

ITUEvents

# 3<sup>rd</sup> ITU Inter-regional Workshop on WRC-19 Preparation

4-6 September 2019  
Geneva, Switzerland

[www.itu.int/go/ITU-R/wrc-19-irwsp-19](http://www.itu.int/go/ITU-R/wrc-19-irwsp-19)



**3<sup>rd</sup> ITU INTER-REGIONAL WORKSHOP  
ON WRC-19 PREPARATION  
(Geneva, 4-6 September 2019)**

## **Sessions 1 & 2**

## **IMT related issues, agenda item (AI) 1.13**

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Organized by:





# WRC-19 agenda item 1.13

To consider identification of frequency bands for the future development of IMT, including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **238 (WRC-15)**.

Resolution **238 (WRC-15)** calls for studies on:

- Spectrum needs for IMT in the frequency range between 24.25 GHz and 86 GHz
- Sharing studies in the bands 24.25-27.5 GHz, 31.8-33.4 GHz, 37-40.5 GHz, 40.5-42.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47-47.2 GHz, 47.2-50.2 GHz, 50.4 52.6 GHz, 66-76 GHz and 81-86 GHz



# 24.25-27.5 GHz – Options for the conditions to protect other services

## Condition A2a (protection of EESS(p) in 23.6-24 GHz from IMT in 26 GHz)

- Option 1: Add mandatory unwanted emission limits to Table 1-1 of Resolution 750
- Option 2: Add recommended unwanted emission limits to Table 1-2 of Resolution 750
- Option 3: Include unwanted emission limits in a WRC Recommendation
- Option 4: Option 3 + delete Table 1-2 from Resolution 750
- Option 5: No condition is necessary

## Condition A2b (protection of EESS(p) around 50 GHz from second harmonics of IMT in 26 GHz)

- Option 1: Add mandatory unwanted emission limits to Table 1-1 of Resolution 750
- Option 2: Point to Cat.B limits of Recommendation ITU-R SM.329 in the IMT Resolution
- Option 3: No condition is necessary

## Condition A2c (protection of SRS/EESS (space-to-Earth) in 25.5-27 GHz)

- Option 1: Develop ITU-R Rec. on this issue and invite admins to protect other services
- Option 2: Option 1 + modify RR **5.536A**, **5.536B** and **5.536C** to not apply to IMT stations
- Option 3: Develop an ITU-R Rec. on this issue
- Option 4: Protection of other services to be contained in a WRC Resolution
- Option 5: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details



# 24.25-27.5 GHz – Options for the conditions to protect other services

## Condition A2d (measures related to transmitting earth stations in the FSS (Earth-to-space))

- Option 1: Develop ITU-R Rec. on this issue and invite admins to protect other services
- Option 2: Develop an ITU-R Rec. on this issue
- Option 3: Protection of other services to be contained in a WRC Resolution
- Option 4: No condition is necessary

## Condition A2e (protection of ISS/FSS (Earth-to-space) receiving earth stations)

- Option 1: WRC Res. with TRP limit, restrictions on antenna elevation, tilt & BS density
- Option 2: WRC Res. with TRP limit & restriction on antenna elevation
- Option 3: WRC-Res. with TRP limit. Restrictions on antenna pattern & tilt
- Option 4: WRC Recommendation with provisions from Options 1, 2 and 3
- Option 5: All possible measures to avoid BS main beam above horizon & downtilt
- Option 6: Ensure antenna normally only transmits pointing below horizon & downtilt
- Option 7: Angular EIRP mask for the emissions of IMT BSs in the skyward direction
- Option 8: Mandatory e<sub>pf</sub><sup>d</sup> limits at the GSO by emissions from all the IMT BSs
- Option 9: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details



## 24.25-27.5 GHz – Options for the conditions to protect other services

### Condition A2f (protection of RAS in 23.6-24 GHz from IMT in 26 GHz)







- Option 1: Develop an ITU-R Recommendation on this issue
- Option 2: Protection of other services to be contained in a WRC Resolution
- Option 3: No condition is necessary

