4th March 2022

SUBMISSION IN RESPECT TO THE INTENTION TO CONDUCT AN INQUIRY INTO THE LONG TERM SPECTRUM OUTLOOK FOR PUBLIC CONSULTATION

We refer to the above published notice in GG 45690 on the 24th December 2021.

The written response of the South African Communications Forum follows.

We confirm our availability and indeed request that you include us in in any public hearings or workshops in regard to this matter, should the Authority elect to hold same following receipt of written responses.

Kindly acknowledge receipt of this submission.

Sincerely,

Katharina Pillay

SA Communications Forum

INTRODUCTION

1. The South African Communications Forum (SACF) is an industry association that represents a broad cross-section of leading players in the ICT value chain and are impacted by the Independent Communications Authority of South Africa's (ICASA's) regulations either directly or indirectly.

2. The SACF welcomes the opportunity to participate in ICASA's public consultation on the Long-Term Outlook of Spectrum as published on Christmas Eve, 24 December 2021.

3. We would like to place on record our interest in further participation in this regard, including any public hearings or workshops.

4. The South African Communications Forum ("SACF") extends its appreciation to the Authority for the opportunity to comment on this issue. In particular, we welcome ICASA's forward-looking approach.

5. Spectrum planning is a long-term process, in that licenses are typically issued for a period of 20 years and investments are made in equipment which has a life cycle of at least five years. However, technology changes much more swiftly and flexibility is therefore required in the licensing framework.

6. The Authority is to be commended on what appears to be a very thorough document, which raises many issues to consider, in considerable detail.

7. SACF submissions are limited to areas of consensus by our members, in instances where our members have divergent views these will be included in their respective submissions.

GENERAL COMMENTS

SACF Concerns about the Submission Deadline and Effective Public Consultation

8. The SACF is obliged to place its concerns about the effectiveness and fairness of

this public consultation and its prejudice to our effective and meaningful participation in the process.

9. ICASA published the Long-Term Outlook on Spectrum on 24 December 2021, at a time when it is common cause that South Africans are on holiday for the Christmas and summer break. Even ICASA was closed at the time which was clearly set out in the Chairperson's affidavit in response to Telkom's application to interdict ICASA from proceeding in the licensing of high demand IMT spectrum.

10. The SACF requested an extension to the submission deadline which was denied due to ICASA's concerns about its ability to meet its target for this project. However, it is not immediately apparent what the APP target in this regard is.

11. The SACF had requested an extension to the submission deadline because a core membership component of the SACF has consistently been engaged in ICASA processes and overwhelmed by the related activities thus not allowing us, and we imagine other stakeholders, sufficient time to engage on this document. Our reasons included the holidays, participation in and preparing bids for the IMT auction, opposing the legal challenge against the licensing of high demand spectrum, the mock auction which also took place this week, combined with commentary on the RFS Migration Plan and IMT Roadmap. All these processes require the participation and skills of the same limited human resources across our members. The consequence is that the input and participation has become limited, and our commentary is more superficial than we would prefer, which is extremely unfortunate.

12. We disagree with ICASA's assertion that the time given to stakeholders was reasonable, as this process and public consultation is unusual and can only be likened to an Inquiry. The ECA provides that stakeholders are given a minimum of 45 working days to submit written commentary. This as we understand is the minimum number of days that must be given to stakeholders. There is nothing in the empowering legislation that precludes ICASA from giving stakeholders more time.

The SACF would argue that ICASA did indeed not give stakeholders even the bare minimum 45 days as required in law.

The document was published on 24th December 2021 which as we have said falls squarely during the holidays. The 45-day count would then begin on the next business day, which even by ICASA's Chairperson's affidavit to the High Court is at the earliest on the 3rd of January 2022. Most of our members returned to work between the 3rd and 5th January 2022.

