

WRC-15: Outcomes & Lessons learned



Presented by
SES

Presented on
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About SES

- ▲ Owns and operates one of the world's largest commercial satellite fleets
 - Over 50 satellites covering 99% of the globe
- ▲ Partner of choice serving over 700 broadcasters, telcos, enterprises, governments in over 130 countries
 - Technical reach of 317 million households in 2015
 - Over 7,400 TV channels, generating over 1 Zettabyte of broadcast video annually
 - Largest HD channel line up (over 2,400 channels) in Q2' 16
 - Annually exchanging 57 Gbps of data traffic with the Internet, delivering around 22 TB of data to global Internet POPs
- ▲ Combining the strengths of geostationary orbit (GEO) wide beam, high throughput beam and medium earth orbit (MEO) capabilities
- ▲ Over 1,970 employees in 21 locations worldwide
- ▲ 2015 contract backlog: EUR 7.4 Billion



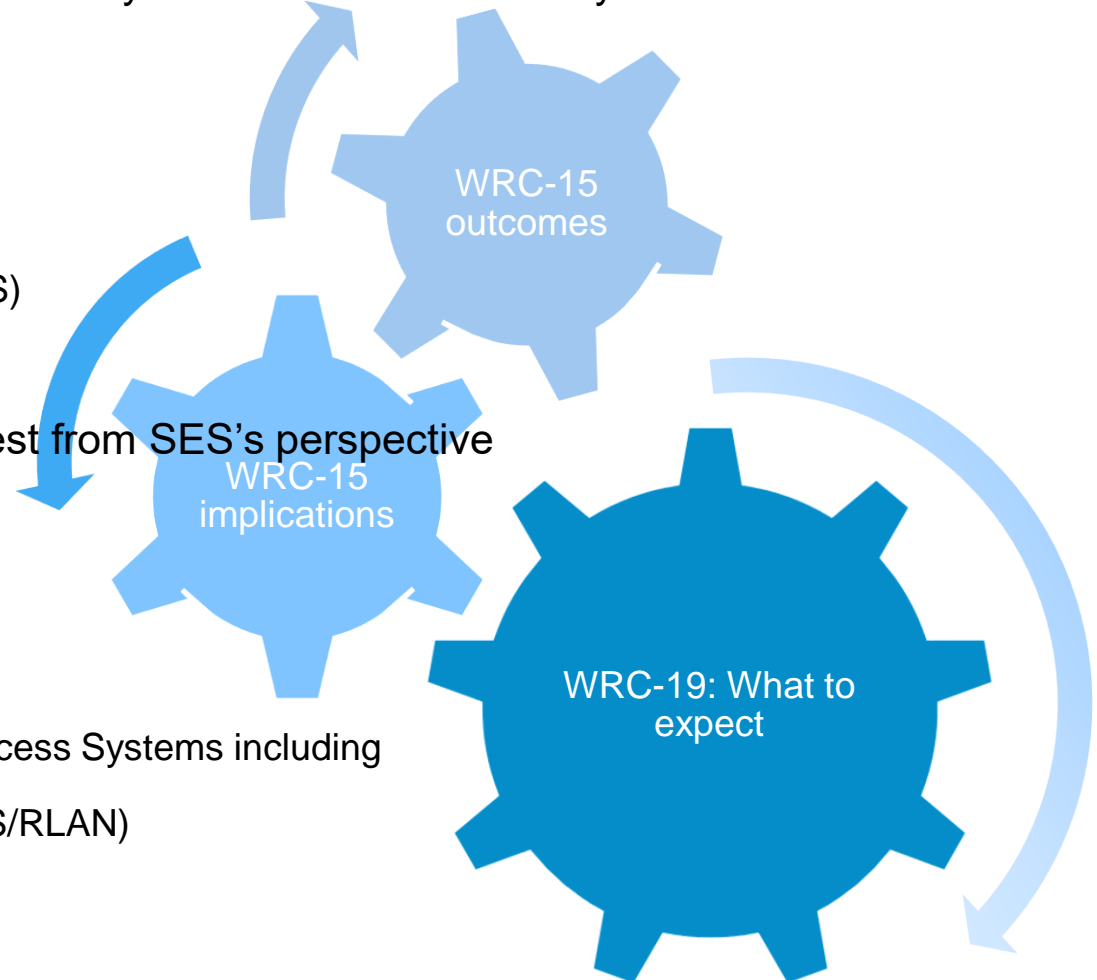
Overview of Presentation

▲ WRC-15: key outcomes and takeaways for the satellite industry

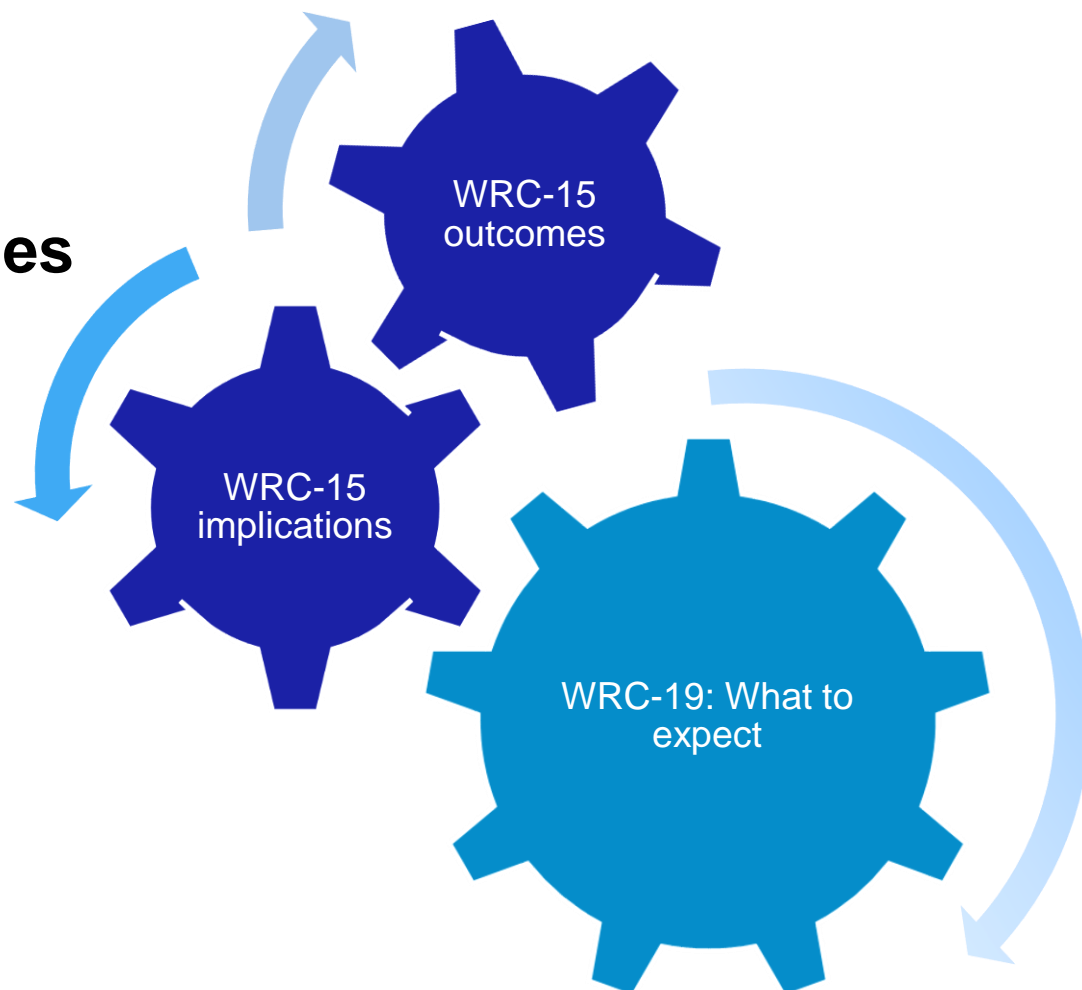
- C-band
- Additional Ku-band Spectrum
- Satellite Regulatory Procedures
- Unmanned Aircraft Systems (UAS)

