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4 March 2022

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Independent Communication Authority of South Africa  
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350 Witch-Hazel Avenue  
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**CENTURION**  
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Via email: [rmakgotlho@icasa.org.za](mailto:rmakgotlho@icasa.org.za)  
Cc: [chairperson@icasa.org.za](mailto:chairperson@icasa.org.za)

Dear Mr Makgotlho

**RE: TELKOM'S SUBMISSION PERTAINING TO THE AUTHORITY'S  
NOTICE REGARDING ITS INTENTION TO CONDUCT AN INQUIRY INTO  
THE LONG-TERM SPECTRUM OUTLOOK**

Telkom SA SOC LTD ("**Telkom**") welcomes the opportunity to submit written representations on the Authority's notice regarding its intention to conduct an inquiry into the long-term spectrum outlook, as published in Government Gazette 45690 (Notice 738 of 2021), dated 24 December 2021 ("**spectrum outlook**"). Written submissions are due no later than 16h00 on 04 March 2022.

Telkom trusts that its submission will assist the Authority in appropriately revising and concluding on the matters espoused in the draft implementation plan.

Please find herewith Telkom's written submission.

Telkom SA SOC Ltd  
Submission date: 04 March 2022

Yours Sincerely

A handwritten signature in black ink, appearing to read 'Mahlangu', written over a circular stamp or seal.

**Dr Siyabonga Mahlangu**

**Group Executive: Regulatory Affairs and Government Relations**

## Submission to the Independent Communications Authority of South Africa

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### Spectrum outlook

Government Gazette No. 45690 (Notice 738 of 2021) dated 24 December 2021

## 1. Introduction

1. Telkom welcomes the opportunity to provide inputs to the Authority's draft spectrum outlook.
2. Telkom did not attempt to answer all questions. Whereas not all questions are relevant to Telkom, some are considered unrealistic to be answer within the time allowed. For example, question 9, (*"What are your forecasts for data traffic and radio frequency spectrum needed over the next 5, 10 and 20 years for each of the EFIS application layers?"*) (own emphasis) is not possible to answered due to the broad scope of the request and the amount of frequency bands and applications involved. The same applies to question 10 (*"How much spectrum is allocated to each of the EFIS application layers, and what is the economic value of spectrum used in each of the above EFIS application layers? What are the opportunity costs for current spectrum allocations for EFIS these application layers (what is the value to alternative users of these allocations)?"*).
3. The time allowed for this consultation was not sufficient due to the extend of this notice as well as considering the other consultations that took place in parallel. It must also be recognised that the mobile industry is preparing for the upcoming auction, which requires a lot of time and dedication.
4. Telkom noted that there is an overlap between the statements made and questions asked in the spectrum outlook and the recent consultation done for the implementation of the frequency migration plan, especially as it relates to IMT. The concern is that these notices are not aligned in terms of IMT bands. Telkom recommends that these be aligned.
5. Nevertheless, Telkom attempted to address key issues in this response. We trust that these inputs will assist the Authority in concluding the spectrum outlook report.

## **2. General comments**

### **2.1. Outdated data and references**

6. Several of the references and data provided in the spectrum outlook notice is out of date.
7. Telkom recommend that the latest information always be used. Where “old” data must be used for a particular reason, the relevance of such data must be reflected.
- 8.

### **2.2. NRFP-21**

9. The Authority states, in section 4 of the spectrum outlook, that the National Radio Frequency Plan 2021 (“NRFP-21”) “has been published”. According to Telkom’s understanding, NRFP-21 has not yet been published. Telkom recommends that this be concluded and prescribed before reference is made in other publications.
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### 3. Specific comments