14. It would therefore be reasonable to begin counting 45 days from 3rd January 2022, which would be the 7th of March 2022. We set out the reasons why 45 days from was inadequate based on the number of critical and urgent parallel processes.
15. The SACF is an industry association with an operating model that is premised on consultation with our members to ascertain their views and debate the varied positions to reach a consensus position for inclusion in a submission. Due to the multiple parallel processes surrounding spectrum and the imminent licensing process it has made effective consultation with our members challenging and not given them the opportunity to reasonably provide commentary.

16. Therefore, we find this approach by ICASA to be extremely prejudicial and limiting to commentary. Below we set out the key tenets for what would constitute effective public participation. This in our view is extremely important if consultation is to be meaningful. Regrettably, in our view the consultation has been superficial at best to meet the timelines on a project plan rather than meaningfully and effectively consult.

Effective Public Consultation

17. Public consultation is a key element of any regulatory process and is explicitly enshrined in the constitution and founding legislation. It is a critical element of any regulatory, policy or legislative process to enable all affected stakeholders an opportunity to present their challenges and concerns and to make proposals on envisaged solutions to address the identified challenges and concerns.
18. It is equally important that stakeholders have a clear understanding of the problem being cured as this would assist stakeholders to proffer solutions.

19. The public consultation process improves transparency and the quality of the regulations because of the diversity of ideas, solutions, and perspectives considered. Public consultations ought to be viewed on the same basis as the principle of network externalities[1], where every additional comment adds value to the collective and the process. Conversely, anyone whose input is denied prejudices the process and collective by depriving the collective of the ability to consider the additional perspectives that will shape the outcome.
20. It is imperative to draw the distinction between competitive and non-competitive processes as the approach to each would be different. The approach to a non-competitive public consultation would be more relaxed because of the objective of the process.
21. A competitive process would of course be less flexible due to the potential prejudice to be suffered by participants.
22. The integrity, fairness, transparency, and consistency of a competitive process must be sacrosanct to mitigate legal challenges. Legal challenges can never be eliminated but can be mitigated when the prospect of success is limited.
23. Adequate notification and awareness of the process is essential for stakeholders to participate. Therefore, it is essential that the process and the timeframes are clear. Stakeholders cannot participate in a process that they unaware of or where the timeframes are particularly short.
24. Meaningful consultation is premised on the ability of stakeholders to consider regulatory proposals and to do the necessary scenario planning to assess the impact. This is a critical element of providing meaningful commentary. Therefore, the timing of the publications and processes is important.
25. While ICASA publishes an annual plan, the SACF urges ICASA to ensure a better spread of overlapping and similar categories of projects due to the limited resources of stakeholders. The most severely prejudiced stakeholders would be those with more limited resources.
26. ICASA should consider that many stakeholders do not have the human capacity to respond to multiple public consultations at the same time. If there are multiple parallel consultations, then the response times should be staggered over time while taking the public interest into account.
27. ICASA has recently adopted an unnecessarily harsh approach to receipt of submissions and requests for extensions despite the detailed reasoning and

[1] Metcalfe's law - Wikipedia

commentary periods which in our view significantly undermines the public consultation process, appearing to reduce it to a superficial consultation.

28. A standardisation of the processes and submission times would be more helpful and inclusive and as a result can only enhance the process and outcome.

Investment, Regulatory Certainty and Economic Development

29. The ICT sector is an investment intensive sector in terms of the ongoing network expansions upgrades and maintenance. Therefore, it is essential that ICASA is cognizant of the critical dependency of the ICT sector on investment and the concomitant dependency on regulatory certainty. The digitation is key to economic growth and development.
30. The COVID pandemic has highlighted the critical need for the digitization of the organisation and businesses and has produced significant evidence linking operational success with digitsation.
31. The online platforms instantly became an overnight success as it enabled remote working and learning enabling continued economic activity.
32. This stimulated the exponential growth of online platforms and services which has become the norm and will remain a part of all aspects of everyday where no geographic locations mean less, and ubiquitous levels of service becomes more critical.
33. This has increased the prominence and critical role of cloud-based services and data centres.

Regulatory

34. The SACF is concerned that some bands that were earmarked for IMT were historically licensed through opaque processes, favouring some licensees over others. SACF urges that all licensing must be fair and transparent, allowing all eligible and interested parties to fairly compete for access to available spectrum.

