

Update to World Radiocommunication Conference 2019 and WRC-23 items of interest

Fred Mistichelli
NESDIS Spectrum Manager
Rich Kelley
Alion Science for NESDIS

INTERNATIONAL TOVS STUDY CONFERENCE
30 Oct – 6 Nov 2019



This talk

- **Covers WRC- 19 agenda items of concern in passive bands**
- **Discusses WRC-23**

Satellites and agencies possibly affected by WRC-19 decisions

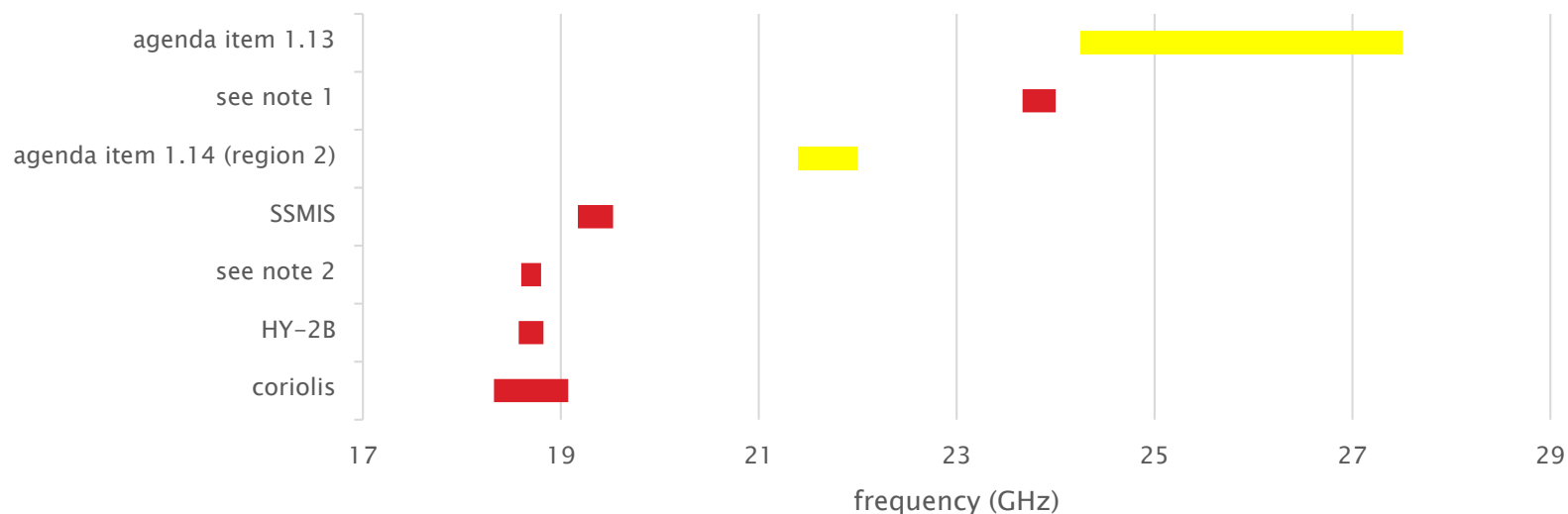
satellite	agency	satellite	agency
Aqua	NASA	HY-2B	NSOAS
Coriolis	DoD	Jason-2	ESA
DMSP	DoD	Jason-3	ESA
EPS-SG-A1	EUMETSAT	Jason-CS	ESA
EPS-SG-A2	EUMETSAT	JPSS-2	NOAA
EPS-SG-A3	EUMETSAT	JPSS-3	NOAA
EPS-SG-A3	EUMETSAT	JPSS-4	NOAA
EPS-SG-B1	EUMETSAT	Megha-Tropiques	ISRO
EPS-SG-B2	EUMETSAT	Meteor-M N2	RosHydroMet
EPS-SG-B3	EUMETSAT	Meteor-M N2-2	RosHydroMet
FY-3B	CMA	Meteor-M N2-3	RosHydroMet
FY-3C	CMA	Meteor-M N2-4	RosHydroMet
FY-3D	CMA	Meteor-M N2-5	RosHydroMet
FY-3E	CMA	Meteor-MP N2	RosHydroMet
FY-3F	CMA	Metop-A	EUMETSAT
FY-3G	CMA	Metop-B	EUMETSAT
FY-3H	CMA	Metop-C	EUMETSAT
FY-3RM-1	CMA	NOAA-15	NOAA
FY-3RM-2	CMA	NOAA-18	NOAA
GCOM-W	JAXA	NOAA-19	NOAA
GPM Core Observatory	NASA	NOAA-20	NOAA
HY-2A	NSOAS	SNPP	NOAA

