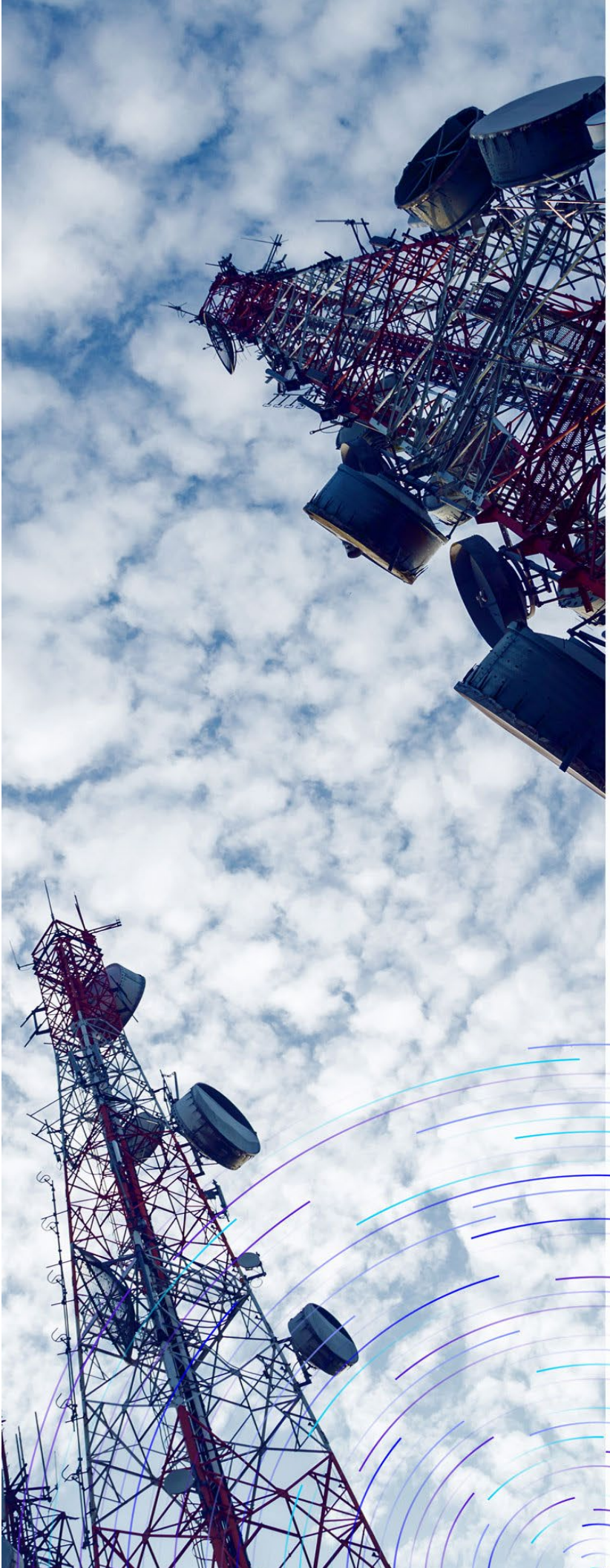


هيئة الاتصالات وتقنية المعلومات
Communications & Information Technology Commission

Fixed Radio Service: Frequency Allocation and Use Regulation for Wireless Links

PUBLIC CONSULTATION

Publishing Date: 21/9/2021

Closing Date for Responses: 21/10/2021

Table of Contents

Preamble - How to Respond & Next Steps

Introduction

The Communications and Information Technology Commission (CITC) is responsible, in accordance with the Telecommunications Act[1], Telecom Act Bylaw[2] and CITC Ordinance; for managing radio spectrum for all users in the Kingdom of Saudi Arabia.

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 "Fixed Radio Service: Frequency Allocation and Use Regulation for Wireless Links". This regulatory document regulates the use of the fixed radio service.

Scope and Objective

The purpose of this public consultation is to provide the relevant interested parties with an opportunity to submit their views and comments on the document titled "Fixed Radio Service: Frequency Allocation and Use Regulation for Wireless Links". This document was prepared to achieve the vision of CITC to unlock the potential of radiocommunication in Saudi Arabia, in order to secure a smarter and safer future by managing spectrum effectively and efficiently.

Submitting Comments

Participants who wish to submit their views/comments on this Public Consultation Document must submit them to CITC no later than 21/10/2021, corresponding to 15/3/1443 H. To participate in this consultation process, stakeholders are requested to provide their views/comments in the format shown below.

[1] https://www.citc.gov.sa/ar/RulesandSystems/CITCSystem/Documents/LA_001_%20A_Telecom%20Act.pdf

[2] https://www.citc.gov.sa/en/RulesandSystems/bylaws/Documents/LA_005_%20E_Telecom%20Act%20Bylaw.pdf

Section #	Question # (if applicable)	Response & Comments

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.
- By mail (paper copy and electronic) to the following postal address: 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 interested parties nationally and internationally, including individuals, public organizations and commercial entities to engage in this process by submitting their views/comments. CITC encourages participants to provide detailed comments supported by relevant data, analysis, benchmarking studies and any other supporting information. CITC will take all views/comments into consideration during its deliberation process, but CITC is under no obligation to adopt the comments or proposals of any participant. Please note that all responses provided to CITC will be treated in confidence and will not be published.

1. Background

Following a previous public consultation concerning fixed wireless links[3], CITC has conducted an extensive exercise of research and analysis. These activities are intended to lead to improvements in the availability, quality and applicability of fixed wireless links usage across the Kingdom of Saudi Arabia. The activities conducted by CITC include an international benchmarking exercise to identify how other countries manage fixed wireless links, and a detailed assessment of the current situation regarding fixed wireless links in KSA.

As a result of this review of fixed wireless links, a number of actions have been identified which are necessary in order to improve fixed wireless link flexibility, availability and quality of service. CITC therefore intends to:

- Simplify band arrangements (such as withdrawing channel rasters which are no longer required).
- Introduce wider bandwidth channels in several bands to enable the higher bandwidth connections necessary to keep pace with modern telecommunication services.
- Re-organise a number of channel plans in some bands where legacy assignments have led to inefficient, overlapping frequency arrangements which reduce frequency availability and increase the likelihood of interference.
- Offer light licensing in some fixed wireless links frequency bands to provide licensees with options which may speed the roll-out of services.
- Clear some bands of fixed wireless links in order to permit the introduction of license exempt, and lightly licensed services, and for future use for IMT (5G).
- Deal with assignments which do not follow the correct channel arrangements.

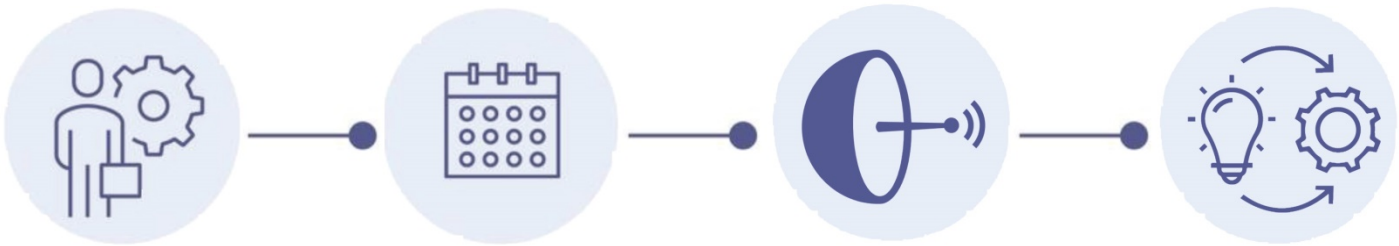
[3] https://www.citc.gov.sa/en/new/publicConsultation/Pages/144203.aspx

- Modify the link length policy to provide a more flexible approach to the use of the fixed wireless link frequency bands.
- Make a number of minor changes to the application form for fixed wireless links, to bring them into line with international best practice.
- Collect and update information relating to fixed wireless link frequencies, to ensure the accuracy of CITC's database.