35. Regulatory certainty is always important but more so in capital intensive sectors where very significant levels of investment are required. Therefore, it is imperative that processes are consistent, clear, fair, and transparent.

36. The SACF has in previous submissions raised our concerns about the opaque

licensing processes, this remains a concern as it does not provide regulatory certainty and is bad for investment which is one of the objects of the ECA.

37. The processes must be consistent, clear, fair, and transparent. In the bands where demand exceeds supply, ICASA must apply a competitive process.

38. In addition to processes being clear, fair, transparent, and consistent, it is important that ICASA has a standard approach to issues so that no licensee is prejudiced over another.

Forward looking Approach

39. Spectrum is one of the most critical elements in the mobile sector and enables network growth but nevertheless is an input and not an end. Accordingly, the SACF is of the view that ICASA must adopt a forward-looking approach to this inquiry.
40. The context and prompt for this inquiry is unclear. It is nevertheless important for ICASA to adopt a forward looking, agile and efficient approach to the licensing of spectrum.
41. We note the time horizon of 20 years, and it is unclear what informs this timeframe. ICASA must note that it is almost an absolute certainty that any forecasts are likely to be off by a large margin as technology and user demand and needs evolve organically and it is difficult to predict, therefore a ten-year horizon is more reasonable. The 20-year forecasts are best guesses by industry.
42. The SACF is of the view that ICASA must adopt an approach to licensing and planning that prioritises technologies that provide the broadest connectivity.
43. Newer and upcoming technologies provided on a best-efforts basis should attract a lower proportion of the assigned spectrum in a manner that enables the development and evolution of new technologies and platforms, without creating a wasteland of spectrum that has been assigned based on a new hype as was the case with the hype of Wi-Max.

Use of Spectrum Sharing techniques

40. The SACF understands that spectrum is a scarce resource that requires efficient utilisation. This can be achieved using modern technologies that seek to optimise

the use of the resource. Spectrum sharing, trading, and pooling can be useful tools to ensure the most effective and efficient use of assigned spectrum. However, it is important that this is done on a commercially agreed basis to prevent the undue prejudice to licensees.

41. A clear framework will protect all interested stakeholders and provide much needed regulatory certainty.
    Spectrum sharing has been embraced across the world, including here in South Africa. SACF urges the Authority to fully embrace spectrum sharing on all applicable frequency bands to achieve the most efficient utilisation of the available spectrum.

Principles towards licensing

42. The SACF is of the view that ICASA must look at a licensing framework that seeks to licence services that connect the largest sectors of the population. This will include current, services that are new now, and services yet to be imagined.
43. Affordability is paramount to enable the effective take-up and use of services. Resultantly critical resources must be licensed efficiently at reasonable rates to make services affordable.

RESPONSES TO CONSULTATION QUESTIONS

44. **Please comment on whether the above captures the relevant regulatory and policy aspects of long-term spectrum planning.**

Comment:

- Section 2 of the notice captures some very relevant policy aspects for spectrum planning.
- In particular we highlight the SA Connect targets and the assessment of penetration of broadband connectivity.
- The guidelines from CRASA and the ATU recommendation are useful tools for ICASA to develop its spectrum policy.
- We recommend ICASA to take account of the ITU process. In particular, we note that additional bands are on the agenda of the WRC-23 for a possible identification for IMT or for Mobile services. Agenda items 1.1, 1.2, 1.3, and 1.5

of the WRC-23 cover these potential new bands. We recommend ICASA to include the bands under consideration in these Agenda Items in its long-term spectrum planning.

- We note that the concept of spectrum sharing is mentioned over 40 times in the document. While we acknowledge that the ECA raises the subject, it is not one to which much attention has been paid in the past.
- The SACF is of the view that spectrum sharing, trading and pooling will contribute to the efficient and effective use of spectrum, but must have a clear regulatory framework that enables effective commercial negotiations in this regard.

