ESOA Response on the RSPG Draft Opinion on the Spectrum Aspects of the Internet-of-things (IoT) including M2M

January 2017

The EMEA Satellite Operators Association (ESOA) has the honour of replying to the RSPG's consultation on its draft Opinion on the Spectrum Aspects of the Internet-of-things (IoT) including M2M.

ESOA is a non-profit, CEO-driven organisation established with the objective of serving and promoting the common interests of satellite operators in Europe, the Middle East and Africa (EMEA). The Association is the reference point for the satellite operators industry and today represents the interests of all EMEA satellite operators who deliver information communication services across the globe.
More information about the association is available from: **www.esoa.net**

Introduction

ESOA would like to endorse and promote the rationale that IoT should be a heterogeneous group of networks, encompassing multiple applications and operational requirements. No single solution for access to spectrum can fit all the possible use cases for IoT since their technical requirements will differ dramatically, for example regarding data rate, coverage and reliability, and output power.

The ESOA response focusses mainly on the satellite component and the role that satellite technology will play in the IoT / M2M applications, whilst recognizing that within the European regulatory framework satellite technology operates in a variety of frequency bands.

ESOA Response to the current draft RSPG opinion

ESOA agrees with the draft opinion that the IoT/M2M domain covers a wide range of vertical sectors, and within those there are use-cases both established and emerging. However we would like to highlight that the current RSPG work programme does not reference the important role that satellite technology will bring to the fold for IoT. Satellites already play an important role in IoT/M2M and are likely to be more important in the future as the number of IoT/M2M devices is predicted to soar, and because ubiquitous geographic coverage is only practically achievable by satellite.

Satellites are more robust and inherently more secure than mobile networks as they have far fewer 'points of failure'. They are therefore ideal for broadcast information, where trustworthiness is vital – this could include road traffic warning systems. Using multiple communication frequencies - terrestrial and satellite - further enhances robustness. Satellites also economically provide wide geographic coverage, covering areas where there is limited coverage from terrestrial networks, in particular rural areas. This makes satellites ideal for services away from built-up areas. In order to ensure seamless connectivity, the future will rely on intelligent hybrid devices that can use multiple communication services, such as satellite but also including Wi-Fi, and the forthcoming 5G mobile networks.

In the connectivity and autonomy of intelligent cars in particular, ESOA members are closely involved in initiatives to ensure that satellite system capabilities respond to developments of intelligent vehicles.

Connected and autonomous vehicles will change the way in which many of us commute. They offer the promise of saving time and money, getting people and goods to their destinations faster and more easily, and aiding mobility for disabled and older people. Such Intelligent transport systems and self-driving vehicles are fast moving towards widespread commercialization, with higher levels of automation on the road expected by 2020. Europe will quickly adopt connected car solutions; as illustrated in the chart below (Figure 1), it is estimated the share of connected cars to non-connected cars will grow from 13% in 2014 to 95% in 2020.[1]

