



11 February 2022

Vodacom's Submission on ICASA request for comments regarding the draft Implementation of the Radio Frequency Migration Plan and of the International Mobile Telecommunications (IMT) Roadmap, NOTICE 739 OF 2021, Gazette 45690.



1. Introduction

Vodacom thanks the Authority once again for furthering engagements and inputs into the **draft Implementation of the Radio Frequency Migration Plan and of the International Mobile Telecommunications (IMT) Roadmap**.

Vodacom commends the Authority in its ongoing engagement with industry on matters relating to broader spectrum and frequency issues affecting South Africa. We believe the recommendations set out below in our responses will guide the Authority toward the best possible outcomes regarding frequency migration, and assist in chartering a path toward greater IMT frequency availability in South Africa. This will in turn improve the efficient use of spectrum, and in so doing assist the Authority to advance some of the country's broadband and connectivity socio-economic goals.

2. Responses to the Authority

2.1. 450 - 470 MHz:

Vodacom supports the allocation of the 450 - 470 MHz range for IMT. In the 2019 Final Radio Frequency Migration Plan, the Authority indicated its intention to allocate this frequency to IMT, which we believe should have already implemented. Whilst there is a historical use of the band for government fixed services, Vodacom believes that a migration to another band would still support government's fixed service application. Such a migration will eliminate the tedious, cumbersome, and administrative task of creating exclusive zones with coordinated deployment.

The IMT450 band provides a broad coverage footprint and could be difficult to control near exclusive zones. According to the GSA, there are 194 device variants supporting B31 with 14 networks currently deployed with B31. In comparison, there are only 37 devices supporting B72, with only 1 network launched which is in Russia supporting this band. B31 is the more favourable band to license in this range due the larger device ecosystem that is currently readily available and deployable.

Vodacom advocates for exclusive use of this band for IMT as it provides the greatest consumer benefit. The Authority stated that equipment currently being used by incumbents in this band is at the end of its lifespan and the technology is outdated. Therefore, the economic benefits of deploying IMT in this band is likely to outweigh all other potential application.

The migration of 450-470 MHz is currently delayed according to the Authority's timelines. The Authority's spectrum audit showed that less than 20% of the band is occupied across South Africa despite the large number of licensees¹. According to ICASA's IMT Roadmap 2019²:

- The SAPS, other government services, municipalities and emergency services are set to migrate to the PPDR band as identified in the NRFP 2018.

¹ Government Gazette Number 38213, NOTICE 1009 OF 2014

² Government Gazette No. 42361



- Transnet has embarked on a technology modernisation process from analogue to digital systems.

Therefore, Vodacom recommends that the Authority pursues an aggressive schedule with to migrate legacy users out the band, after which it should follow an open, fair and transparent licensing process. Vodacom recommends that the B31 channel arrangement be followed, and that the Authority expedites the assignment of the band by releasing an updated RFSAP.

2.2. 617 – 652 // 663 – 698 MHz:

In Vodacom's previous submission for the Draft National Radio Frequency Plan of 2021, Vodacom had requested that the digital dividend 3 band be allocated to IMT on a secondary basis. Respecting access for both broadcasters and telecommunications companies whilst also avoiding cross boarder interference, it would be feasible to deploy IMT in areas where these conditions are met. This could be in areas where the full multiplex set is not being utilized. As an example, a deployment to provide coverage to a basement or undercover parking lot in a city centre would be highly beneficial and effective in this band due to its deep indoor penetration capabilities.

The device system has evolved steadily over the past 3 years, with 257 device variants supporting either B71 or n71.

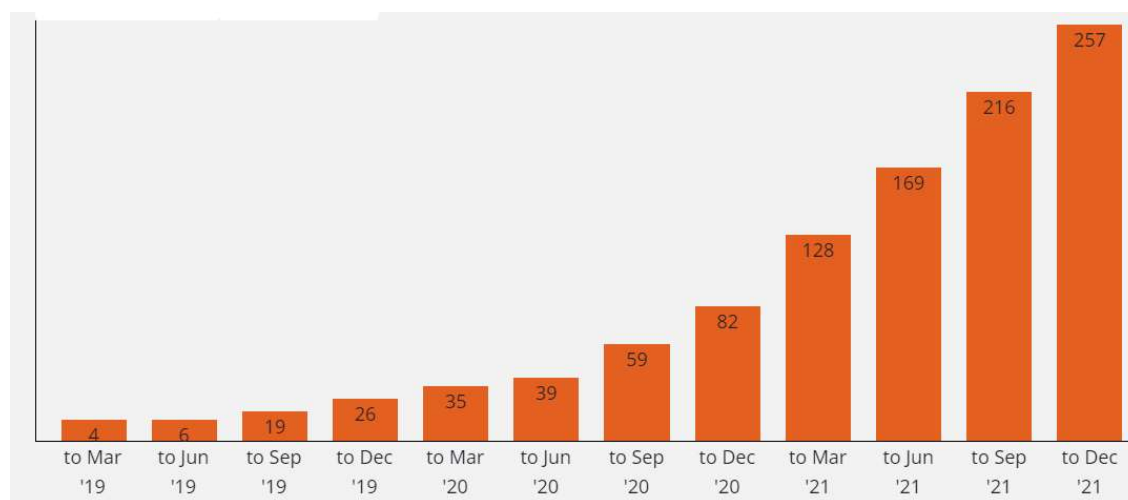


Figure 1: Combined B71 and n71 Device Ecosystem

Vodacom recommends that the band be assigned for IMT usage on a secondary basis, until such time as the aggregate demand for DTT broadcast systems becomes more apparent.