43. **Are there services, in addition to broadband, that ought to be considered as important for economic growth? If so, please explain what these services might be and what the trade-offs are between using spectrum for broadband and alternative services. Please provide any evidence from other countries that may be relevant.**

Comment:

- There is an assumption that the terms "broadband" and "mobile" or "IMT" are synonymous. In practice, in a country as large as South Africa, with many areas of relatively low population density, fixed wireless connectivity is an essential adjunct, or even replacement for, fixed fibre connectivity.
- We note that the Minister recently announced the end of this month as the Analogue Switch Off (ASO) date for terrestrial television[2]. There is a tension between the use of the UHF bands for DTT and for broadband purposes. In our view, the only logical answer is to use DTH (Direct To Home satellite transmission) for TV broadcasting, and to make the entirety of the 470 – 896 MHz band available for broadband uses[3]. Simply driving past Zandspruit in Honeydew, for example, makes it clear that significant numbers of people in informal housing have satellite receivers.
- The emerging field of IoT may well become important for economic growth. This is perhaps particularly important in the field of microgrids, as Eskom's

[2] SA to start analogue TV switch-off in March | SAnews
[3] Digital TV deadlines – All the broken promises (mybroadband.co.za)

increasing inability to provide any semblance of reliable electricity supply affects the economy progressively negatively.

45. **Please comment on the above assessment of the status quo on broadband penetration in South Africa, and what role the spectrum may play in addressing the gaps identified.**

Comment:

- The assessment of broadband penetration in section 3.2 is accurate.
- We agree that the low level of home broadband outside of Gauteng and the Western Cape is a source of concern, as well as the low Internet access penetration levels in rural provinces.
- There are many reasons that explain this, with the lack of mobile spectrum being one of the main causes of low Internet availability in rural areas.
- Additional mobile spectrum in low-frequency bands such as (700 MHz, 800 MHz) would help alleviate this. In addition, additional spectrum in mid-frequency bands (between 2 GHz and 7 GHz) would support the deployment of fixed wireless access in urban/suburban areas without fibre coverage.

46. **What future changes, if any, should ICASA examine about 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?**

Comment:

- A key element of 5G systems is the use of active antennas. These antennas have electronically steered and formed beams, which vary their direction and gain very rapidly according to the needs of the service.
- The regulatory limits for emissions of this type of antennas should be specified in terms of Total Radiated Power (TRP) instead of the traditional Effective Isotropic Radiated Power (EIRP) limits, as EIRP limits are too restrictive and do not account for the fact that, although instantaneous power can be very high, on average the power radiated in any particular direction is low.
- The TRP is the approach followed by CEPT and other regulatory authorities and we recommend that ICASA follows that route for the technical conditions of IMT licenses in the mid and high-frequency bands.

47. **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?**

Comment:

- It is expected that technology will improve such that progressively higher frequencies, well above those currently under consideration, will become increasingly important. This especially applies to high throughput applications. In addition, some of these high frequencies will be important for short range IoT applications.

48. **What and how will technology developments and/or usage trends aid in relieving traffic pressures? When are these technologies expected to become available?**

Comment:

- See comment about higher frequencies above.

49. **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.**

Comment:

- We recommend that ICASA, with its peers in CRASA, attends to the matter of defining the three layers corresponding to the CEPT definitions.

50. 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 in 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.

Comment:

- Demand for mobile services is subject to a large number of variables and therefore difficult to determine. There are a number of forecasts that can be used as a reference, such as the Ericsson Mobility reports and ITU-R Report M.2370.
- The first wave of 5G is being deployed in SA in the C-band for FWA. However, the spectrum will not be enough to sustain capacity demand in SA between 2023 and 2030.