[1] Source BI Intelligence

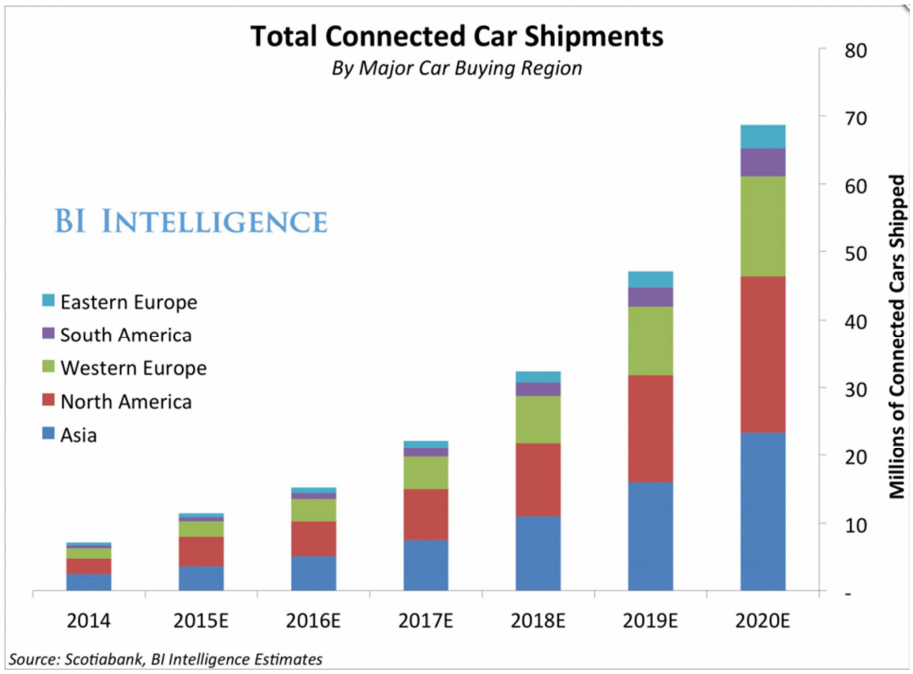

Figure 1: Connected cars by region

Future intelligent transport systems, including connected and autonomous vehicles, will also be vital for meeting a number of the United Nations' 2030 Global Goals, including:

- Good Health and Wellbeing – includes the target of halving the number of global deaths and injuries from road traffic accidents by 2020
- Sustainable Cities and Communities – includes the target of providing access by 2030 to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

While automotive digital technology has been focused on optimizing the internal functions of cars or on the use of sensor technologies for the monitoring and identification of objects near vehicles, recent attention is shifting towards developing communication technologies that integrate cars with smart devices via the Internet. One such technology is satellite, making connected vehicles everywhere a reality with autonomous vehicles not far behind.

Opportunities for both general and individual authorisation

ESOA notes the reference made by the RSPG draft opinion that different authorisation models for access to the spectrum aim to meet various use cases and operational requirements. The draft opinion notes that frequencies whose use is subject to individual authorisation includes those used by satellite services. There are however instances where frequencies used for satellite services do not need an individual authorisation but are subject to a general authorisation and compliance with technical conditions defined in the framework of a general authorisation model.

Examples are the MSS satellite frequencies (L-band and S-band) used by mobile terminals, and the FSS frequencies (C-band, Ku-band, and Ka-band) used by VSATs and mobile terminals. For these applications the terminals operate under licence exemption or general authorisation. ESOA thus concurs with the draft Opinion that satellite platforms operating in a variety of bands will play a role in IoT/M2M.

A key challenge therefore is how to produce, an economic and resilient communication system with very high reliability demanded by some IoT applications. We are already seeing today development by the satellite industry to build satellite systems operating within the Ku-band [2] FSS allocations and the L-band MSS allocations,[3] to meet the requirements of connected and autonomous vehicles. The RSPG should note the current preparations within CEPT for an ECC Decision on the harmonised use, free circulation and exemption from individual licensing of Vehicle-Mounted Earth Stations (VMES) operating with GSO and NGSO systems in the fixed satellite service (FSS) allocations. This is not currently reflected in the draft RSPG opinion where satellite is seen as operating in frequencies whose use is subject to individual authorisation and licensing.

With the predicted growth of IoT applications, this will create an increased demand for access to spectrum depending on the operational requirements and use cases. Moreover, the predicted growth of IoT applications could result in a proliferation of sectorial requests, for exclusive spectrum for specific allocations. This is where the satellite component can bring a great attribute of utilising existing spectrum in an efficient way to provide data communications for low data rate (LDR) machine to machine (M2M) systems for communicating with remote sensors. Figure 2 below provides an overview of such a system. Remote sensors connected wirelessly or wired to a LDR terminal include a satellite module for backhaul communications via a satellite link.

[2] 10.7-12.75 GHz (space-to-Earth) and 14.0-14.50 GHz (Earth-to-space)

