UNITED STATES OF AMERICA

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.11: *to consider a primary allocation for the Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range, in accordance with Resolution **650 (WRC-12)***

Background Information: Many future Earth exploration-satellite service (EESS) missions will require large uplink bandwidth to accommodate the increasing amount of data needed for spacecraft operation plans and dynamic spacecraft software modifications. The only EESS (Earth-to-space) allocation that is currently available in Article **5** for telecommanding is 2 025-2 110 MHz. This 2 025-2 110 MHz band is of fundamental importance and cannot accommodate the bandwidth that is globally required in the future on the Earth-to-space link for these telecommanding functions. There are already as many as 1135 satellite networks filed with the ITU in this band and the ITU expects many new satellite networks to enter into this band, including many nanosatellites and picosatellites. Therefore it would be extremely difficult, if not impossible, to coordinate satellites with large bandwidth requirements within the band 2 025-2 110 MHz and another band is required.

An EESS (Earth-to-space) allocation in the 7-8 GHz range would help alleviate the problems posed by this new type of EESS mission. The telemetry, telecommand and control function could be implemented by pairing this new allocation with the already existing EESS (space-to-Earth) allocation in the band 8 025-8 400 MHz. This may also eventually lead to a simplified on-board architecture and operational concept for some future EESS missions.

ITU-R WP 7B has determined an approximate spectrum requirement of 56 MHz for EESS (Earth-to-space). The frequency range 7 145-7 250 MHz is currently allocated to the fixed, mobile and, space research (Earth-to-space) services on a primary basis, the band 7 145-7 235 MHz is subject to the conditions on the use of the space research service (SRS) in No. **5.460**.

The ITU-R has developed various sharing and compatibility studies between transmitting EESS earth stations and stations of the space research, fixed, mobile and space operations services within the 7 145-7 250 MHz range. These studies show that co-existence of EESS and SRS (deep space) uplinks would not be practical within the same frequency band. Sharing in the 7 145-7 190 MHz band segment, where the use of the space research service is restricted by No. **5.460** to deep space, is not feasible. The studies show that sharing would be feasible with existing services in the 7 190-7 250 MHz band segment.

Proposal:

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. **2.1**)

MOD USA/AI 1.11/1

7 145-7 ~~235~~250 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
7 145-~~7 235~~7 190	FIXED MOBILE SPACE RESEARCH (deep space) (Earth-to-space) ~~5.460~~ 5.458 5.459	
7 190-7 235	FIXED MOBILE SPACE RESEARCH (Earth-to-space) ~~5.460~~ EARTH EXPLORATION-SATELLITE (Earth-to-space) 5.458 5.459 MOD 5.460	
7 235-7 250	FIXED MOBILE EARTH EXPLORATION-SATELLITE (Earth-to-space) MOD 5.460 5.458 5.459	

Reasons: Studies have shown that sharing between the EESS (Earth-to-space) and other services in the 7 190-7 250 MHz band is feasible. Also splitting the Table of Allocations at 7 190 MHz clarifies the allocation of services within the Table.

MOD USA/AI 1.11/2

5.460 ~~The use of the band 7 145-7 190 MHz by the space research service (Earth-to-space) is restricted to deep space; no~~ No emissions to deep space shall be effected in the band 7 190-7 235 MHz. Geostationary satellites in the space research service operating in the band 7 190-7 235 MHz and geostationary satellites in the Earth exploration-satellite service in the band 7 190-7 250 MHz, shall not claim protection from existing and future stations of the fixed and mobile services and No. **5.43A** does not apply. (WRC-~~03~~15)

Reasons: Consequential change to the splitting of the Table of Allocations at 7 190 MHz.

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MOD USA/AI 1.11/3

APPENDIX 7 (REV.WRC-~~12~~15)

Methods for the determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz

TABLE 7b (Rev.WRC-15~~12~~)

Parameters required for the determination of coordination distance for a transmitting earth station

Transmitting space radiocommunication service designation		**Fixed-satellite, mobile-satellite**	**Aero-nautical mobile-satellite (R) service**	**Aero-nautical mobile-satellite (R) service**	**Fixed-satellite**	**Fixed-satellite**	**Fixed-satellite**	**Fixed-satellite**		Earth exploration-satellite, **Space operation, space research**		**Fixed-satellite, mobile-satellite, meteorological-satellite**		**Fixed-satellite**		**Fixed-satellite**		**Fixed-satellite**	**Fixed-satellite** [3]	**Fixed-satellite**	**Fixed-satellite** [3]
Frequency bands (GHz)		2.655-2.690	5.030-5.091	5.030-5.091	5.091-5.150	5.091-5.150	5.725-5.850	5.725-7.075		7.100-7.25~~03~~5 [5]		7.900-8.400		10.7-11.7		12.5-14.8		13.75-14.3	15.43-15.65	17.7-18.4	19.3-19.7
Receiving terrestrial service designations		Fixed, mobile	Aeronautical radio-navigation	Aeronautical mobile (R)	Aeronautical radio-navigation	Aeronautical mobile (R)	Radiolocation	Fixed, mobile		Fixed, mobile		Fixed, mobile		Fixed, mobile		Fixed, mobile		Radiolocation radionavigation (land only)	Aeronautical radionavigation	Fixed, mobile	Fixed, mobile
Method to be used		§ 2.1	§ 2.1, § 2.2	§ 2.1, § 2.2			§ 2.1	§ 2.1		§ 2.1, § 2.2		§ 2.1		§ 2.1		§ 2.1, § 2.2		§ 2.1		§ 2.1, § 2.2	§ 2.2
Modulation at terrestrial station [1]		A						A	N	A	N	A	N	A	N	A	N	–		N	N
Terrestrial station interference parameters and criteria	p_0 (%)	0.01						0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01		0.005	0.005
	n	2						2	2	2	2	2	2	2	2	2	2	1		2	2
	p (%)	0.005						0.005	0.0025	0.005	0.0025	0.005	0.0025	0.005	0.0025	0.005	0.0025	0.01		0.0025	0.0025
	N_L (dB)	0						0	0	0	0	0	0	0	0	0	0	0		0	0
	M_S (dB)	26 [2]						33	37	33	37	33	37	33	40	33	40	1		25	25
	W (dB)	0						0	0	0	0	0	0	0	0	0	0	0		0	0
Terrestrial station parameters	G_x (dBi) [4]	49 [2]	6	10	6	6		46	46	46~~6~~	46~~6~~	46	46	50	50	52	52	36		48	48
	T_e (K)	500 [2]						750	750	750	750	750	750	1 500	1 100	1 500	1 100	2 636		1 100	1 10~~0~~
Reference bandwidth	B (Hz)	4×10^3	150×10^3	37.5×10^3	150×10^3	10^6		4×10^3	10^6	4×10^3	10^6	4×10^3	10^6	4×10^3	10^6	4×10^3	10^6	10^7		10^6	10^6
Permissible interference power	$P_r(p)$ (dBW) in B	−140	−160	−157	−160	−143		−131	−103	−131	−103	−131	−103	−128	−98	−128	−98	−131		−113	−113

