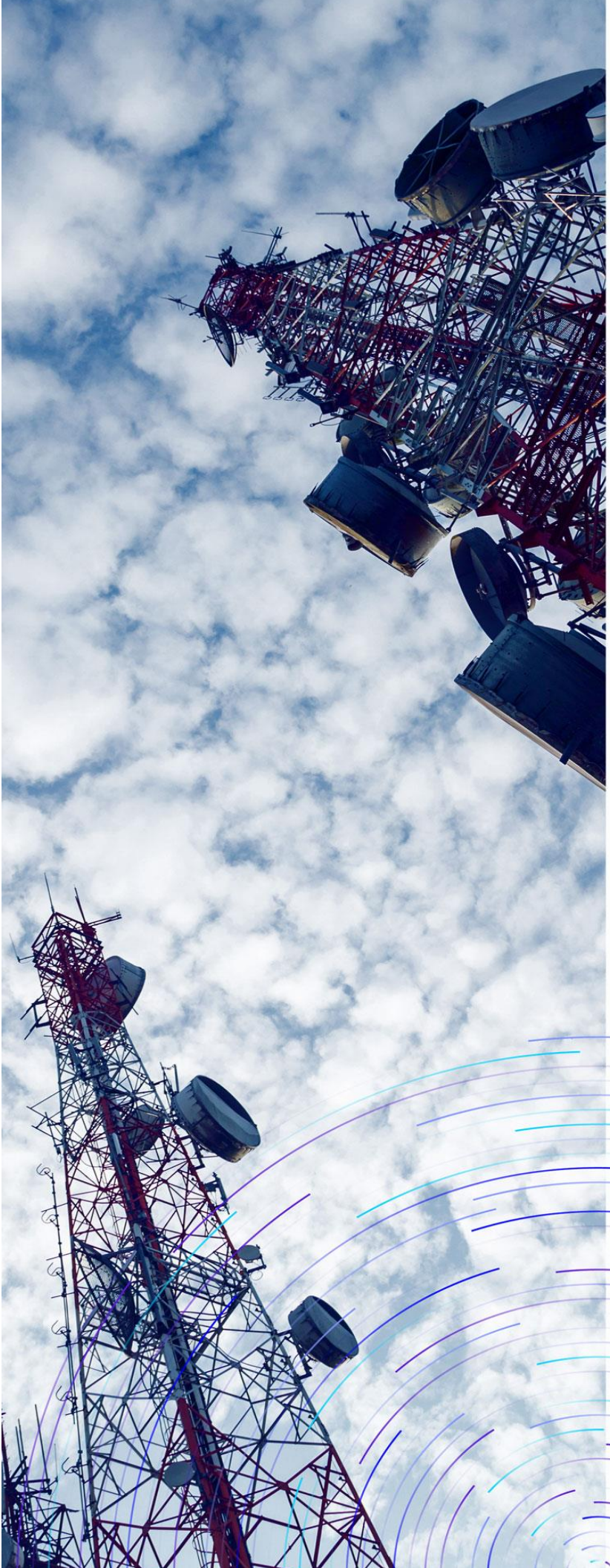

هيئة الاتصالات وتقنية المعلومات
Communications & Information Technology Commission

