

## **Release of the 59-64 GHz Band**

### **A consultation on a licence exempt approach for Fixed Wireless Systems in the 60GHz band**

BAE Systems Advanced Technology Centre provides research and development, consultancy, specialist manufacturing and technology brokering services into defence, aerospace and commercial markets - the latter including Intelligent Transport Systems. BAE Systems ATC is delighted to respond to the Ofcom consultation on the release of the 59-64GHz Band

With 400 scientists and engineers, the Advanced Technology Centre works in collaboration and partnership with academia and innovative organisations identifying, pulling through and integrating technologies and capabilities to deliver discriminating solutions to its customers.

For several years, BAE Systems ATC has been developing technologies, systems and international standards in the 60GHz band in collaboration with a variety of commercial, automotive and government stakeholders. Applications include HD Wireless Broadcasting<sup>1</sup>, Intelligent Transport Systems (ITS), low power exempt 60GHz devices, etc.

Of particular relevance to this consultation is the need to ensure that 60GHz technology development and deployment is fostered, but in a manner that follows key European and International recommendations, and that fully supports harmonised use in bands where critical applications overlap, such as 63-64GHz. We would point out that ITS in the 63-64GHz sub-band is far more than a theoretical prospect and is promoted by European Union high level policy under the i2010 initiative and the CVIS project. This follows earlier UK developments and demonstrations such as the Foresight Vehicle projects MILTRANS<sup>2</sup> and SLIMSENS<sup>3</sup> which have had UK Government support. In addition to hardware development, bodies including the ITU, ETSI and ISO are all active in establishing a standardised framework that facilitates harmonised ITS use which is inherently a roaming cross-border application. As such, we believe that, unless amended, Ofcom's current licence-exempt proposal poses serious risks of regulatory and harmonisation failure.

We would also highlight that Ofcom is in default of European Decision ECC/DEC/(09)01 to make the sub-band 63-64GHz available for ITS use by 31-Aug-2009. That Decision refers to a set of reports and recommendations (to which Ofcom has actively contributed) that support not only ITS use, but has clear consequences for how other applications, particularly Fixed Wireless, should be regulated in the 63-64GHz sub-band to achieve compatibility. Ignoring these creates a clear risk of causing harmful interference to ITS, whose concept includes safety-critical elements that aim to improve road traffic efficiency and to reduce accident fatality rates.

We would be pleased to provide any additional information on request or to participate in any future discussions, both with Ofcom or any other stakeholder who has an interest in this topic.

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<sup>1</sup> <http://www.ofcom.org.uk/consult/condocs/spectrum2012/responses/bae.pdf>

<sup>2</sup> Millimetric Transceivers for Transport Applications

<sup>3</sup> Short and Long Range Integrated Multifunction and Communication Sensors

## Release of the 59-64GHz Band:

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#### Questions & Answers

##### **Question-1a:** *Do you agree...*

- a. *With the proposal shown in figure 1 to combine the existing 57 – 59 GHz band with the new 59 – 64 GHz band for Fixed Wireless Systems? – see also question 3*

##### **Answer-1a:**

We generally support making the 57-59GHz band available so it may be utilised in conjunction with parts of 59-64GHz as this will support 60GHz Fixed Wireless and other related 60GHz technology developments. Many of these will be facilitated by advances in low cost SiGe semiconductor technologies which themselves are facilitated by volume manufacture for applications such as ITS and WirelessHD/PANs etc. (the latter being low-power exempt devices that we are both comfortable with and welcome under a separate regulatory regime).

In addition, it can be considered that 57-59GHz provides substitute spectrum should FWS vendors/operators be unable successfully to implement the required European Recommendations to share in the 63-64GHz sub-band which has been designated well beforehand by the European Union for ITS.

