Doc. CPG-PTA(15)106

CEPT ECC
Electronic Communications Committee

CPG15 PT-A 8

Catania, Sicily 21st – 24th July 2015

Date issued:	**07 July 2015**
Source:	**EMEA Satellite Operators Association (ESOA)**
Subject:	Satellite operator views on proposal for a future WRC agenda item on IMT above 6 GHz on satellite services

Group membership required to read? (Y/N) N

Summary:

This document is submitted on behalf of the European Satellite Operators Association (ESOA) on a proposal made to CPG PTA on the “Future WRC Agenda item - IMT above 6 GHz”.

Consideration of IMT use above 6 GHz is premature at this time because the IMT spectrum needs are highly overestimated and there has been no studies introduced that demonstrate that IMT could share on a non-interference basis with critical incumbent services operating above 6 GHz. While we recognise that IMT is an important element in modern communications networks, its role must be considered in context. In this regard, the available data does not support considering IMT in any potential future WRC agenda items.

Proposal:

The call by the IMT community for consideration of the use of spectrum above 6 GHz for terrestrial mobile services is highly premature at this point in time. While it may be technically feasible to demonstrate certain theoretical mobile services capabilities in any frequency band without prior consideration of demand and business model, actual considerations on future additional or alternative spectrum allocations require in-depth prior analysis thereof. No operator or consumer demand justifying significant additional spectrum for terrestrial IMT above 6 GHz has been demonstrated to date. Indeed, it is relevant to note that the allocated IMT spectrum below 6 GHz has still not been fully utilized yet, and may not even be in full use by 2020 or even later.

It must be emphasized that IMT systems are a subset of the larger class of mobile broadband systems – not all mobile broadband systems meet the IMT requirements – and therefore the criteria for determining technical feasibility for IMT is more extensive than that for mobile broadband systems generically (under the purview of WP 5A). Is it possible to utilize the IMT radio interfaces to achieve the objectives of IMT in bands above 6 GHz? The current IMT radio interfaces (in bands below 6 GHz) have been extensively evaluated and shown to achieve these IMT objectives and requirements for IMT. To which extent can these IMT radio interfaces be implemented in bands above 6 GHz? Would such implementations continue to meet the overall objectives for the future development of IMT? In that context, any evaluation of the technical feasibility of IMT in bands above 6 GHz should address the level of mobility that can be supported e.g. pedestrian speed, vehicular speeds, etc.

Therefore PTA is invited to encourage exploring the technical feasibility of technologies above 6 GHz to

meet the requirements of International Mobile Telecommunications (IMT) outside the WRC preparatory cycle, given that the technology has yet to be proven as being able to potentially qualify the evolving requirements of IMT. It would be premature to support any WRC Agenda Item proposing IMT use above 6 GHz at this time.

Any new agenda item for a future WRC related to allocations / identification for future IMT systems shall be based on proper evidence and analysis after the full technical and operational aspects of future IMT characteristics are defined.

- In any case, we urge PTA to consider only bands above 31.0 GHz for future IMT terrestrial use and not to consider future bands which are allocated on a primary or co-primary basis to satellite services by the ITU. The higher bands above 31 GHz will provide wider bandwidths and increased isolation between co-existing terrestrial radio systems, in turn enabling a substantial increase in the overall system capacity. Those higher bands are also less congested, which will facilitate potential future deployments.

Background:

The growth of IMT services has raised questions about whether more spectrum is necessary to meet the projected usage of IMT in the future. Unfortunately, projected IMT usage and spectrum demand are often significantly overstated [e.g. ref 1]. These projections have in some cases overestimated IMT usage and spectrum demand by at least two orders of magnitude (a factor of 100 or more) [e.g. ref 2]. Such errors typically arise from unrealistic assumptions for both the density of users in heavily populated areas and the data traffic consumed by those users [ref 3].

With respect to the density component, one major source of error is the user densities assumed in future urban areas. For instance, ITU Report M.2290 assumed user densities in excess of 100,000 users per square kilometre, with some entries higher than 200,000 users per square kilometre. These estimates are far greater than even the highest estimates of population densities for real world cities, which even in the most urban areas rarely exceed 30,000 inhabitants per square kilometre. Mumbai, often identified as having the greatest population density in the world, has fewer than 30,000 people per square kilometre, Seoul has fewer than 20,000, and Manhattan has fewer than 3,000 [ref 4].

