

Received: 19 January 2024

Subject: WRC-27 agenda item 1.13

Document 5D/58-E
22 January 2024
English only

SPECTRUM ASPECTS

IAFI¹

PROPOSED FREQUENCY ARRANGEMENTS UNDER WRC-27 AGENDA ITEM 1.13

Selection of frequency arrangements for studies on WRC-27 agenda item 1.13

The 1st Meeting of CPM-27 was held immediately after the World Radiocommunications Conference (WRC-23). During this meeting of the CPM-27 it was decided that the Working Party (WP) 4C would be responsible for conducting studies and preparation of the draft CPM Report under WRC-27 agenda item 1.13 towards possible allocations to the MSS in the frequency bands between 694/698 MHz and 2.7 GHz.

Agenda item 1.13 – Studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage;

Working Party 5D is expected to provide details of frequency bands based on the IMT frequency arrangements contained in the most recent version of Recommendation ITU-R M.1036 along with regulatory considerations on the protection of terrestrial component of IMT. Extracts from Recommendation ITU-R M.1036 listing all the IMT identified bands is enclosed at Annex 2 of this contribution.

Proposal

IAFI proposes to select certain frequency bands which are listed in the Annex 1 from the latest version of Recommendation ITU-R M.1036-7 for submission to WP 4C for conducting studies on sharing and compatibility between terrestrial IMT, including in adjacent frequency bands, ensuring the protection of incumbent services. IAFI also provides its specific recommendation for all the frequency arrangements in the frequency range 694/698 MHz and 2.7 GHz in Annex 1.

Annex 1: Bands proposed to be selected for studies under WRC-27 agenda item 1.13

Annex 2: Extracts from Recommendation ITU-R M.1036 listing all the IMT identified bands

¹ ITU-APT Foundation of India is a Sector Member of ITU (<https://iafi.in>).

ANNEX 1

1 Proposed frequency arrangements for studies for MSS in the 470-960 MHz frequency range

1.1 The following FDD frequency arrangements in this range are recommended for studies under agenda item 1.13:

- a)* A3 (832-862 MHz/ 791-821 MHz)
- b)* A5 (703-748 MHz/ 758-803 MHz)
- c)* A7 and A9 are subset of A5
- d)* A8 (698-703 MHz/ 753-758 MHz).

1.2 Frequency arrangements A6 and A10 are TDD/SDL frequency arrangements therefore may require additional considerations if planned for studies for MSS studies.

1.3 Frequency arrangements A1 and A2 overlap in their Mobile station transmitter and Base station Transmitter whereas frequency arrangement A4 and A11 is a mix of FDD and TDD arrangement and hence these arrangements may require additional considerations if planned for studies for MSS studies.

1.4 Frequency arrangements A12 and A13 are either outside or do not fall completely within the frequency range being considered for studies.

2 Proposed frequency arrangements for studies for MSS in the 1 427-1 518 MHz frequency range

2.1 In this frequency range, only the frequency arrangements G2 is proposed to ensure protection of existing incumbents.

- a)* G2 (1 427-1 470/1 475-1 518 MHz)

3 Proposed frequency arrangements for studies for MSS in the 1 710-2 200 MHz frequency range

3.1 The following FDD Frequency arrangements in this range are recommended for studies under agenda item 1.13:

- a)* B1 (1 920-1 980 MHz / 2 110-2 170 MHz)
- b)* B2 (1 710-1 785 MHz / 1 805-1 880 MHz)
- c)* B3 (1 850-1 920 / 1 930-2 000 MHz)
- d)* B6 (1 980-2 010 / 2 170-2 200 MHz)
- e)* B7 (2 000-2 020 / 2 180-2 200 MHz).

3.2 Frequency arrangement B4 is harmonized with B1 and B2.

3.3 Frequency arrangement B5 is harmonized with B3 and partially harmonized with the downlink of B1 and the uplink of B2.

4 Proposed frequency arrangements for studies for MSS in the 2 300-2 400 MHz frequency range

4.1 It is proposed to keep the frequency range 2 300-2 400 MHz out of studies since the deployment of IMT in this frequency range is based on un-paired arrangement (TDD) with different telecom service providers using different configuration in different regions and countries and hence this cannot be harmonized for MSS.

