ComReg continues to be of the view to award this spectrum for FDD operation only.

WPD Perspective

WPD is concerned that to restrict this spectrum to FDD only at this stage would potentially foreclose on flexibility of use for the band and prevent the industry from being able to exploit future technology developments and more importantly be in conflict with the characteristics of the traffic in the band.

In terms of technology developments, it is too early in the establishment of 'Smart Grid' capability to limit the functionality of the radio-based communications systems on which it will depend. We have

successfully undertaken a trial utilising a TDD based system in the 400 MHz band which demonstrates that TDD based solutions are being developed.

Moreover, Smart Grid traffic profiles are likely to be asymmetric with higher flows of data from the network assets to the centre than the other way around. To this end, with an FDD configuration the 'uplink' channels have the potential to be heavily loaded as they carry data from the network assets to the centre whilst the 'downlink' channels will be lightly loaded carrying commands from the centre to the network assets. As the functionality within the 'Smart Grid' network becomes enhanced over time there is a risk that the uplink channels will become overloaded resulting in a need to re-design / deploy the radio network on which the 'Smart Grid' functionality depends at considerable cost and disruption.

WPD therefore encourage ComReg to adopt an open approach to the operating mode that can be used and in so doing permit both TDD and FDD to be deployed.

5.6 Interference Mitigation

5.30 ComReg therefore proposes to adopt Plums recommendations regarding emission limits and interference mitigation and propose that it will be a condition of any future licence that licensees should base any coordination that may be necessary on the Proposed BEMs specified in Annex 2.

WPD Perspective

As noted above the BEM proposals are worthy of further analysis to better understand any impact of this approach.

Protection of Radio Astronomy

5.35 Although there is currently no Radio Astronomy activity in the band in Ireland, ComReg proposes to attach a licence condition that any potential future licensee(s) must coordinate with any potential Radio Astronomy users so as to minimise interference.

WPD Perspective

WPD acknowledges that ComReg will attach a licence condition to the band to require the licensee to co-ordinate with any potential future Radio Astronomy user and supports this approach.

EIRP Limit

5.36 ComReg proposes an EIRP limit of 50 W for this award as it balances interference concerns with the UK while allowing a potential user to deploy a national network using fewer sites.

5.40 ComReg reminds potential licensees that a limit of 50 W is an upper limit and that the minimum EIRP required to maintain the network should be used at all times. Licensees must also take into consideration potential future obligations to protect the Radio Astronomy service, adjacent licensees, and any potential cross border MOUs.

WPD Perspective

WPD endorses the maximum EIRP of 50W for the band as proposed and acknowledges that this is an upper limit and that the minimum EIRP to maintain the network shall be established and deployed in

order to minimise interference into adjacent licensees, across border and to any future Radio Astronomy service.

5.7 Roll out obligations / usage conditions

5.45 ….. Therefore ComReg is of the opinion that separate roll-out conditions are likely required for the differing tranches of spectrum and these are defined below.

5.47 ComReg considers a reasonable roll-out obligation of no less than 10 base stations in each of the three areas shown in the figure 2 (Coverage Areas for the 2 × 2.5 MHz tranche of spectrum) within the first 3 years.

5.48 With regard to Part A, ComReg notes that within Annex 4 of draft ECC Report 292, Figure 10 shows that in the UK by 2031, at least 89% of high voltage sub-stations will require communications as part of the UKs Smart Grid deployment. The report Further Consultation on the Release of the 400 MHz Sub-band ComReg 18/92 states that these percentages are expected to be representative of the requirements in most member states. A proposed roll-out condition may be based upon the number of utility network elements to be deployed.

5.49 ……., for Part A, ComReg proposes that a reasonable roll-out obligation is for a Network Utility Operator to provide communications to 50% of its utility network within 3 years of the commencement date of the licence. With a proposed licence duration of no less than 15 years, these licences would expire in 2034 at the earliest, allowing a Network Utility Operator to fully provide for communications capabilities in its utility network by the indicated date of 2031 in para 5.48.