The following qualitative factors are important to understand the future IMT traffic demand in SA:

- Globally 5G penetration is expected to grow very fast in the next 6 years reaching 3.5 billion users globally (Ericsson Mobility Report Nov 2020).
- The average mobile traffic per subscriber is expected to also grow up to 270 GB/month/subscriber (ITU report) supported by unlimited data plans and better 5G performance.
- Rural areas in SA would benefit from the use of a combination of technologies although, there ought to be a clear licensing bias that focuses on technologies have the widest appeal.
- Uniform/continuous high capacity coverage cannot be delivered citywide and on motorways in a cost-efficient manner with mmWave (high capacity in hotspots) and cannot be served by low frequency bands (large coverage but not enough capacity to serve the target obligation).
- South Africa has significant evidence that regional networks been far less successful than national networks.
- As acknowledged by ICASA in section 3.2 of the consultation, fixed broadband penetration is low in many locations in the country.
- This will not change in the short term. As a result, many SA consumers are likely to rely on mobile broadband for connectivity at home.
- The GSMA´s report on "Estimating the mid-bands spectrum needs in the 2025-2030 time frame"[4] provides a good approach to calculating traffic and the resulting spectrum needs.

[4] https://www.gsma.com/spectrum/resources/5g-mid-band-spectrum-needs-vision-2030/

- This report takes the IMT-2020 requirements as starting point, notably the 100 Mbps user experienced data rate.
- It then considers how it can be fulfilled in several urban areas in the world, including Johannesburg.
- It shows that the spectrum needs in Johannesburg in the mid-bands would be between 1690 and 2010 MHz, including existing and scheduled assignments.

  We believe this report provides one of the best approaches to estimating spectrum requirements for 5G alongside the ITU Recommendation.

57. **Are the spectrum allocations comprehensive enough for spectrum demand projections for commercial mobile services in South Africa for the next 10 to 20 years?**

Comment:

- No. As noted under Question 11 above, the GSMA estimate over less than 10 years exceeds 2000 MHz.

58. **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?**

Comment:

We do not think that regional assignments are a good solution for the IMT spectrum for South Africa. Regional licenses have significant disadvantages:

- Regional licenses require buffer zones at the boundaries to avoid co-channel interference between users on each side. This multiplies with smaller divisions, unless regions are assigned separate groups of channels, such as in the Seven Mux Plan for DTT in South Africa.
- There would be an additional burden for ICASA to define, issue, and manage licenses, and for the operators to plan and run networks.
- Seamless coverage along transport paths (rail, roads) becomes complicated.

- Regional licenses do not have a good track record: past initiatives to allocate spectrum licenses on a regional or local basis have not been very successful (e.g. 3.5 GHz bands around 10 years ago in some countries).
- Two recent C-band auctions (Austria, Ireland) proposed regional licensing across the whole band but have ended up with national licensing with the exception of a small part of the band
- However, there is a strong case to be made for more flexible licensing arrangements.

58. **Are there any other frequency bands that should be considered for release in the next 10 to 20 years for commercial mobile that is not discussed? Provide motivations for your proposal.**

Comment:

- The 6425-7125 MHz band is under consideration for IMT identification at WRC-23.
- It is a key band for the future development of 5G and future evolutions of the IMT family of technologies.
- It is likely the last remaining band below 26 GHz and above 1 GHz that can be made available for IMT.
- Once it is agreed at WRC-23, we believe that countries will open it for mobile use in the 2024-2030 timeframe.
- We recommend ICASA to include this band in its future plans for the second part of the decade.

61. **What are your views on reallocating the following bands for IMT over the next years? 44 Table 3: List of possible future IMT bands (please supplement or delete as your organization considers reasonable)**

 450-470 (20 MHz)

 617-698 (70 MHz)

 1 427-1 518 (91 MHz)

 1 710-2 025 (315 MHz)

 3 300-3 400 (100 MHz)

 3 400-3 600 (200 MHz)

 3 600-3 800 (200 MHz)

 4 800-4 990 (190 MHz)

 24 250-27 500 (3250 MHz)

 37 000-43 500 (6500 MHz)

 45 500-47 000 (1500 MHz)

 47 200-48 200 (1000 MHz)

 66 000-71 000 (5000 MHz)

Comment:

- 450-470 (20 MHz); We agree with the allocation of this band, but we note that the ecosystem for consumers is very limited.
- 617-698 (70 MHz): We agree that ICASA should consider options for this band in the long term.
- 1 427-1 518 (91 MHz): this band provides additional capacity and there is a relatively good SDL ecosystem already. We suggest ICASA consider release with a band plan that supports SDL in the short term and TDD in the long term.
- 1 710-2 025 (315 MHz): We recommend the Authority to maintain the current band plans for 3GPP Band 1 (2100 MHz) and Band 3 (1800 MHz).
- 3 300-3 400 (100 MHz): ICASA has indicated that it intends to proceed with the RFSAP for this band. We support this.
- 3 400-3 600 (200 MHz): This band is part of the upcoming award. We strongly support the release of 5G Technology.
- 3 600-3 800 (200 MHz): This band should be considered for 5G as soon as possible. It is a key 5G Band, in use in Europe, the US, and many other regions, and with a very large ecosystem available.

- 4 800-4 990 (190 MHz). This band is identified for IMT in South Africa. Equipment availability is limited, but we recommend the Authority to consider it for future release.
- 24 250-27 500 (3250 MHz). This band is identified for IMT in South Africa. There is a good and growing ecosystem that can be used for hot spots and FWA. However, we recommend that ICASA consider the situation of existing fixed services use of the band and the considerable potential introduction of IMT.
- 37 000-43 500 (6500 MHz), 45 500-47 000 (1500 MHz), 47 200-48 200 (1000 MHz) and 66 000-71 000 (5000 MHz): These mmWave bands should be considered in the long term.
- In addition to the bands listed above, we emphasize the importance of the 6425-7125 MHz block for the second phase of 5G introduction in the 2025-2030 timeframe.

64. **Are the spectrum allocations comprehensive enough for spectrum demand projections for fixed services in South Africa for the next 10 to 20 years?**

Comment:

- 5G is becoming widely deployed in the world. ETSI mWT ISG reports[5] that the capacity need for a backhaul network in the 5G mature era will reach 10 Gbps to 20 Gbps.
- In today's fixed spectrum allocations, E-band (71-76 GHz, 81-86 GHz) could provide the highest transmission capacity. At its highest performance, the E-band system could fulfil the above-mentioned 5G backhaul capacity requirement of 10-20 Gbps.
- It is estimated that from 2030, i.e., 10 years later, 6G will be used in the world. 6G is expected to have a much higher user access speed than today's 5G, which then results in much higher bandwidth requirement for a backhaul network than 5G. As a result, more spectrum for backhaul in the future to meet the 6G capacity needed shall be considered.

[5] ETSI Group Report mWT 012 V1.1.1 (2018-11)-5G Wireless Backhaul/X-Haul

65. **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?**

Comment:

- If the frequency is allocated by block without shared use, there would be no interference between service providers, in principle. The single service provider that uses the block can optimize the planning and the frequency band reuse. At the same time, the process of frequency application from the service provider would be very much simplified.
- For the low traditional bands in the 7-13 GHz range: The number of 28 MHz channels is not enough to give a minimum block to each operator. There is 8*28 MHz in 8 GHz and 10*28 MHz in 7 GHz so each operator cannot achieve 4*28 MHz.
- Therefore we suggest keeping an individual license in 7-8 GHz. Moreover, these frequency bands have a narrow T/R separation, so different hardware is used for each channel; this condition implies a high percent of hardware changing in case of frequency re-allocation.
- Mid traditional band in the 15-38 GHz / 80 GHz range: there's enough spectrum to allocate the minimum channel spacing to each operator.

66. **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**.

Comment:

- As noted in our response to Question 21, much higher bandwidth for a backhaul network for 6G in the next 10 to 20 years is required.
- It is suggested to use W-band (92-114.5 GHz)/D-band (130-174.8 GHz)[6] to meet this requirement, as W/D-band possesses a total 17.85 GHz and 31.8 GHz spectrum bandwidth respectively.