This document sets out CITC's proposals for these changes, including their implementation timescales, as an action plan. In addition, it provides the updated fixed radio service frequency allocation and use regulations document which will result from these changes. It is organized as follows:

- Section Error! Reference source not found. provides CITC's proposed action plan for fixed wireless links;
- Section 2 sets out CITC's proposed fixed radio service frequency allocation and use regulations document.

The figure below sets out the next steps and timescales in this Public Consultation.



21/9/2021	21/10/2021	Q4 2021	Q1 2022
Publication of Consultation	Responses to Public Consultation Close	Update the Fixed Radio Service: Frequency Allocation and Use Regulation for Wireless Links	Implementation transition plan

2. Proposed Action Plan

In this section we identify the actions to improve fixed wireless link services in KSA and the timetable for their change or introduction.

2.1. Process and timing for changes to channel arrangements

2.1.1. The process for the withdrawal of any channel arrangements affected by these decisions will be as follows:

- These channel arrangements will be removed from the table of fixed wireless link frequency arrangements forthwith.
- No new assignments using these arrangements will be made from 1 January 2022.
- Any existing assignments using these arrangements may continue to operate until 31 December 2022, after which licenses will not be renewed.

2.1.2. The process for the introduction of any new frequency arrangements will be as follows:

- These channel arrangements will be added to the table of fixed wireless link frequency arrangements forthwith.
- New assignments using these arrangements will be available from 1 January 2022.

2.1.3. For any users requiring re-farming, the following process will be followed:

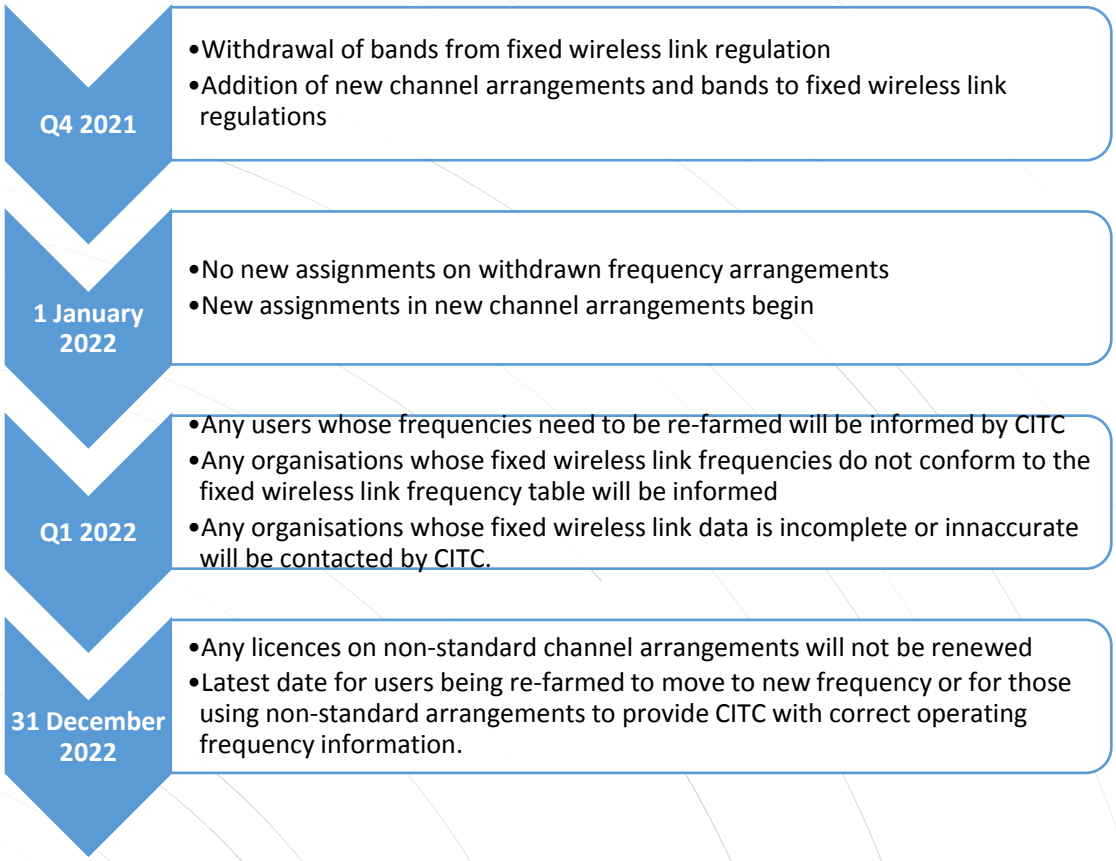
- Any users whose license is affected by the re-farming will be informed by CITC by Q1 2022. Users will be offered the option either to continue to operate until 31 December 2022, or to re-farm to a new frequency.
- Any users who choose not to be re-farmed to a new frequency will have their licenses terminated on 31 December 2022.

- Any users who choose to be re-farmed to a new frequency will have until 31 December 2022 to apply for, and migrate to, the new frequency.

2.1.4. Updating of CITC fixed wireless link database:

- CITC plans to conduct a data cleansing activity on its fixed wireless link frequency database. CITC may therefore approach any organization whose fixed wireless link license data appears incomplete or otherwise inaccurate by Q1 2022. These organisations will have until 31 December 2022 to provide updated information or may face the termination of their license.

The key dates at which different actions will be taken are summarized in the diagram below.



Q 1: *Do you agree with the proposed process and timetable for the withdrawal, re-farming and introduction of any modified arrangements?*

2.2. Correction of non-standard assignments

There are a number of assignments across a range of fixed wireless links frequency bands which do not currently match with CITC's fixed wireless links bands and channel arrangements. Some of these have non-standard duplex separations; others have non-standard emission bandwidths. In most cases, a small amendment to the operating frequency or duplex separation, or the modification of the license to adopt a standard bandwidth channel will correct these anomalies. It is also possible that some of these instances are cases where the information previously provided to CITC is incorrect.

Any such assignments have the potential to cause interference to fixed wireless links which are operating in-line with the published band plans due to channel overlaps, and they reduce the availability of the band by blocking out multiple channels.

CITC intends to begin a programme of re-assignment of any fixed wireless links which do not meet the published band plans. Users whose assignments are not in-line with the table of fixed wireless link frequency bands will be refarmd following the re-farming process set out in section 2.1.

Q 2: *Do you agree that CITC should take action to correct these legacy assignments?*

2.3. Withdrawal of low bandwidth channel arrangements

The current CITC fixed wireless link band plans include a number of channel arrangements which are no longer used by stakeholders, and for which there is no evidence of ongoing demand either in KSA or internationally. In these cases CITC intends to withdraw these arrangements from its fixed wireless link band plans.

The specific frequency arrangements to which this applies are identified in the table below.