### Condition A2g (protection measures for multiple services)

- Option 1: Apply RR No. **9.21** in the corresponding IMT footnote
- Option 2: Need to obtain agreement from the administrations concerned
- Option 3: Review the impact of the evolution of IMT characteristics on sharing studies
- Option 4: Update IMT characteristics, assess sharing study impact and report to WRC
- Option 5: No condition is necessary







High-level summary – see CPM Report to WRC-19 for full details

# 24.25-27.5 GHz – current regional positions

	APT	ASMG	ATU	CEPT	CITEL	RCC
						
<b>Method</b>	A2 Alt. 2* (IMT)	A2 Alt. 2 (IMT)	A2 Alt. 2 (IMT)	A2 Alt. 2 (IMT)	A2 Alt. 2 (IMT)	A2 Alt. 1 (IMT-LMS)
<b>Condition A2a (EESS 23.6-24 GHz)</b>	Option 1 (Res. 750 Table 1-1)	Option 3 (ITU-R Rec.)	Option 1 (Res. 750 Table 1-1)	Option 1 (Res. 750 Table 1-1)	Option 1 (Res. 750 Table 1-1)	Option 1 (Res. 750 Table 1-1)
<b>Base station limit</b>	TBD	-32	-32	-42	-28	TBD
<b>Mobile station limit</b>	TBD	-28	-28	-38	-28	TBD
<b>Active service band</b>	TBD	24.25-27.5	TBD	24.25-27.5	24.25-24.75	TBD
<b>Condition A2b (EESS 50 GHz range)</b>	Option 2 (SM.329)	Option 3 (Not req.)	Option 3 (Not req.)	Option 2 (SM.329)	Option 3 (Not req.)	Option 1 (Res. 750 Table 1-1)
<b>Base station limit</b>	n/a	n/a	n/a	n/a	n/a	TBD
<b>Mobile station limit</b>	n/a	n/a	n/a	n/a	n/a	TBD

\*APT supports Alt. 2 subject to regulatory provisions associated with Condition A2e

# 24.25-27.5 GHz – current regional positions

	APT	ASMG	ATU	CEPT	CITEL	RCC
						
<b>Method</b>	A2 Alt. 2* (IMT)	A2 Alt. 2 (IMT)	A2 Alt. 2 (IMT)	A2 Alt. 2 (IMT)	A2 Alt. 2 (IMT)	A2 Alt. 1 (IMT-LMS)
<b>Condition A2c (SRS/EESS in-band)</b>	TBD	Option 5 (Not req.)	Option 5 (Not req.)	Option 1** (ITU-R Rec.)	Option 1 (ITU-R Rec.)	Option 2 (FNs <b>5.536</b> )
<b>Condition A2d (FSS transmitting)</b>	TBD	Option 4 (Not req.)	Option 4 (Not req.)	Option 1 (ITU-R Rec.)	Option 4 (Not req.)	Option 1 (ITU-R Rec.)
<b>Condition A2e (ISS/FSS receiving)</b>	TBD	Option 9 (Not req.)	Option 9 (Not req.)	Option 6 (Normally)	Option 6 (Normally)	Option 1&7 (TRP & eirp)
<b>Condition A2f (RAS 23.6-24 GHz)</b>	TBD	Option 3 (Not req.)	Option 3 (Not req.)	Option 1 (ITU-R Rec.)	Option 1 (ITU-R Rec.)	Option 1 (ITU-R Rec.)
<b>Condition A2g (Multiple services)</b>	TBD	Option 5 (Not req.)	Option 5 (Not req.)	Option 3 (Review)	Option 5 (Not req.)	Option 5 (Not req.)