#### 3.1. Ad section 1 (“Introduction”)

11. The Authority refers to the national frequency register and states the technical and management information that should be contained therein.
    - a. It is not clear what the national frequency register is and whether this is an internal or public document. Telkom recommends that this be clarified.
    - b. It is also indicated that the frequency information register must contain, among others, “cost involved with system implementation”. This type of information is commercial and business sensitive and is not provided to the Authority as part of the spectrum licensing process. Telkom recommends that this information not be obtained or stored. If such information is provided as part of the licensing process, it will not be relevant at the time when these systems may be considered for frequency migration, which could be a reason for obtaining such information. The need and relevance of this information as part of the national frequency register must be clarified.
  12. The Authority list a range of policy and legal factors that affect spectrum planning.
    - a. The reference to the ITU frequency allocation table, i.e. Article 5 of the Radio Regulations, are mentioned, which is correct. However, the relevant information is not limited to Article 5; many other provisions such as Resolutions and Recommendations, Articles etc. are also relevant and should be mentioned.
    - b. Telkom agrees that technical the information should be supplemented by the ITU BR IFIC. However, in addition, it is paramount that South Africa actively engaged in the associated processes namely those contained in Chapter 3 of the ITU Radio Regulations (“Coordination, notification and recording of frequency assignments and Plan modifications”). Telkom submitted the necessary information in terms of these procedures to ITU many years ago but not lately. Access to the BR IFIC is very expensive and not feasible for licensees. The Authority, in consultation with the DCDT as signatory, need to establish the necessary systems and processes to ensure that the required information is submitted to the ITU. Active engagement by ICASA (in conjunction with the DCDT) with the BR IFIC publications and its processes will also ensure that national spectrum users will be protected, and spectrum use recognized internationally.
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- c. Reference is made to “standardization policy”. This reference is not clear; Telkom recommends that the Authority elaborates in this.
  - d. In addition to the listed policy and legal factors, it is also critical to consider the market and competition. In particular with mobile, the competition in the sector greatly influences the use and need for spectrum.
13. Telkom agrees that long-term planning must include a commitment to a process of regular revision and review in which spectrum managers regularly reconsider plans in the light of developments. However, it is also critical to ensure stability in the market and for this, certainty pertaining to the use and availability of spectrum is needed. Deployment of national networks requires substantial investments and stability and certainty will allow licensee to opportunity to recoup these investments.

### **3.2. Ad section 2 (“Regulatory Framework and Policy objectives”)**

14. **Q1:** *Please comment on whether the above captures the relevant regulatory and policy aspects of long-term spectrum planning*
- a. The Authority must also include reference, as well as discussion of the National Radio Frequency Spectrum Policy<sup>1</sup>, the National Integrated ICT Policy White Paper, 2016<sup>2</sup> and the Policy on High Demand Spectrum and Policy Direction on the Licensing of a Wireless Open Access Network, 2019<sup>3</sup>.
  - b. These policies speak directly to issues pertaining to spectrum, including spectrum planning. For example, The National Integrated ICT Policy addresses issues such as open access, spectrum policy, the Wireless Open Access Network (WOAN), spectrum sharing, roles in spectrum management, etc.
  - c. If spectrum planning is used as a tool to encourage affordable broadband access, the effect of competition should also be included. Spectrum access differentiate MNO, therefor spectrum access can and should be used to level playing fields and ensure competition.

### **3.3. Ad section 3 (“Spectrum management and economic impact”)**

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<sup>1</sup> GG 33119, GN 306 of 2010, 16 April 2010

