Outcomes of WRC-15. By Dr Ali Ebadi (January / February 2016)

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The World Radio communication Conference 2015 (WRC-15) concluded on 27 November 2015 with the signing of the Final Acts that revised the Radio Regulations, the international treaty governing the use of radio frequency (RF) spectrum and satellite orbits. WRC-15 addressed more than 30 agenda items related to frequency allocation and frequency sharing for the efficient use of spectrum and orbital resources, covering a wide range of radio communications services, including mobile broadband, satellite delivery, TV broadcasting, scientific services and emergency services.

Growing demand for spectrum for mobile broadband services and FSS C-band protection

The satellite industry welcomes the fact that the 3600-4200MHz band remains exclusively allocated to fixed satellite services (FSS) worldwide well into the next decade, through a "No Change" decision in the band worldwide, except for a handful of countries in Region 2 that have identified International Mobile Telecommunications (IMT) allocation through a footnote in the 3600-3700MHz band.

While ITU Region 1 (Europe, the Middle East and Africa (EMEA)) have opted to allocate the 3400-3600MHz band to mobile services, sharing co-primary status with the FSS, the Asia-Pacific region (Region 3) managed to withhold the band from regional allocation to mobile services.

WRC-15 also allocated the L-band spectrum in the 1427-1518MHz band in Regions 2 and 3, and some countries in Region 1, subject to ITU-R studies to determine the regulatory and technical measures to ensure compatibility of IMT and broadcasting satellite service (sound) operations in the frequency band 1452-1492 MHz, and also compatibility with the mobile-satellite service operations in the adjacent band (1518-1559MHz).

To address the growing demand for spectrum, the IMT group is greeted with a new agenda item for WRC-19 to identify high-frequency bands above 24GHz for IMT/5G services. The studies relating to more than 30GHz of spectrum definitely provides a major stepping stone for IMT services towards a new wave of mobile innovation into the next decade.

And, in favour of the satellite industry, WRC-15 decided that the C-, Ku- and Ka-bands currently allocated to the fixed satellite service (FSS), mobile-satellite service and broadcast-satellite service should not be considered in the studies.

Spectrum imbalance in the Ku-band

In order to address the spectrum imbalance in the Ku-band spectrum, WRC-15 allocated 250MHz of downlink spectrum in the 13.4-13.65GHz band in Region 1. In the uplink direction, some countries identified in the new resolution were allocated 250MHz (Regions 1

and 2) and 300MHz (Region 3) of spectrum in the 14.5-14.8GHz band, subject to constraints such as minimum antenna diameter, maximum power level and that the location of earth stations should be at least 500km from the border(s) of other countries.

Earth stations in motion (ESIM)

WRC-15 clarified the regulatory ambiguity in the earlier footnote with respect to the scope of application of “Earth Stations in Motion” (ESIM) in part of the Ka-band satellite spectrum (19.7-20.2GHz and 29.5-30GHz), and adopted new regulations to facilitate the global roaming of such terminals while protecting other services and treatment of interference.

In addition, WRC-15 approved an agenda for the next WRC cycle, to study the technical and operational characteristics for ESIM that operate or plan to operate within geostationary FSS allocations in the frequency bands 17.7-19.7GHz and 27.5-29.5GHz, while studying the sharing and compatibility between ESIM with geostationary FSS networks and current and planned stations of existing services allocated in these frequency bands.

Global flight tracking for civil aviation

The ITU responded in record time — within a year — to the reflections of the global community regarding global flight tracking, in response to ITU Resolution in regard to the disappearance and strategic loss of Malaysian Flight 370 in March 2014. Typically, ITU would take four years to carry out the necessary studies for a new allocation to be considered at WRC.

The approval of spectrum allocation in the 1087.7-1092.3MHz band to aeronautical mobile-satellite service (Earth-to-space) for reception by space stations of Automatic Dependent Surveillance-Broadcast (ADS-B) emissions from aircraft transmitters will facilitate reporting the position of aircraft equipped with ADS-B anywhere in the world.

While ITU-R has to come up with technical and regulatory procedures, the International Civil Aviation Organization (ICAO) will address the performance criteria for satellite reception of ADS-B signals according to established standards and recommended practices (SARP).

Unmanned aircraft systems

WRC-15 paved the way for worldwide capacity provided by existing and planned satellite systems to be accessible for unmanned aircraft (UA) command and non-payload communication (CNPC) applications in non-segregated airspace. This is through a new resolution that invites ICAO to develop the worldwide standards for unmanned aircraft systems (UAS), and to identify the regulatory conditions that may be applied to such systems internationally.

Other issues

WRC-15 also addressed regulatory provisions in the existing Radio Regulations on issues such as bringing into use (BIU), satellite hopping, reduction of coordination arc, satellite failure, suspension of satellite networks, excessive filings and launch failure. Decisions and outcomes of WRC-15 were constructive, neither complex nor relating to undesired consequences.

On the issue of satellite hopping, administrations should voluntarily provide information on previous location of the satellite as well as frequency assignment and suspension date.

As of 1 January 2018, the ITU shall cancel frequency assignments to the satellite network if no information is provided. Based on information given, future WRCs will decide on the issue of satellite hopping.

Paving the way for future conferences

WRC-15 concluded by outlining the works of future conferences and the need to recognise the future growth of the satellite industry. WRC-15 adopted agenda items to study spectrum needs and possible allocation to FSS in the 51.4-52.4GHz band for WRC-19, and in the 37.5-39.5GHz band for WRC-23.

WRC-15 also adopted a resolution to study technical and operational issues and regulatory provisions for new non-GSO systems in the 3700-4200MHz, 4500-4800MHz, 5925-6425MHz and 6725-7025MHz frequency bands allocated to the FSS to protect the geostationary FSS networks.

Considering the need to encourage the development and implementation of new technologies in the FSS at frequencies above 30GHz, WRC-15 approved a study on technical and operational issues, and regulatory provisions for non-GSO FSS satellite systems in the 37.5-39.5GHz (space-to-Earth), 39.5-42.5GHz (space-to-Earth), and 47.2-50.2GHz and 50.4-51.4GHz (Earth-to-space) frequency bands.

The next conference will discuss possible additional allocations to mobile services, including IMT, on a primary basis in portion(s) of the frequency range between 24.25Hz and 86GHz for the future development of IMT for 2020 and beyond.

Sharing and compatibility studies will include bands which are already allocated to the mobile service on a primary basis and the bands 31.8-33.4GHz, 40.5-42.5GHz and 47-47.2GHz, for possible additional allocations to the mobile service on a primary basis.

The approval of the agenda to study the technical and operational characteristics for ESIM that operate within geostationary FSS frequency bands requires the satellite industry to continue its caution to the next conference to ensure that the FSS is sufficiently protected and no undue constraints are placed on existing and future FSS services.

WRC-15 also noted that there is a need for greater broadband connectivity and telecom services in underserved communities and in rural and remote areas, and that high-altitude platform station (HAPS) is one of the possible means for providing fixed broadband connectivity that would enable wireless broadband deployment in remote areas.

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