WPD Perspective

Part A Perspective

In terms of the Part A spectrum whilst we welcome the commitment of this spectrum for Smart Grid developments in Ireland it is also important to acknowledge the practicalities as well as the economics behind the roll-out of such radio network capability. As a matter of priority the appropriate funding needs to be put in place in order to facilitate this type of network deployment. The utilities to which this spectrum will be assigned will need to secure the appropriate funding through their regulatory settlements in order to facilitate roll-out. The cycle of these funding rounds are likely to vary across sectors and at this stage in the process the necessary funding arrangements are not in place to pay for the roll-out. To this end, we would encourage ComReg to liaise with the relevant Government Departments and Regulatory authorities to determine at what point the necessary funding will be in place to support such a roll-out. Once the timescales for funding are understood it is then worthwhile to consider the practicalities of network roll-out considering the typical timescales for planning consent, infrastructure deployment and commissioning to further elaborate the appropriate timings for any roll-out obligations.

Finally, in terms of the active Smart Grid that is deployed there may be considerable variances between the needs of the Electricity sector relative to those of the Gas sector and as such 50% of the utility network being covered may vary dramatically dependent on the 'actor' involved. Perhaps it will be possible to establish a more nuanced approach to roll-out obligations which focuses on outcomes and which is developed in partnership with the Energy sector regulators. This approach could be aligned to the requirements of reducing CO2 emissions, increasing network efficiency and enhancing the utilisation of renewables amongst other criteria which will be enabled as a result of the Smart Grid deployment.

Part B Perspective

Relative to the Part A roll-out obligations those being proposed for Part B appear less onerous and hence easier to achieve. As per comments above we see merit in aligning roll-out obligations to specific outcomes in terms of the services that may be delivered rather than some arbitrary level of infrastructure deployment.

Measurement of Roll out obligation

5.51 The obligation for Part B would be assessed after a 3 year period to ensure compliance. The licensee would be required to register the locations of apparatus (both base stations and numbers of connected devices) each on the anniversary of licence issue for ComReg's records and assessment of the usage of spectrum.

5.52 With respect to Part A, in order for the above roll-out obligation to be measurable, ComReg proposes that interested parties must submit details of their utility network (for example, the number and locations of Wireless Telegraphy equipment deployed to cover the Smart Grid network) with their application to participate in any award that may take place. ComReg also proposes to make it a condition of the licence that licensees must submit an annual report on the anniversary of licence issue demonstrating compliance with its roll-out obligation.

WPD Perspective

Whilst we have no specific issues about the monitoring and reporting of network roll-out per-se we do have concerns with the appropriateness of the timescales being considered for Part A spectrum. As noted above we encourage the adoption of an outcome-based roll-out obligations and hence suggest that the reporting framework should be aligned to the benefits that will be realised through the establishment of Smart Grid capability.

5.8 Memorandum of Understanding

5.59 ComReg concurs that the current MOU should be re-examined as the current potential uses are likely to utilise wideband technologies. ComReg also notes that there has been an increase in the amount of spectrum available to 410 – 415.5 / 420 – 425.5 MHz which could have an effect on systems deployed in the UK.

5.60 ComReg would engage with Ofcom, the UK National Regulatory Authority, to re-examine the current MOU.

WPD Perspective

We support ComReg's intention to re-visit the MoU with the UK to address any issues associated with the deployment of wideband technologies in the band under consideration. The extent to which this engagement will be straightforward is unclear at this stage so we encourage early engagement to ensure that the spectrum can be utilised in Ireland as early as possible after the award.

5.9 Third Party Use

5.63 Regarding Part B, ComReg maintains its view that third party use in the band would mirror the Third Party Business Radio by allowing licensees to provide services to third parties throughout the

country without the need for individual licensing for specific geographic sites or by each third party user.

WPD Perspective

WPD supports ComReg's proposal to allow third party use in Part B of the band in keeping with the existing arrangements for Third Party Business Radio.