<sup>2</sup> GG 40325, GN 1212 of 2016, 3 October 2016

<sup>3</sup> GG 42597, GN 1013 of 2019, 26 July 2019

15. Reference is made to the low base of broadband coverage in South Africa, which can be attributed to, amongst others, slow roll-out of fixed-line access and delays in Local Loop Unbundling (LLU). These are outdated analysis; the emergence of fibre and wireless access has overtaken the need for LLU. Broadband coverage is high - 74% as confirmed under heading 3.2, paragraph 1.
16. **Q3:** *Please comment on the above assessment of the status quo on broadband penetration in South Africa, and what role spectrum may play in addressing the gaps identified.*
- a. The Authority refers to the view that lack of access to spectrum being a barrier to lower prices. Whereas it is true that additional spectrum could lead to lower prices, the Competition Commission stated that it is not a lack of spectrum, but the duopolistic market structure that has resulted in higher prices in mobile. It is therefore critical that the importance of effective competition be acknowledged and addressed as part of the spectrum outlook. Competition also have a direct bearing on the future spectrum requirements.
  - b. Low internet access is a sign of unaffordable internet. Vodacom and MTN has the biggest coverage and the highest network speeds (according to MyBroadband network results). This is an indication of an over priced service. Should they receive more spectrum, they may drop their prices and maintain network speeds, or keep prices the same and increase network speed. It is not a fact that more spectrum to Vodacom and MTN will reduce prices. Only more competition will result in lower prices.
17. **Q4:** *What future changes, if any, should ICASA examine with regard to the existing licensing regime to better plan for innovative new technologies and applications and allow for benefits that new technology can offer, such as improved spectrum efficiency?*
- a. Technology enhancements continuously developing and requires continuous updates of spectrum regulations. One of the biggest recent updates was the requirement for 5G to access bigger channels. This requirement to access continuous spectrum blocks of 100MHz and larger calls for a complete re-think of current spectrum assignments and planned future spectrum allocations.
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18. **Q5:** *What future emerging technologies are to be taken into consideration and which technologies will have a significant impact? When are these technologies expected to become available?*
- a. *Beam steering antennas are making positive progress, and much is still expected from this technology going forward. Opportunistic software defined radios are also well overdue for making significant contributions towards automated spectrum management*
19. **Q6:** *What and how will technology developments and/or usage trends aid in relieving traffic pressures? When are these technologies expected to become available?*
- a. Technology enhancements are part of everyday development and therefore requires continuous updates of spectrum regulations. One of the biggest recent updates was the requirement for 5G to access bigger channels. This requirement to access continuous spectrum blocks of 100 MHz and larger calls for a complete re-think of current spectrum assignments and planned future spectrum allocations.
20. **Q7:** *Are there any IoT applications that will have a large impact on the existing licence-exempt bands? If so, what bands will see the most impact from these applications?*
- a. The W-iFi bands are already experiencing an increase in IOT devices, especially with high bandwidth applications like video sharing and streaming between devices (screen cast and wireless cameras) IOT's impact on Wi-Fi going forward will just increase, requiring more Wi-Fi spectrum going forward.

**3.4. Ad section 4.1 (“Standardisation of lists of applications for different ITU radio services”)**

21. The Authority provides a process pertaining to the determination of spectrum demand outlook. As part of this process, the Authority will: “*Define questions on spectrum outlook and demand for publication in the NRFP-2021 consultation document*”. This step in the process is not clear, specifically the reference to the “NRFP-21 consultation document”. It is not clear how and when these questions on spectrum outlook and demand will be integrated into the NRFP consultation process. Telkom recommends that this be clarified.

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22. **Q8:** *Please provide your views regarding the standardization of the naming of applications in the NRFP in accordance with CEPT ECC decision 1(03) approved 15 November 2001 and its subsequent revisions*

- a. Telkom supports the standardization of naming of applications. In addition to the reasons provided, it will also facilitate the coordination of frequency sharing and compatibility studies with the work of the ITU-R study groups in preparation for WRCs within Region 1.
- b. The table containing the list of abbreviations must be corrected. "Automatic Dependant Surveillance (Aeronautical)" has been duplicated, which caused a misalignment between acronyms and their descriptions in the rows that followed.

**3.5. Ad section 4.2 ("Spectrum outlook for commercial electronic communication network services (fixed, mobile, including IMT)")**

23. The Authority states that, at the conclusion of the "current spectrum auction", 1015 MHz of spectrum will be assigned. Reference is made to GG 43768, which was published 2 October 2020. The reference to the 2020 ITA, which was reviewed and set aside by the Courts, is not clear. The current ITA is contained in GG 45628, GN 717, dated 10 December 2021. According to this ITA, an additional 406 MHz will be assigned taking the currently assigned 529 MHz to 935 MHz.

24. According to the Authority, the mobile data usage for all operators in 2020 was in the region of 7,023 PB. According to the Authority, based on a study as per ITU Report ITU-R M.2370, the mobile data for South Africa by 2020 was estimated at 562 PB. The ITU figure grossly underestimated the mobile data use in South Africa, noting the 2020 use has already far exceeded to 2030 forecast.

