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19th April 2022

The Chairperson,
Independent Communications Authority of South Africa,
350 Witch-Hazel Avenue,
Eco Point Office Park Eco Park,
Centurion South Africa,
Private Bag X10,
Highveld Park 0169 Centurion,
Pretoria

Attention: Mr. Manyaapelo Richard Makgotlho

Dear Sir,

RE: Intention to conduct an inquiry into the Long-term Spectrum Outlook for South Africa

The GSMA acknowledges ICASA's consultation on the Intention to conduct an inquiry into the Long-term Spectrum Outlook for South Africa past due date, but recognises the importance of contributing. Therefore, taking the opportunity to reply to other comments from several stakeholders, the GSMA is pleased to forward this submission.

Given there is a limited supply of mobile spectrum, it is vital that regulators primary goal is to ensure it is awarded to users who will use it most efficiently to support affordable, high quality mobile services. Spectrum is needed in low-, mid- and high- bands to fully realise the capabilities of 5G.

The GSMA highly commends ICASA for taking steps towards awarding spectrum with a successful auction recently finalised and, at the same time, for the intention to release additional spectrum in the future. Our comments are guided by international best practice, and we believe that the adoption and successful implementation of these will support the creation of an enabling regulatory environment that will support the implementation and growth of 5G in South Africa.

Additionally, we would like to inform that the provided submission is responding to comments related to Sections 4.2.1 (Mobile) and 6 (Spectrum Sharing).

We remain available in case other question may arise and thank again for the opportunity.

Best regards,

Angela Wamola
Head of Sub-Saharan Africa
GSMA

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GENERAL COMMENTS

1. Spectrum management and economic impact

5G supports significantly faster mobile broadband speeds and significantly improved latency. The technology will also help enable the full potential of the Internet of Things, from virtual reality and autonomous cars, to the industrial internet and smart cities, 5G will be at the heart of the future of communications. Today's most popular mobile applications also benefit from 5G by ensuring continued growth and quality.

Most notably, the speed, reach and quality of 5G services will be heavily dependent on governments and regulator support to provide timely access to the right amount and type of spectrum, and under the right conditions.

5G is a pillar of digital transformation and has the potential to impact communities and economies, and as it delivers transformational services it can boost global GDP by US$2.2 trillion. In 2019, mobile technologies and services generated 4.7% of GDP across the globe. By 2024, the contribution is predicted to increase to 4.9% of GDP. This can only happen, however, if sufficient spectrum resources are in place to provide the capacity for innovation and development.

As 5G will require a higher amount of investment, governments and regulators should avoid inflating 5G spectrum prices as this may limit network investment and drive the cost of services up. This includes excessive reserve prices or annual fees, limiting spectrum supply, excessive obligations and inefficient auction design. It is desirable to adopt reasonable pricing by setting reserve prices below a conservative estimate of market value and treating annual fees as part of reserve price.

The decision of making a specific ranges available to a service should consider the socio-economic impact it will bring and, at the same time, the capacity of the licensees to develop and maintain this importance and impact within the years. This includes making spectrum available when it is been awarded to other services (sometimes under-used or not in use) in order to make sure the most relevant service – with available technology and focusing on economies of scale – is made available, considering short-, mid- and long-term demand.

GSMA Recommendation
The GSMA agrees and reinforces that 5G will contribute to socio economic growth of the country. This will be unlocked by several use cases, as listed on the proposed roadmap. Including manufacturing, agriculture, health, and education. We recommend policies that encourage licensed 5G to flourish and support the development of several use cases.

2. Spectrum needs

In order to get the most out of 5G, spectrum is needed across low-, mid- and high-bands to deliver widespread coverage and support all use cases.

Mid-bands

Frequencies in the 3.5 GHz range (3.3-4.2 GHz) have in particular been used as the basis for the first roll-outs of 5G globally, driving the wider ecosystem, device diversity and competition. The range is at a

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balancing point between coverage and capacity that provides the perfect environment for the earliest 5G connectivity.