Major concentrations of people for specific events, such as sports competitions, parades, and political rallies, will be limited to discrete times and locations, likely also with sparsely-populated areas nearby due to parking lots and other structures. These events are thus much better addressed through temporary and tailored capacity measures such as deployables.

Another source of error that results in inflated estimates of future IMT spectrum needs is unrealistic assumptions about the amount of traffic consumed by each user. The total bandwidth projected to be required by IMT users is dramatically impacted by the unrealistic assumptions about the use of super-high-volume data services such as streaming high definition video. Although such bandwidth-intensive data services are likely to be widely used by 2020, the growth in such services is likely to be primarily on Wi-Fi-connected devices rather than on IMT networks due to the user preference for offloading to less expensive, more reliable Wi-Fi connections. Further, the actual spectrum requirements for super-high-speed data services are expected to diminish as improved data compression technologies and other spectrum-efficiency techniques are developed. In addition, although many individuals in such high density situations may be streaming high definition video programming, not most of them. Countless others will use less data-intensive services such as making voice calls, texting, or viewing email.

Another factor that significantly reduces the projected spectrum usage of IMT services is the many spectrum and network efficiencies that reduce the need for substantial additional allocations for terrestrial mobile services. For example, mobile network operators can greatly increase the capacity of their networks through the additional spectrum re-use that results from reducing the spacing between base stations; such in-fill is a common response to increased populating densities by infrastructure providers of all kinds. Mobile network operators can also gain dramatic efficiency improvements by using indoor access points to offload traffic from outside base stations. Similarly, offloading traffic to unlicensed or licensed-exempt Wi-Fi networks is already ubiquitous today. For reasons of cost, speed, and reliability, consumers are naturally attracted to the economics of using Wi-Fi, where possible, rather than cellular mobile networks as their

access mechanisms. As noted above, data compression technologies also remain a significant factor in managing actual mobile spectrum requirements. Even though all of these capacity-enhancing measures are widely employed today, failing to consider these factors may lead policy makers to dramatically overestimate the need for IMT spectrum.

Based on these factors, the actual need for additional spectrum to support terrestrial mobile services is far lower than has been predicted by the wireless industry and reported within the ITU.

Moreover, Res 233 (WRC-12) asked to take into account the use of bands currently identified for IMT and the possibility of optimizing the use of these bands with a view to increasing spectrum efficiency. However, as of today there is no available information at ITU on current spectrum usage. Before considering a new agenda item for the identification of additional spectrum to IMT in WRC-19, an exhaustive study on current spectrum usage and the possibility of optimizing the use of IMT is needed. The frequency bands above 6 GHz and below 31 GHz are currently well used by a large number of services, including satellite communication systems, mostly operating in the C-band, X-band, Ku- and Ka-band frequencies. Satellite networks are designed to share spectrum efficiently with multiple other spectrum users, but to date there are no technical studies that demonstrate that IMT can share with these services. For example, C-band satellite networks have long operated on a shared basis with fixed point-to-point microwave networks on a coordinated basis. Satellite networks also share with each other; for example nearly all of the approximately 180 C-band satellites in operation today use much of the same spectrum, employing precise orbital spacing and directional antennas to avoid interference into each other. Same arrangement is also valid for other frequency bands such as X-band, Ku- and Ka-band. IMT services fundamentally break these carefully calibrated sharing assumptions and thus are not compatible with the existing intensive use of spectrum above 6 GHz.

Many satellite system operators around the world currently operate / plan to operate global or regional satellite services using C, X, Ku and Ka-band frequencies. These satellite networks do and will provide valuable services in many regions around the world and are also enablers for terrestrial operators. For example, Arabsat, Avanti, EchoStar, Eshailsat, Eutelsat, Gascom, Hispasat, Inmarsat, Intelsat, Nilesat, Nigcomsat, O3b, RSCC, SES, Telenor, Telesat, Thaicom, Turksat, Viasat, Yahsat, and the governments of Brazil, Australia, and France currently operate or plan to operate satellite systems within the C-band 6000-7075 MHz frequencies, Ku-band 12.75-13.25 / 13.75-14.50 / 17.30-18.10 / 10.70-12.75 GHz frequencies and Ka-band 24.65-25.25 / 17.3-17.8 / 21.4-22 GHz and 27.0 – 30.0 / 17.7 – 20.2 GHz frequencies .