25. The Authority refers to the anticipated increase in site density, which will reduce the need for spectrum. However, this is getting more and more difficult, with site power, backhaul, lease approval time, lease amount and theft and vandalism, which are on the increase. The low hanging fruit (easy sites) are already in use, and every additional site added is getting significantly more complex to add.

26. **Q10:** *How much spectrum is allocated to each of the EFIS application layers, and what is the economic value of spectrum used in each of the above EFIS application*

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- layers? What are the opportunity costs for current spectrum allocations for EFIS these application layers (what is the value to alternative users of these allocations)?*
- a. The answers to these questions should be contained in a stand-alone dedicated study/white paper.
27. **Q11:** *How should demand for commercial mobile services and IMT in the next few years be determined? What traffic model should be used in South Africa for traffic demand expectations? What are your comments on the spectrum requirements set out on Table 2? What are your views on using the Recommendation ITU-R M.1768-1 methodology to forecast IMT spectrum demand in South Africa? Please complete the input parameters in the attached spreadsheet for the market study information needed to apply the Recommendation ITU-R M.1768-1.*
- a. Network dimensioning and spectrum dimensioning cannot be answered in a single question. Telkom support using ITU-R M.1768-1 for calculating spectrum requirements for IMT.
28. **Q12:** *Provide your support or reasons for objections on the bands being considered internationally for 5G commercial mobile allocations*
- a. Telkom supports the bands identified for IMT at WRC-19 and previous conference. These bands were identified for IMT following rigorous international study and debate and was adopted by the ITU. South Africa endorsed these bands for IMT.
29. **Q13:** *Are the spectrum allocations comprehensive enough for spectrum demand projections for commercial mobile services in South Africa for the next 10 to 20 years?*
- a. Telkom is of the view that additional mid-band spectrum will be required for IMT. The band 3.6-3.8 GHz, which was identified by the Authority as a candidate band in its 5G Report to the Minister (as per the 2019 Policy on High demand Spectrum), was assigned to multiple SMMEs and is therefore not available to MNOs for IMT deployment. The loss of this band for IMT need to be replaced; for example, the upper 6 GHz band (6425-7150 MHz) to be considered by WRC-23 is an alternative.
  - b. In addition, the identification of the 600 MHz band as an additional sub 1 GHz band must also be supported. This band is also discussed at WRC-23 (agenda item 1.5). The identification of this band for IMT will provide
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additional spectrum for the deployment of IMT services in rural and deep rural areas.

30. **Q14:** *Is there a demand for more flexible frequency licensing and frequency assignment/allotments processes on a regional basis required to complement the national frequency licensing and frequency assignments/allotments in the next 10 to 20 years?*
- a. New frequency licensing methodologies may be required for higher frequency bands, such as mmWave spectrum, due to different propagation conditions and applications.
  - b. Allowing regional licensing, where MNO doesn't use its spectrum nationally, could allow for use of this spectrum in rural areas where an MNO targets for example, only main metro areas. This can be beneficial to the MNO, WISP and ultimately to the consumer. Nevertheless, access to such spectrum to extend mobile networks must be considered.
31. **Q15:** *Are there any other frequency bands that should be considered for release in the next 10 to 20 years for commercial mobile that are not discussed? Provide motivations for your proposal.*
- a. The bands to be considered for IMT release were discussed in detail in the consultation pertaining to the Authority's position and draft implementation of the frequency migration plan and the IMT roadmap<sup>4</sup>. These IMT bands are also aligned with the IMT identifications for Region 1 as contained in the ITU Radio Regulations, Article 5.
32. **Q16:** *Which vertical markets will require the most secured licensed spectrum to overcome their current interference and congestion issues?*
- a. Par 4.2 explained that many specialised applications will run on commercial mobile networks. It is therefore safe to say that these commercial mobile networks will require different levels of security and robustness to interference to cater for their demand. The vertical markets will therefore not require their own spectrum.