Band	Low Block		Upper Block		Raster (MHz)	Duplex Separation (MHz)
	Start (MHz)	End (MHz)	Start (MHz)	End (MHz)		
15 GHz	14502.75	14919.25	14922.75	15339.25	3.5	420
23 GHz	21225.75	22342.25	22457.75	23574.25	3.5	1232
38 GHz	37059.75	38176.25	38319.75	39436.25	3.5	1260

Q 3: *Do you have any comments regarding the withdrawal of the low bandwidth arrangements in these bands?*

2.4. Introduction of wider bandwidth channels

As demand for bandwidth grows internationally, so the need for higher bandwidth backhaul is also increasing. Across a number of countries examined by CITC, higher bandwidth fixed wireless link channels are becoming more common. Also, in CITC's previous consultation on fixed wireless links[4], the responses strongly indicated a desire for wider bandwidth links.

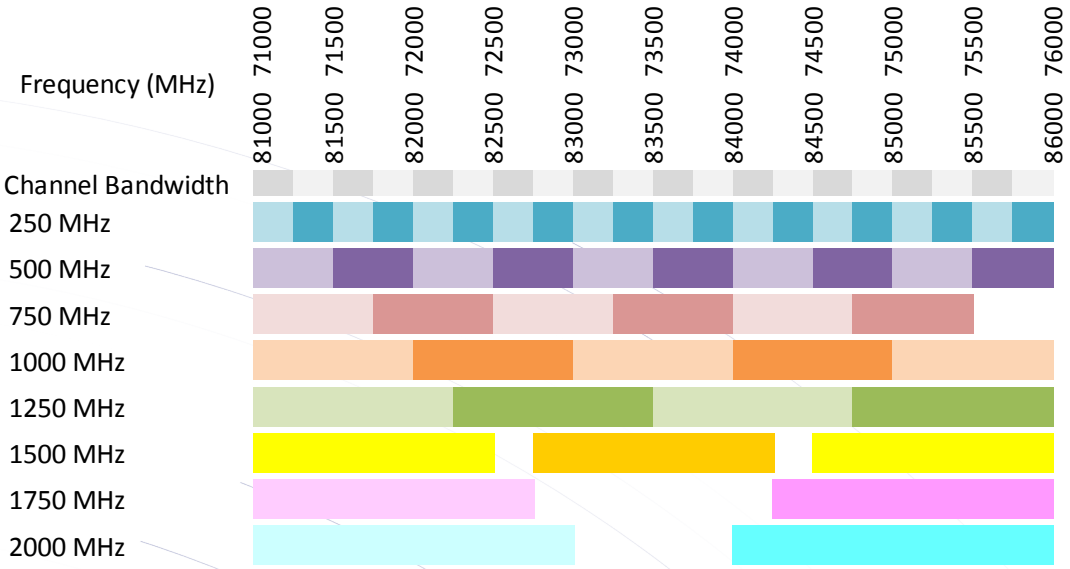
For these reasons, CITC is planning to introduce wider bandwidth links in a number of fixed wireless link bands where there is sufficient capacity to do so.

The table below sets out the new, wider bandwidth channels which CITC plans to introduce.

Band	Low Block		Upper Block		Raster (MHz)	Duplex Separation (MHz)	ITU Reference	Usage
	Start (MHz)	End (MHz)	Start (MHz)	End (MHz)				
2 GHz	2036	2099	2211	2274	7	175	F.1098 (Annex 1)	P2P
8 GHz	7761	7929	82044.5	8212.5	56	283.5	F.386 (Annex 1)	P2P
11 GHz	10735	11135	11265	11665	80	530	F.387 (Annex 1)	P2P
18 GHz	17810	18580	18820	19590	110	1010	F.595 (Annex 4 & Preferred)	P2P
23 GHz	21280	22288	22512	23520	112	1232	F.637 (Annex 2)	P2P
32 GHz	31871	32431	32683	33243	112	812	F.1520 (Annex 1 & 2)	P2P
	31927	32375	32739	33187	224	812		
38 GHz	37114	38122	38374	39382	112	1260	F.749 (Annex 1)	P2P
	37170	38066	38430	39326	224	1260		
70/80 GHz	Note 1					10000	F.2006 (Preferred)	P2P

[4] https://www.citc.gov.sa/en/new/publicConsultation/Pages/144203.aspx

Note 1: In the 70/80 GHz band there are a number of possible channel bandwidth arrangements. Currently CITC licenses only 250 MHz bandwidth channels, however it is intended to extend this to permit channel bandwidths of up to 2 GHz (i.e. 2000 MHz). The proposed channel arrangements are as identified in the figure below.



Q 4: *Do you have any comments on the addition of these wider bandwidth channels?*

2.5. Reframing of some bands

Due to historical reasons, in the 7, 8, 11, 15 and 23 GHz frequency bands, CITC has licensed frequency arrangements which overlap each other. This can lead to situations which:

- Reduce overall spectrum availability; and
- Increase the possibility of interference between users using non-aligned, overlapping frequency arrangements.

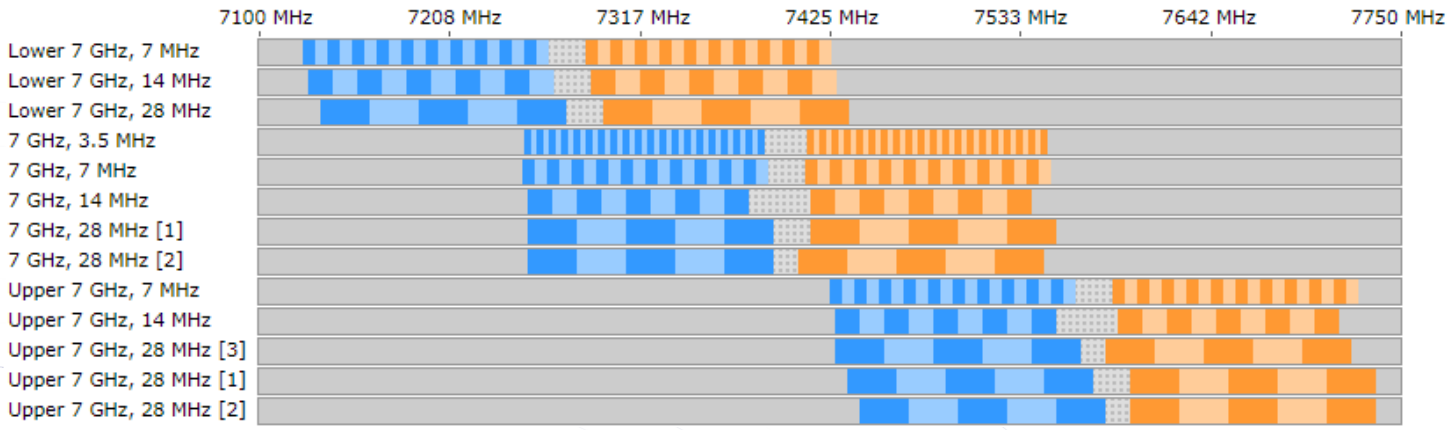
As a result of the review of fixed wireless link bands, CITC therefore proposes to rationalize the frequency usage in a number of bands in order to remove these historic misalignments.

The figures below illustrate the current situation in bands where changes are proposed. These are followed by the frequency arrangements which will be withdrawn.

Q 5: *Do you have any comments regarding the rationale for re-organizing these bands?*

2.5.1. 7 GHz Band

The figure below shows the current channel arrangements which have historically been licensed by CITC.



In addition to a lower and upper arrangement, there is also a mid arrangement. This mid arrangement overlaps with both the upper and lower arrangements. An assignment in this mid arrangement will therefore block out three assignments in total (one in each of the low, mid and upper arrangements), reducing channel availability and increasing the potential for interference. It was also found that this mid arrangement was not in use in the other countries benchmarked.