WRC 19 agenda items of interest

Agenda item	spectrum addressed
1.5	17.7–19.7 GHz (space-to-Earth) and 27.5–29.5 GHz (Earth-to-space)
1.6	37.5–39.5 GHz (space-to-Earth), 39.5–42.5 GHz (space-to-Earth), 47.2–50.2 GHz (Earth-to-space) and 50.4–51.4 GHz (Earth-to-space)
1.7	spectrum requirements for telemetry, tracking and command in the space operation service for the growing number of non-GSO satellites with short duration missions (small satellites/microsats/picosats)
1.13	24.25–27.5 GHz (data downlink for JPSS/MetOp) 31.8–33.4 GHz 37–40.5 GHz 47.2–50.2 GHz (passive use only) 50.4–52.6 GHz (passive use only) 81–86 GHz
1.14	regulatory actions for high-altitude platform stations (HAPS), within existing fixed-service allocations
Issue 9.1.9	51.4–52.4 GHz

n.b. The WMO position paper on WRC 19 agenda items are at <https://www.itu.int/md/R16-WRC19-C-0034/en> <https://www.itu.int/md/R16-WRC19-C-0106/en>.

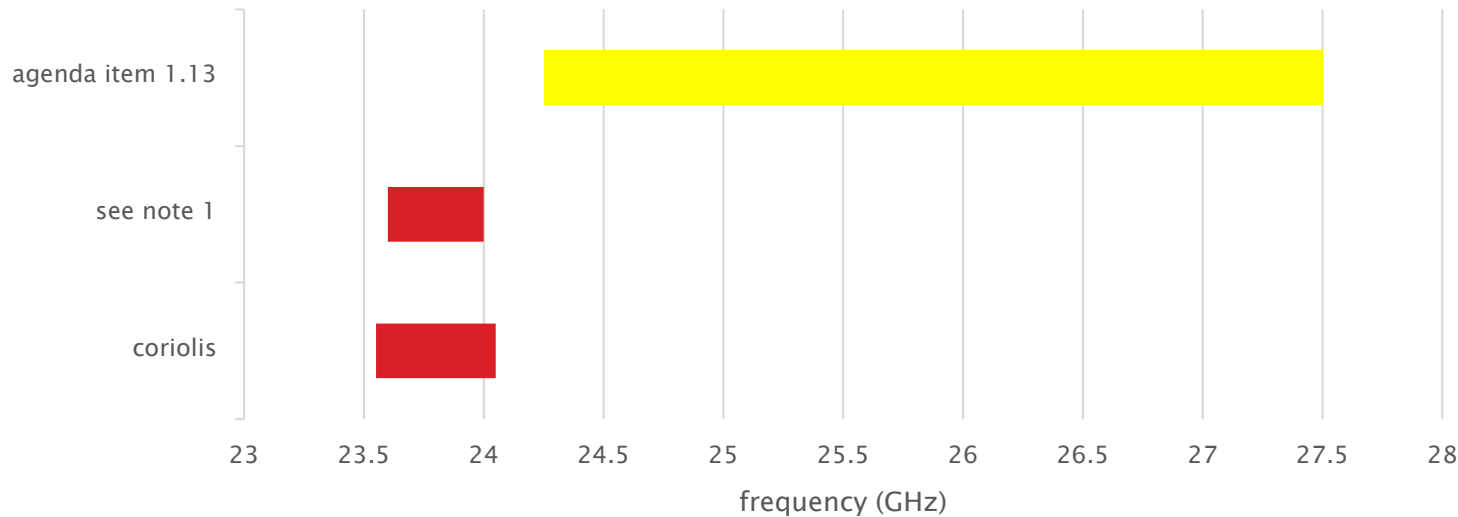
Spectrum use 17.425 - 23.935 GHz



Note 1: FY-3B, FY-3C, GCOM-W, GPM Core Observatory, JASON-2, Megha-Tropiques, Meteor-M N2, JASON-3, FY-3D, HY-2B, Meteor-M N2-2, SWOT, FY-3RM-1, Meteor-M N2-3, FY-3F, Meteor-M N2-4, FY-3G, JASON-CS-A, Meteor-M N2-5, FY-3RM-2, Meteor-MP N1, EPS-SG-B1, Meteor-MP N2, JASON-CS-B, EPS-SG-B2, EPS-SG-B3, , Aqua, Coriolis, FY-3B, FY-3C, GCOM-W, GPM Core Observatory, HY-2A, JASON-2, Megha-Tropiques, Meteor-M N2, NOAA-15, NOAA-18, NOAA-19, SARAL, SNPP, JASON-3, Metop-A, FY-3D, HY-2B, Meteor-M N2-2, Metop-B, NOAA-20, SWOT, FY-3RM-1, Meteor-M N2-3, Metop-C, FY-3F, Meteor-M N2-4, FY-3G, JASON-CS-A, Meteor-M N2-5, FY-3RM-2, Meteor-MP N1, EPS-SG-A1, JPSS-2, EPS-SG-B1, Meteor-MP N2, JASON-CS-B, JPSS-3, EPS-SG-A2, EPS-SG-B2, JPSS-4, EPS-SG-A3, EPS-SG-B3