\*APT supports Alt. 2 subject to regulatory provisions associated with Condition A2e

\*\*CEPT also proposes a MOD to RR No. **5.536A**



APT	ASMG	ATU	CEPT	CITEL	RCC
					

## 31.8-33.4 GHz – current regional positions

<b>Method</b>	<b>B1 (NOC)</b>	<b>B1 (NOC)</b>	<b>B1 (NOC)</b>	<b>B1 (NOC)</b>	<b>B1 (NOC)</b>	<b>B1 (NOC)</b>
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## 71-76 GHz – current regional positions

<b>Method</b>	<b>TBD</b>	<b>K1 (NOC)</b>	<b>K1 (NOC)</b>	<b>K1 (NOC)</b>	<b>K1 (NOC)</b>	<b>K1 (NOC)</b>
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## 81-86 GHz – current regional positions

<b>Method</b>	<b>TBD</b>	<b>L1 (NOC)</b>	<b>L1 (NOC)</b>	<b>L1 (NOC)</b>	<b>L1 (NOC)</b>	<b>L1 (NOC)</b>
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# 37.5-40.5 GHz – Options for the conditions to protect other services

## Condition C2a (protection of EESS(p) in 36-37 GHz from IMT in 37-40.5 GHz)

- Option 1: Add mandatory unwanted emission limits to IMT Resolution
- Option 2: No condition is necessary

## Condition C2b (protection of FSS (space-to-Earth))

- Option 1: Invite admins to ensure balance IMT/HDFSS and develop ITU-R Rec. to assist
- Option 2: Protection of other services to be contained in a WRC Resolution
- Option 3: Develop ITU-R Rec. to assist; potential constraints on IMT; ensure balance
- Option 4: Admins to take into account constraints on IMT due to HDFSS in the IMT FN
- Option 5: State in the IMT FN that IMT should not impede HDFSS deployments
- Option 6: No condition is necessary

## Condition C2c (protection of SRS (space-to-Earth))

- Option 1: Develop ITU-R Rec. on this issue and invite admins to protect other services
- Option 2: Protection of other services to be contained in a WRC Resolution
- Option 3: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details



# 37.5-40.5 GHz – Options for the conditions to protect other services

## Condition C2d (measures for SRS/EESS (space-to-Earth))







- Option 1: State in RR that IMT shall not claim protection from SRS/EESS
- Option 2: No condition is necessary

## Condition C2e (protection measures for multiple services)

- Option 1: Apply RR No. **9.21** in the corresponding IMT footnote
- Option 2: Need to obtain agreement from the administrations concerned
- Option 3: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details

# 37-40.5 GHz – current regional positions

	APT	ASMG	ATU	CEPT	CITEL	RCC
						
<b>Method</b>	C2 Alt. 2 (IMT)	C1 (NOC)	C2 Alt. 2 (IMT)	View	C2 Alt. 2 (IMT)	C1 (R1) C2 (R2&3)
<b>Condition C2a (EESS 36-37 GHz)</b>	TBD	n/a	Option 2 (Not req.)	Option 1 (IMT Res.)	Option 2 (Not req.)	Option 1 (IMT Res.)
<b>Base station limit</b>	TBD	n/a	n/a	-33	n/a	TBD
<b>Mobile station limit</b>	TBD	n/a	n/a	-32	n/a	TBD
<b>Condition C2b (FSS space-to-Earth)</b>	TBD	n/a	Option 6 (Not req.)	same as for 40.5-43.5	Option 4 (constraints to IMT)	TBD
<b>Condition C2c (SRS space-to-Earth)</b>	TBD	n/a	Option 3 (Not req.)	Option 1 (ITU-R Rec.)	Option 1 (ITU-R Rec.)	TBD
<b>Condition C2d (SRS/EESS E-to-s)</b>	TBD	n/a	Option 2 (Not req.)	Address in Resolution	Option 2 (Not req.)	TBD
<b>Condition C2e (Multiple services)</b>	TBD	n/a	Option 3 (Not req.)	same as for 40.5-43.5	Option 3 (Not req.)	TBD