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<sup>4</sup> GG 45690, GN 739 of 2021, 24 December 2021

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33. **Q17:** *Assuming that South Africa follows the ITU's recommendations to assign up to 1,940MHz of spectrum for IMT-2000 and IMT-advanced services, and that South Africa follows trends in Europe for potentially another 2,000 MHz of spectrum for IMT-2020, what bands would need to be freed up?*
- a. As indicated above, the existing IMT bands are recorded in the Radio Regulations and is expected to also be included in the NRFP-21, when prescribed and was also discussed in detail in the consultation pertaining to GG 45690 dated 24 December 2021.
  - b. The additional IMT bands being considered at WRC-23, such as 6 GHz and 600 MHz, must also be considered for IMT identification.
  - c. It is anticipated that most of the spectrum will need to come from 3300 MHz to 4990 MHz.
34. **Q18:** *What are your views on reallocating the following bands for IMT over the next years?*
- a. This table is not complete and do not correlate with the IMT roadmap inquiry recently done by the Authority. It is suggested that the output from the IMT roadmap inquiry be used for future spectrum outlooks. The mmWave frequency bands (i.e. above 24 GHz) will not be easy to monetise in South Africa within the next 5 years.
  - b. The listed bands are mostly "new" IMT bands not yet licensed in South Africa for IMT, although already in the ITU Radio Regulations for Region 1 and possibly to be included in the NRFP-21. Telkom supports these bands for IMT as these were supported by South Africa at previous WRC's.
  - c. The band 1710-2025 MHz is identified for IMT and portions thereof are already licensed for IMT in South Africa (for example IMT1800 and IMT2100). The rest of the band is earmarked for IMT satellite services or currently used for services such as FWA. The entire band can in future be used for IMT terrestrial or satellite services.
  - d. The band 3400-3600 MHz are already used and licensed in South Africa for IMT. It is not clear why this band has been included in the list of bands "to be reallocated for IMT".
  - e. The band 3600-3800 MHz is not allocated to the mobile services and therefore also not identified for IMT. As such, the band should not be allocated to the mobile services or identified for IMT. The band can be used for FWA type applications.
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35. **Q19:** *Provide your support or reasons for objections on the bands being considered internationally for 5G commercial mobile, fixed, satellite, or licence-exempt allocations.*
- a. This question is too broad to be answered within the allotted time.
  - b. As an active participant in ITU WRC studies, Telkom supports the ITU study group process to ensure full technical evaluation of candidate bands.

### **3.6. Add paragraph 4.2.2 (“Fixed”)**

36. Telkom wishes to offer high level inputs around the importance of the Fixed Services bands, which have a critical role in support of especially Mobile RAN back-/front-/midhaulhaul.
37. Numerous sources such as GSMA offer statistics on the importance that microwave/mmW wireless transport systems will fulfil, especially for the connectivity of 4G and 5G RAN. Of special mention is a report from GSMA titled “Wireless Backhaul Evolution - Delivering next-generation connectivity” dated February 2021<sup>5</sup>. This report contains statistics which underscore the important role which various radio bands will contribute to the connectivity of mobile 4G and 5G RAN. The report speaks to questions 20 to 28 in the spectrum outlook notice.
38. Hence it is important that as much of the bands currently heavily used for FS transport be carefully balanced against the rising IMT radio demands for Mobile Services, especially bands identified in WRC-19 (26 GHz, 38 GHz, 42 GHz) and those under study in WRC-23 (L6, U6 GHz). The impact that bands shared for IMT MS in the short, medium, and long term must be carefully factored to not disrupt existing deployments whilst offering entry of newer IMT services.
39. The report contains details of studies with participation of industry operators and important telecommunications companies.

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<sup>5</sup> <https://www.gsma.com/spectrum/resources/wireless-backhaul-spectrum/>