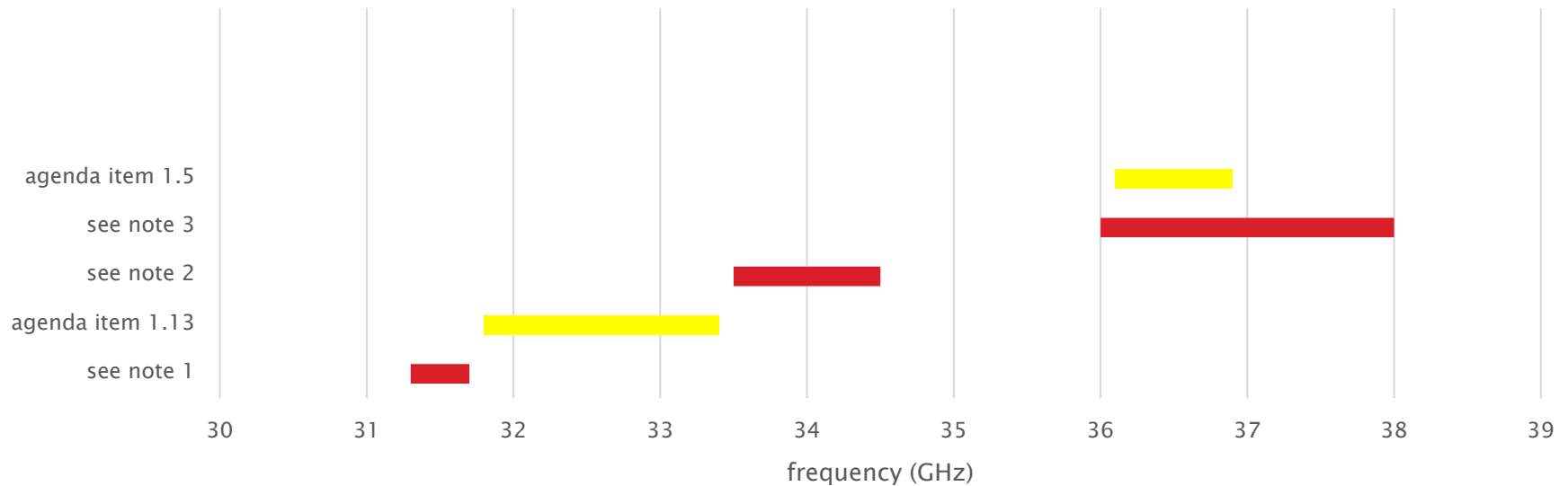
Note 2: FY-3B, FY-3C, GCOM-W, GPM Core Observatory, JASON-2, Megha-Tropiques, Meteor-M N2, JASON-3, FY-3D, HY-2B, Meteor-M N2-2, SWOT, FY-3RM-1, Meteor-M N2-3, FY-3F, Meteor-M N2-4, FY-3G, JASON-CS-A, Meteor-M N2-5, FY-3RM-2, Meteor-MP N1, EPS-SG-B1, Meteor-MP N2, JASON-CS-B, EPS-SG-B2, EPS-SG-B3

Spectrum use 23 – 28 GHz



Note 1: FY-3B, FY-3C, GCOM-W, GPM Core Observatory, HY-2A, Megha-Tropiques, Meteor-M N2, FY-3D, HY-2B, Meteor-M N2-2, FY-3RM-1, Meteor-M N2-3, FY-3F, Meteor-M N2-4, FY-3G, Meteor-M N2-5, FY-3RM-2, Meteor-MP N1, EPS-SG-B2, EPS-SG-B3