▲ WRC-19 Agenda items of interest from SES's perspective

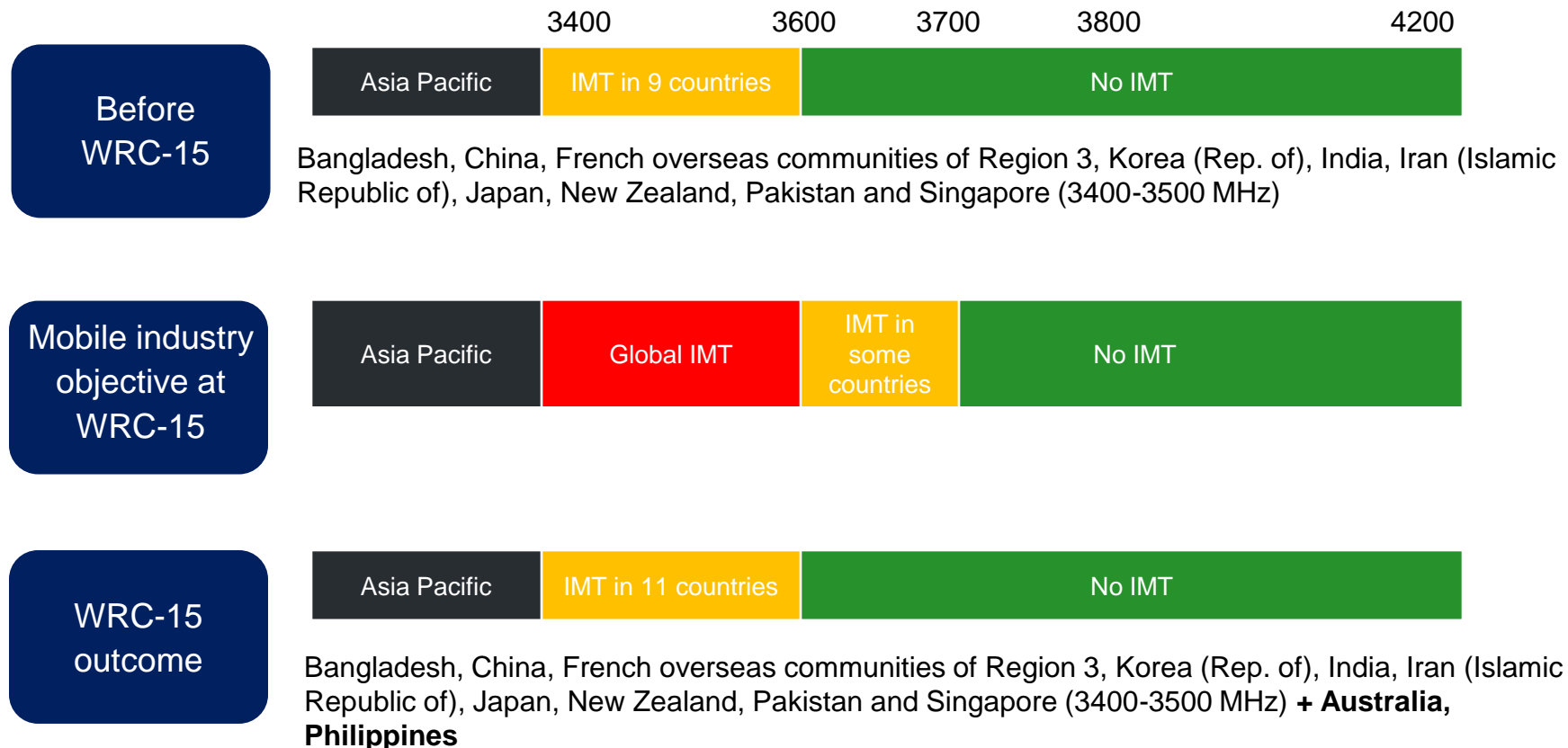
- NGSO in C band
- Satellite Regulatory Procedures
- Frequency bands for IMT
- Frequency bands for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN)



WRC-15: key outcomes and takeaways



C band – WRC-15 decision



Expansion of IMT was contained in this region and all portions of the C band despite the strong push of the mobile industry

C band – Lessons learned and next steps

▲ Lessons learned

- The Asia Pacific, African, and South American regions are key in the defense of C-band
- Studies at the ITU demonstrated the incompatibility of satellite and terrestrial mobile - key elements in defending satellite spectrum

▲ Next steps

- Continue monitoring national/regional developments in pro-mobile countries in the bands 3600-3700 MHz (USA, Canada, Australia) and 3600-3800 MHz (Europe) which could have an impact on this region