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40. **Q20:** *Provide your support or reasons for objections on the bands being considered internationally for fixed applications. Please provide a list of such bands for potential fixed use.*
- a. This question is also too broad to answer. Potentially any of the bands allocated to the fixed services in the NTFA can be used in future for fixed services. This will depend on the availability of technologies to be deployed in such bands.
  - b. Reference is made to Table 4, which doesn't appear in the spectrum outlook notice.
41. **Q21:** *Are the spectrum allocations comprehensive enough for spectrum demand projections for fixed services in South Africa for the next 10 to 20 years?*
- a. Yes, there are many bands allocated to the fixed services in the NTFA, which could potentially be used for fixed services.
42. **Q22:** *Is there a demand for more flexible frequency licensing and frequency assignment/allotments processes for fixed services on a regional basis required to complement the national frequency licensing and frequency assignments/allotments in the next 10 to 20 years?*
- a. New frequency licensing methodologies may be required for higher frequency bands, such as mmWave spectrum, due to different propagation conditions and applications.
43. **Q23:** *Are there any other frequency bands that should be considered for release in the next 10 to 20 years for fixed services that are not discussed? Provide motivations for your proposal.*
- a. It seems this question is also related to Table 4, which was not provided.
44. **Q24:** *Will the demand for commercial mobile, licence-exempt, satellite, or fixed wireless services/applications impact the demand for backhaul spectrum? If so, how and which of these?*
- a. **Yes.** The listed services/applications may impact the demand for backhaul spectrum, depending on the specific service or application.
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45. **Q25:** *Are there adequate spectrum allocations for video backhaul for broadcast and security services in South Africa? What is the realistic demand for these services in the next 10 to 20 years?*
- a. No allocations are made to video backhaul for broadcast and security services; these are applications that be deployed under services such as the fixed service.
  - b. Par 4.2 explained that many specialised applications will simply run on commercial mobile networks. Video backhaul will be one such service.
46. **Q30:** *What will impact on the demand for these services/applications in the coming 10-20 years? What is the realistic demand for these services in the next 10 to 20 years? Are there adequate spectrum allocations for Broadcasting services in South Africa?*
- a. Par 4.2 explained that many specialised applications will simply run on commercial mobile networks. Broadcasting or streaming video is one such example. With more video services moving to online streaming, the requirement for terrestrial video broadcasting will reduce.
47. **Q37:** *Can mobile broadband currently be used for PPDR purposes? If not, will this be possible in the future with better quality of service and lower prices?*
- a. Yes, Mobile networks can and should be used for PPDR. It is far more expensive to build a dedicated PPDR network, which will lie idle for most of the time, to allow adequate capacity during emergencies. It will be better (financially) to buy capacity with SLA agreements from MNO during times of need. This model will allow the costly infrastructure to be re-used and therefor cross-subsidised by commercial users (i.e. internet access) during off-peak emergency requirements.
48. **Q38:** *Are there any reasons to consider further spectrum from broadcasting in the band 470MHz to 694MHz to public protection and disaster relief (PPDR) services in the next 10 to 20 years?*
- a. No, the spectrum should rather be pooled with IMT spectrum to allow for bigger bandwidth which allow for better oversell ratios.

### **3.7. Add paragraph 4.3.8. ("Satellite systems")**

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49. The impact of NGSO LEO FSS satellite constellations on existing GEO FSS needs to be factored into the Authority's studies. Commercial platforms such as Starlink have a base constellation deployed with a growing number being launched frequently. Starlink is offering South African subscribers the opportunity to pay deposits for access to its satellite constellation although its understood actual services are not yet available, awaiting the build out of the coverage footprint. See also report from Analysis Mason ("Operators are partnering with LEO satellite providers to harness new revenue growth opportunities", January 2022).
50. Satellites are also having more and more applications in support of 5G infrastructure supporting Inter-of-Things (IoT) and Machine Type communications (MTC). A 5G America report, titled "5G and Non-Terrestrial Network" of February 2022 offer useful material regarding the impact of non-terrestrial networks into their wider studies.

**3.8. Add paragraph 4.3.10 ("Short-range devices")**

51. The regulation of SRD services in South Africa are largely aligned with those published in CEPT ECC REC70-03.
52. **Q44:** Which vertical markets will require most secured licensed spectrum to overcome their current interference and congestion issues?
- a. Mobile networks
53. **Q46:** *Please provide input on future spectrum requirements for the different service allocations as well as the urgency for such additional frequency allocations for such a service.*
- a. This question is very broad and cannot be answered in this response.
54. **Q47:** *Which Service allocations require RFSAP's and for which frequency bands. Also specify the urgency for the creation of such RFSAP's.*
- a. This question was partially answered in Telkom's response to the 2021 frequency migration consultation.