5 Proposed frequency arrangements for studies for MSS in the 2 500-2 690 MHz frequency range

5.1 It is proposed to keep the frequency range 2 500-2 690 MHz out of studies since the deployment of IMT in this frequency range is based on both paired (FDD) and un-paired arrangement (TDD) with different telecom service providers using different configuration in different regions and countries and hence this cannot be harmonized for MSS.

ANNEX 2

**Frequency arrangements within 694/698-2 590 MHz
included in Recommendation ITU-R M.1036**

Frequency arrangements in the 610-960 MHz frequency range

Frequency arrangements	Paired arrangements (FDD)				Un-paired arrangements (TDD) (MHz)
	Mobile station transmitter (MHz)	Centre gap (MHz)	Base station transmitter (MHz)	Duplex separation (MHz)	
A1	824-849	20	869-894	45	None
A2	880-915	10	925-960	45	None
A3	832-862	11	791-821	41	None
A4	698-716 776-793	12 13	728-746 746-763	30 30	716-728
A5	703-748	10	758-803	55	None
A6					698-806
A7	703-733	25	758-788	55	None
A8	698-703	50	753-758	55	None
A9	733-736	52	788-791	55	None
A10	External		738-758		None
A11 (harmonized with A7 and A10)	703-733 External	25	758-788 738-758	55	None
A12	663-698	11	617-652	46	None
A13	663-703	11	612-652	51	None

Notes to Table 2:

Note 1: In A3, IMT systems are operating in FDD mode and use a reversed duplex direction, with mobile terminal transmit within the upper band and base station transmit within the lower band. Such an arrangement provides better conditions for coexistence with the lower adjacent broadcasting service. It is noted that administrations which do not wish to use this plan or which do not have the full band 790-862 MHz available may consider other frequency arrangements including, e.g. partial implementation of frequency arrangement described in A3, a TDD frequency arrangement (with a guardband of at least 7 MHz above 790 MHz) or a mixed introduction of TDD and FDD frequency arrangements.

Note 2: In A4, administrations can use the band solely for FDD or TDD, or some combination of FDD and TDD. Administrations can use any FDD duplex spacing or FDD duplex direction. However, when administrations choose to deploy mixed FDD/TDD channels with a fixed duplex separation for FDD, the duplex separation and duplex direction as shown in A4 are preferred. Individual band blocks in the mixed channel arrangement may include further subdivisions to accommodate both duplex methods.

Note 3: The frequency arrangements for the band 698-960 MHz have been developed taking into consideration the *recognizing* above. The frequency arrangements for PPDR systems using IMT technologies in the bands identified in Resolution **646 (Rev.WRC-19)**, are outside the scope of this Recommendation and are covered by Recommendation ITU-R M.2015. There are inherent benefits of deploying IMT technologies for PPDR applications in this band, including advantages of large coverage area and possible interoperability across the 700 and 800 MHz bands, noting the differences in operational requirements and implementations.

Note 4: In A5, 2 × 45 MHz FDD arrangement is implemented by using sub-blocks with dual duplexer solution and conventional duplex arrangement. Internal guardbands of 5 MHz and 3 MHz are provided at the lower and upper edge of the band for better co-existence with adjacent radiocommunication services.

Note 5: In A6, taking into account the external 4 MHz guardband (694-698 MHz), a minimum internal guardband of 5 MHz at the lower edge (698 MHz) and 3 MHz at the upper edge (806 MHz) needs to be considered.

Note 6: The frequency arrangement in A7 aligns with the lower duplexer from A5.

Note 7: Administrations can implement the A8 arrangement alone or in combination with parts of A7 (e.g. UL: 698-718/DL: 753-773 MHz), provided that coexistence with the services below 694 MHz is ensured.

Note 8: The frequency arrangement in A9 aligns with part of the upper duplexer of A5.