Additional Ku-band spectrum – WRC-15 decision

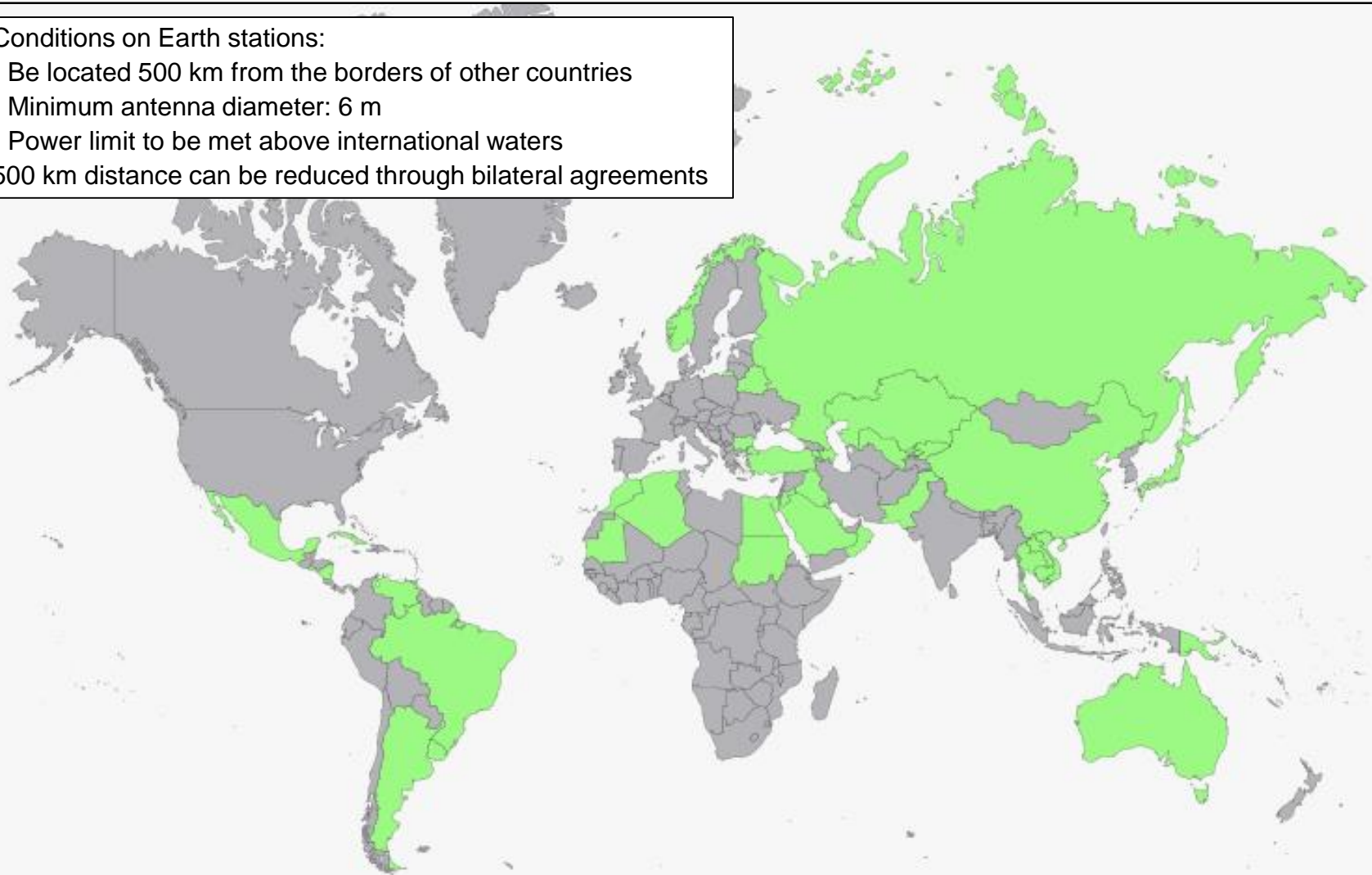
- ▲ Issue: to identify additional satellite Ku-band spectrum in the uplink for all Regions and in the downlink for Region 1
 - 250/300 MHz in uplink in Region 2/Region 3 in order to balance the amount of spectrum available in uplink with the amount of spectrum available in downlink in those regions
 - 250 MHz in uplink and downlink Region 1 in order to balance the amount of spectrum available in this Region compared to the other Regions
 - Uplink band to be identified should preferably be the same in all regions
- ▲ After three weeks of extremely difficult discussions, WRC-15 decided in the last days of the Conference to allow the use of the band 14.5-14.8 GHz by non-planned FSS in 39 countries (including Asia Pacific) with certain conditions to be met by Earth stations
- ▲ The map in the following slide shows the countries where Earth stations can be deployed
- ▲ Benefit for satellite community
 - Additional uplink spectrum in Regions 2/3 will reduce complexity when designing new spacecraft
 - Additional spectrum in Region 1 will provide opportunities to develop DTH services and HTS systems