**3.9. Ad section 5 ("Frequency migration and costing")**

55. **Q49:** *The spectrum outlook described above in Section 4, and in particular the substantial additional requirements for IMT and fixed-wireless spectrum, suggest that a number of additional bands will need to be assigned for the purposes of internet*
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*access, and incumbent users will need to be migrated out of the bands mentioned in the list on Table 3 and on any bands your organisation suggests on Table 4. What are the costs of migrating these users so that radio frequency spectrum is allocated to its highest value use?*

- a. This question is very vague. Migration cost depends on which band specifically, and migration timelines.

### **3.10. Ad section 6 (“Frequency sharing”)**

56. Spectrum sharing is an important topic that is being investigated in various standards bodies such as ETSI, where the Industry Service Group Millimeter Wave Technology (known as mWT) has published some results and recommendations on this important topic. Reports pertaining to this matter are available at <https://www.etsi.org/committee/mwt>.
57. Generally, in higher frequency bands the reuse of frequencies is higher due to the physical propagation characteristics of bands and can vary significantly from band to band – a point in case being the large oxygen absorption losses in the 66 GHz band.
58. These models should also reduce the cost of spectrum based on various parameters that modelled to offer the optimum usage versus cost balance.
59. **Q52:** *Due to the scarcity of high demand spectrum and the consequential fact that Spectrum Sharing in certain bands are non-negotiable, how shall you describe the best sharing conditions for the South African scenario?*
  - a. Spectrum sharing is an integral part of spectrum management and is implemented daily. For example, bands allocated to fixed services are shared between licensees for point-to-point links.
  - b. In bands used for deployment of national networks, for example IMT mobile networks (bands such as for example 700 MHz, 1800 MHz, 2300 MHz, etc.), sharing within the same area with other services is not possible.
  - c. Where the mobile network is not deployed, sharing is technical possible. However, it must be acknowledged that the mobile networks are constantly growing; it took Vodacom and MTN more than 25 years to reach above 98% population coverage. Additional base stations are still deployed to fill coverage gaps.

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- d. Sharing is therefore best applied where systems are deployed in different geographic areas. For example, in the 26 GHz band, IMT 5G can be deployed within urban areas, whereas the same band can be shared with PTP links in areas outside the urban areas.
  - e. Another example of sharing is whereas one system deploys low power, or are restricted to indoor use, whereas the primary user deploys higher power and outdoor...
  - f. ...
60. **Q53:** *Due to the convergence of technologies and the changes in regulatory licensing environment do you believe that certain service allocations categories will or need to change?*
- a. Yes. For example, aspects of fixed and mobile are converging. For example, mobile is used to deploy FWA.
61. **Q54:** *What existing licence-exempt frequency bands will see the most evolution in the next five years?*
- a. 2.4 GHz, 5.8 GHz, and lower 6 GHz
62. **Q55:** *How much spectrum, and in which bands, should be made available for licence-exempt purposes (such as Wi-Fi) over the 5, 10 and 20 years? What would the costs of freeing up these bands for IMT be? What would the economic benefits of doing so be, in respect of increase consumer surplus, and increased producer surplus? Which vertical markets will require most secured licensed spectrum to overcome their current interference and congestion issues?*
- a. The intent in this statement is not clear and is seemingly mixing Wi-Fi and IMT. An operator can deploy licence exempt spectrum as part/add-on to its network, which deployments are generally done on a licence exempted basis.
  - b. Clearing a Wi-Fi band, where license exempt services have been deployed, is very difficult due to there be no data basis of use of these bands and due to the extent of these deployments.
63. **Q59:** *Will the trend for offering carrier-grade or managed Wi-Fi services continue to increase over the next five years? If so, will this impact congestion in Wi-Fi bands and which bands would be most affected?*
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- a. The trend may increase in absence of enough IMT spectrum. This will not necessarily cause congestion since a managed Wi-Fi network in the office will not interfere with a private Wi-Fi network at home. Manage Wi-Fi networks inside private homes will only be per choice of the customer.

### **3.11. Ad section Appendix A (“Frequency Band allocation per service allocation”)**

64. Telkom notes that the bandwidth calculations for Fixed-Satellite Services have not been included in the table. Telkom recommends that this also be added. In fact, all services within the band plan should be reflected.