[6] W-band: 92-94 GHz; 94.1-100 GHz; 102 -109.5 GHz; 111.8 – 114.25 GHz
D-band: 130-134 GHz, 141-148.5 GHz, 151.5-164 GHz, 167-174.8 GHz

67. **Will the demand for commercial mobile, license-exempt, satellite, or fixed wireless services/applications impact the demand for the backhaul spectrum? If so, how and which of these**

Comment:

- Yes, we notice that the trends in other radio services will have an impact on the demand for the backhaul spectrum.
- Mobile IMT was identified in multiple mmWave bands at WRC-19, including 26 GHz, 40 GHz, and 60 GHz. Many countries have started their plan in 26 GHz for IMT, therefore the use of 26 GHz for backhaul is decreasing.
- Similarly, 6 GHz (6425-7025 MHz) is under the WRC-23 Agenda Item 1.2 for IMT identification.
- Mid-band for IMT mobile can provide a good balance between capacity and coverage (which cannot be provided through mmWave band), thus mid-band for IMT plays and will continue playing an important role.
- We strongly encourage South Africa to support 6 GHz for IMT in WRC-23 Agenda Item 1.2, while we note that the band is currently used for backhaul in South Africa. Part of the use is for short links within urban areas, and part is for long links in rural areas.
- Considering that IMT mobile normally starts deployment from an urban area, it's suggested to upgrade those backhaul links at an urban area to other (higher) backhaul frequency bands.
- Low-frequency bands should be used to provide long-distance links, and high-frequency bands should be used for short-distance links. This is encouraged by the Authority's implementation of Administered Incentive Pricing (AIP) scheme for spectrum fees. However, this should be followed through, such that lower frequencies should not be assigned at all for shorter links.
- We note that some regions/countries also consider allocating the 6 GHz band to license-exempt use even if backhaul is an incumbent service.
- Care must be taken to protect the incumbent backhaul use.
- The total amount of license-exempt devices might be huge, and the use is without control (use in outdoor environment and mobility), thus it might cause interference to backhaul links.

- There are studies (both lab test and field test) showing such interference from license use to backhaul links.
- In previous submissions the SACF urged ICASA to participate in the ongoing studies into the licensing and use of the 6GHz band rather than prematurely rushing into licensing for as yet unproven technologies that will be difficult to later undo.

69. **How much will transmission technology improve the volume of traffic in the next 10 to 20 years?**

Comment:

There are improvements in the fixed links technology that will significantly increase capacity:

- Bigger Bandwidth: 112 MHz channel spacing which supports from 18 GHz to 38 GHz could support to 1 Gbps per channel.
- XPIC: The cross-polarization interference cancellation (XPIC) technology is used together with the co-channel dual-polarization (CCDP) technology. Application of the two technologies doubles the transmission capacity with channel conditions unchanged with single frequency resource;
- CA: CA (carrier aggregation) aggregates multiple dispersed channels to provide a larger logical bandwidth, catering for large-capacity microwave transmission on future 5G networks. CA that aggregates n channels is called NCA configuration. For example, the 2CA configuration means that two channels are aggregated into one channel. 2CA configuration is equivalent to 2+0 configuration.
- MIMO: MIMO uses space multiplexing to improve the transmission rate of the system. Space multiplexing is a method that divides data to be transmitted into multiple data streams and then transmits them from different antennas. The application of the MIMO technology makes space a resource for improving communication performance, and can increase the coverage range of a wireless system Spectrum efficiency is also improved: within the same bandwidth, one frequency can provide two or four channels, thus doubling the spectrum utilization.

70. **What and how will technology developments and/or usage trends aid in relieving traffic pressures and addressing spectrum demand for backhaul services? When are these technologies expected to become available?**

Comment:

- Full-Duplex technology in W/D-bands could relieve the traffic pressures, by using radio in the same band and with the same polarization to provide simultaneous bi-directional communication, and then it could double frequency efficiency compared to that of traditional FDD and TDD.
- It is suggested to implement Full-Duplex as an expansion to TDD systems, or in a brand new band without any existing deployment, to avoid interference to existing FDD systems.
- As of today there are rarely TDD systems deployed, so it is estimated that Full-Duplex technology could become available together with the W/D band system when W/D band systems are used.