2.3. 694 – 790 MHz:

Vodacom supports the decision of the Authority.

2.4. 733 – 758 MHz (700MHz Guard frequency bands):

The 733 – 758 MHz range is identified by 3GPP as B67. If the band is currently deemed feasible for assignment and is not currently being used, Vodacom proposes that the range be expedited for assignment in order to maximize the coverage benefits that can be derived from the 700 MHz range.



2.5. 790 – 862 MHz:

Vodacom supports the decision of the Authority.

2.6. 862 – 890 MHz (including 862 – 876 MHz):

Vodacom recommends the Authority engage with Liquid Telecom to find a suitable band it can migrate to. Currently, Liquid Telecom is not using the frequency and therefore it is recommended that the Authority either withdraw the spectrum or immediately migrate Liquid Telecom's assignment, given that there is no impediment to them being migrated. Vodacom has two proposals that the Authority could possibly consider below:

- Liquid Telecom's assignment could be migrated to the 450 MHz band if feasible, or;
- Alternatively, Liquid Telecom can cede their 850MHz assignment in return for the 4 MHz currently provisionally assigned to Liquid Telecom in the 3.5 GHz band.

2.7. 876 – 960 MHz (876 – 960 MHz, 890 – 942 MHz, 880 – 960 MHz, 942 – 960 MHz):

The change in consumer habits arising from the COVID-19 lockdown from 2020 has placed heavy demand and severe strain on mobile networks, both in South Africa and internationally.

The 2100 MHz band, which currently supports a high number of 3G users, is, where possible, being re-farmed for LTE to alleviate some of this new traffic demand. The re-farming of 900 MHz for LTE is currently being used as a last resort to further alleviate the traffic demand, as it is still currently heavily loaded with 2G and 3G users, largely due to the high legacy device penetration.

A large percentage of 2G users currently utilize the 2x1 MHz that is requested to be ceded. These users are among the less fortunate users, often residing in rural areas. A forced migration that requires relinquishing of 2G spectrum resources would not likely align with ICASA's objectives of providing broadband/basic connectivity access to rural areas. These users will be severely affected if the 2x1 MHz is ceded prior to receiving new spectrum through the current ITA process. With Vodacom's current traffic demands and without the release of new ITA spectrum, it is extremely difficult to cede the 2x1 MHz without impacting many of Vodacom's key performance indicators which will result in a degraded user experience and quality of service (QoS). This is largely due to the interconnected nature of the access network, where capacity loss on a particular frequency layer, has a knock-on impact on other frequency layers.

The in-band migration will require 900MHz capable cell extenders and older DAS deployments to be replaced due to the limitations of band pass filters and older deployments with in-band combiners. Vodacom has made significant progress in its migration planning, with almost half of the quoted cell extenders having already been replaced. Vodacom's cell extender replacement is ongoing. However, it is a resource intensive task that needs to be done in a manner that does not risk severe network quality degradation, especially in outlying areas.

In addition, the in-band migration, will require a re-design of the frequency plan of the entire Vodacom network. This will require a significant effort, which would need to be co-ordinated with the other 2 operators within the band. This co-ordination will be challenging, as each cluster will need to be retuned at the same time with the other operators. Inter-operator co-ordination is a

critical success factor in ensuring the re-farming is successfully completed and Vodacom recommends the following plan to approach this.