To meet the IMT-2020 requirements, an initial 100 MHz per operator is needed in 5G-enabled mid-bands. Making less spectrum available will impact service quality, decrease peak data rates and increase the necessary network investments. For example, moving from 40 MHz to 100 MHz in 5G mid-bands will result in double peak data rates, while decreasing channel sizes, will increase network density.

However, this is just the first step towards building resilient connectivity. During this decade, it is therefore important that ICASA releases around 2 GHz of mid-band spectrum for 5G going forward, including in the 3.5 GHz range and the 6 GHz band.

The GSMA worked with Coleago Consulting to determine the amount of mid-band spectrum needed by 2030, looking at a number of cities from around the world, including the SSA region.

It has found that the amount of mid-band capacity needed to meet ITU requirements varies between cities depending on factors including population density and fibre roll-out. Offload to Wi-Fi and to mmWave were taken into account in the study, which was carried out by Coleago Consulting. In the global study of 36 cities an average of 2 GHz of mid-band spectrum was required. Spectrum-needs were not related to the income level of the countries.

Having that in mind, the upper part of the 3.5 GHz range, i.e., 3.8-4.2 GHz, is seen as a prime 5G spectrum range. Without those 400 MHz available to IMT, the ITU requirements would not be met, nor new 5G use cases would be fully unlocked.

Therefore, the GSMA recommends studies that will allow the mobile use of the 400 MHz without any restrictions or sharing with current or future users. This approach requires the cease, when not in use, or relocation of current services to higher bands such as Ka and Ku.

As mentioned above, 6 GHz should also be in the pipeline. Region 1 will discuss the 6425-7125 MHz band for IMT at WRC-23. The trade-off between licenced 5G and Wi-Fi / 5G NR-U (unlicenced 5G) in the 6 GHz band will affect how 5G develops in the future. The band is one of the last pieces of mid-band spectrum that is likely to be considered for IMT and allowing licence-exempt use of any band is effectively irreversible.

Gigabit speeds are achievable through Wi-Fi 6 using existing 2.4 and 5 GHz bands. While Wi-Fi speeds in Tunisia do not usually achieve this mark, the bottleneck to achieving these speeds is not more access spectrum. Faster internet access through Wi-Fi is more typically because of the limited propagation of low-power signals that are used by licence-exempt systems, or otherwise the backhaul. Examining how fixed connectivity will be delivered for the licence exempt router will be an important part of delivering higher throughput broadband.

Low bands

Due to the limited amount of spectrum available, bands that offer coverage for wide areas (such as 700 MHz and 800 MHz) will eventually exhaust their capacity. Long-term planning without new obligations is necessary in countries that want to obtain the flexibility of using the band for mobile services.

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The low frequencies will support extended coverage in urban, suburban and rural environments and will help support Internet of Things (IoT) services. In particular, the 600 MHz band will be important in the long term to provide additional capacity in coverage bands that allow supporting the increase in the massive use of Internet of things services, and 5G stand alone.

WRC-23 will consider the identification of additional mid- and low-frequency bands. An important step in the evolution of 5G is spreading the benefits of 5G to rural areas and accelerating the IoT revolution. Therefore, the GSMA is supporting efforts to identify more spectrum below 1 GHz at WRC-23 to improve 5G coverage.

High bands

The ITU has analysed the IMT spectrum requirements for frequency bands above 24 GHz. The results are presented in three ranges: 24.25-33.4 GHz, 37-52.6 GHz and 66-71 GHz. Different parameters, including application-based approaches and technical performance.

Individual information from various countries was also included, each of which established its needs based on its own national considerations. Results vary depending on the approach and parameters used. In this range, 26 GHz and 28 GHz have emerged as two of the most important bands.

These have the potential to offer broader harmonisation with minimal equipment complexity.