CEPT has already reached an agreement and issued Decisions ERC/DEC/(00)07 and ECC/DEC/(05)01 on a frequency plan and use of the Ka band for the deployment of satellite and terrestrial fixed services within the CEPT. Such CEPT ECC instruments provide certainty to the satellite industry on the availability for spectrum in Europe. Regulatory certainty in access to satellite spectrum is necessary for operators to continue to make the investments required to meet user demands for high-throughput satellite services.

Additionally, satellite communications are often used as a basis for other broadband access technologies and billions of investment Euros have already been spent on the satellite networks. If the frequencies supporting these systems were to be placed within the scope of any new WRC agenda item, that act alone would create uncertainty for FSS operators, their customers, and their investors. FSS systems usually take 20 years from initial planning and funding, through end of life, and during this period regulatory certainty is required. Such regulatory certainty would be undermined by any proposal to accommodate terrestrial IMT above 6 GHz.

There remains significant uncertainty about whether IMT even requires such additional spectrum and at the same time significant risk that IMT will disrupt critical incumbent services already using that spectrum.

We recommend that until there are well-supported studies projecting realistic spectrum usage for future IMT operations, and clearly-established radio interfaces/mature IMT systems characteristics in bands above 6 GHz that can be used in sharing studies to assess compatibility, there cannot be an agenda item to modify the table of allocations. If and when such reliable data is available, any consideration on candidate frequency bands for IMT terrestrial should be limited in scope to frequency bands above 31.0 GHz and outside the frequency bands allocated by the ITU on a primary or co-primary basis to satellite services.

Conclusion

In summary additional spectrum for IMT should not be at the expense of other radio services that are an integral part of the global broadband infrastructure. It has been recognized globally that satellites are indeed a key component of the global broadband network, and many countries rely on satellites to provide ubiquitous broadband access to their citizens. Considering that there are no ITU approved IMT terrestrial radio interfaces for bands above 6 GHz and in fact many of the frequency bands currently identified for IMT terrestrial below 3 GHz are not used or not used efficiently, we recommend that until there are vetted IMT radio interfaces and specific/mature/widely accepted IMT systems characteristics in bands above 6 GHz that can be used in sharing studies to assess compatibility, there cannot be an agenda item to modify the table of allocations.

If there is properly validated requirement for additional spectrum for terrestrial IMT above 6 GHz, and the technical feasibility for such IMT systems is mature and has been fully vetted and demonstrated, any consideration on candidate frequency bands for IMT terrestrial should be limited in scope to frequency bands above 31.0 GHz and outside the frequency bands allocated by the ITU on a primary or co-primary basis to satellite services.

This is because more opportunities exist in higher mmWave frequencies (above 31.0 GHz) than in lower sub-mmWave bands (between 6 – 31.0 GHz). This is due to the significantly increased isolation between co-existing terrestrial radio systems that follows from the propagation properties in the mmWave bands. This is also reflected in the EU METIS studies [ref 5], where the assessment focused on finding wide bands of contiguous spectrum (1 GHz and above). Such bands are difficult to find in lower frequencies due to current regulation and usage.

References

Overestimating Wireless Demand: Policy and Investment Implications of Upward Bias in Mobile Data Forecasts, A. Mehta and A. Musey (2014) (available at http://ssrn.com/abstract=2418364)

ITU Report titled “Future spectrum requirements estimate for terrestrial IMT” (M.2290) (available at http://www.itu.int/pub/R-REP-M.2290-2014).

The Worlds Most Densely Populated Cities, The Weather Channel Online (2014) (available at http://www.weather.com/health/worlds-most-densely-populated-cities-20140225).

METIS_D5.3_V1, SECTION 2.5 (DOCUMENT NUMBER: ICT-317669-METIS/D5.3, DATED 29-AUGUST-2014) HTTPS://WWW.METIS2020.COM/WP-CONTENT/UPLOADS/DELIVERABLES/METIS_D5.3_V1.PDF