In addition, there are multiple overlapping arrangements with 28 MHz channel widths in the upper 7 GHz band, some of which have differing duplex separations. These arrangements will also be withdrawn to standardize the frequency arrangements in the band.

As such, CITC is proposing to withdraw the following frequency arrangements from the 7 GHz band.

Band	Low Block		Upper Block		Raster (MHz)	Duplex Separation (MHz)	Reason for Removal
	Start (MHz)	End (MHz)	Start (MHz)	End (MHz)			
Mid 7 GHz	7253	7386	7414	7457	3.5 & 7	161	Mid arrangement
	7260	7372	7421	7533	14	161	Mid arrangement
	7267	7379	7428	7540	28	161	Mid arrangement
	7267	7379	7421	7533	28	154	Mid arrangement

Band	Low Block		Upper Block		Raster (MHz)	Duplex Separation (MHz)	Reason for Removal
	Start (MHz)	End (MHz)	Start (MHz)	End (MHz)			
Upper 7 GHz	7442	7554	7596	7708	28	154	Overlapping arrangement
	7456	7568	7610	7722	28	154	Overlapping arrangement

Q 6: *Do you have any comments regarding the proposed withdrawal of these 7 GHz channel arrangements?*

Note that there are a number of assignments which operate on the mid 7 GHz frequency arrangement which can be re-assigned frequencies in the lower 7 GHz bands, such a change only requiring minimal re-tuning of frequencies. Examples of frequencies which will be re-tuned in this way are given in the table below.

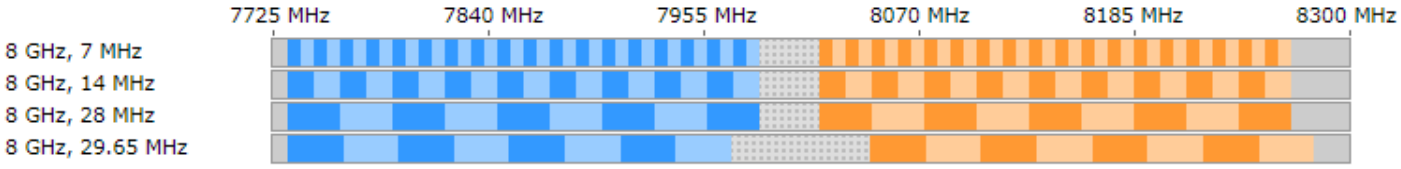
Original 'mid' 7 GHz arrangement		New 'lower' 7 GHz arrangement		Channel widths supported	Change required
Low block (MHz)	Upper block (MHz)	Low block (MHz)	Upper block (MHz)		
7253	7414	7254	7415	7 MHz	1 MHz frequency increase
7260	7421	7261	7422	7 and 14 MHz	
7267	7428	7261	7422	7, 14 and 28 MHz	6 MHz frequency decrease
7267	7421	7261	7422	28 MHz	6 MHz frequency decrease and change to duplex separation

Licensees on these frequencies may prefer to re-tune to the alternative frequency arrangements rather than have their licenses withdrawn.

Q 7: *Will you be affected by the proposed changes in the 7 GHz band?* ***If so, please explain to what extent.***

2.5.2. 8 GHz Band

The figure below shows the current channel arrangement in the 8 GHz band



The band includes both channel arrangements based on multiples of 7 MHz as well as one based on 29.65 MHz channel bandwidths. These overlapping arrangements are sub-optimal as each 29.65 MHz channel will cause interference to multiple channels based on the 7 MHz arrangement.

CITC's national frequency plan (NFP) for this band states that it follows ITU-R Recommendation F.386. This recommendation states:

> *"Administrations currently using channel arrangements based on the 29.65 MHz raster are encouraged, in the future, to migrate to this more efficient 28 MHz and sub-multiples channel arrangement"*

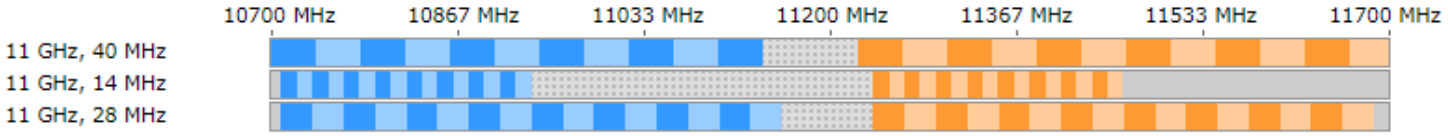
As such, CITC is proposing to withdraw the following frequency arrangements from the 8 GHz band.

Band	Low Block		Upper Block		Raster (MHz)	Duplex Separation (MHz)
	Start (MHz)	End (MHz)	Start (MHz)	End (MHz)		
8 GHz	7747.7	7955.25	8059.02	8266.57	29.65	311.32

Q 8: *Do you have any comments on the withdrawal of this 8 GHz channel arrangement?*

2.5.3. 11 GHz Band

The figure below shows the current channel arrangement in the 11 GHz band



The band includes both channel arrangements based on multiples of 14 MHz as well as one based on 40 MHz channel bandwidths. As with the previous bands, these overlapping arrangements are sub-optimal, reducing channel availability and increase the possibility of interference between users. Benchmarking has identified the 40 MHz arrangement as being the most common internationally. Further, over 90% of assignments in the band use the 40 MHz channel arrangement, the remainder of which are already reducing overall channel availability.

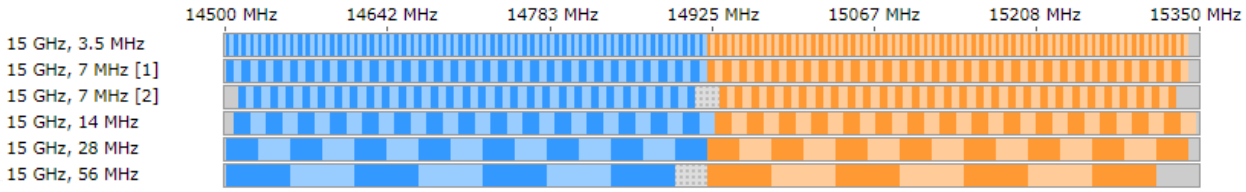
As such, CITC is proposing to withdraw the following frequency arrangements from the 11 GHz band.

Band	Low Block		Upper Block		Raster (MHz)	Duplex Separation (MHz)
	Start (MHz)	End (MHz)	Start (MHz)	End (MHz)		
11 GHz	10716	10926	11246	11456	14	530
	10723	11143	11253	11673	28	530

Q 9: *Do you have any comments on the withdrawal of these 11 GHz channel arrangements?* ***If you are impacted, what are the specific obstacles to the change of plan?***

2.5.4. 15 GHz Band

The figure below shows the current arrangement of channels in the 15 GHz band.