71. **How much bandwidth for backhaul will be saved due to the deployment of fibre networks in South Africa for the next 5, 10 to 20 years?**

Comment:

- In terms of market share and trends, wireless backhaul (microwave) in the traditional (7-40 GHz) range was responsible for nearly 57% of macrocell backhaul links in 2017, diminishing to 45% of macro-cell links by 2025. Microwave links in the 41-100 GHz will double from 3.2% to 6.1% in the same period. The shorter range of the latter (<3 km) is offset by their increased data throughput and thus make it a suitable technology in urban areas. For small cells, traditional microwave was used for 35.2% of links in 2017 diminishing to 21% in 2025, whilst microwave links in the 41-100 GHz range will grow from 10.4% to 13.1% in the same period.
- Fibre based backhaul was responsible for 25.6% of macrocell links in 2017, rising to 39.6% by 2025. Fibre is the market leader for small cell backhaul with 43.2% of the market on 2017, rising to 56.1% in 2025.[7]

[7] GSMA | Mobile Backhaul: An Overview - Future Networks

79. **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 PPDR services in South Africa?**

Comment:

Some of the newer technologies and platforms are supported by a mix in technologies depending on the various on connectivity available.

- Global systems if treated and allowed to operate on a global scale are able to realise the efficiencies and benefits including affordability. However, when global systems are split up and treated as though regional, the benefits and efficiencies are eroded.
- For example, when satellite systems are treated as though regionally or nationally licensed increases the compliance costs and ultimately impacts affordability.
- Therefore, we would urge ICASA to consider regional approaches to licensing and collaboration among regulators.

80. **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?**

Comment:

- CRASA has harmonised the band 4940-499 MHz for broadband PPDR purposes.

81. **Are there any reasons to consider further spectrum from broadcasting in the band 470 MHz to 694 MHz to public protection and disaster relief (PPDR) services in the next 10 to 20 years?**

Comment:

- No. Existing narrowband and wideband PPDR CRASA harmonized allocations are below 470 MHz.

85. **What will impact 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 Astronomy services in South Africa?**

Comment:

- Yes, adequate spectrum has been made available in the SKA areas.

86. **What will impact 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 Short-range services in South Africa?**

Comment:

- While it is expected that the usage of SRDs will increase with time, there is no indication at present that the allocated spectrum is inadequate.

88. **How much will spectrum management and orderly frequency planning improve the interference situations in certain frequency bands?**

Comment:

- Significantly so. Many existing assignments are legacy, and were not necessarily made using the best available propagation modelling tools as are available today. In addition, the loss of old records means that interference calculations may be in error.

95. **Due to the scarcity of the high-demand spectrum and the consequential fact that Spectrum Sharing in certain bands is non-negotiable, how shall you describe the best sharing conditions for the South African scenario?**

Comment:

- We note that the concept of sharing is mentioned well over 40 times in the

Consultation document. From this, we gather that the Authority places significant store by it.

- Our members are firmly of the view that conventional spectrum sharing should be on a commercial basis, where the "donor" is compensation by the "beneficiary".

96. **Due to the convergence of technologies and the changes in the regulatory licensing environment do you believe that certain service allocations categories will or need to change?**

Comment:

- The SACF holds the view that the licensing framework must be reconsidered towards ensuring the efficient and effective licensing and inclusive licensing framework that promotes competition and attracts and sustains investment.

101. **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?**

Comment:

- The IoT market is developing rapidly. However, at present it is more promise than actuality. It is therefore difficult to give accurate predictions.

103. **Are there specific frequency bands that will be in higher demand over the next 10 to 20 years and do you expect higher demands for spectrum in these frequency bands in South Africa? Are there any other frequency bands that should be considered for release in the next 10 to 20 years for commercial mobile, fixed, satellite, or licence-exempt that are not discussed above? Provide motivations for your proposal.**

Comment:

- Other than the obvious comment that usage of progressively higher frequencies – specifically those above 100 GHz – will become increasingly important, it is difficult to answer this question with any precision.