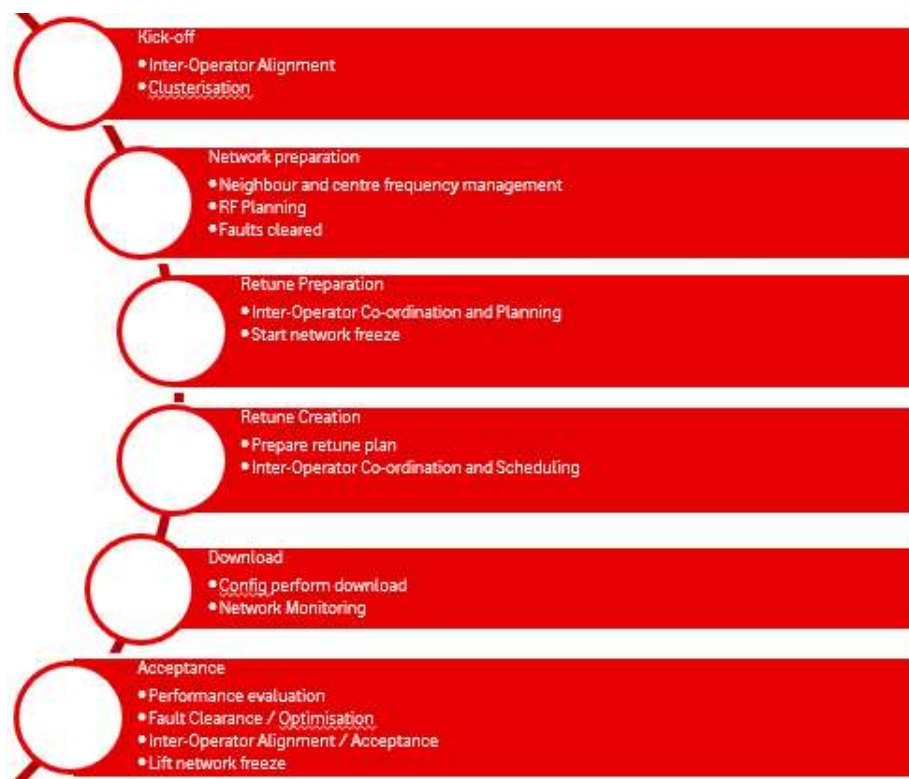


Figure 2: Inter-Operator Co-ordination Plan

Vodacom estimates that once new spectrum is made available on a permanent basis, the re-farming process can be completed in roughly 6 months. Unfortunately, Provisional assignments run the risk of being withdrawn, and as such cannot substitute for permanent spectrum assignments in the current circumstance. Vodacom recommends that the migration be completed 6 months after either new spectrum is acquired through the ITA or after the state of emergency is ended, due to the reasons mentioned above.

In addition to the above, the Authority has carried out an intensive competition assessment in preparation for the ITA. From this assessment, spectrum caps have been developed to promote competition among the MNOs and that after the ITA, all operators will have competitive holdings. The Authority is urged to carefully consider the impacts, including competition, when assigning the 2x5MHz spectrum made available through the migration process.

2.8. 1350 – 1375 // 1492 – 1518 MHz and 1375 – 1400 // 1427 – 1452 MHz:

Vodacom supports the decision of the Authority regarding this bands. Vodacom sees a non-FDD configuration as the optimal band plan for L-Band. There are currently no 3GPP bands supporting this range and therefore the band is unlikely to be viable for IMT applications in the next 2-3 years. However, we recommend that the Authority monitor global developments to be able to react in a timely manner once there is traction within the ecosystem for this band.



2.9. 1429 – 1518 MHz (1429 – 1452 MHz, 1452 – 1492 MHz and 1492 – 1518 MHz)

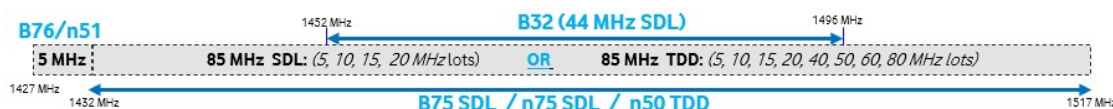


Figure 3: 3GPP bands in L-Band

Vodacom would like to request the Authority to consider the L-band in its entirety, as illustrated above and not to segment it into 2 parts i.e., 1452 – 1492 MHz and 1492 – 1518 MHz. The advantage of the full L-band is that it contains 91 MHz of contiguous spectrum from 1427 – 1518 MHz, and in conjunction with its more favourable propagation characteristics, which could provide significant consumer benefit. Consumers will not get the full benefit of the band if only parts of it will be made available for IMT. By considering the band in segments, neither B32 or B75/ n75 or n50 can be fully utilized, which would amount to inefficient use of the band.

According to the GSA as tabulated below, the following countries are utilizing the L-band for IMT. It can be seen that B75/ n75 is the popular choice and also that some countries have licensed both B32 and n75 concurrently. There are currently 5 devices supporting band n75, and while there are no devices supporting n50, the TDD band offers more flexibility over the SDL structure. The SDL configuration is currently more popular due to the immediately available ecosystem. According to 3GPP Specification #: 36.753, the implementation of TDD arrangement in the L-band is a realistic option while achieving the protection of the EESS and MSS, based on studies conducted.

Operator	Country	Regions	Frequencies
3 Austria	Austria	Western Europe	n75 or n76 (1427-1517) SDL: Piloting
3 UK	United Kingdom	Northern Europe	b32 (1452-1496) SDL: Launched
3 UK	United Kingdom	Northern Europe	n75 or n76 (1427-1517) SDL: Evaluating/testing/trialling
A1 Telekom	Austria	Western Europe	n75 or n76 (1427-1517) SDL: Licensed
KPN	Netherlands	Western Europe	b32 (1452-1496) SDL: Licensed
KPN	Netherlands	Western Europe	n75 or n76 (1427-1517) SDL: Licensed
Salt	Switzerland	Western Europe	b75 or b76 (1427-1517) SDL: Licensed
Salt	Switzerland	Western Europe	n75 or n76 (1427-1517) SDL: Licensed