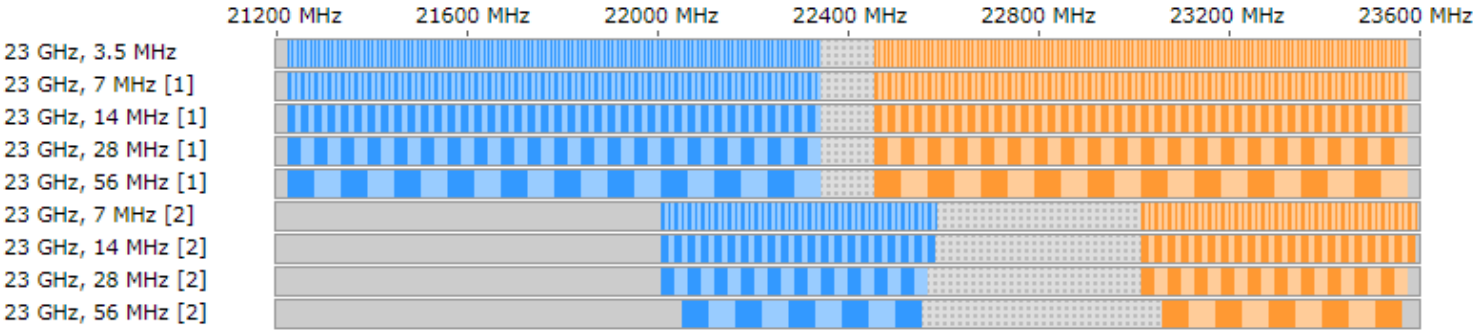
The 15 GHz band has two arrangements for 7 MHz channel bandwidths. Only one of these arrangements is recommended in ITU-Recommendation F.636, specifically where 3.5 MHz bandwidth channels are not in use. As such, CITC is proposing to withdraw one of the 7 MHz arrangements as detailed in the table below.

Band	Low Block		Upper Block		Raster (MHz)	Duplex Separation (MHz)
	Start (MHz)	End (MHz)	Start (MHz)	End (MHz)		
15 GHz	14515	14907	14935	15327	7	420

Q 10: *Do you have any comments regarding the withdrawal of this 15 GHz channel arrangements?*

2.5.5. 23 GHz Band

The figure below shows the current channel arrangement in the 23 GHz band



There are two significantly overlapping channel arrangements, one with a 1232 MHz duplex separation, and one with a 1008 MHz duplex separation. The arrangement with the 1008 MHz separation is only intended for countries which do not have access to the frequency range 21.2 to 22 GHz for fixed wireless links. Given that this spectrum is available in Saudi Arabia, and given that the arrangement with 1232 MHz duplex separation has significantly more available channels, the arrangement with 1008 MHz duplex separation will therefore be withdrawn.

As such, CITC is proposing to withdraw the following frequency arrangements from the 23 GHz band.

Band	Low Block		Upper Block		Raster (MHz)	Duplex Separation (MHz)
	Start (MHz)	End (MHz)	Start (MHz)	End (MHz)		
23 GHz	22011.5	22585.5	23019.5	23593.5	7	1008
	22015	22575	23023	23583	14	1008
	22022	22554	23030	23562	28	1008
	22078	22526	23086	23534	56	1008

Q 11: *Do you have any comments on the withdrawal of these 23 GHz channel arrangements?*

2.6. Introduction of license exempt and light licensing in some bands

CITC's spectrum outlook[5] and a recent public consultation "Radio Spectrum Allocation and Use Regulation for WLAN Applications"[6] have identified a number of frequency bands which are being investigated for light licensing including for high powered WLAN, and plans to license exempt spectrum for low powered WLAN. Some of these bands are currently used for fixed wireless links (point-to-point and point-to-multipoint). A separate consultation is examining the issues surrounding the spectrum light licensing regime[7], however as a result of that consultation, the frequency arrangements available for fixed wireless links are likely to change.

License exempt use and light licensed use are on a non-interference basis, meaning that light licensed users must not cause interference to any other users, and must not claim protection from any interference caused by other users. The difficulty of operating a protected service in a band which is heavily used by users whose location may not be known (such as the current 2.4 GHz WiFi band) is significant. Protection could be provided by geographic exclusion zones, by restricting access to certain frequencies, or by imposing transmission requirements so severe that the new technology would be unable to provide a useful service. Where license exempt services operate in a band, CITC has no knowledge of the location or technical details of the use of license exempt devices as these do not require registration and if a complaint is received by CITC of interference to the incumbent user, there is no way that CITC would be able to quickly or straightforwardly identify the interferer. CITC would be forced to conduct an extensive monitoring investigation which, due to the heavy use of the band, may still not reveal the exact location of the interferer. Under the proposed light licensing regime, CITC will have a register of users, however there

[5] https://www.citc.gov.sa/en/mediacenter/pressreleases/Pages/2021033001.aspx

[6] https://www.citc.gov.sa/en/new/publicConsultation/Pages/144207.aspx

[7] https://www.citc.gov.sa/en/new/publicConsultation/Pages/144301.aspx

may be several potential interferers and it may require significant investigation by CITC to identify the source of any interference.

As such, it is not economically feasible to provide protection to any services operating in spectrum set-aside for license exempt use. For light licensing, and in the longer term, a database will be used to assess access to bands where incumbent (i.e. fixed wireless link) users are present which will provide some protection but for the time being, CITC initially intends to mitigate against interference to fixed wireless links by either removing access to bands for fixed wireless links, or initially segregating bands into licensed and lightly licensed segments.

Q 12: *Do you agree with the reasons behind the proposed changes?* ***Are there other methods of sharing between license exempt and fixed wireless links which CITC should consider?***

The following changes are therefore being proposed:

- Access to the 6 GHz band for fixed wireless links is being withdrawn as it is proposed that this will be a license exempt and lightly licensed band. Existing assignments in the band will therefore either cease or be re-farmed to other bands. The withdrawal of use of the band will follow the same steps and timetable identified for the withdrawal of other bands as per section 2.1.

Q 13: *Will you be affected by the withdrawal of the 6 GHz band?* ***If so, please provide details of how you will be impacted.***

- Access to the 10 GHz band for fixed wireless links is being withdrawn as it is proposed that this will be a lightly licensed band. Existing fixed assignments in the band will therefore either cease or be re-farmed to other bands. The withdrawal of use of the band will follow the same steps and timetable identified for the withdrawal of other bands as per section 2.1.

Q 14: *Is there an ecosystem of equipment for use for light licensed purposes at 10 GHz? In which frequency range does this operate?*

- Access to the 70/80 GHz band will be made for lightly licensed use through a database approach. While we are automating the process, we will continue to allow applications for fixed wireless links on link-by-link basis (in either all or part of the band) such that there are no delays to the deployment of current users.

Q 15: *Is CITC's proposed approach to access the 70 and 80 GHz band reasonable? Do you believe that it is necessary to wait for the database to provide light licensed access to the whole band?*

2.7. Re-farming of bands for future 5G use

CITC's spectrum outlook has identified the 25 GHz band as one which will be auctioned for IMT (5G) services. Existing users of the band will therefore need to be re-farmed in order to permit the full band to be used for 5G. In addition, CITC has identified the 28 GHz band for lightly licensed use, based on the use of 5G technologies. This band will also need to be cleared of incumbent fixed wireless link use in order to permit these new lightly licensed services to access the spectrum.

As such, CITC is proposing to take the following actions:

- Access to the 25 GHz band for fixed wireless links is being withdrawn as it is proposed that this will be auctioned for IMT (5G) services. The withdrawal of use of the band will follow the same steps and timetable identified for the withdrawal of other bands as per section 2.1.
- Exclusive access to the 28 GHz band for fixed wireless links is being withdrawn as it is proposed that this will be a lightly licensed band for short-range 5G applications. The withdrawal of use of the band will follow the same steps and timetable identified for the withdrawal of other bands as per section 2.1.