1 A: analogue modulation; N: digital modulation.

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2 The parameters for the terrestrial station associated with transhorizon systems have been used. Line-of-sight radio-relay parameters associated with the frequency band 5 725-7 075 MHz may also be used to determine a supplementary contour with the exception that $G_X = 37$ dBi.

3 Feeder links of non-geostationary-satellite systems in the mobile-satellite service.

4 Feeder losses are not included.

5 Actual frequency bands are 7 190-7 250 MHz for Earth exploration satellite service, 7 100-7 155 MHz and 7 190-7 235 MHz for space operation service and 7 145-7 235 MHz for the space research service.

6 Gx (dBi)= 56.5 for Earth exploration satellite service.

Reasons: Consequential change of adding a primary EESS (Earth-to-space) allocation to the band 7 190-7 250 MHz.

ARTICLE 21

Terrestrial and space services sharing frequency bands above 1 GHz

MOD USA/AI 1.11/4

Section II – Power limits for terrestrial stations

TABLE ~~-~~ **21-2** (Rev.WRC-~~12~~15)

Frequency band	Service	Limit as specified in Nos.
1 427-1 429 MHz 1 610-1 645.5 MHz (No. **5.359**) 1 646.5-1 660 MHz (No. **5.359**) 1 980-2 010 MHz 2 010-2 025 MHz (Region 2) 2 025-2 110 MHz 2 200-2 290 MHz 2 655-2 670 MHz[5] (Regions 2 and 3) 2 670-2 690 MHz[5] (Regions 2 and 3) 5 670-5 725 MHz (Nos. **5.453** and **5.455**) 5 725-5 755 MHz[5] (Region 1 countries listed in Nos. **5.453** and **5.455**) 5 755-5 850 MHz[5] (Region 1 countries listed in Nos. **5.453**, **5.455** and **5.456**) 5 850-7 075 MHz 7 145-7 ~~235~~ 250 MHz* 7 900-8 400 MHz	Fixed-satellite Meteorological-satellite Space research Space operation Earth exploration-satellite Mobile-satellite	**21.2**, **21.3**, **21.4** and **21.5**

* For this frequency band only the limits of Nos. 21.3 and 21.5 apply.

** *Note by the Secretariat:* This Resolution was revised by WRC-07 and WRC-12.

Reasons: Consequential change of adding a primary EESS (Earth-to-space) allocation to the band 7 190-7 250 MHz.

MOD USA/AI 1.11/5

Section III – Power limits for earth stations

TABLE **21-3** (Rev.WRC-~~12~~15)

Frequency band		Services
2 025-2 110 MHz		Fixed-satellite
5 670-5 725 MHz	(for the countries listed in No. **5.454** with respect to the countries listed in Nos. **5.453** and **5.455**)	Earth-exploration-satellite Meteorological-satellite Mobile-satellite
5 725-5 755 MHz[6]	(for Region 1 with respect to the countries listed in Nos. **5.453** and **5.455**)	Space operation
5 755-5 850 MHz[6]	(for Region 1 with respect to the countries listed in Nos. **5.453**, **5.455** and **5.456**)	Space research
5 850-7 075 MHz		

7 190-~~7 235~~7 250 MHz		
7 900-8 400 MHz		
10.7-11.7 GHz[6]	(for Region 1)	
12.5-12.75 GHz[6]	(for Region 1 with respect to the countries listed in No. **5.494**)	
12.7-12.75 GHz[6]	(for Region 2)	
12.75-13.25 GHz		
14.0-14.25 GHz	(with respect to the countries listed in No. **5.505**)	
14.25-14.3 GHz	(with respect to the countries listed in Nos. **5.505**, **5.508** and **5.509**)	
14.3-14.4 GHz[6]	(for Regions 1 and 3)	
14.4-14.8 GHz		

Reasons: Consequential change of adding a primary EESS (Earth-to-space) allocation to the band 7 190-7 250 MHz.

SUP USA/AI 1.11/6

RESOLUTION 650 (WRC-12)

Allocation for the Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range

Reasons: ITU-R Working Party 7B completed required studies and this resolution is no longer needed.