Sunrise Communications (Yallo)	Switzerland	Western Europe	b75 or b76 (1427-1517) SDL: Licensed
Sunrise Communications (Yallo)	Switzerland	Western Europe	n75 or n76 (1427-1517) SDL: Licensed
Swisscom	Switzerland	Western Europe	b75 or b76 (1427-1517) SDL: Licensed
Swisscom	Switzerland	Western Europe	n75 or n76 (1427-1517) SDL: Licensed
T-Mobile	Netherlands	Western Europe	b32 (1452-1496) SDL: Licensed
T-Mobile	Netherlands	Western Europe	n75 or n76 (1427-1517) SDL: Licensed
T-Mobile (Magenta Telekom)	Austria	Western Europe	n75 or n76 (1427-1517) SDL: Licensed
TDC (YouSee)	Denmark	Northern Europe	n75 or n76 (1427-1517) SDL: Licensed
TIM	Italy	Southern Europe	b32 (1452-1496) SDL: Launched
TIM	Italy	Southern Europe	b32 (1452-1496) SDL: Launched
TT-Netvaerket (Telia/Telenor jv)	Denmark	Northern Europe	n75 (1432-1517) SDL: Licensed
Vodafone	United Kingdom	Northern Europe	b32 (1452-1496) SDL: Launched
VodafoneZiggo	Netherlands	Western Europe	b32 (1452-1496) SDL: Licensed
VodafoneZiggo	Netherlands	Western Europe	n75 or n76 (1427-1517) SDL: Licensed

Vodacom wishes to encourage the Authority to release the full range of L-band 1427-1518 MHz as soon as feasible to enable a significant block in this band for IMT use (91 MHz vs. the 40MHz of 1452-1492 MHz).



While some regulators have already assigned this band for supplemental downlink (SDL – Band n75) as tabulated above, we expect that there may be a future migration to the more flexible Band n50+n51 arrangement. As such, we would recommend the Authority to immediately assign the range 1432-1518MHz in a Band n75 configuration, with a migration plan to the n50+n51 (1427-1518MHz) TDD band plan. This would ultimately allow for use of 5G for downlink only, uplink only or uplink/downlink transmissions depending on the needs of the operators.

Currently, there is only 3.875 MHz of spectrum being occupied by incumbents in a bandwidth of 200 MHz (1.3 – 1.5 GHz range), according to the Authority³. Vodacom proposes that the current incumbents do an in-band migration to a range below 1427 MHz. There would be 127 MHz (1300 – 1427 MHz) available to occupy the 3.875 MHz required by the incumbents.

Vodacom has expressed interest in its previous submissions (Draft National Radio Frequency Plan 2021 and Inquiry for The Implementation of The Radio Frequency Migration Plan and The IMT Road Map) to use the L-band for IMT.

2.10. 1598 – 1525 MHz:

IMT can co-exist with MSS with a guard band of 3 MHz, noting that MSS starts at 1525 MHz in many parts of the parts of the world⁴. Vodacom supports the Authority to develop a RFSAP for this band in the shortest timeline available.

2.11. 1880 – 1900 MHz (1880 – 1920 MHz + 1885 – 1980 MHz):

While the Authority wrote 1880 – 1900 MHz (1880 – 1920 MHz + 1885 – 1980 MHz), Vodacom assumes that the Authority meant to reference 1880 – 1920 MHz. As previously mentioned from Vodacom’s submission for the Draft National Radio Frequency Plan 2021, Vodacom notes that 1880-1900 MHz is license exempt and that Telkom uses 1900-1920 MHz for fixed wireless access (FWA) systems, of which 1915-1920MHz is a guard band and is not used for the service that was delivered⁵. It is not clear as to the extent that Telkom’s legacy FWA service is still relevant, given the age of the technology and the likely prospect that a large proportion of the original user-base may have abandoned the service in favour of IMT mobile. Vodacom recommends that 1880-1920 MHz (band n39) be allocated to IMT and be made available to other operators, allowing for greater national benefit for a far greater number of customers, and further recommends that legacy fixed services that have limited coverage have a schedule developed for migration out of the band. Vodacom proposes that the band be made available for assignment to MNOs through an open, fair and transparent process.

2.12. 2010 – 2025 MHz:

According to the GSA, there are currently 533 device variants supporting either B34 or n34. The ecosystem has grown steadily over the past 3 years as illustrated below. Despite this ecosystem, there are currently no deployments of this band.

³ <https://www.icasa.org.za/legislation-and-regulations/spectrum-usage-and-availability-q1-2019>

⁴ https://www.gsma.com/spectrum/wp-content/uploads/2019/10/L-band-for-mobile-broadband_web.pdf

⁵ Government Gazette No. 42361 of 2019 Pg. 92

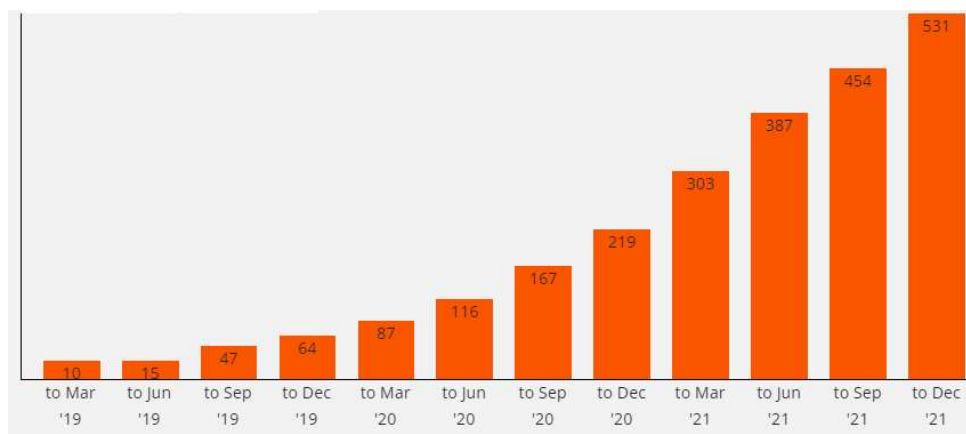


Figure 4: B34/ n34 Ecosystem

Given that some operators have returned this range back to the Authority, it may be useful to consider this band for public services or social delivery in South Africa. Alternatively, we recommend that the Authority monitor global ecosystem developments, and revisits its assignment plans once there is greater traction.