Public consultation on Radio Fixed Links

Publishing Date: 11 March 2021

Closing Date for Responses: 30 March 2021

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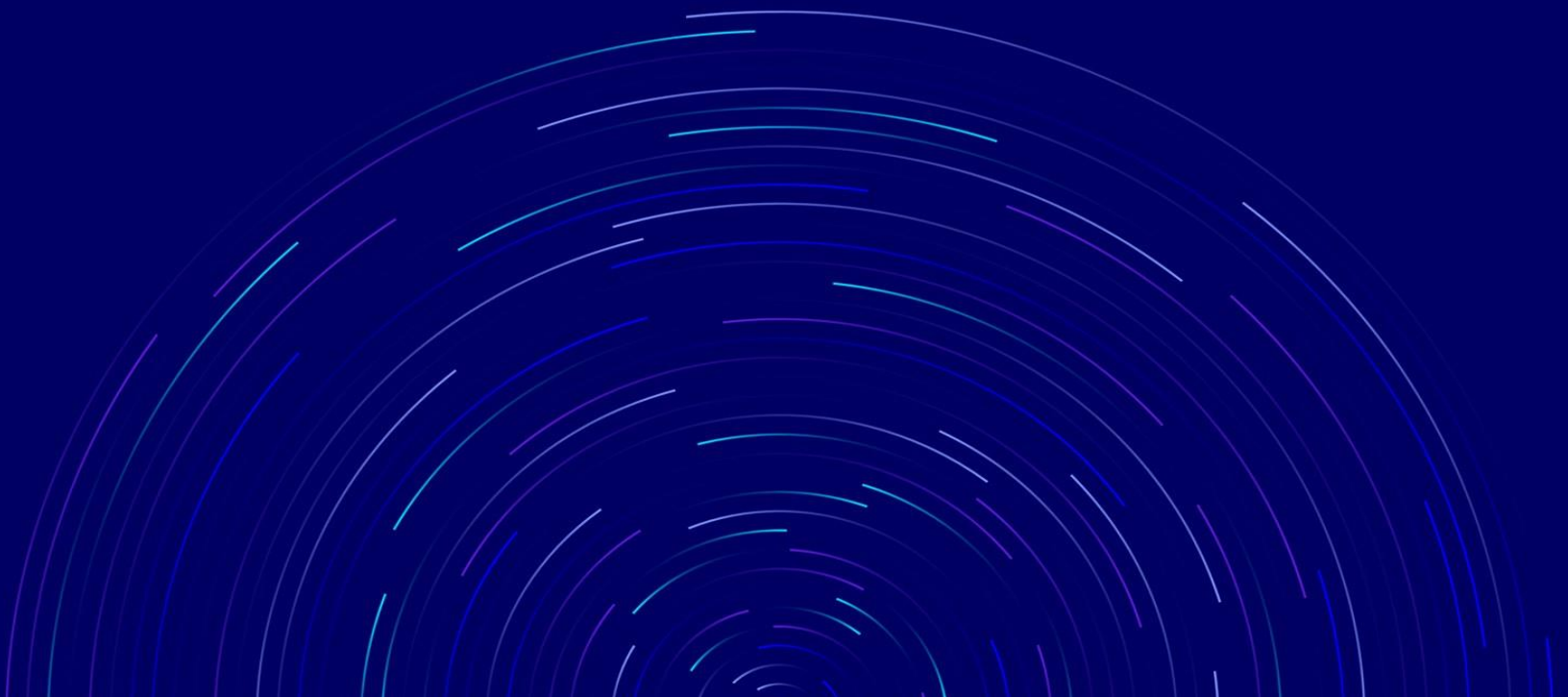

Preamble - How to Respond & Next Steps

Introduction

The Communications and Information Technology Commission (CITC) is responsible, in accordance with the Telecommunications Act, Telecom Act Bylaw and CITC Ordinance; for managing radio spectrum for all users in the Kingdom of Saudi Arabia.

CITC licenses the use of the spectrum used for fixed links (point-to-point and point-to-multipoint) in several frequency bands for all spectrum users in the Kingdom. Since many of the current channel plans for these bands are interconnected and inconsistent, we are seeking to re-plan some of the frequency bands used for the fixed link service (both point-to-point and point-to-multipoint) and update the licensing mechanism for such use in order to achieve the optimal use of the frequencies, reduce possible wireless interference between users, and enable future technologies such as 5G networks.

Fixed links including fixed wireless access (FWA) provide an essential means of connectivity whether providing the last mile connection to homes and businesses, or backhauling large volumes of data between otherwise unconnected locations. CITC is keen to ensure that the spectrum used for these links is used efficiently to maximize the benefit to users and to the country. As demand for bandwidth increases, the need to ensure that all radio spectrum is used efficiently grows and may be necessary to re-farm bands used for fixed links in order to:

- Phase out old and inefficient technologies;
- Enable new fixed link technologies and topologies which provide higher capacity connections
- Provide spectrum for FWA
- Provide spectrum for new mobile technologies such as 5G and 6G

CITC continues to pursue its mission to protect consumers, promote investment and safeguard competition in order to ensure reliable communications' services and innovative digital technologies, and is pleased to publish a Public Consultation document on its "Public Consultation on Radio Fixed Links".