Spectrum use 30 – 39 GHz

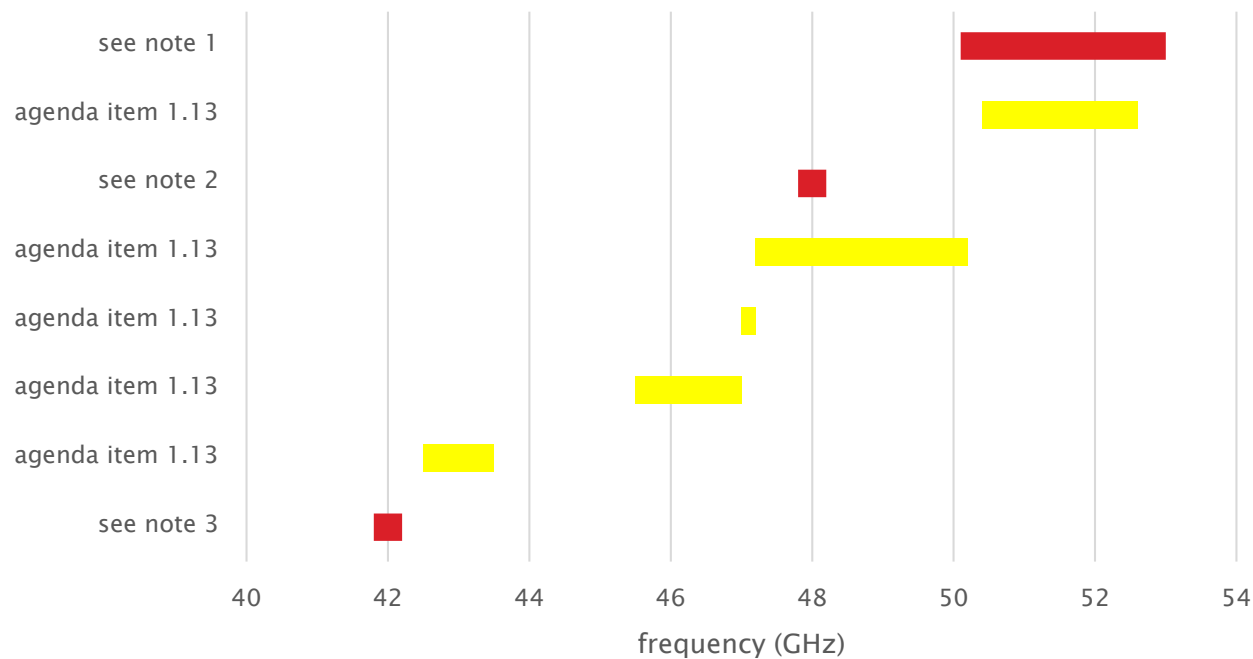


Note 1: Aqua, NOAA-15, NOAA-18, NOAA-19, SNPP, Metop-A, Metop-B, NOAA-20, Metop-C, EPS-SG-A1, JPSS-2, EPS-SG-B1, JPSS-3, EPS-SG-A2, EPS-SG-B2, JPSS-4, EPS-SG-A3, EPS-SG-B3, Meteor-M N2, Meteor-M N2-2, Meteor-M N2-3, Meteor-M N2-4, Meteor-M N2-5, Meteor-MP N1, Meteor-MP N2

Note 2: JASON-2, JASON-3, SWOT, JASON-CS-A, JASON-CS-B

Note 3: DMSP, FY-3B, FY-3C, GCOM-W, GPM Core Observatory, Megha-Tropiques, SARAL, FY-3D, FY-3RM-1, FY-3F, FY-3G, FY-3RM-2, Meteor-M N2, Meteor-M N2-2, Meteor-M N2-3, Meteor-M N2-4, Meteor-M N2-5, Meteor-MP N1, Meteor-MP N2, Coriolis, HY-2A

Spectrum use 40 – 54 GHz



Note 1: Aqua, EPS-SG-A1, EPS-SG-A2, EPS-SG-A3, EPS-SG-B1, EPS-SG-B2, EPS-SG-B3, FY-3C, FY-3D, FY-3E, FY-3F, FY-3G, FY-3H, FY-3RM-1, FY-3RM-2, JPSS-2, JPSS-3, JPSS-4, Meteor-M N2, Meteor-M N2-2, Meteor-M N2-3, Meteor-M N2-4, Meteor-M N2-5, Meteor-MP N1, Meteor-MP N2, Metop-A, Metop-B, Metop-C, NOAA-15, NOAA-18, NOAA-19, NOAA-20, NOAA-20, SNPP