The combination of 5G and mmWaves leads to a new level of mobile performance with ultra-high speeds and low latencies. Momentum behind the 28 GHz band is growing, with the availability of commercial devices and services. For the 26 GHz band, the results of WRC-19 had a major impact on the ability of mobile operators to make the most of the band.

GSMA Recommendation
The GSMA recommends that ICASA considers low- (sub 1 GHz), mid- (1-7 GHz) and High-bands (mmWaves), including the entire 6 GHz range (5925 – 7125 MHz) not yet mentioned on ICASA's plan for IMT. The GSMA studies are published[1] to support spectrum needs analyses.

3. Spectrum pricing

High spectrum prices jeopardise the effective delivery of wireless services. Seeking to maximise state revenues from spectrum can have negative socioeconomic costs. Competition in communications markets can be undermined and there is a risk of higher retail prices and lower network investment. Licensing authorities should set reserve prices conservatively to allow the market to determine a fair price and to reduce the risk of leaving spectrum unassigned.

[1] Mobile Spectrum licensing best practice: Mobile-Spectrum-Licensing-Best-Practice.pdf (gsma.com)
General Licencing: https://www.gsma.com/spectrum/resources/learn-mobile-spectrum/
Set-asides: https://www.gsma.com/spectrum/resources/mobile-networks-for-verticals/
Spectrum Pricing: https://www.gsma.com/spectrum/resources/effective-spectrum-pricing/
Coverage Expansion: https://www.gsma.com/expanding-mobile-coverage/
Spectrum for 5G: https://www.gsma.com/spectrum/resources/5g-spectrum-positions/
TDD Synchronisation: https://www.gsma.com/spectrum/resources/3-5-ghz-5g-tdd-synchronisation/
Mid-band needs: https://www.gsma.com/spectrum/resources/5g-mid-band-spectrum-needs-vision-2030/

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Where spectrum is auctioned, ongoing charges should be limited to recovering the cost of spectrum management. Any subsequent fees associated with licence renewal should not prevent reasonable returns being earned on risky investments as this discourages technological innovation.

We encourage the ICASA to avoid inflating 5G spectrum prices as this is linked to slower broadband speeds and worse coverage. Key concerns are excessive reserve prices, annual fees, limited spectrum supply (e.g. through set-asides) and poor auction design.

GSMA Recommendation
In order to encourage 5G development in South Africa, the GSMA recommends that ICASA sets affordable spectrum prices.

4. Spectrum Sharing

In helping to reduce spectrum shortages faced by some operators while ensuring valuable spectrum does not lie fallow, spectrum sharing helps more intensive spectrum use, increased service quality and lower costs of service provision.

Spectrum leasing and trading enable the parties that have the best information on the value of spectrum to determine its price. A buyer or lessee will need to create more value from the acquired spectrum than the seller to justify the sale. Voluntary leasing and trading also reduce risks for operators as they are able to sell or lease unused spectrum while having the opportunity to acquire new capacity as they grow. The ability to trade and lease licences can ensure that spectrum is used efficiently without any need for further charges to be imposed by government.

Experience with spectrum trading and leasing shows that:

- Trading is more likely to take place where there is substantial available spectrum and where there is predictability on both future spectrum availability and the regulatory framework.
- Trading is more likely to take place where there is available spectrum and where there is a need to support network deployment by the lessee, such as for verticals.
- Long licence terms allow the buyer or lessee of the rights to undertake investments to make use of the spectrum.
- Spectrum trading and leasing are made difficult where decisions about whether licences are to be renewed and the conditions that will be attached to the new licences are made close to the expiry date of the existing licences.
- Authorities should be notified of the agreements taking place so that it is clear who holds spectrum usage rights. Notification enables authorities to assess whether a proposed trade would create any risks to competition. Regulatory frameworks that support voluntary spectrum trading can benefit society by ensuring the ongoing efficient use of spectrum.