Scope and Objective

CITC is currently investigating the licensing and assignment procedure of fixed links to help understand whether any changes in the current authorization regime would enhance the way in which frequencies are provided. In addition, CITC is considering re-farming some fixed link bands in order to bring their usage in line with international best practice, and to rationalize the band-plans in use. We would therefore be grateful

if you could take the time to complete the following questionnaire which relates to your usage of fixed links. Please be aware that all information provided will be only shared between CITC and the study team.

The timeline below shows the next steps in this consultation exercise.

11 March 2021	30 March 2021	July 2021	September 2021	October 2021
Issue Public Consultation	Last date to receive responses	Consultation on the proposed fixed link policy and action plan	Update of fixed link policies and procedures	Start implementing the action plan

Figure 1: The timeline of rearrangement of frequency bands used for fixed links project.

How to Respond to this Consultation

Participants who wish to submit their views/comments on this Public Consultation Document must submit them to CITC no later than the 30th of March 2021. Views/comments can be submitted to one or more of the following addresses:

- By email to:

Spectrum.Strategy@citc.gov.sa

- Hand-delivered (paper and electronic) at the CITC premises or By mail to:

Communications and Information Technology Commission
Al-Nakheel District
Prince Turki Bin Abdul Aziz I Street intersection with Imam Saud Bin Abdul Aziz Road
PO Box 75606, Riyadh 11588
Saudi Arabia

CITC invites all members of the public, including individuals, public organizations and commercial entities to engage in this process by submitting comments. Participants are invited to provide their views in detail. CITC also encourages Participants to support their comments with relevant data, analysis, benchmarking studies and other information. CITC will take all comments into consideration during its deliberation process, but CITC is under no obligation to adopt the comments or proposals of any participant. The consultation document and any responses to it are not binding on CITC. The Commission may publish the comments on its website if it deems appropriate and in conformance to its Statutes.

Abbreviations and Acronyms

EIRP	Effective Isotropic Radiated Power
FWA	Fixed Wireless Access
ITU	International Telecommunications Union
P2MP	Point to MultiPoint
P2P	Point to Point
QAM	Quadrature Amplitude Modulation
SCADA	Supervisory Control and Data Acquisition
TDD	Time Division Duplex
WAN	Wide Area Network
WLAN	Wireless Local Area Network

Frequency Plans

The annex at the end of this document provides a list of frequencies which are currently used in Saudi Arabia for the operation of fixed links. In addition, CITC permits the operation of some equipment on a license-exempt basis including in the 2.4, 5, and 60 GHz bands. These bands may be used for fixed link applications subject to the restrictions detailed in CITC Technical specification RI045.

There are also a number of other bands which are used in other countries for this purpose which are not available in the country. These are indicated in the table below.

Table 1: Frequency bands that are not in use for fixed links in Saudi Arabia

Band	Frequency Range	Channel Sizes	ITU Reference
12 GHz	11.7 - 12.7 GHz	19.18 MHz	F.746
14 GHz	14.25 - 14.5 GHz	7, 14, 28 MHz	F.746
31 GHz	31.0 - 31.3 GHz	7, 14, 28 or 25, 50 MHz	F.746
42 GHz	40.5 - 43.5 GHz	7, 14, 28, 56, 112 MHz	F.2005
52 GHz	51.4 - 52.6 GHz	7, 14, 28, 56 MHz	F.1496
62 GHz	57.0 - 66.0 GHz	7, 14, 28, 56 or 50 MHz	F.1947
90 GHz	92.4 - 95 GHz	50, 100 MHz	F.2004

Some of the frequency bands currently used for fixed links contain conflicting channel arrangements which overlap with each other. The use of a link in one of these bands may result in the potential for interference to a number of different channels, causing an inefficient use of spectrum. CITC is considering re-farming these bands such that they are structured in a more efficient way. This may include the following:

- The mid 7 GHz band overlaps with both the lower and upper arrangements. The use of the mid 7 GHz band may be withdrawn.
- The 8 GHz band has rasters based on both 29.65 MHz and multiples of 7 MHz channel widths which are incompatible with each other. One of these arrangements may be withdrawn.
- The 23 GHz band has arrangements with a 1008 and a 1232 MHz duplex separation, which overlap. One of these arrangements may be withdrawn.