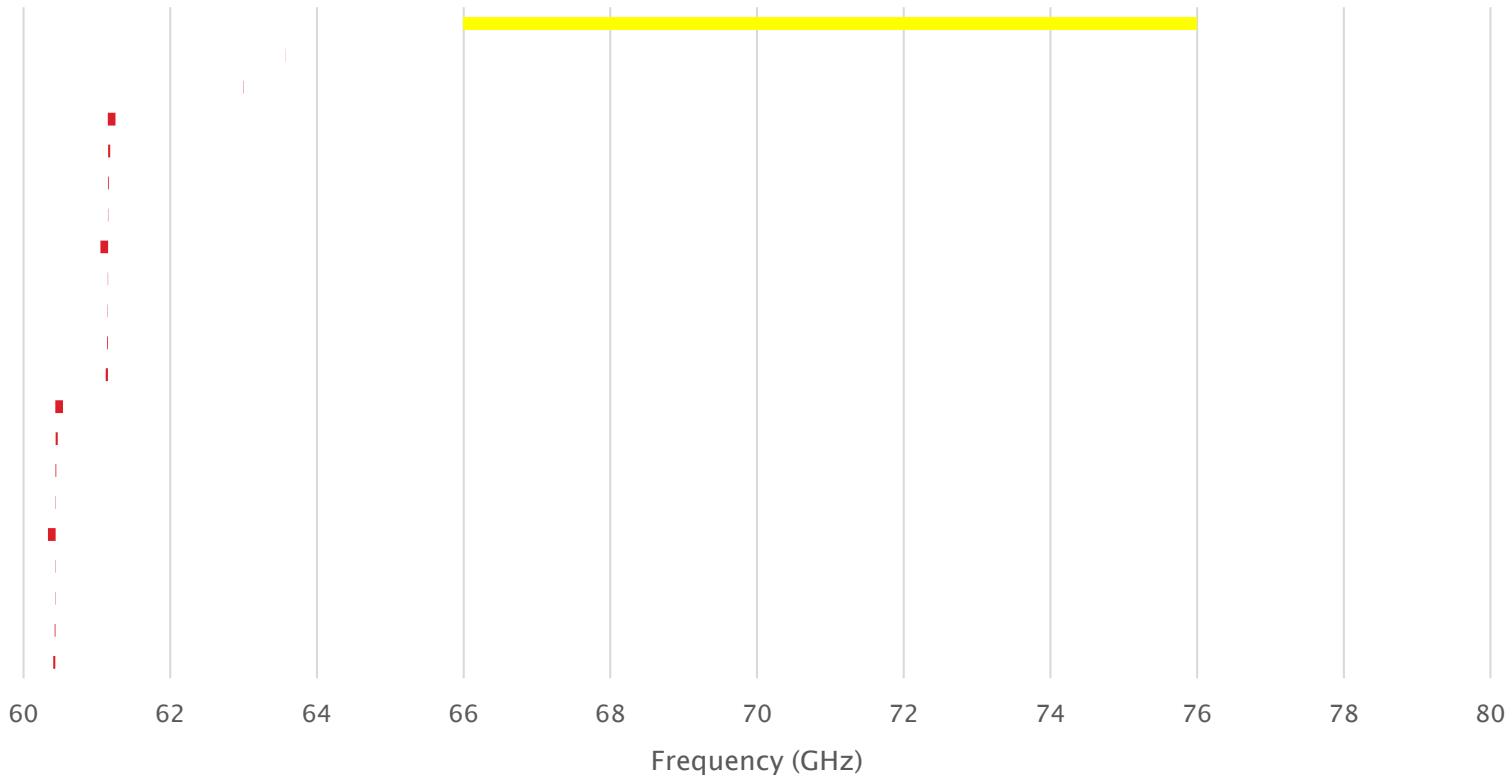
Note 2: Meteor-M N2, Meteor-M N2-2, Meteor-M N2-3, Meteor-M N2-4, Meteor-M N2-5