2.13. 2025 – 2110 // 2200 – 2285 MHz:

Currently, there are no 3GPP bands that lie within this range and its identification might not fall in the Authorities timeframe of 2-3 years. Vodacom supports the decision of the Authority to develop an RFSAP for this band in the shortest time to implement.

2.14. 2300 – 2450 MHz:

Vodacom supports the decision that 2300-2400 MHz will be assigned to IMT and that 2400-2450 MHz will be used for ISM applications.

According to Telkom's recent application⁶, it is willing to surrender its 2400-2481 MHz spectrum. Therefore, the Authority's assumption that fixed links in this band would be required to be migrated to bands above the 3 GHz range is unfortunately not relevant anymore as there are no fixed links operating within this band and as such, no migration is required.

Vodacom recommends that the spectrum be made available through an open, fair and transparent ITA process.

2.15. 2500 – 2690 MHz:

Vodacom supports the decision of the Authority.

2.16. 3400 – 3600 MHz:

Vodacom supports the decision of the Authority.

2.17. 3300 – 3400 MHz, 3600 – 3800 MHz & 3800 – 4200 MHz:

According to the findings of the Authority, Radiolocation services are not presently being used in South Africa. This implies then that the band is currently vacant and is not being efficiently used.

⁶ Government Gazette No. 45333



According to the GSMA, a channel size of 80-100 MHz per operator lowers network density and reduces the cost of 5G while providing an improved user experience, that has the best potential to approximate the ITU IMT-2020 ambitions. This allocation provides the greatest benefit to both operators from a deployment perspective, as well as to consumers, as they will benefit from greater speeds at lower costs.

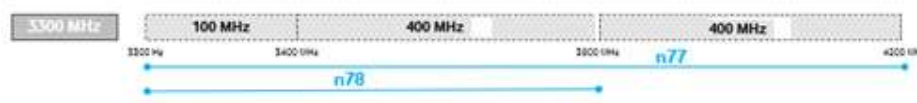


Figure 5: 3.6 GHz IMT Band

The Authority should consider licensing the entire range of 3.3 – 3.8 GHz for IMT, as this will make available the entire 500 MHz of band n78 to operators. According to a study by Plum Consulting, a considerable cost benefit can be derived by the early release of the 3600-4200 MHz⁷. Similar, though not as high, cost benefits could also be realized with the early release of 3300-3400 MHz.

The GSA suggests a mature ecosystem for band n78, with 848 devices currently supporting the band. Device support has grown exponentially for the band due to the global harmonization of the 3.4 - 3.6 GHz range. The GSA reports 198 networks that are currently utilizing n78 for 5G services. The GSA also reports of 24 networks utilizing band n77, as well as 658 device variants supporting the band. From talks with vendors, the 3.3 – 3.4 GHz range is supported well by user equipment; however, radio equipment is still developing for this range. The 3.6 – 3.8 GHz is more popular globally and as such, radio equipment is more readily available to support this range along with user equipment.

Recently, the Federal Aviation Administration (FAA) warned that 5G networks in the US, operating on C-Band spectrum (3.7-3.98GHz range), could interfere with aircraft altimeters operating in the 4.2-4.4GHz range. According to a report on Aviation today, the key problem is that the Radar Altimeter's spectrum tolerance mask is extremely inefficient, spanning 500 MHz+ as illustrated below. Some telecommunications industry members have stated that a guard band of 0.22 GHz should be sufficient to protect aircrafts and cause no interference⁸. In Japan, three bands have been designated for 5G and are 3.6GHz - 4.1GHz, 4.5GHz and 28GHz. Even though part of Japan's 5G network overlaps altimeters in the 4.0-4.2GHz range, the Japanese report no problems to aviation⁹. Vodacom recommends that the Authority uses best practices from countries like Japan to provide clear, evidence-based guidance in South Africa.

⁷ <https://plumconsulting.co.uk/economic-benefits-use-c-band-3600-4200-mhz-mobile-broadband-uk/#>

⁸ <https://theconversation.com/how-5g-puts-airplanes-at-risk-an-electrical-engineer-explains-175306>

⁹ <https://www.capacitymedia.com/articles/3830566>

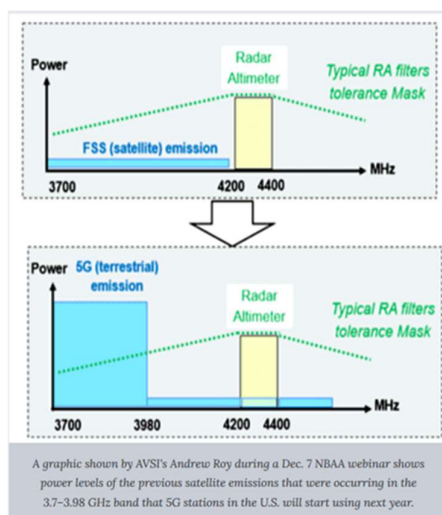


Figure 6: Interference of 5G to Radar Altimeters¹⁰

Vodacom would like to suggest that 3.3 – 3.4 GHz & 3.6 – 3.8 GHz be allocated for IMT within in the Authority's time frame of 2-3 years and before WRC-23, as this will allow operators to make efficient use of the 500 MHz of contiguous spectrum. Several countries have already started utilizing this band and the ecosystem is mature. As demonstrated in Plum's Consulting study, there is a huge cost benefit from releasing the spectrum early. Vodacom would also like to request the Authority to release a feasibility study for the 3.6 – 3.8 GHz range, similar to that of the 3.3-3.4 GHz range. The spectrum should be made available through a fair, open and transparent process.