# 40.5-42.5 GHz – Options for the conditions to protect other services

## Condition D2a (protection of FSS (space-to-Earth))

- Option 1: Invite admins to ensure MS/FSS balance and develop ITU-R Recommendation
- Option 2: Protection of other services to be contained in a WRC Resolution
- Option 3: Develop ITU-R Rec. to assist; potential constraints on IMT; ensure balance
- Option 4: Admins to take into account constraints on IMT due to HDFSS in the IMT FN
- Option 5: State in the IMT FN that IMT should not impede HDFSS deployments
- Option 6: No condition is necessary

## Condition D2b (protection of RAS in 42.5-43.5 GHz)







- Option 1: Develop an ITU-R Recommendation on this issue
- Option 2: Protection of other services to be contained in a WRC Resolution
- Option 3: No condition is necessary

## Condition D2c (protection measures for multiple services)

- Option 1: Apply RR No. **9.21** in the corresponding IMT footnote
- Option 2: Need to obtain agreement from the administrations concerned
- Option 3: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details

# 40.5-42.5 GHz – current regional positions

	APT	ASMG	ATU	CEPT	CITEL	RCC
						
<b>Method</b>	D2 Alt. 2 (IMT)	D2 Alt. 2 (IMT)	D2 Alt. 2 (IMT)	D2 Alt. 2 (IMT)	D2 Alt. 2 (IMT)	D2 Alt. 1 (IMT-LMS)
<b>Condition D2a (FSS space-to-Earth)</b>	TBD	Option 6 (Not req.)	Option 6 (Not req.)	Option 1 (Ensure balance)	Option 3 (constraints to IMT)	Option 1 (Ensure balance)
<b>Condition D2b (RAS 42.5-43.5 GHz)</b>	TBD	Option 3 (Not req.)	Option 3 (Not req.)	Option 1 (ITU-R Rec.)	Option 1 (ITU-R Rec.)	Option 1 (ITU-R Rec.)
<b>Condition D2c (Multiple services)</b>	TBD	Option 3 (Not req.)	Option 3 (Not req.)	Option 3 (Not req.)	Option 3 (Not req.)	Option 3 (Not req.)



# 42.5-43.5 GHz – Options for the conditions to protect other services

## Condition E2a (protection of ISS/FSS (Earth-to-space))

- Option 1: WRC Res. with TRP limit, restrictions on antenna elevation, tilt & BS density
- Option 2: WRC-Res. with TRP limit. Restrictions on antenna pattern & tilt
- Option 3: WRC Recommendation with provisions from Options 1 and 2
- Option 4: Angular EIRP mask for the emissions of IMT BSs in the skyward direction
- Option 5: Ensure antenna normally only transmits pointing below horizon & downtilt
- Option 6: All necessary measures to avoid BS main beam above horizon & downtilt
- Option 7: No condition is necessary

## Condition E2b (protection of RAS in 42.5-43.5 GHz)

- Option 1: Develop an ITU-R Recommendation on this issue
- Option 2: Protection of other services to be contained in a WRC Resolution
- Option 3: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details



# 42.5-43.5 GHz – Options for the conditions to protect other services

## Condition E2c (protection measures for multiple services)

- Option 1: Apply RR No. **9.21** in the corresponding IMT footnote
- Option 2: Need to obtain agreement from the administrations concerned
- Option 3: Review the impact of the evolution of IMT characteristics on sharing studies
- Option 4: Update IMT characteristics, assess sharing study impact and report to WRC
- Option 5: No condition is necessary

## Condition E2d (Measures related to transmitting earth stations in the FSS (Earth-to-space))







- Option 1: Develop ITU-R Rec. on this issue and invite admins to protect other services
- Option 2: Develop an ITU-R Rec. on this issue
- Option 3: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details