Note 9: For A10 and A11, zero to four frequency blocks of 5 MHz in 738-758 MHz could be used to complement the downlink capacity of a frequency arrangement in this or other bands.

Note 10: For administrations having implemented the A7 arrangement, this arrangement can be combined with the A10 arrangement, i.e. A11.

Note 11: The frequency arrangement A12 is based on a reverse FDD configuration. This will guarantee compatibility with A5 arrangement since upper A12 block and lower A5 block will be both transmitting in uplink direction.

Note 12: Frequency arrangement A12 may not align with the channelization schemes of other services in all regions.

Note 13: The frequency arrangement A13 is based on a reverse FDD configuration. This will guarantee compatibility with A5 arrangement since upper A13 block and lower A5 block will be both Mobile station transmitters transmitting in uplink direction.

Frequency arrangements in the band 1 427-1 518 MHz

The recommended frequency arrangements for implementation of IMT in the band 1 427-1 518 MHz are provided in Table 3 and in Fig. 4, noting the implementation aspects in Section 1 above, as well as the Note 1 below.

TABLE 3
Frequency arrangements in the band 1 427-1 518 MHz

Frequency arrangements	Paired arrangements (FDD)				Un-paired arrangements (TDD) (MHz)
	Mobile station transmitter (MHz)	Centre gap (MHz)	Base station transmitter (MHz)	Duplex separation (MHz)	
G1	External	–	1 427-1 517	–	None
G2	1 427-1 470	5	1 475-1 518	48	None
G3					1 427-1 517

Note to Table 3:

Note 1: With respect to IMT in the frequency band 1 492-1 518 MHz and the MSS in the frequency band 1 518-1 525 MHz, ITU-R studies are being conducted in accordance with Resolution **223 (Rev.WRC-19)** to provide possible technical measures to facilitate adjacent band compatibility. The implementation of the frequency arrangements and the text of this Note may need to be reviewed and revised taking into account the results of these studies, which are intended to be included in ITU-R Reports and ITU-R Recommendations, as appropriate.

Based on the current results of these ongoing studies, one of a number of possible measures to facilitate adjacent band compatibility, is for administrations to consider additional frequency separation below 1 518 MHz at the upper part of G1, G2, or G3 (e.g. a total separation of different values up to 6 MHz). Moreover, when implementing these frequency arrangements, administrations are also encouraged to take into account the results of the compatibility studies, e.g. in order to address IMT-MSS coexistence in certain areas (around seaports and airports, etc.).

Frequency arrangements in the band 1 710-2 200 MHz²

The recommended frequency arrangements for implementation of IMT in the band 1 710-2 200 MHz are summarized in Table 4 and in Fig. 5, noting the implementation aspects in Section 1 above.

² The 2 025-2 110 MHz band is not part of the frequency arrangements.

TABLE 4

Frequency arrangements in the band 1 710-2 200 MHz

Frequency arrangements	Paired arrangements (FDD)				Un-paired arrangements (TDD) (MHz)	Relevant Notes
	Mobile station transmitter (MHz)	Centre gap (MHz)	Base station transmitter (MHz)	Duplex separation (MHz)		
B1	1 920-1 980	130	2 110-2 170	190	1 880-1 920; 2 010-2 025	1, 2, 4
B2	1 710-1 785	20	1 805-1 880	95	None	1
B3	1 850-1 920	10	1 930-2 000	80	1 920-1 930	1, 2, 5
B4 (harmonized with B1 and B2)	1 710-1 785 1 920-1 980	20 130	1 805-1 880 2 110-2 170	95 190	1 880-1 920; 2 010-2 025	1, 2, 4
B5 (harmonized with B3 and partially harmonized with the downlink of B1 and the uplink of B2)	1 850-1 920 1 710-1 780	10 330	1 930-2 000 2 110-2 180	80 400	1 920-1 930	1, 2, 3, 5
B6	1 980-2 010	160	2 170-2 200	190	None	4, 5
B7	2 000-2 020	160	2 180-2 200	180	None	5

Notes to Table 4:

Note 1: In the band 1 710-2 025 MHz and 2 110-2 200 MHz three basic frequency arrangements (B1, B2 and B3) are already in use or planned to be used by public mobile cellular systems including IMT. Based on these three arrangements, different combinations of arrangements are recommended as described in B4 and B5. The B1 arrangement and the B2 arrangement are fully complementary, whereas the B3 arrangement partly overlaps with the B1 and B2 arrangements.