Countries where FSS Earth stations can be deployed in the frequency band 14.5-14.8 GHz

Conditions on Earth stations:

- Be located 500 km from the borders of other countries
- Minimum antenna diameter: 6 m
- Power limit to be met above international waters

500 km distance can be reduced through bilateral agreements



Additional Ku-band spectrum – Lessons learned and next steps

▲ Lessons learnt

- Accommodate concerns of opponents, have a holistic view in resolving issue

▲ Next steps

- Develop an ITU recommendation providing guidance to regulators for implementing the new frequency band and reducing the 500 km distance through discussions with neighbouring countries
- Work with regulators to implement the new frequency in their national regulation
- Include the new band in new satellite projects

300 MHz of Ku non-planned FSS uplink spectrum are available in 9 countries in APAC for new satellite and gateway projects

Satellite regulatory procedures – Satellite Hopping (1)

- ▲ Issue of restricting “Satellite hopping” had a lot of attention during the study cycle
- ▲ deals with the use of one space station to bring frequency assignments to geostationary-satellite networks at different orbital locations into use within a short period of time.
- ▲ WRC-15 eventually adopted Resolution 40 (WRC-15) which:
 - requests that each time they use a satellite to bring into use frequencies, ITU member states shall provide the orbital position and the ITU filing reference of the last orbital position brought into use with the satellite
 - only applies to the last three years preceding the bringing into use
 - applies to two orbital positions brought into use by two different administrations with the same satellite and even if the frequencies were different
 - makes the provision of information mandatory for any bringing into use performed after 1 January 2018
 - enters into force on 1 January 2017

Satellite regulatory procedures – Satellite Hopping (2)

- ▲ Implementation of decisions of the WRC-15 relating to this issue, the following information is mandatory as of 01.01.2018



RESOLUTION 40 (WRC-15)

Use of one space station to bring frequency assignments to geostationary-satellite networks at different orbital locations into use within a short period of time

Satellite network for which frequency assignments have been brought into use, or brought back into use after suspension:

	AP4 items	
Identity of the Satellite Network	A.1.a	
Notifying Administration	A.1.f.1	
Nominal Orbital Position	A.4.a.1	
Date of bringing into use (Or bringing back into use after suspension)	A.2.a	

The bringing into use, or bringing back into use after suspension has been accomplished with a space station that has previously been used to bring into use, or resume the use of, frequency assignments at a different orbital location within the three years prior to the date of submission of this information:

	YES	NO
	<input type="radio"/>	<input type="radio"/>
a) Last orbital location where the space station was used to bring into use, or resume the use of, frequency assignments		/
b) Satellite network(s) with which the frequency assignments in a) above were associated		/
c) The date on which the space station was no longer maintained at the orbital location in a) above		/

Form to be sent by the Administration to brmail@itu.int.

Satellite regulatory procedures – Improvement of non-planned filing procedure

- ▲ Issue relates to the development of new automatic generation of Advance Publication Information (API) mechanism. The 6 month commenting period between API and CR/C was suppressed as there is limited information in the API publication to comment upon.

- ▲ Upon receipt of the CR/C submission, the BR will create a snapshot summary of the submission and immediately publish the information on the website. This would allow administrations to know the orbital locations for which CR/C publications have been submitted. BR allows an administration to retract their CR/C submission within 15 days without any penalty.

- ▲ The new API procedure will come into effect on 01.01.2017

- ▲ Implementation of decisions of the WRC-15 relating to this issue:
 - Resolution 31 (WRC-15) was developed to address the transitional measures needed for the API submitted under the current API procedure.
 - APIs will not be accepted by the BR as of 01.07.2016, and any API for which CR/C has not been submitted up to 31.12.2016 will be suppressed.