[3] Around 1.5/1.6 GHz

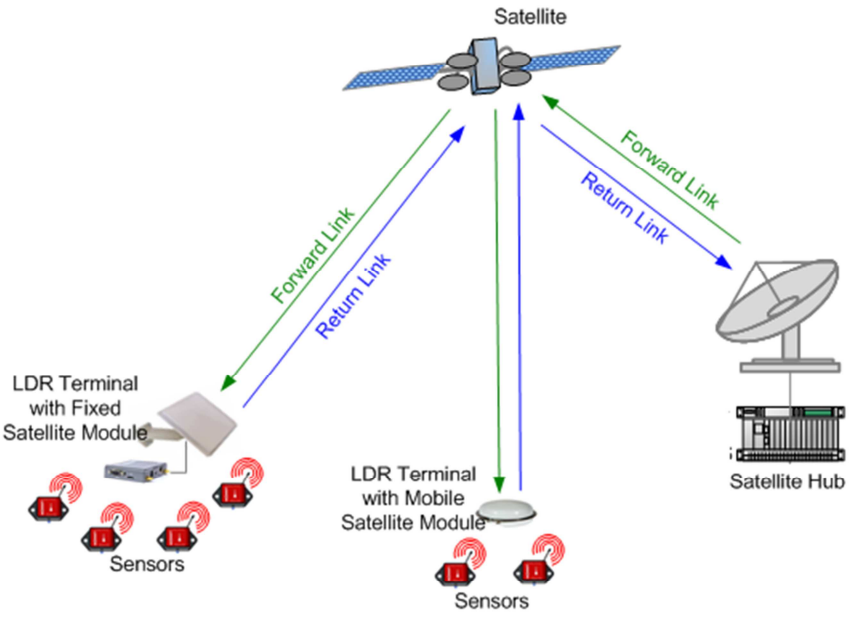

Figure 2: Typical topology of a satellite to vehicle connection

It is important to ensure, in the long term, that access to spectrum is not a barrier for the growth of the IoT/M2M sector. The regulatory framework should not act directly on the technology but on the spectrum resources available for the development of IoT/M2M applications, considering also the compatibility with existing services and their applications.

It should also be noted that the European Telecommunications Standards Institute (ETSI) has already adopted Ku-band standards for earth stations on vessels (ESVs) under European Norm EN 302 340, for VMESs under EN 302 977, and for aircraft Earth stations (AESs) under EN 302 186. However, it appears that, to date, there is no ECC decision with regards to VMES on automotive applications in the Ku-band. So far, ECC Decisions cover only MSS terminals, ESVs and AESs in Ku-band, and Earth Stations on Mobile Platforms (ESOMPs) operating in Ka-band. The band 14.25-14.5 GHz is used by the Fixed Service (FS) in Europe however there are other services with allocations within these bands. These bands are also available for the use by the FSS. Therefore, one proposal that could be adopted by the RSPG is to promote compatibility studies between existing services and VMES in Ku band.

The draft RSPG opinion notes that IoT functionality will be designed into 5G from the start. The future generation of mobile communications will integrate several (currently separated) heterogeneous networks, to reach ambitious goals in term of performance, range of services (from IoT to very high data rate), coverage, availability, programmability, energy, etc. ESOA would like to highlight to the RSPG that satellites will definitely have a role to play here, e.g. to allow the global network resilience, ensure universal service deployment (anywhere and at any time), support intelligent traffic management, allow intelligent caching (content push to the edge).

Next generation networks will also address the needs for mobile data and connectivity of billions of people who live beyond the reach of mobile networks in rural, suburban and remote sites. Satellite communications are the only means to provide a truly global coverage and mobility, also to prevent digital divide, isolation and depopulation. Furthermore, rural development and modern agriculture rely increasingly on connectivity networks, for a wide range of applications, including tourism, sensor monitoring of crops and use of drones in trade and agriculture.

Benefits of Satellite to be considered within the RSPG

Satellite services have been critical and unchallengeable in meeting needs for connectivity in maritime and aeronautical environment, lying outside the reach of terrestrial networks. Satellite plays a role also in connecting rural and remote areas and this role will remain well into the future and will expand with an increase emphasis on broadband penetration to access sub-urban and rural areas.

The satellite industry should be considered as an important element of the IoT arena, where use cases in the transportation sectors appear to be particularly promising. In the context of the fast development of the IoT applications and market, there is a growing demand for ubiquitous machine to machine (M2M) connectivity. For example in the USA, some terrestrial operators (e.g. AT&T) have fully incorporated satellites into their networks to maximise coverage of land and air tracking of IoT devices for cargo transport. This trend looks set to increase as more and more intelligent transport systems are being developed where software updates and content download make satellite systems a much more cost effective technology due to its efficiency in broadcasting services.