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Response to Ofcom's Call for Inputs

Promoting investment and innovation in the Internet of Things

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References

1. http://webarchive.nationalarchives.gov.uk/20120810121037/http://www.highways.gov.uk/customer/25238.aspx
2. http://www.britishparking.co.uk/write/Documents/Library/Reports%20and%20research/BPA_UK_Parking_Sector_Report_AWweb.pdf
3. http://www.royalmailgroup.com/sites/default/files/The%20outlook%20for%20UK%20mail%20volumes%20to%202023.pdf

Introduction

This is Senaptic Limited's response to Ofcom's "Promoting investment and innovation in the Internet of Things" consultation document.

We have given our responses under section headers that mirror the numbering in Ofcom's response form to make response collation easier. Where we do not have a specific comment to make we have left the section blank.

Background on Senaptic

Senaptic is a privately owned UK SME that was spun-out from Plextek Ltd in March 2014. Plextek in turn is a privately owned UK company that is one of longest established technology consulting organisations in the Cambridge tech cluster. Previous success stories from Plextek related to IOT include:

- The development of the first wide scale smart gas metering system
- The development of the market leading stolen tracking car system (now used in 28 countries world-wide)
- The development of the Ultra Narrow Band (UNB) concept (in 1997) now adopted by several IOT players
- Manufacturing and sale of over 7 million UNB devices over the last 17 years

Plextek has a good track record of creating successful spin out companies. This is illustrated by two sister companies that are recent Plextek spin outs:

- Telensa Ltd. has more street lights under remote control across the world than any other supplier. This is one of the key growth applications often cited in IOT analysis
- Redtail Telematics Ltd. is a leading developer of black box tracking units for managing vehicle fleets and assessing driver behaviour for insurance companies

Senaptic was established to accelerate the adoption of Plextek's UNB technology. Our goal is to have the highest number of devices connected to our network technology which fits within the Low Power Wide Area (LPWA) segment. We are now the only UK owned company to have large scale LPWA deployments.

1. IOT definition, applications and demand

Wireless IOT is split into two major segments:

1. Local area devices – these will typically be connected via gateways using existing short range standards (often Wifi) within buildings.
2. Wide area devices – these require longer range connectivity due to their location, mobility requirements or need for direct connection to a service provider without relying on a 3rd party communications pipe

Within the wide area segment there is a further split between the following:

1. Broadband devices that require generic Internet connectivity
2. Sensing and control applications that require lower bandwidth

Broadband devices are typically best served by mobile network operators (MNOs).

Radio networks suitable for sensing and control are now commonly referred to as Low Power Wide Area (LPWA). Most applications in this category require low power battery operation. However, some applications, notably electricity smart metering, do not have this requirement but still have similar wide area radio network requirements.

The largest growth area in wireless IOT will be applications using LPWA technology:

1. Smart metering (electricity, gas and water). In the UK alone there is a potential market for over 26 million smart water meters.
2. Smart city applications such as street light control, parking, traffic sensing and municipal security sensing. In the UK there is a market for devices to monitor/control 5.6M street lights [1] and over 8M parking spaces [2].
3. Agricultural monitoring. On the livestock farming side applications include tracking, animal welfare monitoring and yield optimisation. On the arable farming side applications include irrigation optimisation and chemical level monitoring. As an example of scale, in the UK there is a population of 37M cattle/sheep/pigs.
4. Industrial automation and logistics tracking. This covers applications that assist lean manufacturing operations, parcel tracking and retail logistics. In the UK approximately 1.7Bn parcels were sent in 2012[3].
5. Consumer applications such as child, pet and valuable asset tracking.

Growth will initially be driven by utility, government and industrial users. The UK is well placed to capitalise on this growth and we look to government to encourage the use of UK developed technology in systems that it procures.

Key Points – LPWA is a key growth market. This segment has a stronger focus on applications that have economic and society level benefits when compared to generic broadband connectivity. As the investment required for LPWA systems is low, the returns from government involvement will have a disproportionately high return when measured in benefit to society.

2. Spectrum requirements

LPWA systems are often implemented in licence exempt spectrum and this is one of the main factors that will encourage growth in this market. This spectrum offers a low barrier to entry for new innovative service providers and so is more likely to be efficiently utilised for meaningful economic activity than licensed spectrum.

As a result, we welcome further extension of licence exempt spectrum in the 400MHz to 1GHz range.

Our experience of licence exempt spectrum is that it provides a reliable resource that enables efficient competition. However, we accept that there is sometimes uncertainty in those new to this type of spectrum usage. In order to mitigate these fears we welcome continued strong regulation in the relevant bands. As well as specific technical regulations, we would welcome stronger monitoring of the relevant spectrum to ensure that deployed systems meet the necessary limits.

A number of limits apply in the current 868MHz licence exempt bands including:

- 500mW, 10% duty cycle
- 25mW, 1% duty cycle
- 25mW, 0.1% duty cycle

We currently utilise the 500mW sub-band for downlink, base station traffic and we welcome wider availability of similar bands.