2.18. 4800 – 4990 MHz:

South Africa has identified 4800 – 4990 MHz for IMT, and its Power Flux Density (PFD) limit is an agenda item for WRC-23, however, this limit will not apply to South Africa. Currently, there is 1 3GPP band (n79) spanning the 4400 – 4990 MHz range. According to the GSA, there are currently 11 networks utilizing this band, including China, Hong Kong, Japan, Russia and Kuwait.

The ecosystem currently has 493 devices supporting band n79 and has seen steady growth quarter on quarter, as illustrated below.

¹⁰ <https://www.aviationtoday.com/2021/12/23/faa-issues-new-radar-altimeter-5g-c-band-risk-assessment-request-aviation-industry/>

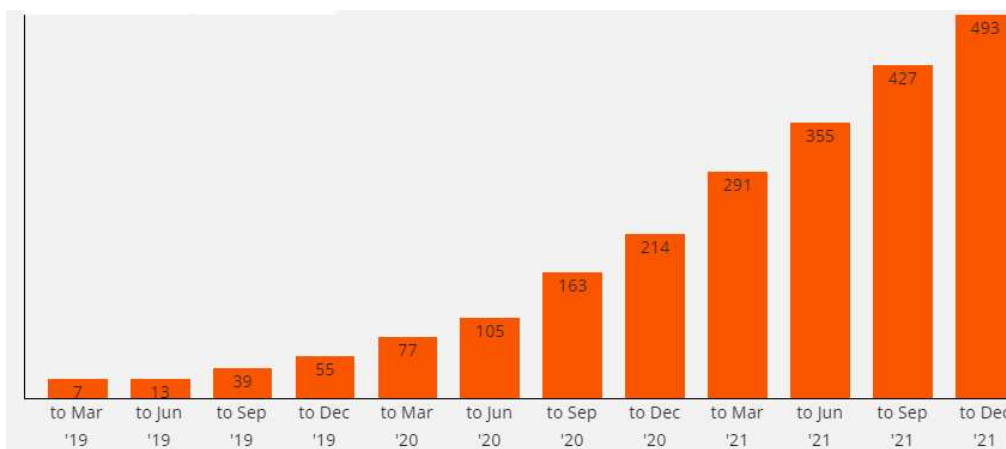


Figure 7: n79 Ecosystem

According to the GSMA, the 4GHz range provides additional mid-band spectrum, which is vital to 5G's future, with candidate mid-band ranges as illustrated below:

Lower mid-band spectrum		Upper mid-band spectrum	
1.5 GHz	1427-1518 MHz	Lower 3.5 GHz	3.3-3.8 GHz
1.8 GHz	1710-1785 x 1805-1880 MHz	Upper 3.5 GHz	3.8-4.2 GHz
PCS	1850-1910 x 1930-1990 MHz	4.8 GHz	4.8-5 GHz
AWS	1710-1755 x 2110-2155 MHz	Lower 6 GHz	5.925-6.425 GHz
2.1 GHz	1920-1980 x 2110-2170 MHz	Upper 6 GHz	6.425-7.125 GHz
2.3 GHz	2300-2400 MHz		
2.6 GHz	2500-2690 MHz		

Figure 8: GSMA Mid-Band Spectrum¹¹

According to their study, SA (Johannesburg) will at a minimum, require 1690 MHz of mid-band spectrum, with an upper estimate being 2010 MHz. Therefore, it is crucial to release the 4 GHz to keep up with the demand of data traffic, as well as to meet SA Connect Targets.

According to the Authority¹², the band is currently occupied by SANDF & SAPs (4488 - 4684 MHz // 4800 - 5000 MHz) for fixed links (although their usage of the band is unknown), and by the CSIR/ SAC for radio astronomy (4400 – 5000 MHz). Vodacom encourages the Authority to engage with the SANDF/ SAPs to see if the band is being utilized, and if so, to consider alternatives for expedited migration.

¹¹ <https://www.gsma.com/spectrum/wp-content/uploads/2021/07/5G-Mid-Band-Spectrum-Needs-Vision-2030.pdf>

¹² <https://www.icasa.org.za/legislation-and-regulations/spectrum-usage-and-availability-q1-2019>



2.19. 5150 – 5250 & 5250 – 5255 & 5255 – 5350 MHz:

Vodacom supports the decision of the Authority. There are currently two 3GPP bands that lie within this range, namely B46 and n46 which ranges from 5150 – 5925 MHz, and is a TDD unlicensed range.

According to the GSA, there are currently 220 devices that support either B46 or n46.