1. Do the current channel plan arrangements identified in the annex meet your needs? Are there any changes to the plan which would be helpful?
2. Do you operate any fixed links in license exempt bands?

   a) If 'yes', please provide details of the type of usage, and explain why you selected to use a license exempt band instead of a licensed one.

   b) If 'no', please explain why you have decided not to use a license exempt band for any of your links.
3. Do you have any comments concerning the potential changes to the channel plans in the 7, 8 and 23 GHz bands indicated above?
4. Are there any fixed link bands (either point-to-point or point-to-multipoint) which CITC should consider introducing?

   a) If 'yes', which bands and what would you intend to use them for?
5. Are there any fixed link bands which are available but which you do not plan to use?

   a) If 'yes', why are these bands not interesting?

Current Usage

In order to understand the extent to which re-farming of the various frequency bands is possible, it is necessary to gain an understanding of the technical capabilities of the equipment currently in use. This will allow us to assess the impact of any changes which may need to take place and ensure that stakeholders face as little technical and commercial disruption as possible.

6. Please complete the attached Excel spreadsheet detailing, for each fixed link:

- The location of each link (coordinates)
- The band and frequency of operation (transmit and receive) (in MHz)
- The bandwidth of the link (in MHz)
- The modulation scheme used (i.e. 64 QAM)
- The throughput of the link (in Mbps)
- The transmitter power (e.i.r.p.)
- The length of the link (in km)
- Whether the link is point-to-point (P2P) or point-to-multipoint (P2MP)
- Whether the equipment used on the link is able to be re-tuned
  - Within the same band;
  - With a different duplex spacing (in the same band);
  - To a different (e.g. neighboring) band.

7. What percentage of your equipment is in the following age ranges?

Table 2: Age of equipment in team of percentage.

Age of Equipment	Percentage of Equipment
0 - 2 years old	
2 - 5 years old	
5 - 10 years old	
Over 10 years old	

8. For what purposes do you use fixed links?

Table 3: number of fixed links for each purpose.

Purpose	Number of links
Base Station/Cell Tower Backhaul	
Other Network Connectivity	
Internet Connectivity	
Private LAN/WAN	
Inter-site Connections	
SCADA Backhaul	
Other (please describe)	

9. What would be the financial impact on your organization if you were required to re-farm some of your fixed link frequencies? Please provide evidence to support your results.

Licensing and Assignment

CITC's current link length policy specifies a maximum and minimum link length which applies for each frequency band. This is replicated in the table below. CITC will only assign new fixed links which are within the stated path length for the bands indicated below. A new policy is currently under design so your feedback would be very helpful.

Table 4: link length policy for fixed links.

Frequency Band	Maximum Path Length	Minimum Path Length
6, 7 & 8 GHz	80 km	20 km
11 GHz	50 km	10 km
13 GHz	35 km	5 km
15 GHz	30 km	5 km
18 GHz	25 km	4 km
23 GHz	20 km	3 km
32 GHz	10 km	1 km
38 GHz	6 km	1 km

It has come to CITC's attention that some countries conduct an EMC assessment as part of the fixed link licence application process. The purpose of this analysis is to try and minimize interference between links. This analysis is either done by the applicant or the regulator and can be time-consuming leading to longer application times.

CITC has recently published a Draft "Spectrum Outlook for Commercial and Innovative Use 2021-2023" for public consultation. Section 7 has identified the frequency bands 10 - 10.5 GHz, 27.5 - 29.5 GHz and 71-76 paired with 81-86 GHz for potential future light licensing in which there would be reduced burden on license applications (for example, it might be that a simple registration would be required rather than a full license application). Some of these bands could be used for fixed applications.