GSMA Recommendation
ICASA should allow voluntary spectrum sharing, leasing and trading amongst operators and facilitate such mechanisms through clearly defined spectrum sharing framework, long licence terms, and limited administrative costs.

5. Enterprise use cases

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In the era of competitive mobile markets, auctions have become the primary means of assigning mobile spectrum licences. They allow the market to determine spectrum assignments - rather than a government or regulator. In this way they support the competition which has delivered better outcomes for consumers.

However, we have noted that governments and regulators can unintentionally make decisions about spectrum auctions that distort fair market competition by setting aside spectrum. This restricts the amount of spectrum that operators can access, which can negatively impact mobile broadband speed and coverage and inflate spectrum prices.

Setting-aside spectrum is risky and operators can make industrial applications a reality. Our current position states:

GSMA Recommendation
• Commercial mobile operators support the needs of a wide variety of vertical sectors and will have added capabilities with 5G; • Spectrum leasing or, when carefully planned, other types of spectrum sharing can be viable options for supporting verticals who want to build private networks; • Spectrum that is set-aside exclusively for verticals in core mobile bands risks being underused and can undermine fair spectrum awards; • Spectrum that is set-aside for mobile networks for verticals in core mobile bands can also threaten the wider success of 5G as it creates scarcity – including slower rollouts, worse performance and reduced coverage; • Policymakers should consider the coexistence challenges when different use cases need to be supported in the same mobile band; • Unlicensed spectrum is likely to play an important role for numerous verticals; and • Policymakers should carefully consider their options and consult stakeholders to ensure they most efficiently support the needs of verticals without undermining other spectrum users.

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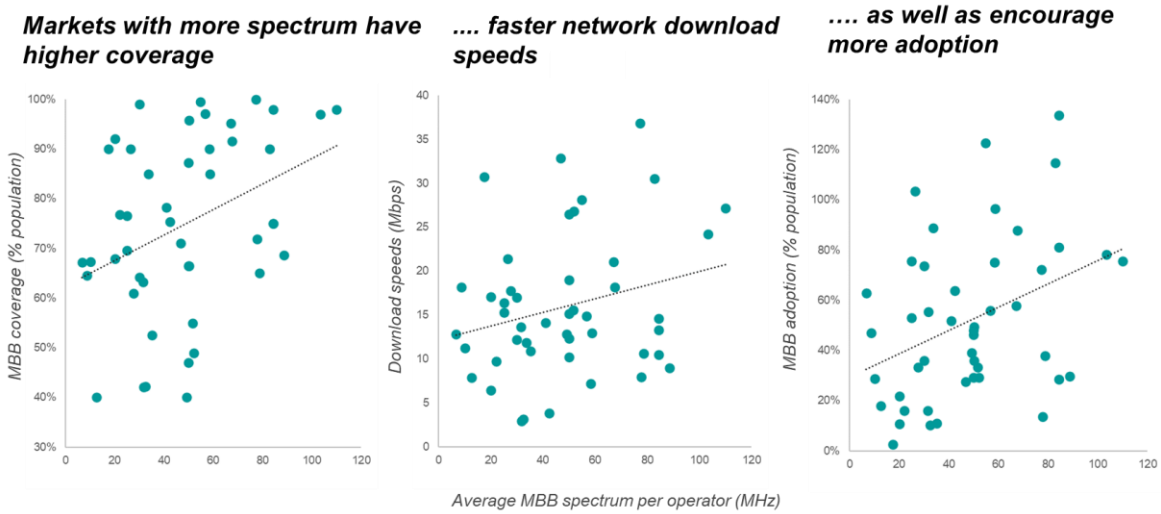
SPECIFIC RESPONSE TO CONSULTATION QUESTIONS