Note 3: Meteor-M N2, Meteor-M N2-2, Meteor-M N2-3, Meteor-M N2-4, Meteor-M N2-5

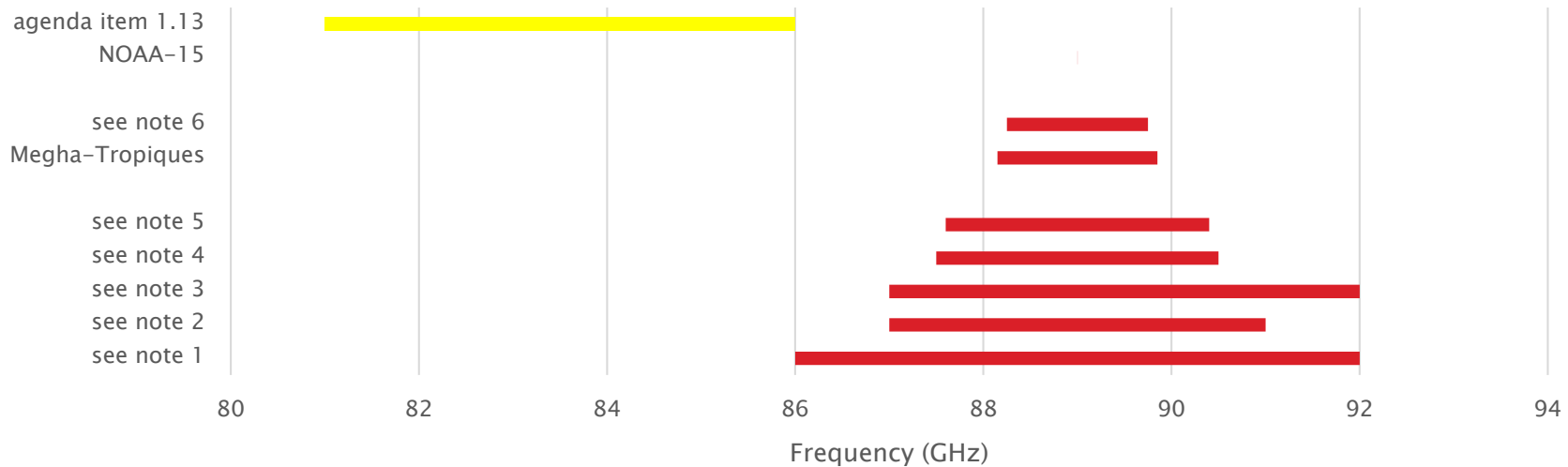
Spectrum use 60 – 80 GHz

agenda item 1.13,

- DMSP (SSMIS)
- DMSP (SSMIS)
- DMSP (SSMIS)
- DMSP (SSMIS)
- DMSP (SSMIS)
- DMSP (SSMIS)
- DMSP (SSMIS)
- DMSP (SSMIS)
- DMSP (SSMIS)
- DMSP (SSMIS)
- DMSP (SSMIS)



Spectrum use 80 – 94 GHz



Note 1: Aqua, GPM Core Observatory, NOAA-15, NOAA-18, NOAA-19, Metop-A, Metop-B, Metop-C

Note 2: EPS-SG-A1, EPS-SG-B1, EPS-SG-A2, EPS-SG-B2, EPS-SG-A3, EPS-SG-B3

Note 3: SNPP, NOAA-20, JPSS-2, JPSS-3, JPSS-4

Note 4: FY-3B, FY-3C, GCOM-W, FY-3D, FY-3RM-1, FY-3F, FY-3G, FY-3RM-2

Note 5: NOAA-18, NOAA-19, Metop-A, Metop-B, Metop-C

Note 6: FY-3C, FY-3D, FY-3E, FY-3RM-1, FY-3F, FY-3G, FY-3RM-2, FY-3H

WRC-23 agenda items

Won't be certain until after WRC-19 complete

Preliminary WRC-23 agenda items¹

- ▶ RESOLUTION 161 (WRC-15) Studies relating to spectrum needs and possible allocation of the frequency band 37.5–39.5 GHz to the fixed-satellite service
 - Nothing in band in passive service according to OSCAR on 20 Aug 19, 500 MHz away from the closest passive band at 36–37 GHz
- ▶ RESOLUTION 235 (WRC-15) Review of the spectrum use of the frequency band 470–960 MHz in Region 1
 - No concern for passive sensing
- ▶ RESOLUTION 361 (WRC-15) Consideration of regulatory provisions for modernization of the Global Maritime Distress and Safety System and related to the implementation of e-navigation
 - No frequencies yet selected
- ▶ RESOLUTION 656 (WRC-15) Possible allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders in the range of frequencies around 45 MHz
 - No concern for passive sensing
- ▶ RESOLUTION 657 (WRC-15) Spectrum needs and protection of space weather sensors
 - No concerns

¹RESOLUTION 810 (WRC-15) Preliminary agenda for the 2023 World Radiocommunication Conference

WRC-23 agenda¹

“WRC-19 decisions must ensure that satellite communications can meet the demands of the communities and customers they serve, by maintaining and expanding access to harmonized spectrum resources. This includes the Ku-band, Ka-band, Q/V-band, E-band, and the C-band in which IMT is seeking identifications at WRC-19, and in national consultations. Harmonized spectrum in these bands is critical for the provision of communication services via satellite — including the expanding mobile and broadband connectivity needs that are uniquely met by satellites.