Q 16: *Will you be affected by the withdrawal of the 25 or 28 GHz bands for fixed wireless links?* ***If so, please provide details of how you will be impacted.***

2.8. Changes to the application form

Following research by CITC, it is proposed that a number of minor changes will be made to the application form used for fixed wireless links. These changes are as follows:

- A requirement to provide details of the equipment's frequency tolerance will be removed;
- The requirement to provide the manufacturer and model number of the transmitters, receivers and dishes in use will be added.

These changes will be implemented forthwith.

Q 17: *Do you have any additional comments on the proposed changes to the fixed wireless link application form?*

2.9. Changes to the link length policy

The purpose of CITC's fixed wireless link length policy is to ensure that lower frequency bands are reserved for longer length links. This is an efficient use of the spectrum as the propagation characteristics at higher frequencies makes it difficult to provide reliable long distance links. Having reviewed the situation in several benchmark countries, a number of small changes are being proposed:

- The upper link length requirement is being removed, and instead replaced by a maximum e.i.r.p. This provides greater flexibility for the use of the fixed wireless link bands (i.e. where longer line-of-sight paths may exist) whilst protecting all users from interference caused by the use of excessive power.
- The minimum link length categories are being rationalized in order to ensure that all bands are covered. The previous policy specified particular minimum lengths for specific bands and as such, in theory, not all bands were covered. This change ensures that all current (and any future) fixed wireless link bands have a clearly defined minimum link length.

- CITC will remove the minimum link length requirement of 1 km for frequencies over 40 GHz. This is in line with the situation in many benchmark countries and will permit the use of the higher frequency fixed wireless link bands for shorter paths.

These changes will take effect forthwith. The revised link length / e.i.r.p. policy can be found in the fixed wireless link policy, in section 3.4.5 of this consultation document.

Q 18: *Do you have any additional comments on the proposed revision to the fixed wireless link length policy?*

Q 19: *Do you have any comments regarding the proposed maximum e.i.r.p. limit?*

2.10. Summary of all proposed actions

The table below sets out all of the fixed wireless link bands affected by this action plan, and summarizes the changes being proposed.

Band/Topic	Proposed change
2 GHz	• Addition of 7 MHz channel bandwidths
6 GHz	• Withdrawal of the use of the band for fixed wireless links • Introduction of license exempt and light licensed use • Re-farming existing fixed wireless link assignments
7 GHz	• Withdrawal of the 'mid' channel arrangements • Withdrawal of overlapping 28 MHz channel arrangements in the upper 7 GHz band • Re-farming existing fixed wireless link assignments following the withdrawn channel arrangements
8 GHz	• Withdrawal of the 29.65 MHz channel bandwidth • Introduction of 56 MHz channel bandwidth • Re-farming existing fixed wireless link assignments following the withdrawn channel arrangements
10 GHz	• Withdrawal of the use of the band for exclusively assigned fixed wireless links • Introduction of light licensed use • Re-farming existing fixed wireless link assignments
11 GHz	• Withdrawal of 14 and 28 MHz channel bandwidths • Introduction of 80 MHz channel bandwidth • Re-farming existing fixed wireless link assignments following the withdrawn channel arrangement

Band/Topic	Proposed change
15 GHz	• Withdrawal of overlapping 7 MHz channel arrangement • Re-farming existing fixed wireless link assignments following the withdrawn channel arrangement
18 GHz	• Introduction of 110 MHz channel bandwidth
23 GHz	• Withdrawal of 1008 MHz duplex separation channel arrangement • Introduction of 112 MHz channel bandwidth • Re-farming existing fixed wireless link assignments following the withdrawn channel arrangement
25 GHz	• Withdrawal of the use of the band for fixed wireless links • Reframing existing fixed wireless link assignments • Will be auctioned for 5G services
28 GHz	• Withdrawal of the use of the band for exclusively assigned fixed wireless links • Introduction of light licensed use • Re-farming existing fixed wireless link assignments
32 GHz	• Introduction of 112 and 224 MHz channel bandwidths
38 GHz	• Introduction of 112 and 224 MHz channel bandwidths
60 GHz	• Introduction of light licensed use (note: not currently a fixed wireless link band)
70/80 GHz (E-band)	• Introduction of light licensed use • Introduction of wider channel bandwidths (up to 2 GHz)
94 GHz (W-band)	• Introduction of light licensed use (note: not currently a fixed wireless link band)
Correction of non-standard assignments	• Users whose assignments are not in-line with the channel plan mentioned in section 3.3 of this document will be Re-farmed
Application form	• The requirement to provide details of the equipment's frequency tolerance will be removed; • The requirement to provide the manufacturer and model number of the transmitters, receivers and dishes in use will be added
Link length policy	• Withdrawal of maximum link length • Introduction of maximum e.i.r.p.
Data cleansing	• Re-farming of users whose assignments do not meet the fixed wireless link band plan • Collection of missing or potentially erroneous data to ensure CITC's fixed wireless link license database is accurate

Q 20: *Do you have any additional comments on the proposed action plan?*

3. Proposed Fixed Radio Service Frequency Allocation and Use Regulations

3.1. Introduction

This document is issued by the Communications and information Technology Commission (CITC) in accordance with its responsibility established under the Telecommunications Act[8] and the Bylaw to the Telecommunications Act[9] to ensure the efficient management of the radio spectrum. It establishes the frequency allocation and use regulations that apply to the use of the frequency bands for wireless links in the Kingdom of Saudi Arabia. The regulations set out in this document are designed to ensure that equipment used by wireless links is operated in accordance with these regulations. The objectives for this document are to:

- Promote optimum utilization of the national spectrum resource.
- Ensure equitable access to spectrum by seeking a balance between complementary technologies and services.
- Support introduction of new services and spectrum uses for the benefit of the Kingdom, including promotion of emerging radio technologies.
- Ensure effective usage of frequencies with an acceptable level of interference.
- Ensure clarity and transparency of procedures.
- Ensure principles of equality and non-discrimination.

In order to meet these objectives, CITC is guided by the following principles:

- Promoting release and utilization of spectrum for the wider benefit of The Kingdom.

[8] https://www.citc.gov.sa/ar/RulesandSystems/CITCSystem/Documents/LA_001_%20A_Telecom%20Act.pdf

[9] https://www.citc.gov.sa/en/RulesandSystems/bylaws/Documents/LA_005_%20E_Telecom%20Act%20Bylaw.pdf

- Permitting the technology neutral use of spectrum where this is technically feasible.
- Promote improved spectrum utilization, including the support of shared spectrum bands under appropriate technical conditions of use to ensure coexistence of services.

In line with these objectives, CITC wishes to ensure that, so far as is possible, spectrum for the fixed wireless links:

- Is used in a way which aligns with ITU band plans and international usage arrangements.
- Is arranged in ways which ensure spectrum is efficiently used.
- Minimizes situations which could lead to potential interference between users.
- Is used appropriately ensuring the propagation characteristics of the various fixed wireless link bands are taken into account when assigning frequencies.
- Have access to a range of bands and licensing options to permit the instigation of services in a timely manner.

fixed wireless 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.

3.2. Definitions

The following definitions apply:

Fixed Service: The fixed service (or fixed radiocommunication service) provides a radiocommunication service between specified fixed points.

Point to point links: A fixed radiocommunication service between two specified fixed points.

Point to multipoint links: A fixed radiocommunication service between a central hub station and a number of fixed user stations.
Channel Raster: The separation between adjacent channels used for fixed wireless links in a given frequency band.

Duplex Separation: The different between the transmit and receive frequencies of a two-way fixed wireless link.