5.10 Compliance with the RED Directive

5.64 All radio and telecommunications equipment must comply with the essential requirements and other relevant provisions of the Radio Equipment Directive ("RED") before putting them into service.

WPD Perspective

WPD supports ComReg's position that all radio and telecommunications equipment must comply with the RED.

5.11 Summary of Proposals

ComReg Proposal	WPD Perspective
Part A of the spectrum would be technology neutral but service specific and restricted for use of Smart Grids as defined in para 3.22 of this document. Part B, the remaining 2 × 2.5 MHz would be awarded in a manner which respects the principles of service and technology neutrality	*WPD welcomes ComReg's proposal to restrict the Part A spectrum for Smart Grid deployments.* *We also welcome the release of the Part B spectrum on a service and technology neutral basis.*
to make 400 MHz spectrum available on a national basis	*WPD support the release of the 400 MHz spectrum on a national basis*
no restriction on bandwidth, but to allow licensees to use spectrum rights of use with whatever bandwidth they wish, provided that potential licensees operate within their spectrum holdings and comply with the Proposed BEMs discussed in section 5.6 and specified in Annex 2	*WPD support the proposed flexibility of bandwidth subject to the limitations of spectrum held and the BEMs proposed.*
a licence duration of 15 years	*As noted in our response above we welcome the proposal for a minimum term of 15 years but encourage ComReg to consider a 20-year term to afford the energy utilities sufficient time to deploy and exploit the Smart Grid capability*
to make the spectrum available for FDD operation only	*WPD encourages ComReg to adopt an approach that does not limit the band to one mode of operation to avoid foreclosing on technology developments. Moreover, it is important to recognise the asymmetric nature of the traffic and the resulting inefficiencies that would result if the Smart Grid network were*

	limited to the FDD mode of operation.
a Block Edge Mask ("BEM") which licensees must conform to	*WPD to review the implications of the BEM proposed and feedback accordingly.*
ComReg's further proposal on allowing potential Third Party Use in the band is that the proposed scheme is likely to mirror the Third Party Business Radio licensing scheme	*WPD supports this proposal for Third Party access.*
Part B would be made available in lots of 2 × 100 kHz. To clarify, this represents the smallest building block that potential users may use to aggregate spectrum into larger amounts	*We support the proposal for lot sizes of 2 x 100 kHz for the Part B release.*
Roll-out Obligations for Part A, a roll-out obligation for a Network Utility Operator to provide communications to 50% of its utility network within 3 years of the commencement date of the licence	*In light of the complexity of funding associated with enterprises subject to price regulation. In addition to the inherent timing issues associated with network roll-out at scale, e.g. planning consent, infrastructure build and commissioning we suggest that the proposed roll-out obligations are likely to be unachievable. Rather we encourage ComReg to consider an outcome-based approach which could be developed in conjunction with the utilities to target the specific timing of Smart Grid capability that will be naturally aligned to regulatory objectives.*
for Part B of the spectrum, ComReg considers a reasonable roll-out obligation of no less than 10 base stations in each of the three areas as defined in section 5.7 by year 3. This obligation will be assessed after 3 years	*As per comments above we see merit in aligning roll-out obligations to specific outcomes in terms of the services that may be delivered rather than some arbitrary level of infrastructure deployment*
ComReg is of the view that a SCA is the auction format best suited to deal with the considerations outlined in the DotEcon Report	*WPD endorses the proposed SCA auction format for the award.*
ComReg is of the preliminary view that lots in Part A should be made available on a frequency specific basis (that is, 410 – 413 MHz / 420 – 423 MHz) and Part B should be made available on a frequency generic basis	*wpd supports the proposed lot arrangements*
ComReg is of the preliminary view that a competition cap is not appropriate for this award process	*We agree with ComReg's proposal that a competition cap is not appropriate.*
any spectrum not taken up in the Part A auction will be included as part of the award for the remaining Part B	*We support this approach.*
the fee proposals	*WPD welcomes the fee proposals for Part A and Part B spectrum and the establishment of the upfront and annual charging mechanism.*