It is the practice in some countries to assign a 'block' of fixed link spectrum to users with heavy demand. In these cases the user is free to plan links within their defined block, in the knowledge that there will be no other users in their frequency band. This can speed up the time required to implement fixed links, but

requires that the organisation with the block is capable of managing their fixed link assignments and that they use their frequencies efficiently.

10. Does the current fixed link length policy constrain your use in any way?
    a) If 'yes', please explain in what way
11. Do you consider the link length policy when planning your links?
12. What other considerations do you follow when planning your links?
13. Do you find the fixed link licensing process straightforward?
    a) If not, how would you improve it? Please give details.
14. Do you think that a frequency compatibility assessment should be required for fixed link frequency assignments?
    a) Who should be responsible for this, the applicant or CITC?
    b) How do you think that these analyses should be conducted?
15. Would you support the use of light licensing where there was increased flexibility to use the spectrum for fixed applications in some of these frequency bands?
16. How would you propose that light licensing of these frequency bands could be handled to ensure equal access for everyone?
17. **Would you prefer to license links within your own 'block' of frequencies (block** assignment), or on a link-by-link basis? Please justify and elaborate your answer.
    a) If yes, which frequency bands would you prefer the block assignments to be in?
18. If you were to have a block of frequencies for your fixed links, how would you ensure that your block was used efficiently?
19. On what basis would you be willing to share a block assignment with other users?

Future Plans

It is important that CITC consider not just current needs for fixed links, but also take into account how demand will change over the coming years. The future policy for fixed links needs to be one which is robust to any changes that are likely to take place. There are many issues which could lead to changes in demand for fixed link frequencies, some of these are technological (i.e. with the fixed link technology itself), some of these may be related to other areas of ICT such as the move to 5G which may result in the need for the clearance of some bands, or changes in demand or bandwidth of fixed link connections. We therefore seek your views on how these changes may play out in Saudi Arabia.

20. How do you foresee your demand for fixed point-to-point links changing in the next 5 years (i.e. increasing, decreasing)? Please provide details including

    a) Bands you expect changes in?

    b) Expected number of links in each bands?

    c) Expected area?

    d) Purpose of using each band?

    e) Any other details that might help understanding future needs.

21. What changes in technology do you foresee which may change your demand for, or your use of, fixed links? For Example

    - Increased fiber availability
    - Full-duplex operation
    - Cross-polar interference cancellation
    - 5G roll-out
    - In-band backhaul
    - Different fixed link topologies
    - Active beamforming
    - Massive MIMO
    - Changes in demand for fixed wireless access
    - Wider bandwidth fixed links
    - Changes in fixed wireless access technology
    - Higher modulation rates.

22. Have you considered using fiber instead of fixed links?

    a) If 'yes', in what circumstances would you choose fiber instead of a fixed link?

    b) If 'no', what stops you using fiber?

Fixed Wireless Access

Fixed Wireless Access (FWA) is one application of point-to-multipoint links. The provision of FWA is likely to change significantly with the introduction of 5G, both in terms of the extent of deployment, and the need for some frequency bands to be used for FWA services (e.g. the 26 GHz band). CITC therefore wishes to understand the current deployment of FWA in Saudi Arabia and how this will change in the future in order that suitable decisions can be taken which will support this application in addition to other uses of fixed links.

23. Please describe your current deployment of Fixed Wireless Access including details the following:
    a) Bands you use.
    b) Areas you cover.
    c) Number of base station site you have.
    d) Number of subscribers you serve.
24. How should any conflict between demand for spectrum for Fixed Wireless Access and demand for other services such as point-to-point links or 5G systems be handled?
25. How do you foresee your demand for fixed wireless access links changing in the next 5 years (i.e. increasing, decreasing)? Please provide details including which bands you expect changes in.
26. Which frequency bands do you foresee a need for to provide Fixed Wireless Access services in the future?

Interference Issues

Each year, on average, CITC handles around 10 complaints of interference to fixed links. This is relatively small compared to the total number of links in operation however each complaint requires CITC to conduct an investigation and may require the affected link to be re-tuned to a different frequency. Whilst CITC is aware of those interference complaints which it has responded to, it is important to understand whether those who were affected were satisfied with the process, and, in addition, whether there have been other complaints which have not been reported, have been transitory, or which users have rectified themselves. This will help us to improve the services we provide.