Exclusive Licensing: A license which provides the use of a specific frequency in a specific location to a single user.

License Exempt: The shared use of spectrum by multiple users who do not require a license to operate equipment. Technical restrictions (i.e. power and bandwidth) will apply.

Fixed Wireless Access: A commercially operated fixed radiocommunication service. May comprise either point to point, or point to multipoint connections.
Harmful Interference: Interference which seriously degrades, obstructs or repeatedly interrupts a radio communication service operating in accordance with international radio regulations issued by International Telecommunication Union (ITU).
EIRP: The Effective Isotropic Radiated Power is the actual power emitted by the antenna.
Link Length: The link length is the distance between to fixed service stations.
Light Licensing: An approach where spectrum is not exclusively assigned, but users need to register in order to have shared access to specified radio spectrum. Such approach includes:

- Registration of location of usage.
- Use of systems to reduce interference between registered users, for example, by preventing new registrations that might interfere with existing registrations.
- Use of systems that dynamically allow use, including on a time-sharing basis, to enable band sharing between users in a band.

3.3. Frequency Allcation for Fixed Wireless Links

There are 17 frequency bands that are allocated for use by fixed wireless links. This document sets out the regulations with respect to access to and use of these frequencies for the fixed wireless links.

The following table sets-out the fixed wireless links frequency bands which CITC has allocated for the licensing of fixed wireless links. Note that P2P refers to use for fixed point-to-point links, P2MP refers to fixed point-to-multipoint links and FWA refers to the fixed wireless access.

Band	Low Block		Upper Block		Raster (MHz)	Duplex Separation (MHz)	ITU Reference	Usage	Access Regime
	Start (MHz)	End (MHz)	Start (MHz)	End (MHz)					
2 GHz	2032.5	2102.5	2207.5	2277.5	3.5	175	F.1098 (Annex 1)	P2P	Exclusive
	2036	2099	2211	2274	7	175			
4 GHz	4418	4670	4730	4982	28	312	F.1099 (Annex 3)	P2P	Exclusive
Lower 7 GHz	7128	7261	7289	7422	7	161	F.485 (Preferred L+)	P2P	Exclusive
	7135	7261	7296	7422	14	161			
	7149	7261	7310	7422	28	161			
Upper 7 GHz	7428	7561	7589	7722	7	161	F.485 (Preferred H+)	P2P	Exclusive
	7435	7547	7596	7708	14	161			
	7449	7561	7610	7722	28	161			
8 GHz	7736.5	7981.5	8020	8265	7	283.5	F.386 (Annex 2)	P2P	Exclusive
	7740	7978	8023.5	8261.5	14	283.5			
	7747	7971	8030.5	8254.5	28	283.5			
	7761	7929	82044.5	8212.5	56	283.5			
10 GHz	10157.5	10290.5	10507.5	10640.5	7	350	F.747 (Annex 3)	FWA	Light Licensing
	10161	10287	10511	10637	14	350			
	10168	10280	10518	10630	28	350			
11 GHz	10715	11155	11245	11685	40	530	F.387 (Annex 1)	P2P	Exclusive
	10735	11135	11265	11665	80	530			
13 GHz	12754.5	12971.5	13020.5	13237.5	7	266	F.497	P2P	Exclusive
	12758	12968	13024	13234	14	266			
	12765	12961	13031	13227	28	266			
	12779	12947	13045	13213	56	266			
15 GHz	14504.5	14917.5	14924.5	15337.5	7	420	F.636 (Preferred 1.2)	P2P	Exclusive
	14515	14907	14935	15327	7	420			
	14515	14921	14935	15341	14	420			
	14515	14907	14935	15327	28	420			

Band	Low Block		Upper Block		Raster (MHz)	Duplex Separation (MHz)	ITU Reference	Usage	Access Regime
	Start (MHz)	End (MHz)	Start (MHz)	End (MHz)					
	14529	14865	14949	15285	56	420			
18 GHz	17713.75	18662.5	18723.75	19672.5	13.75	1010	F.595 (Annex 4 & Preferred)	P2P	Exclusive
	17727.5	18662.5	18737.5	19672.5	27.5	1010			
	17755	18635	18765	19645	55	1010			
	17810	18580	18820	19590	110	1010			
23 GHz	21227.5	22340.5	22459.5	23572.5	7	1232	F.637 (Annex 2)	P2P	Exclusive
	21231	22337	22463	23569	14	1232			
	21238	22330	22470	23562	28	1232			
	21252	22316	22484	23548	56	1232			
	21280	22288	22512	23520	112	1232			
28 GHz	27954.5	28038.5	28962.5	29046.5	28	1008	F.748 (Annex 2)	FWA	Light licensing
32 GHz	31818.5	32567.5	32630.5	33379.5	7	812	F.1520 (Annex 1 & 2)	P2P	Exclusive
	31822	32564	32634	33376	14	812			
	31829	32557	32641	33369	28	812			
	31843	32515	32655	33327	56	812			
	31871	32431	32683	33243	112	812			
	31927	32375	32739	33187	224	812			
38 GHz	37061.5	38174.5	38321.5	39434.5	7	1260	F.749 (Annex 1)	P2P	Exclusive
	37065	38171	38325	39431	14	1260			
	37072	38164	38332	39424	28	1260			
	37086	38150	38346	39410	56	1260			
	37114	38122	38374	39382	112	1260			
	37170	38066	38430	39326	224	1260			
60 GHz	57000	71000						TBD	Light licensing
70/80 GHz	71125	75875	81125	85875	250	10000	F.2006 (Preferred)	P2P	Light Licensing
	71250	75750	81250	85750	500	10000			
	71375	75125	81375	85125	750	10000			
	71500	75500	81500	85500	1000	10000			
	71625	75375	81625	85375	1250	10000			
	71750 73500 85250		81750 83500 85250		1500	10000			
	71875 75125		81875 85125		1750	10000			
	72000 75000		82000 85000		2000	10000			
94 GHz	92100	93900			100	TDD	F.2004 (Annex 1)	P2P and P2MP	Light Licensing

Q 21: *Are you interested in using the (57-71) GHz band for fixed wireless links on lightly licensed basis? If so, for what application and use cases? Please elaborate and provide technical justifications.*

Q 22: *Do you have any comments on the list of fixed wireless links bands?*

Q 23: *Are there any bands which you believe should be included on this list? If so, please provide details of which bands and why they should be included.*

Operation of fixed wireless links in frequency bands which are not included in this table will be handled by CITC on a case-by-case basis.

3.4. Regulations

These regulations set out the framework under which fixed wireless link equipment is permitted to operate in the identified frequency bands in section 3.3.

3.4.1. Eligibility

The following applicant types are eligible to use fixed wireless links:

- Governmental military organizations (i.e. defense, security)
- Mobile and fixed telecommunications service providers; for the use of their backhaul and to provide fixed connectivity for other agencies such as governmental organization and business enterprise users.

Under certain conditions, CITC might allow spectrum use for other kind of users.

Q 24: *Do you have any comments on the eligibility requirements?*

3.4.2. License Renewal and Rights of Spectrum Access

While CITC is generally in favor of license renewal to give license holders certainty for long-term investment, CITC may, at its sole discretion, choose to change the conditions of, revoke, or not to renew any licenses whenever there are reasonable justifications to do so such as:

- illegal behavior by the licensee;
- a requirement to re-farm a frequency band;
- promoting efficient spectrum use;

- a need to update technology for market, competition or environmental factors;
- international spectrum coordination; or
- meeting other policy objectives.