##### **Question-1b:** *Do you agree...*

- b. *that the CEPT channel plan given in ECC/REC/(09)01 should not be mandated with the exception of two 100 MHz guard bands at the band ends to protect adjacent users? and that a flexible band structure is appropriate for facilitating access to the 57 – 64 GHz band?*

##### **Answer-1b:**

The CEPT Channel plan in ECC/REC/(09)01 already recognises that channel flexibility may be preferred and permits aggregation of 50MHz slots up to a bandwidth of 2500MHz. We favour full flexibility in the lower 57-63GHz range, but highlight that any regulation/exemption must account for the regulatory/technical measures outlined by **ECC Decision (09)01** (March 2009, which refers to ECC Report 113) that apply in the 63-64GHz band where harmful interference to ITS from FWS has been shown to be a distinct possibility unless (specified) mitigation action for FWS use is employed.

Furthermore, it is important that Ofcom's UK national regulations do not inadvertently make an uncoordinated regime available which may then result in breaches of European harmonisation, particularly if that national regime is an exempt one, where loss of control inevitably occurs once exempted.

##### **Question 2:** *Do you agree that a maximum EIRP limit of 55dBm together with a maximum transmitter output power limit of 10dBm are the minimum technical conditions required to allow flexible use of this band by FWS while maintaining adequate protection of other services?*

##### **Answer-2:**

**NO** – European work expressly included a recommendation of a minimum antenna gain of 30dBi in ECC REC(09)01 and Report 113 so that interference/coexistence studies could assume directional FWS beams/links that were not aimed downwards at highways.

Whilst operation close to the central 60GHz Oxygen attenuation peak provides some mitigation, at the upper edge of the band under consideration this has fallen. Whilst affecting long range frequency re-use distances, Oxygen attenuation offers little protection in itself for many short-range ITS communication scenarios. Furthermore, the numbers and density of ITS users who would be victims is potentially far higher than FWS links.

Therefore, in line with European decisions, we request that a minimum antenna gain of 30dBi is specified for FWS, at least in the 63-64GHz sub-band as per Annex-1 of ECC/REC(09)01, so as to minimise the probability of harmful interference from overlapping coverage, along with guidance on FWS mounting height and beam elevation angle to minimise aiming at highways.

**Question 3:** Do you agree with a licence exempt approach for the 60 GHz band?

**Answer-3:**

**ESPECIALLY NOT IN 63-64GHz, particularly with the present proposal.**

For Fixed Wireless Systems that may use 63-64GHz, ECC Report 113 explicitly states that there is a likelihood of harmful interference and that Light Licensing or other forms of coordination have to be considered as part of the regulatory package if FWS is co-frequency with ITS. The EU and CEPT consider ITS to be higher priority and with more numerous applications, and one that is intended to have far greater societal benefits (as fostered by UK Government Dept and EU initiatives).

There is also one other important factor to consider:-

Further to paragraphs 1.6 and 4.7-4.10 in the consultation document referring to fixed military radiolocation use, we would highlight that the 60GHz band is also subject to current developments for vehicle-related military communications that may involve the whole 59-64 GHz band and geographical areas both within and outside of the three proposed exclusion zones. We would welcome discussions with Ofcom in this particular regard and its potential effect on the required coordination and regulations for FWS.

We also note that Ofcom's Impact Assessment dismisses Light Licensing as burdensome, in the logic for justifying an exempt approach. Whilst this is fine for low power devices such as those recently exempted (eg for indoor WirelessHD etc), the systems and circumstances here are different. In fact, industry and Ofcom already have a satisfactory working light licensing system for 71/76-81/86GHz links. That scheme could be easily extended if new FWS needed to use the 63-64GHz sub-band, or were sited adjacent to areas/highways with military use.

We would further highlight that Ofcom were major contributors to the Impact Assessment which forms Annex-2 of CEPT Report 20 (21-Dec-2007) wherein it states in Section-4:-

*“...potential costs include delays resulting from agreement and implementation of harmonisation measures. The costs that incumbent users incur in order to vacate spectrum to accommodate ITS are also relevant. At 5.9 GHz the compatibility studies have shown the ability to coexist, at 63 GHz, where there is already a European allocation and there are currently no other users (although applicants), so it is important that any new users sharing the bandwidth do so in a way that does not threaten the life and injury saving capabilities of ITS systems.”*

Finally, we would highlight that the benefits of ITS in vehicles are based on free movement and seamless border crossing in all parts of Europe, which supports a strong requirement for European harmonised spectrum.