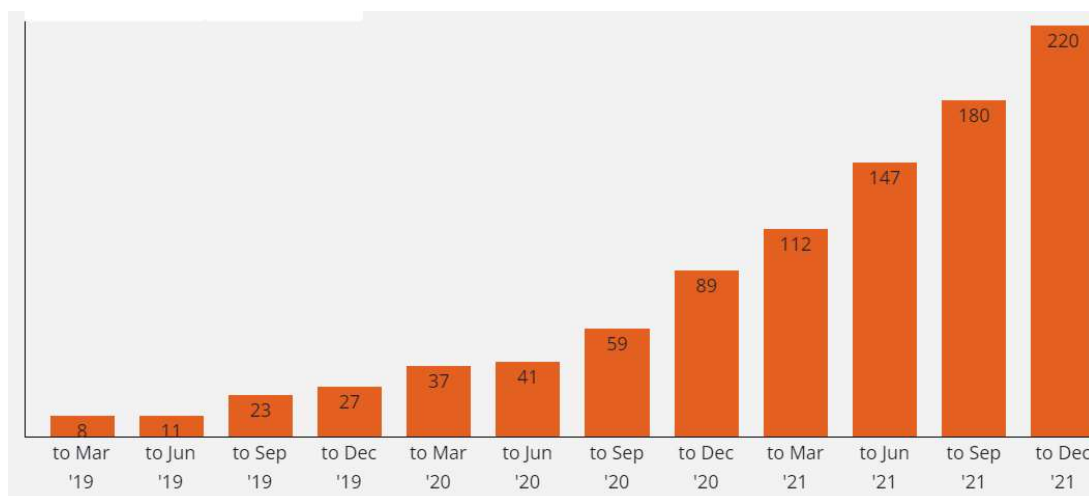


Figure 9: B46 or n46 Ecosystem

The GSA also reports 5 networks currently utilizing the band.

Operator	Region	Country	Band
AT&T Mobility	Northern America	United States	b46 (5150-5925) TDD LTE-Advanced: Launched
Claro	Latin America and the Caribbean	Brazil	b46 (5150-5925) TDD LTE-Advanced: Evaluating/testing/trialing
Ooredoo	South-eastern Asia	Myanmar	b46 (5150-5925) TDD LTE-Advanced: Deploying
T-Mobile US (inc. Sprint)	Northern America	United States	b46 (5150-5925) TDD LTE-Advanced: Launched
Telus	Northern America	Canada	b46 (5150-5925) TDD LTE-Advanced: Evaluating/testing/trialing

Vodacom supports the Authority to conduct a feasibility study on this band, and to subsequently develop an RFSAP.

2.20. 5925-7125 MHz:

The 6 GHz band is a potential golden capacity band for 5G/6G and should follow the WRC-23 routine to study the possibility for IMT identification. Beyond the 3GHz & 4GHz bands (which still suffer from legacy incumbent use), the next available capacity band for IMT is in the 6GHz range. When compared to the limited user connectivity of Wi-Fi (typically being constrained to users with alternative fixed access), the prospect of providing high capacity IMT services to large numbers of users is a more compelling proposition in a country such as South Africa that has very limited fixed



access. In regard to local Wi-Fi networks, there are other short-range alternatives for personal area networks. If allocated to WiFi, and the spectrum is to be used to generate a Mobile hotspot, the data traffic will be backhauled over the more scarce Mobile network's spectrum. Therefore, it would mean that there is duplicate use of spectrum in that traffic would be carried over the operator's spectrum while the Wi-Fi spectrum will merely act as a relay to the local network. This will be inefficient use of the spectrum resource. For these reasons, we urge the Authority to reconsider their position on the 6GHz band, as the demand for IMT allocation for the full band is gaining momentum, and represents a better consumer outcome.

2.21. 24.25 – 27.5 GHz:

Vodacom would like to propose that the frequency range of 26.5-27.5 GHz be harmonized for IMT usage, and that a IMT27000 RFSAP be finalised for assignment to operators. The spectrum can be released immediately to MNOs as there would appear to currently be no other services deployed in this range, as illustrated in Vodacom's submission to the Draft National Radio Frequency Plan 2021. This will allow for SA consumers and industry to benefit from mmWave 5G deployments. Vodacom would like to suggest that the Authority release an Annexure for this band, to illustrate the current assignments of incumbents in the band.

According to the GSA, there are 41 device variants supporting band n257 and 31 device variants supporting band n258. The device ecosystem is gaining traction for these bands, as illustrated below.