27. Have you experienced any interference on your fixed links?

    If yes,

    a) What was the reason for the interference?

    b) Was it resolved to your satisfaction?

    c) In your opinion, what is the best mitigation to avoid interference?

28. In your experience, how could the interference resolution process be improved?

Annex

The following table lists the frequency ranges currently in use for fixed links in Saudi Arabia.

Band	Frequency Range (MHz)	Duplex Spacing	Channel Raster	P2P	P2MP	ITU Reference
2 GHz	2032.5 - 2102.5 2207.5 - 2277.5	175 MHz	3.5 MHz	✓		F.1098 Annex 10
4 GHz	4418 - 4670 4730 - 4982	312 MHz	28 MHz	✓		F.1099
Lower 6 GHz	5945.2 - 6152.75 6197.24 - 6406.79	252.04 MHz	29.65 MHz	✓		F.383
Upper 6 GHz	6440 - 6750 6780 - 7090	340 MHz	10 MHz	✓	✓	F.384
Lower 7 GHz	7128 - 7261 7289 - 7422	161 MHz	7 MHz	✓		F.385 (Annex 1 and Annex 5)
			14 MHz			
			28 MHz			
Mid 7 GHz	7253 - 7379 7414 - 7547	161 MHz	3.5 MHz	✓		
			7 MHz			
			14 MHz			
			28 MHz			
		154 MHz	28 MHz	✓		
Upper 7 GHz	7428 - 7568 7589 - 7722	161 MHz	7 MHz	✓		
			14 MHz			
			28 MHz			
		154 MHz	28 MHz	✓		
8 GHz	7736.5 - 7955.25 8020 - 8266.57	283.5 MHz	7 MHz	✓		F.386 (Annex 2 and Annex 6)
			14 MHz			
			28 MHz			
		311.32 MHz	29.65 MHz	✓		
10 GHz	10182 - 10206.5	350 MHz	3.5 MHz	✓		F.747 (Annex 3)

	10532 - 10556.5					
11 GHz	10715 - 11155 11245 - 11685	530 MHz	14 MHz 28 MHz 40 MHz	✓		F.387 (Annex 4 and Annex 5)
13 GHz	12754.5 - 12971.5 13020.5 - 13237.5	266 MHz	7 MHz 14 MHz 28 MHz 56 MHz	✓		F.746
15 GHz	14502.75 - 14921 14922.75 - 15341	420 MHz	3.5 MHz 7 MHz 14 MHz 28 MHz 56 MHz	✓		F.636
18 GHz	17713.75 - 18662.5 18723.75 - 19762.5	1010 MHz	13.75 MHz 27.5 MHz 55 MHz	✓		F.595 (Annex 4)
23 GHz	21225.75 - 22342.25 22457.75 - 23574.25	1232 MHz	3.5 MHz 7 MHz 14 MHz 28 MHz 56 MHz	✓		F.637 (Annex 1 and Annex 2)
	22011.5 - 22585.5 23019.5 - 23593.5	1008 MHz	7 MHz 14 MHz 28 MHz 56 MHz	✓		
25 GHz	24563 - 25431 25571 - 26437	1008 MHz	28 MHz	✓	✓	F.748 (Annex 1)
28 GHz	27562.5 - 28430.5 28570.5 - 29438.5	1008 MHz	28 MHz	✓	✓	F.748 (Annex 2)
32 GHz	31818.5 - 32567.5	812 MHz	7 MHz	✓		F.1520 (Annex 1)

	32630.5 - 33379.5		14 MHz			
			28 MHz			
			56 MHz			
38 GHz	37059.75 - 38176.25 38319.75 - 39436.25	1260 MHz	3.5 MHz	✓		F.749 (Annex 1)
			7 MHz			
			14 MHz			
			28 MHz			
			56 MHz			
80 GHz	71062.5 - 75937.5 81062.5 - 85937.5	10000 MHz	125 MHz	✓		F.2006
			250 MHz			


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