Therefore, it would be logical for Ofcom to suspend any final decision on FWS until it has fully considered all the factors present in the band, including 63-64GHz where we request bringing forward the UK Implementation of ECC Decision ECC/DEC(09)01 on ITS. This was due for implementation by 31 Aug 2009, and is needed to complete the overall 60GHz regulatory environment in a coordinated manner.

**See overleaf for additional information/references.**

## Additional Information from ECC Report 113

ECC Report 113, which considers a variety of compatibility studies, explicitly states in its Executive Summary table for co-frequency ITS and FWS systems that:-

### **ITS as Victim:**

MGWS-WPAN/WLAN equipment: indoor no problem, outdoor not compatible noting that **compatibility may be achieved if CPE implement mitigation techniques such as Detect And Avoid.**

MGWS-FLANE vs. ITS-RSU: **measures may need to be implemented to reduce the separation distances (e.g. light licensing or co-ordination).**

In other words Report 113 does not consider indeterminate exemption to be practical for the 63-64GHz sub-band.

## References

- 1) ECC REC(09)01: Jan 2009 - Use of the 57-64GHz Band for Point-to-Point Fixed Wireless Systems
- 2) ECC DEC(09)01: 13 Mar 2009 - Harmonised Use of the 63-64GHz Band for Intelligent Transport Systems
- 3) ECC Report 113: May 2009 - Compatibility Studies around 63 GHz between ITS and Other Systems
- 4) CEPT Report 20: Report from CEPT to EC on harmonised spectrum for safety critical applications of ITS

## ITS Developments, Projects & Standards

### **UK (Supported by DfT Highways Agency, DTI and Academic / Industry Partners):-**

- BAE Systems: [http://www.baesystems.com/ProductsServices/ss\\_tes\\_atc\\_shortrange\\_comms.html](http://www.baesystems.com/ProductsServices/ss_tes_atc_shortrange_comms.html)
- MILTRANS: [http://www.foresightvehicle.org.uk/dispproj1.asp?wg\\_id=1113](http://www.foresightvehicle.org.uk/dispproj1.asp?wg_id=1113)
- SLIMSENS: [http://www.foresightvehicle.org.uk/dispproj1.asp?wg\\_id=1144](http://www.foresightvehicle.org.uk/dispproj1.asp?wg_id=1144) (integration of ITS with Automotive Radar)

### **European**

CVIS: <http://www.cvisproject.org/> - Cooperative Vehicle Infrastructure Systems

### **International Standards**

- ETSI ITS: <http://www.etsi.org/WebSite/technologies/IntelligentTransportSystems.aspx>
- ETSI Technical Report TR 102 400: ERM;SRD;ITS;RTTT; Technical Characteristics for Communications Equipment in the frequency band from 63 to 64GHz; System Reference Document"
- ISO-21216-1: CALM (Communications Access for Land Mobiles) – CALM using millimetre communications. Part 1. Air interface.

## MILTRANS ITS Proving Trials:- (facilitated by Ofcom T&D licensing)

BAE SYSTEMS

### Test track: Inter-vehicle communications



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### Test track: Vehicle-to-roadside communications



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### MILTRANS – Results summary

- Demonstration of 2-way real-time video exchange between moving vehicles
- Range up to 170m (reduced to 140m in fog)
- Dynamic range > 44dB
- Vehicle closing speeds up to at least 210 kph
- Coverage to +/- 75° within road width
- No significant multipath problems seen
- BPSK and QPSK modulation
- Data rates in demo to 18 Mb/s (per channel) (higher is possible)
- At least three nodes in a bi-directional data network
- Applications demonstrated include streaming video, store-and-forward and positional information