# 42.5-43.5 GHz – current regional positions

	APT	ASMG	ATU	CEPT	CITEL	RCC
						
<b>Method</b>	E2 Alt. 2 (IMT)	E2 Alt. 2 (IMT)	E2 Alt. 2 (IMT)	E2 Alt. 2 (IMT)	E2 Alt. 2 (IMT)	E1 (NOC)
<b>Condition E2a (FSS Earth-to-space)</b>	TBD	Option 7 (Not req.)	Option 7 (Not req.)	Option 5 (Normally)	Option 5 (Normally)	n/a
<b>Condition E2b (RAS 42.5-43.5 GHz)</b>	TBD	Option 3 (Not req.)	Option 3 (Not req.)	Option 1 (ITU-R Rec.)	Option 1 (ITU-R Rec.)	n/a
<b>Condition E2c (Multiple services)</b>	TBD	Option 5 (Not req.)	Option 5 (Not req.)	Option 3 (Review)	Option 5 (Not req.)	n/a
<b>Condition E2d (FSS transmitting)</b>	TBD	Option 3 (Not req.)	Option 3 (Not req.)	Option 1 (ITU-R Rec.)	Option 3 (Not req.)	n/a



APT	ASMG	ATU	CEPT	CITEL	RCC
					

## 45.5-47 GHz – current regional positions

Method	F1 (NOC)	F1 (NOC)	TBD	TBD	F1 (NOC)	F1 (NOC)
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## 47-47.2 GHz – current regional positions

Method	G1 (NOC)	G1 (NOC)	G1 (NOC)	G1 (NOC)	G1 (NOC)	G1 (NOC)
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## 47.2-50.2 GHz – Options for the conditions to protect other services

### Condition H2a (protection of EESS (passive) in 50.2-50.4 GHz from IMT below)

- Option 1: Add limits to Table 1-1 of Resolution 750
- Option 2: Add limits to Table 1-1 of Resolution 750, taking into account RR **5.340.1**
- Option 3: No condition is necessary

### Condition H2b (protection of FSS space stations (Earth-to-space))

- Option 1: WRC Res. with TRP limit, restrictions on antenna elevation, tilt & BS density
- Option 2: WRC-Res. with TRP limit. Restrictions on antenna pattern & tilt
- Option 3: WRC Recommendation with provisions from Options 1 and 2
- Option 4: Angular EIRP mask for the emissions of IMT BSs in the skyward direction
- Option 5: Ensure antenna normally only transmits pointing below horizon & downtilt
- Option 6: All necessary measures to avoid BS main beam above horizon & downtilt
- Option 7: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details



## 47.2-50.2 GHz – Options for the conditions to protect other services

### Condition H2c (Measures related to transmitting earth stations in the FSS (Earth-to-space))







- Option 1: Develop ITU-R Rec. on this issue and invite admins to protect other services
- Option 2: Protection of other services to be contained in a WRC Resolution
- Option 3: Admins to take into account constraints on IMT due to HDFSS in the IMT FN
- Option 4: State in the IMT FN that IMT should not impede HDFSS deployments
- Option 5: No condition is necessary

### Condition H2d (protection measures for multiple services)

- Option 1: Apply RR No. **9.21** in the corresponding IMT footnote
- Option 2: Need to obtain agreement from the administrations concerned
- Option 3: Review the impact of the evolution of IMT characteristics on sharing studies
- Option 4: Update IMT characteristics, assess sharing study impact and report to WRC
- Option 5: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details

# 47.2-50.2 GHz – current regional positions

	APT	ASMG	ATU	CEPT	CITEL	RCC
						
<b>Method</b>	TBD	H1 (NOC)	H2 Alt. 2 (IMT)	H1 (NOC)	H2 (47.2-48.2) H1 (48.2-50.2)	H1 (NOC)
<b>Condition H2a (EESS 50.2-50.4 GHz)</b>	TBD	n/a	Option 2 (Res. 750 & 5.340.1)	n/a	Option 3 (Not req.)	n/a
<b>Base station limit</b>	TBD	n/a	-32	n/a	n/a	n/a
<b>Mobile station limit</b>	TBD	n/a	-28	n/a	n/a	n/a
<b>Condition H2b (FSS Earth-to-space)</b>	TBD	n/a	Option 7 (Not req.)	n/a	Option 7 (Not req.)	n/a
<b>Condition H2c (FSS transmitting)</b>	TBD	n/a	Option 5 (Not req.)	n/a	Option 5 (Not req.)	n/a
<b>Condition H2d (Multiple services)</b>	TBD	n/a	Option 5 (Not req.)	n/a	Option 5 (Not req.)	n/a