For administrations having implemented the B1 arrangement, B4 enables optimization of the use of spectrum for paired IMT operation.

For administrations having implemented the B3 arrangement, the B1 arrangement can be combined with the B2 arrangement. B5 is therefore recommended to optimize the use of the spectrum:

- B5 enables the use of spectrum to be maximized for IMT in administrations where B3 is implemented and where the band 1 770-1 850 MHz is not available in the initial phase of deployment of IMT in this frequency band.

Note 2: TDD may be introduced in unpaired bands and also under certain conditions in the uplink bands of paired frequency arrangements and/or in the centre gap between paired bands.

Note 3: If selectable/variable duplex technology is implemented within terminals as the most efficient way to manage different frequency arrangements, the fact that neighbouring administrations could select B5 will have no impact on the complexity of the terminal. Further studies are necessary.

Note 4: The bands 1 980-2 010 MHz and 2 170-2 200 MHz in the frequency arrangement B6 are intended to be used in combination with the frequency arrangements B1 or B4 which provides even further optimization of the use of spectrum for paired IMT operation (see Note 1).

Note 5: A unique situation exists for the frequency arrangements B6 and B7 and parts of arrangements B3 and B5 in the bands 1 980-2 010 MHz and 2 170-2 200 MHz, which have been identified for the terrestrial component of IMT and the satellite component of IMT as outlined in *recognizing d*). Co-coverage, co-frequency deployment of independent satellite and terrestrial IMT components is not feasible unless appropriate mitigation techniques are applied. When these components are deployed in adjacent geographical areas in the same frequency bands, technical or operational measures need to be implemented if harmful interference is reported. Further studies may be carried out by ITU-R, as appropriate, taking into account the results of WRC-19.

Frequency arrangements in the band 2 300-2 400 MHz

The recommended frequency arrangements for implementation of IMT in the band 2 300-2 400 MHz are summarized in Table 5 and in Fig. 6, noting the implementation aspects in Section 1 above.

TABLE 5
Frequency arrangements in the band 2 300-2 400 MHz

Frequency arrangement	Paired arrangements (FDD)				Un-paired arrangements (TDD) (MHz)
	Mobile station transmitter (MHz)	Centre gap (MHz)	Base station transmitter (MHz)	Duplex separation (MHz)	
E1					2 300-2 400

Frequency arrangements in the band 2 500-2 690 MHz

The recommended frequency arrangements for implementation of IMT in the band 2 500-2 690 MHz are summarized in Table 6 and in Fig. 7, noting the implementation aspects in Section 1 above.

TABLE 6
Frequency arrangements in the band 2 500-2 690 MHz (not including the satellite component)

Frequency arrangements	Paired arrangements (FDD)				Un-paired arrangements (TDD) (MHz)
	Mobile station transmitter (MHz)	Centre gap (MHz)	Base station transmitter (MHz)	Duplex separation (MHz)	
C1	2 500-2 570	50	2 620-2 690	120	2 570-2 620
C2	2 500-2 570 External	50	2 620-2 690 2 570-2 620	120	None
C3	Flexible FDD/TDD				

Notes to Table 6:

Note 1: In C1, in order to facilitate deployment of FDD equipment, any guardbands required to ensure adjacent band compatibility at the 2 570 MHz and 2 620 MHz boundaries will be decided on a national basis and will be taken within the band 2 570-2 620 MHz and should be kept to the minimum necessary, based on Report ITU-R M.2045.

Note 2: In C3, administrations can use the band solely for FDD or TDD or some combination of TDD and FDD. Administrations can use any FDD duplex spacing or FDD duplex direction. However, when administrations choose to deploy mixed FDD/TDD channels with a fixed duplex separation for FDD, the duplex separation and duplex direction as shown in C1 are preferred.