The satellite industry will propose that the World Radiocommunication Conference in 2023 (WRC-23) consider further changes to help achieve these objectives by taking advantage of the unique and increasing advantages of satellite communications. “

¹ITU News Magazine No. 5, 2019 “Managing spectrum for evolving technologies”

Possible WRC-23 agenda item

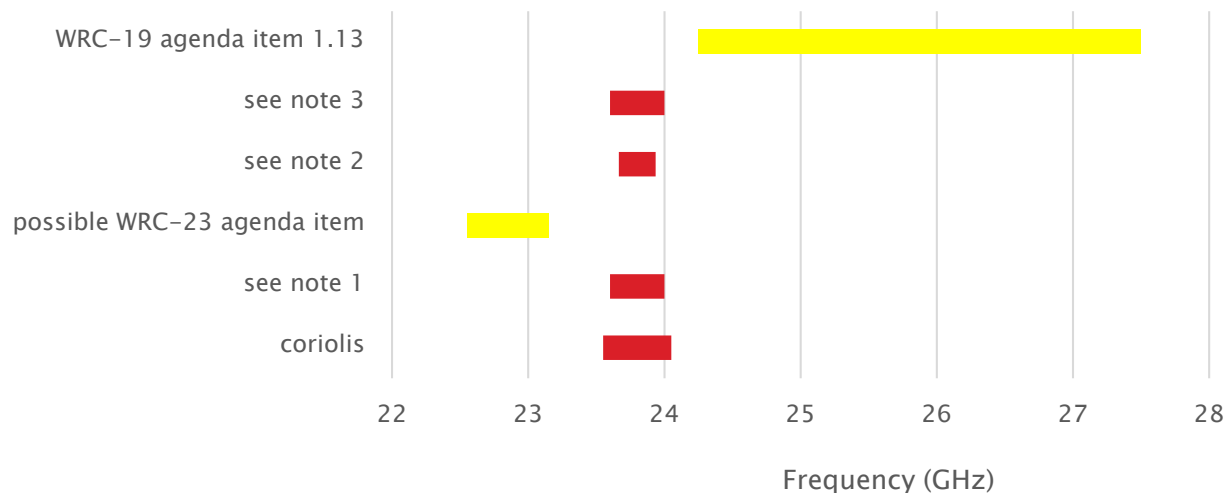
“...examine the compatibility of fixed-satellite systems with terrestrial services allocated in the so-called “E-band” between 71-76 GHz and **81-86 GHz**. Access to the E-band spectrum by fixed-satellite services would further bolster the broadband capacity delivered by satellite networks, improve connectivity speeds to end users, and position satellite services as an alternative or complementary platform to terrestrial networks for big-data applications. “¹

Several EESS passive systems use 86 – 92 GHz: Aqua , GPM Core Observatory , Metop-A , Metop-B , Metop-C , NOAA-15 , NOAA-18 , NOAA-19, Suomi NPP, NOAA-20

¹ITU News Magazine No. 5, 2019 “Managing spectrum for evolving technologies”

Possible WRC-23 agenda item (from SG7 chair)

- ▶ possible new allocation for the Earth exploration-satellite service in 22.55– 23.15 GHz



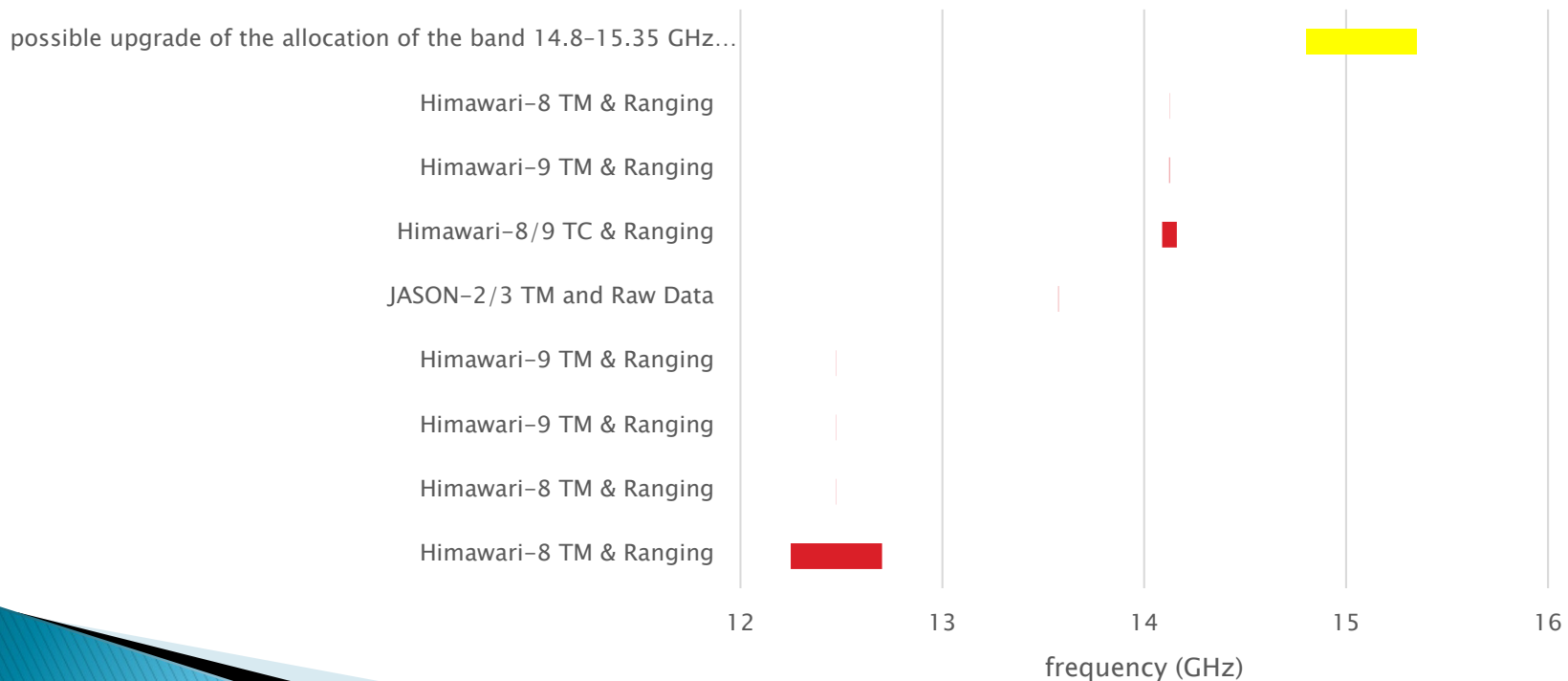
Note 1: FY-3B, FY-3C, GCOM-W, GPM Core Observatory, HY-2A, Megha-Tropiques, Meteor-M N2, FY-3D, HY-2B, Meteor-M N2-2, FY-3RM-1, Meteor-M N2-3, FY-3F, Meteor-M N2-4, FY-3G, Meteor-M N2-5, FY-3RM-2, Meteor-MP N1, EPS-SG-B1, Meteor-MP N2, EPS-SG-B2, EPS-SG-B3