## 50.4-52.6 GHz – Options for the conditions to protect other services

### Condition I2a (protection of EESS (passive) in 50.2-50.4 GHz from IMT above)

- Option 1: Add limits to Table 1-1 of Resolution 750
- Option 2: Add limits to Table 1-1 of Resolution 750, taking into account RR **5.340.1**
- Option 3: No condition is necessary

### Condition I2b (protection of FSS space stations (Earth-to-space))

- Option 1: WRC Res. with TRP limit, restrictions on antenna elevation, tilt & BS density
- Option 2: WRC-Res. with TRP limit. Restrictions on antenna pattern & tilt
- Option 3: WRC Recommendation with provisions from Options 1 and 2
- Option 4: Angular EIRP mask for the emissions of IMT BSs in the skyward direction
- Option 5: Ensure antenna normally only transmits pointing below horizon & downtilt
- Option 6: All necessary measures to avoid BS main beam above horizon & downtilt
- Option 7: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details



## 50.4-52.6 GHz – Options for the conditions to protect other services

### Condition I2c (protection measures for multiple services)







- Option 1: Apply RR No. **9.21** in the corresponding IMT footnote
- Option 2: Need to obtain agreement from the administrations concerned
- Option 3: Review the impact of the evolution of IMT characteristics on sharing studies
- Option 4: Update IMT characteristics, assess sharing study impact and report to WRC
- Option 5: No condition is necessary

### Condition I2d (Measures related to transmitting earth stations in the FSS (Earth-to-space))







- Option 1: Develop ITU-R Rec. on this issue and invite admins to protect other services
- Option 2: No condition is necessary

High-level summary – see CPM Report to WRC-19 for full details

# 50.4-52.6 GHz – current regional positions

	APT	ASMG	ATU	CEPT	CITEL	RCC
						
<b>Method</b>	TBD	I1 (NOC)	I2 Alt. 2 (IMT)	I1 (NOC)	TBD	I1 (NOC)
<b>Condition I2a (EESS 50.2-50.4 GHz)</b>	TBD	n/a	Option 2 (Res. 750 & 5.340.1)	n/a	TBD	n/a
<b>Base station limit</b>	TBD	n/a	-32	n/a	TBD	n/a
<b>Mobile station limit</b>	TBD	n/a	-28	n/a	TBD	n/a
<b>Condition I2b (FSS Earth-to-space)</b>	TBD	n/a	Option 7 (Not req.)	n/a	TBD	n/a
<b>Condition I2c (Multiple services)</b>	TBD	n/a	Option 5 (Not req.)	n/a	TBD	n/a
<b>Condition I2d (FSS transmitting)</b>	TBD	n/a	Option 5 (Not req.)	n/a	TBD	n/a

# 66-71 GHz – current regional positions

	APT	ASMG	ATU	CEPT	CITEL	RCC
						
<b>Method</b>	TBD	J2 Alt. 2 (IMT)	J2 Alt. 2 (IMT)	J2 Alt. 2 (IMT)	J1 (NOC)	J1 (NOC)
<b>Condition J2a (MGWS coexistence)</b>	TBD	Option 4 (Not req.)	Option 1 (WRC Res. & ITU-R Rec.)	Option 1 (WRC Res. & ITU-R Rec.)	n/a	n/a
<b>Condition J2b (Other services)</b>	TBD	View 1 (Not req.)	TBD	View 1 (Not req.)	n/a	n/a
<b>Condition J2c (Multiple services)</b>	TBD	Option 3 (Not req.)	Option 3 (Not req.)	Option 3 (Not req.)	n/a	n/a