Use of satellite for command and control of UAV (1)

- ▲ WRC-12 considered the use of unplanned FSS bands for the control and non-payload communications (CNPC) of Unmanned Aircraft systems (UAS) in civil airspaces
 - International Civil Aviation Organization (ICAO) has overall responsibility for all civil aviation matters to include establishment of standards and practices (SARPs) for UAS operations, and is expected to develop such SARPs in the coming years
 - Role of WRC-15 was to establish a regulatory framework for use of FSS
- ▲ WRC-15 adopted Resolution 155 (WRC-15) providing a regulatory framework for the use of standard Ku and Ka-band FSS capacity for CNPC links
 - Earth stations of UAS shall not cause more interference or claim more protection from other satellite networks /terrestrial services
 - To ensure safety of flight operations of UAS, frequency assignments used have to be successfully coordinated and notified with favourable finding
- ▲ Implementation will only be possible when the relevant ICAO standards have been developed. ICAO is to provide updates on the progress of development of SARPs for UAS CNCP links during WRC-19
- ▲ WRC-23 will review this Resolution and take necessary action as appropriate

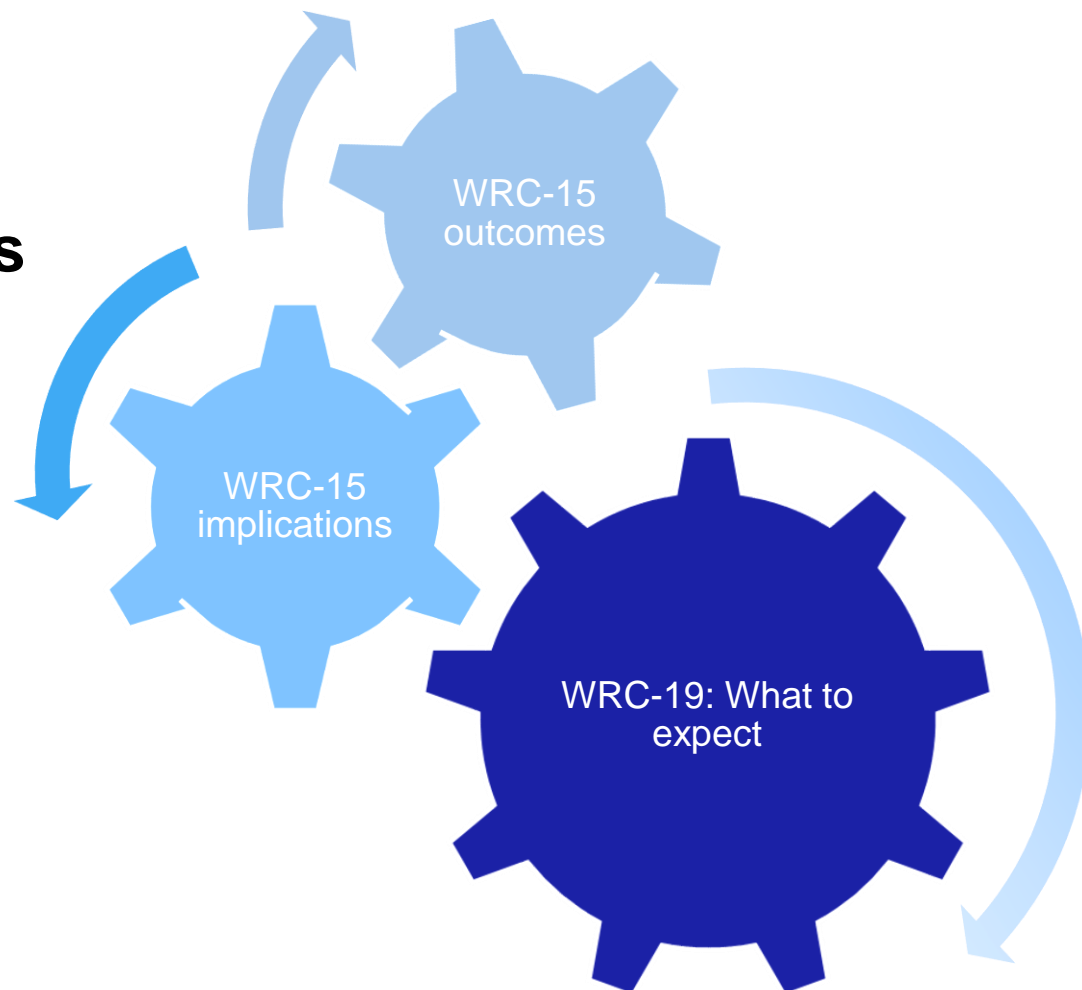
Use of satellite for command and control of UAV (2)