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

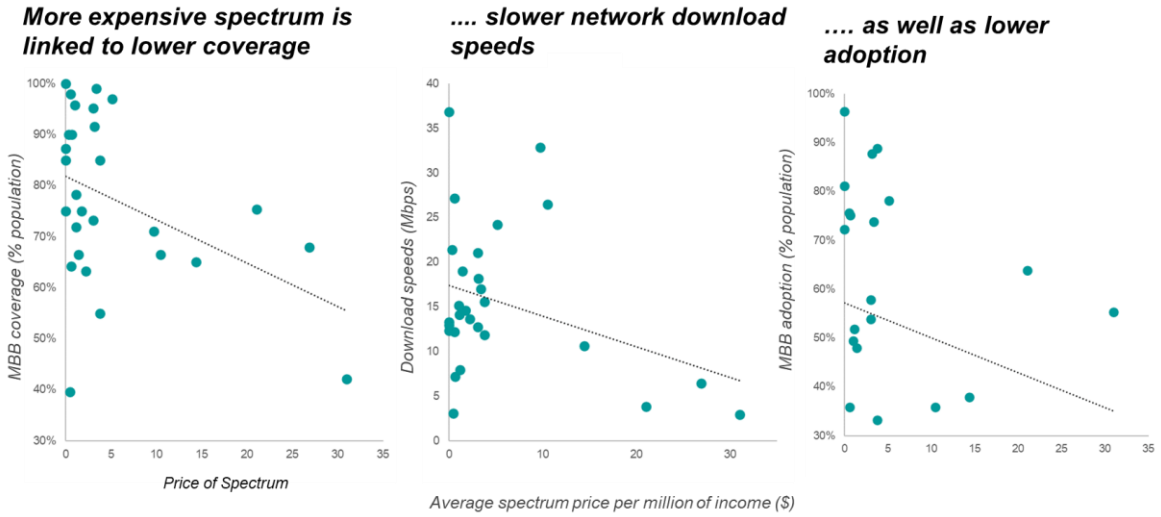
   The ATU Spectrum Recommendations captures the relevant regulatory and policy aspects of long term spectrum planning.

3. 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.

   The GSMA is aligned with ICASA's assessment of the impact that spectrum availability has on consumers' access to and adoption of mobile broadband services. In a recent GSMA study[2] which looked at 405 spectrum assignments globally, we assess that;



Additionally,



[2] https://www.gsma.com/spectrum/resources/effective-spectrum-pricing-africa/

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Whilst other factors may contribute to the levels of adoption of mobile broadband services, this illustrates the critical role that spectrum plays in facilitating access for citizens. It is, therefore, ever more pertinent to explore all possible avenues through which spectrum in low, mid and high bands, can be made available to service providers to spur and support demand for broadband services.

4. 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?

- Enable a licensing regime that allows for effective spectrum sharing and trading through a secondary spectrum market
- In view of the fast pace of innovation and introduction of new and emerging technologies, continue to effectively implement a technology-neutral approach to spectrum licensing
- Carefully assess the implementation of service neutrality, particularly in spectrum bands which may be used for IMT service but are currently assigned to applications
- Assign spectrum in blocs of 80-100 MHz in the mid-band, and 800-1000 MHz in the mmWave range, per operator. This will enable the full potential of 5G and future technologies

5. 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?

- Artificial Intelligence
- Augmented Reality
- Virtual Reality
- IoT
- Low latency applications
- Industrial Automation Applications
- Smart Cities
- Smart Countryside
- Etc.

12. Provide your support or reasons for objections on the bands being considered internationally for 5G commercial mobile allocations.

- **3300-3800 MHz:** WRC-23 Agenda Items 1.2 and 1.3 are an opportunity to achieve greater harmonisation of the 3.5 GHz range. Frequencies in the 3.5 GHz range are already used as the basis for commercial 5G networks globally. This spectrum is at a balancing point between coverage and capacity that has provided the perfect environment for much of the earliest 5G connectivity. The payoff will be more affordable 5G services for everyone.
- **470 – 960 MHz:** Additional spectrum below 1 GHz is being discussed under Agenda Item 1.5 at WRC23. These frequencies can be used to provide increased capacity and performance in rural areas where higher frequencies cannot cover cost-effectively. In-building coverage will also be enhanced.
- **6425-7125 MHz**: The 6 GHz range is a core component of the spectrum needed to realise universal 5G connectivity. 5925-7125 MHz is a priority band for mobile network operators on