The 0.1% duty cycle sub-bands are difficult to utilise for many applications and we would prefer future allocations at the lower power levels to have at least a 1% duty cycle limit. Higher power levels are more suitable for downlink traffic from base stations and so would benefit from duty cycle limits of 10%.

The current allocations allow transmitters to utilise the whole of the relevant sub-bands. We feel that this unfairly penalises narrow band transmitters, which could benefit from higher power or duty cycle limits without unfairly contributing to interference in the band. Therefore, we propose that higher power / duty cycle limits be considered for very narrowband transmissions.

We welcome further investigation of the concept of “lightweight-licensing” and we understand that this is subject to a separate consultation from Ofcom. We will provide specific feedback on this in the more focussed consultation.

Key Points – The low barrier to entry provided by licence exempt spectrum encourages innovation and new value chain models that will drive IOT growth. The detailed regulatory requirements of licence exempt spectrum (with regard to power level, duty cycle and other factors) is probably not optimal to encourage growth and we would like to see further analysis of this.

3. Network-related issues

Backhaul and core network systems for IOT will largely be IPv6 based. There are a number of standards activities in this area and there is a sufficiently vibrant competitive market so that Ofcom does not need to have a regulatory role.

We would welcome a review of the Electronic Communication Code powers in relation to base station deployments. These powers were established during times of large scale infra-structure deployment and modifications that lower the entry barriers for small players may encourage competition.

There are two main topologies for wide area IOT networks, mesh and star. Mesh networks retransmit the same data over several hops and have a spectrum overhead associated with maintaining the mesh. As a result, when

spectrum usage is considered in relation to end-to-end user data transfer, mesh networks are very inefficient. Radio regulations do not penalise mesh networks as limits only apply to single hops of data transfer. It would be useful for Ofcom to consider whether it is feasible to apply limits based on overall data throughput efficiency.

4. Security and resilience

We believe that security and resilience levels should be specific to the application and we provide various authentication and encryption schemes to enable this.

5. Data privacy

Currently, there is uncertainty about network operators' obligations with respect to data retention and data privacy. It would be useful for Ofcom to address this. Data privacy and retention should be addressed at an application level and it would be useful to clarify that the data pipe operator has no specific obligations in this area.

We are concerned about the costs associated with meeting any regulatory data retention requirements. We are also concerned about loss of business due to lowered trust from our customers in the case that lawful interception methods are mandated.

6. Numbering and addressing

IPv6 will be the dominant addressing mechanism but this may not extend as far as edge devices for bandwidth efficiency reasons.

7. Devices

The current CE marking scheme provides a good framework for device regulation. In particular we support the current situation in which radio regulations apply on a "per CE mark" basis.

We strongly believe in application neutrality for radio regulations and hope that Ofcom will continue to push down this route when assigning new spectrum. We note that a number of valuable sub-GHz bands are utilised in an inefficient manner and we hope that Ofcom will work towards loosening the definition of applications that can operate in these bands.

For example, RFID systems have significant relaxations on transmit power and duty cycle when compared with generic short range devices. However, the ETSI harmonised standard for RFID spectrum is rather specific to that one application.

8. Digital literacy

We have nothing specific to note in this section.

9. Data analysis and exploitation

We have nothing specific to note in this section.

10. International developments

The lack of harmonisation of licence exempt bands on a global basis is a significant barrier to growth.

Harmonisation of frequency bands is less critical for the LPWA market as devices are not generally expected to roam between countries. However, regulation of power levels, antenna constraints, duty cycles, LBT, frequency hopping, channel widths and modulation requirements have a much larger impact on system design. Harmonisation of these parameters would be extremely beneficial.

We hope that Ofcom can work towards harmonisation of these items within the ITU framework or via bilateral agreements. We note that some regulatory regimes are much laxer than the EU (for example with no duty cycle limits). We would like to see Ofcom encourage a wide set of countries to adopt the CEPT regulatory limits even if they apply to different frequency bands. This will make it easier for UK vendors to access global markets.

Export restrictions are another barrier to growth. It is not possible to export many encryption schemes without an export licence even if the specific scheme is widely available in open source form. It would be useful if Ofcom could work with the export licensing authorities in order to maintain a list of freely available encryption schemes that do not require an export licence.

The UK is ideally placed to profit from the emerging IOT market. However we are seeing a significant amount of government effort and investment in this areas being passed to foreign owned companies. We hope that Ofcom can encourage government to engage with UK owned companies where possible.

11. Ofcom's role

A summary of the items mentioned elsewhere in this document that we would like to see from Ofcom is:

1. Continued leadership in setting the regulatory regime in Europe however, with greater emphasis on reinforcing the competitive positioning of UK owned companies.
2. A review of licence exempt spectrum with a view to reducing the amount of spectrum allocated to specific applications.
3. Conduct a review of light licensing.
4. Work with the ITU and other regulatory bodies to harmonise licence exempt spectrum, focusing on system level parameters rather than simply frequency.
5. Consider whether the existing Electronic Communication Code powers could be modified in order to lower the barrier to entry for new network operators in certain spectrum segments.
6. Work with the UK government to encourage investment in UK owned industry.

12. Additional comments

We have nothing specific to note in this section.