- ▲ Implementation of decisions of the WRC-15 relating to this issue:
 - New class of station for earth stations providing unmanned aircraft system control and non-payload communication (UAS CNPC) links “UG”
 - Submission of satellite network filings with UG will be shown on a web based platform
 - Studies in relation to technical, operational and regulatory aspects to be performed in relation to implementation of Resolution 155 (WRC-15). Active participation from administrations and ITU-R Sector members welcomed



ITU framework for use of FSS Ku and Ka band capacity for UAV CNPC links was agreed but will have to be reviewed when ICAO standards have been developed

WRC-19 Agenda Items of interest



WRC-19 agenda items (1)

▲ Agenda Item 9.1.3: NGSO in C band

- Resolution 157 (WRC-15) calls to study technical and operational issues and regulatory provisions for these NGSO systems
- Studies include revising pfd limit in Article 21, Table 21-4 for NGSO FSS satellites in the band 3700-4200 MHz, the epfd limits in Article 22 for NGSO systems in the bands 5925-6425 MHz/3700-4200 MHz and developing epfd limits in 6725-7025 MHz/4500-4800 MHz in Article 22
- while ensuring that GSO networks are protected from unacceptable interference pursuant to No. 22.2 and existing protection criteria

▲ Agenda Item 7: Satellite regulatory issues

- To further clarify and establish predictable regulations, aiming for improved efficiency of satellite procedures
- More issues will be introduced at later stage, current ones include the bringing into use (BIU) of frequency assignments of NGSO systems

▲ Agenda Item 1.16: Identification of frequency bands for WAS/RLAN (WIFI) in 5 GHz range

- Resolution 239 (WRC-15) calls out for detailed sharing and compatibility studies, including mitigation techniques, between WAS/RLAN and incumbent services in the 5 GHz range including the band 5 850-5 925 MHz, while not imposing any additional constraints on the existing services

WRC-19 agenda items (2)

- ▲ Agenda Item 1.6: Regulatory framework for non-GSO FSS satellite systems in V band
- Resolution 159 (WRC-15) invites ITU-R to conduct technical/regulatory studies for the operation of NGSO FSS while:
 - ensuring protection of GSO satellite networks in the FSS, MSS and BSS
 - not limiting/unduly constraining future GSO networks
 - not modifying the provisions of Article 21
 - Develop equivalent power flux-density limits for NGSO FSS towards GSO or into any geostationary FSS earth station
 - Develop sharing conditions between NGSO FSS
- Spur the development of FSS systems based on the use of new technologies above 30 GHz and associated with both GSO and NGSO satellite constellations to provide high-capacity and low-cost means of communication even to the most isolated regions
- FSS bands of 37.5-42.5 GHz (s-to-E) and 47.2-48.9 GHz (limited to feeder links only), 48.9-50.2 GHz and 50.4-51.4 GHz (all E-to-s) could be studied for the use of NGSO FSS

WRC-19 agenda items (3)

▲ Agenda Item 1.13: Identification of frequency bands for IMT/5G

- Mobile industry seeking to identify a broad range of additional spectrum for terrestrial 5G services
- Candidate bands: 24.65-25.25, 27.0-27.5, 37.5-40.5, 42.5-43.5, 47.2-50.2, 50.4-51.4, 71.0-76.0, and 81.0-86.0 GHz

▲ Relevant ITU meetings

- As indicated in Resolution 238 (WRC-15), WP 5D is responsible for conducting and completing studies with regards to spectrum needs & technical and operational characteristics (including protection criteria, and deployment scenarios) for the terrestrial component of IMT
- WP 5D has to report the results of these studies to Task Group 5/1 (TG 5/1) by 31 March 2017, which is responsible to conduct the sharing and compatibility studies
- WP4A has to provide FSS parameters and protection criteria to TG5/1 by 31 December 2016

▲ Impact on the satellite community

- Identification of satellite frequencies for IMT in 2019 would make those frequencies unusable in the countries deciding to deploy mobile networks, impacting existing and future satellite operations

FSS bands in parts of Ka band and V band have to be protected against the identification for IMT/5G

Terima Kasih
Thank you