Furthermore, CITC may vary or withdraw the assigned spectrum at any time by giving reasonable notice. This may be required before the expiry of a spectrum license, for example to consolidate fragmented spectrum holdings within a band.

Q 25: *Do you have any comments on the license renewal, revocation and rights of spectrum access?*

3.4.3. Method of exclusive frequency assignment

CITC assigns frequencies in the available bands on a First Come First Serve (FCFS) basis according to specific link requirements (e.g. compliance with CITC band plan and link length requirements). Fixed wireless link frequencies are assigned on a link-by-link basis. The link length policy ensures that lower frequency bands are reserved for longer links. A minimum link length must be satisfied for each link. Where minimum link lengths are not satisfied, the applicant may apply again for a higher frequency band.

CITC shall aim to issue, reject, or modify fixed wireless link license applications in line with the timescales stipulated in its Service Level Agreement (SLA).

3.4.4. Rights and obligations related to spectrum use

Licensees may use the assigned spectrum subject to any geographic limitations, technical or service obligations and usage conditions as specified in the license. Licensees must ensure that their equipment is maintained in good working order, and support CITC in the investigation of interference, should such occur. In addition, licensees must inform and gain approval of CITC of any changes which impact the license including ownership, location, frequency, antenna height, power, service type, or any other issue as included in the license.

Q 26: *Do you have any comments on the rights and obligations of spectrum use?*

3.4.5. Link length policy and technical requirements

In order to ensure that spectrum is used efficiently, it is necessary to restrict the minimum path length of fixed wireless links in particular frequency bands. This ensures that lower frequency bands are reserved for uses where longer length connections are necessary. In addition, CITC shall impose a maximum e.i.r.p. limit of 55 dBW for all fixed wireless links, to ensure a controlled interference environment.

The maximum link lengths, of the allocated fixed wireless links frequency bands shall apply as shown in the table below.

Frequency Band	Minimum Path Length
Below 9 GHz	20 km
9 - 12.5 GHz	10 km
12.5 - 20 GHz	5 km
20 - 24 GHz	4 km
24 - 34 GHz	3 km
34 - 40 GHz	1 km
Above 40 GHz	No minimum path length

CITC licenses the use of a given frequency for each fixed wireless link. It does not distinguish between the polarizations. As such, the use of dual-polarisation links on a single frequency (e.g. applying XPIC) is permitted, without the need to apply for a separate license for each polarization.

Q 27: *Do you have any comments on the link length policy?*

3.4.6. Light licensing

Light licensing allows many users to share spectrum, subject to coordination measures to control interference between them or protect incumbent users. Such measures may include databases for registration of use and prevention of conflicting uses – perhaps on a dynamic basis. A range of spectrum bands have been identified by CITC for potential fixed

wireless link access under Light Licensing and these will be detailed in CITC's spectrum light licensing regulation.

The access rules for light licensed access may be more relaxed than for exclusive licensed operation but will remain consistent with the coexistence needs of other users. Equipment used for delivery and access to services under Light Licensing must comply with the rules and power limits stipulated for fixed wireless links in CITC's spectrum light licensing regulation. Fees for usage under Light Licensing will apply.

Q 28: *Do you have any comments on the impact of light licensing on fixed wireless links?*

3.4.7. Fixed Wireless Access

CITC does not intend to dedicate any spectrum solely to FWA as it can be used through the current or future IMT spectrum holdings. Furthermore, the FWA can use spectrum identified for the light licensing regime as specified in section 3.3.

3.4.8. License exmpt usage of fixed wireless links

WLAN technology may also be used to provide fixed wireless link connections on a license exempt or lightly licensed basis, subject to the technical and regulatory restrictions specified in Radio Spectrum Allocation and Use Regulation for WLAN Applications document and the spectrum light licensing regulation document. Other than this, the use of WLAN bands for fixed wireless links is not permitted.

3.4.9. EMC Analysis

CITC will conduct an electromagnetic compatibility (EMC) analysis for every fixed wireless links application. The purpose of this analysis is to examine whether a new applicant will cause interference to existing licensees. Where CITC identifies there may be the potential for interference, the new applicant may have their application refused, or an alternative frequency or frequency band, or other technical criteria may be proposed by CITC.

3.4.10. License duration

Licenses are valid for 1 year from the date of issue until the end of the Gregorian calendar year (i.e. 31 December). For licenses issued after 1 November of any year, the license will be valid until 31 December of the following year. For renewals, licenses shall cover the full calendar year.

3.4.11. Spectrum fees

Spectrum fees are applicable for the use of equipment in the fixed wireless link frequency bands. The spectrum fees are calculated based on the formula given in the "Frequency Usage Fees in the Kingdom of Saudi Arabia"[10] policy.

Q 29: *Do you have any comments on the spectrum fees?*

3.4.12. Type Approval

Fixed wireless link equipment shall be type approved by CITC prior to importation into The Kingdom. The radio interface performance shall comply with the regulations set out in this document in order to qualify for type approval and custom clearance. Also, equipment that operates in the fixed wireless links frequency bands shall comply and meet the appropriate requirements specified in the technical specifications published on CITC's website[11].

Q 30: *Do you have any comments on the type approval policy?*

3.4.13. Enforcement

If CITC detects that frequency use falls outside the terms of any authorized use, CITC will serve an enforcement notice requiring either immediate cessation of transmissions in the case of a serious deviation that could lead to harmful interference, or a correction within a given timescale for less serious deviations. Note that CITC will impose a penalty in

[10] https://www.citc.gov.sa/en/RulesandSystems/Bylaws/Pages/FinancialSpectrumPolicy.aspx

[11] https://www.citc.gov.sa/ar/RulesandSystems/RegulatoryDocuments/EquipmentApproval/Pages/Technical_Specification.aspx

accordance with Chapter 10 of the Telecoms Act for any violations of these regulations that could lead to harmful interference.

Q 31: *Do you have any comments on the enforcement rules?*

3.4.14. Data collection

CITC may, at its discretion, request data concerning the operation of fixed wireless links from licensees (both at the time of application for a license and at any time during the license validity). This information is necessary for CITC to perform its regulatory functions and will be stored in line with all data protection, security and confidentiality requirements.

3.5. Future spectrum demand

There continue to be specific spectrum needs arising from new services and technologies being introduced and CITC will work with stakeholders to ensure there is access to the appropriate spectrum bands supporting the fixed wireless links.

At times, CITC may need to re-allocate or re-farm frequencies used for fixed wireless links in order to reduce interference, optimize spectrum efficiency or meet with international obligations. In such cases, CITC will notify stakeholders of any changes with sufficient time to implement such changes and, where appropriate, may work with stakeholders to identify alternative frequency arrangements.

Q 32: *Do you have any comments on CITC's spectrum demand?*

Q 33: *Do you have any comments on CITC's arrangements for the re-distribution of frequencies?*

3.6. Maintaining this document

CITC will review and update this document as appropriate to respond to emerging uses and demands for access to spectrum used by the fixed radio service.

As part of this maintenance process, CITC will undertake consultations whenever needed in accordance with its most recent general spectrum strategy, as an important part of

promoting transparent, fair and effective spectrum management to gather information and views so as to inform a wide range of spectrum policy decisions.

Q 34: *Do you have any additional comments on the proposed fixed radio service frequency allocation and use regulations?*

Q 35: *Do you wish to make any additional comments on any of the issues raised in this consultation?*

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Communications & Information Technology Commission