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a global basis as they look to increase capacity and lower costs. Research by the GSMA[3] highlights the fact that if the entire band is allocated to mobile, this scenario will deliver the largest benefits across all countries if fixed broadband technologies do not provide maximum user speeds above 5 Gbps. Based on existing spectrum availability, spectrum will not be a bottleneck for Wi-Fi unless fixed broadband offers speeds that can exceed at least 5 Gbps to all FTTH/B and cable users. This is because there is already sufficient capacity with existing unlicensed spectrum. This scenario will still deliver the largest benefits across most countries if in those countries fixed broadband provides maximum user speeds up to 10 Gbps and if a portion of Wi-Fi traffic is offloaded to the 60 GHz band.

- **4800-4990 MHz:** This band now has the backing of a growing ecosystem, based on new assignments in China, nearby assignments in Japan and the ongoing activity for WRC-23. In short, it is backed by countries representing a large portion of the world's population. That makes it a strong option for adding more mid-band spectrum, which is needed to ensure future 5G growth

15. 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.

    In addition to the bands highlighted in the response to Question 12 above, bands identified for IMT at WRC15 (e.g., the L Band) and WRC19 should be considered for release in the next 10 to 20 years. This will enable the full potential of 5G, emerging technologies and the foundations of the next generation of network technologies.

16. Which vertical markets will require the most secured licensed spectrum to overcome their current interference and congestion issues?

    Spectrum that is set-aside exclusively for verticals, especially in core mobile bands, risks being underused and can undermine fair spectrum award. Assigning spectrum to the highest value user has been central to the success of mobile spectrum management in recent decades. This has proven a reliable means of ensuring spectrum is used efficiently and significant value is created for society. Set-asides for vertical industries in core mobile bands circumvent this process and raise concerns about efficient spectrum use. Set-asides can also undermine other spectrum users who create more value for society.

    For example, those vertical industries which choose to use a dedicated set-aside in the 3.5 GHz band are only likely to operate in a relatively small number of fixed locations so the spectrum is likely to go unused in parts of metropolitan areas and almost all suburban and rural areas. Furthermore, it is unclear whether a critical mass of verticals will wish to take on building their networks, and thus rely on the setaside, given that other solutions providers may be able to better meet their needs. Surveys show most verticals do not need dedicated, fully isolated private networks[4].

17. 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?

[3] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fdata.gsmaintelligence.com%2Fapi-web%2Fv2%2Fresearch-file-download%3Fid%3D69042233%26file%3D310121-The-socioeconomic-benefits-of-the-6-GHz-band.pdf
[4] See GSMA report 'Network Slicing Use Case Requirements' (April 2018)

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See response to Question 15

18. 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 organisation considers reasonable)
    - 450-470 (20MHz)
    - 617-698 (70MHz)
    - 1 427-1 518 (91MHz)
    - 1 710-2 025 (315MHz)
    - 3 300-3 400 (100MHz)
    - 3 400-3 600 (200MHz)
    - 3 600-3 800 (200MHz)
    - 4 800-4 990 (190MHz)
    - 24 250-27 500 (3250MHz)
    - 37 000-43 500 (6500MHz)
    - 45 500-47 000 (1500MHz)
    - 47 200-48 200 (1000MHz)
    - 66 000-71 000 (5000MHz)

    The GSMA supports the allocation of the listed bands to IMT, and encourages ICASA to hold consultations with stakeholders towards facilitating seamless reallocation of the bands

52. 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?

    We encourage ICASA to develop a spectrum sharing framework which considers Frequency Separation, Spatial Separation, and Time Separation, whilst allowing this sharing to happen voluntarily between service providers based on individually agreed commercial terms.