Note 2: Aqua, NOAA-15, NOAA-18, NOAA-19, SNPP, Metop-A, Metop-B, NOAA-20, Metop-C, EPS-SG-A1, JPSS-2, JPSS-3, EPS-SG-A2, JPSS-4, EPS-SG-A3, FY-3RM-1, FY-3F, FY-3G, FY-3RM-2, FY-3H

Note 3: FY-3B, FY-3C, GCOM-W, GPM Core Observatory, HY-2A, Megha-Tropiques, Meteor-M N2, FY-3D, HY-2B, Meteor-M N2-2, FY-3RM-1, Meteor-M N2-3, FY-3F, Meteor-M N2-4, FY-3G, Meteor-M N2-5, FY-3RM-2, Meteor-MP N1, EPS-SG-B1, EPS-SG-B2, EPS-SG-B3

Possible WRC-23 agenda item (from SG7 chair)

- ▶ a possible upgrade of the allocation of the band 14.8–15.35 GHz to the space research service (no passive bands nearby)



Possible WRC-23 agenda items (from SG7 chair)

- ▶ consideration of possible adjustments to passive remote sensing allocations between 231.5 and 252 GHz.
 - three (3) future EUMETSAT satellites– EPS-SG-B1, EPS-SG-B2, EPS-SG-B3, planned to be operating at frequency range 240.7 – 245.7 GHz.
 - no current satellites operating in this band now.

ITU-R points of contact (7C - Passive Remote sensing)

Australia

Mr KNIGHTS Kevin
Engineering and Spectrum Manager
CSIRO
Email: kevin.knights@csiro.au

China

Mr ZHANG Jiashen
National Satellite Meteorological
Center
Email: zhangjs@cma.gov.cn

France

Mr ALLAIX Éric
National Frequency Manager
Météo France
Email: eric.allaix@meteo.fr

Germany (Federal Republic of)

Dr EWALD Ralf
Frequency Expert; Satellite
Communications
Deutsches Zentrum Für Luft- u.
Raumfahrt
Email: ralf.ewald@dlr.de

Japan

Mr ITABASHI Ryohei
Associate Administrator
Japan Aerospace Exploration
Agency (JAXA)
Email: itabashi.ryohhei@jaxa.jp

Russian Federation

Mr STEPANOV Anton
Head of Radio spectrum centre
JSC
Email: rfc@spacecorp.ru

United States of America

Mr FRANC David
Deputy Director-
International Spectrum Policy NOAA/DOC
Email: david.franc@noaa.gov

European Organisation for the Exploitation of Meteorological Satellite (EUMETSAT)

Mr DREIS Markus
EUMETSAT
Email: markus.dreis@eumetsat.int

European Space Agency (ESA)

Mr VASSALLO Enrico
European Space Agency (ESA)
Email: enrico.vassallo@esa.int

Backup material

