Satellite Orbit & Spectrum Resources for Future Innovation

WRC-15 OUTCOME
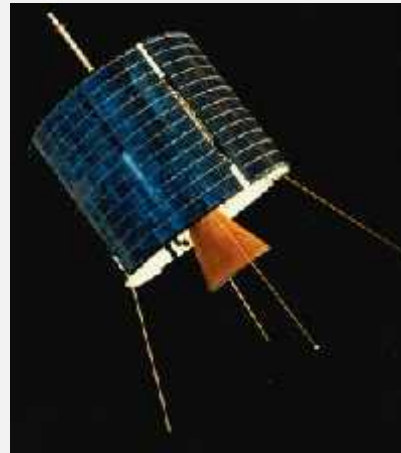
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150 years
1865 International Telegraph Union

25 years
1990 Hubble Space Telescope was deployed

2015

50 years
1965 1st commercial communications satellite in GSO, Intelsat 1

WRC-15

ITU Secretary General, Houlin Zhao

World Radiocommunication Conference

Review or revise international treaty on radio-frequency spectrum and orbits

1. Harmonize global spectrum to create economies of scale, roaming and interoperability

3. Creating certainty requires consensus: time, efforts and patience

PURPOSE

2. Create regulatory certainty for a multi-trillion dollars industry playing an increasingly important role in the development of our societies

Space Industry in 2015

$ 335.3 billion
(IDR 4,430,000,000,000,000)

Source: SSIR 2016 Tauri Group

Global Impact and Usage

Satellite Radio

Corporate networks

Maritime communication

Earth Observation

National Security & Defense

E-learning

Agriculture

Cellular Backhaul

Telemedicine

Aviation Security

SNG

VSAT

Internet

Disaster Relief

Global Flight Tracking

DTH

Satnav

The Sustainable Development Goals

The Sustainable Development Goals

- In 2015, the United Nations adopted 17 Sustainable Development Goals (SDGs) as part of the Agenda 2030 to achieve a better future for all.

- These goals apply to all countries, whether developing or developed.

- Radiocommunications, including satellites have a key supporting role in achieving each and everyone of these 17 SDGs.

Consensus took 500 meetings
692 hours or "86.5 working days"

WRC-15 in numbers

2 - 27 Nov 2015 in Geneva
3275 participants
162 Member states
40 topics
678 documents with 2888 proposals
Final Acts www.itu.int/pub/R-ACT-WRC.12-2015

WRC-15 OUTCOME TOPICS

- Mobile broadband
- FSS allocation
- FSS applications
- Regulations
- Maritime-mobile satellite & science services
- Future agenda items

Everybody in favor of spectrum harmonization but
Everybody wants his own way

3400-3700 MHz
WRC-07: Use it or loose it!
3400-3600 MHz: Lost
3600-3700 MHz
WRC-15: Use it or loose it
WRC-??: Lost??
3700-3800 MHz ??

MOBILE BROADBAND
VS
SATELLITES

Allocations to mobile service and/or identifications for IMT in 3400-3700 MHz and 470-694/698, 694 – 790 (R 1),1427-1518, 3300-3400, 4800 – 4990 MHz

Subject to conditions to secure protection of incumbent services e.g. non-interference basis, pfd limits, 9.21

Better balance between up/downlink & between Regions

Space-to-Earth
13.4-13.65 GHz in R1
Earth-to-space
14.5-14.75 GHz in R1 and R2 (30 countries)
14.5-14.8 GHz in R3 (9 countries)

NEW FSS ALLOCATION

4 Keys to make it work:
1. Commitments (E/S 500 km from boarder, PFD at 0-19000m)
2. Limitations Uplink (E/S (6 m) PFD toward GSO) and Downlink (PFD)
3. SRS upgrade
4. Coordination No. 9.7 (±6 deg, DT/T), Ap30A#7.1, No. 9.21

2015 NOV 28 ↔ 2017 JAN 1

Entry into force

Unmanned Aircraft Systems (UAS)

8 bands , Ku band: 970 MHz globally, 1520 MHz regionally, Ka band: 1000 MHz globally;
To be used only after development of ICAO aeronautical standards & recommended practices (SARPs);
...commercial used after 2023!!!

FSS APPLICATIONS

Earth stations located on board vessels (ESVs)
FSS in
5 925-6 425 MHz
and 14-14.5 GHz
smaller (1.2m)
antenna

Earth Stations in Motion (ESIM)
GSO FSS space stations in 19.7-20.2, 29.5-30.0 GHz in all Regions

- Modern communication (Res 907)
- Electronic submission of satellite filings (Res 908)
- Auto-generate API from CR, SUP 6 months

MODs to REGULATIONS

- Reduction of coordination arc in C & Ku-bands
- MOD to No. 13.6 to include reason for BR' query
- Clarification of BIU under Nos. 11.44/11.44B using No. 13.6

Inform BR of suspension within 6 months, else 3-year suspension period reduced (MOD No. 11.49)

BR to publish DBIU & Suspension on web (MOD Nos. 11.44B & 11.49)

MODs to REGULATIONS

hop

hop

hop

Use of one space station to BIU satellite networks at different orbital positions, Adm to provide details of previous BIU; BR to publish on web (Res. 40)

<u>No comment within 4m = no agreement</u>

Comments on Special Sections published under §4.1.5 of Ap30/30A R1 § 3

For submissions published from 01.01.2017 (§4.1.10)

MODs to REGULATIONS

<u>Conversion from analogue to digital</u>

WRC-15 adopted Res 556 (WRC-15)

Conversion to digital assignments in Ap30/30A R1, 3 & List

To be implemented in BR IFIC 2836 of 10 January 2017

MMSS in 7375-7750 MHz :
Additional BW for downlink data transmissions of next-gen satellites in MMSS

Removal of 5 km communication distance limitation for Extra Vehicular Activities in 410-420MHz :
Facilitation rendezvous and docking maneuvers

MARITIME-MOBILE SATELLITE & SCIENCE SERVICES

Earth Exploration-Satellite Service (EESS) for TT&C in 7 190-7250 MHz
Simplification of on-board architecture & operational concepts for future missions of EESS

EESS (active) in 9200-9300, 9900-10000MHz, 10.-10.4GHz
Modern broadband sensing technologies & space-borne radars on active sensing EESS

Reference time scale :
current implementation of UTC to insert leap seconds to continue until WRC-23!

... and also

WRC 2019

Global Flight Tracking (GFT)
improves aircraft tracking through utilization of an existing technology; especially important for polar, oceanic, remote areas ; ARNS allocation in 1087.7-1092.3 MHz for satellite reception ADS-B messages

Future broadband
Wireless access system (5 GHz), pico-femto-cells (24.25-86 GHz) IMT, HAPS, global NGSO FSS (>30 GHz) , identification in 275-450 GHz for land-mobile and fixed services

ESIM
Communicating with GSO FSS in 17.7-19.7 & 27.5-29.5 GHz

Safety of life
development of Global Aeronautical and Maritime distress and safety systems (GADSS and GDMSS)

WRC 2019

Earth resources & Climate monitoring, Weather forecast,

Intelligent Transport System and unmanned transport M2M for maritime, railway, road transport

Stations on board sub-orbital vehicles

MERCI

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