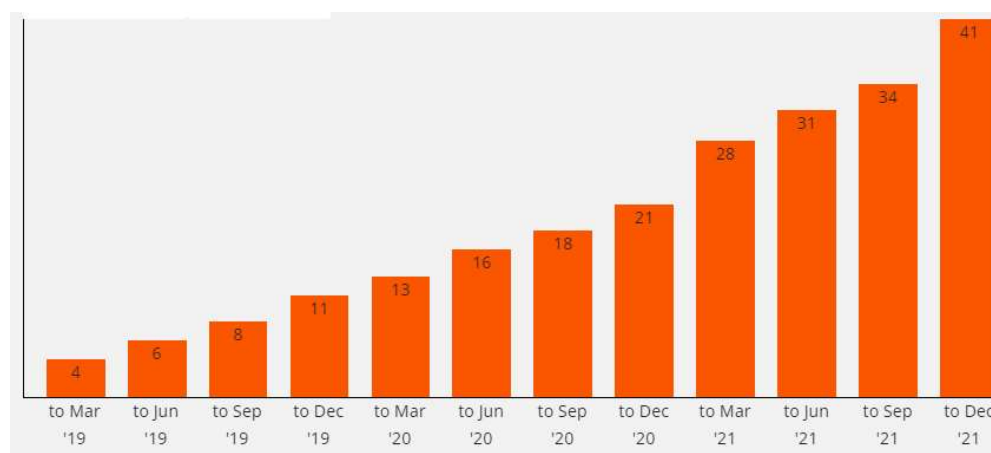


Figure 10: n257 Ecosystem

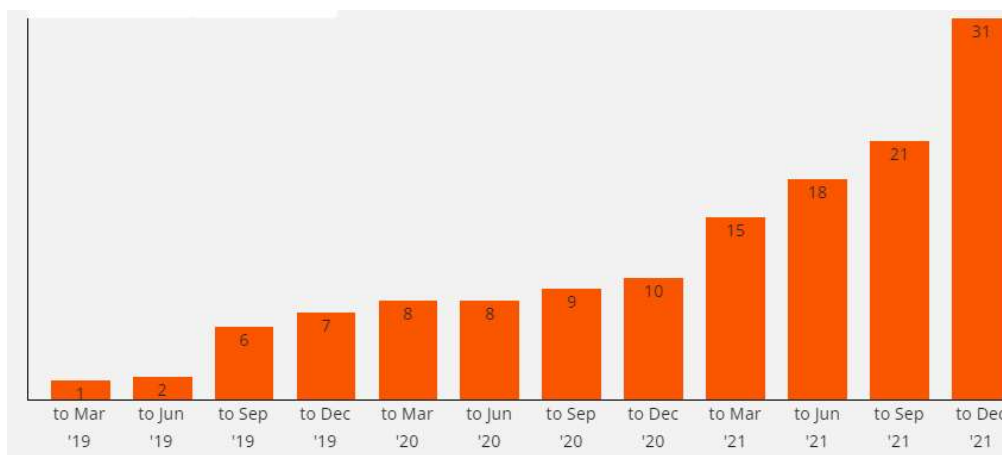


Figure 11: n258 Ecosystem

2.22. 31.8 – 33.4 GHz:

Vodacom supports the decision of the Authority.

2.23. 37 – 40.5 GHz:

Vodacom supports the decision of the Authority.

2.24. 40.5 – 42.5 GHz:

Vodacom supports the decision of the Authority.

2.25. 37 – 43.5 GHz (including 38 – 39.5 GHz for HAPS) & 35.5 – 47 GHz:

According to the GSA, there are currently 70 device variants supporting band n260 (37-40 GHz), with the ecosystem gaining traction quarter on quarter as illustrated below. In addition, there are currently 28 networks with a license for band n260 in the world, mainly in Northern America and Oceania regions, as well as Japan. Band n259 (39.6-43.5 GHz) does not presently have a developed ecosystem.

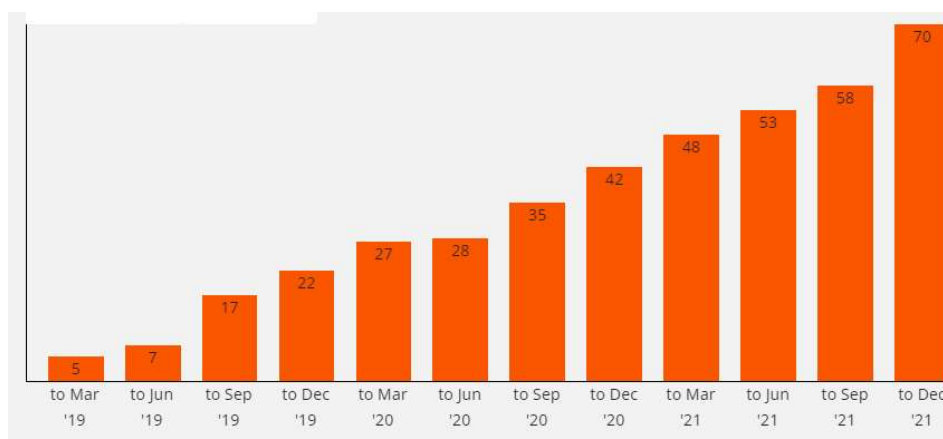


Figure 12: n260 Ecosystem

Vodacom supports the decision to allocate the frequency to IMT, and recommend that it be licensed in the near future to take advantage of the n260 ecosystem which has already started



developing. Vodacom recommends that spectrum assignment for HAPS should be to the MNOs, who are in the business of network infrastructure investment.

2.26. 47.2 – 48.2 GHz (identified for IMT in Region 2 and another 69 countries from regions 1 and 3):

While Vodacom notes that the GSA currently reports no networks or devices supporting band n262, we support the decision to allocate the band to IMT, and suggest that the Authority monitors further developments of the band before assigning it to operators.

2.27. 66 – 71 GHz:

Vodacom supports the decision of the Authority to use the band for unlicensed 5G.

2.28. Comment on EIRP/ TRP Limits for TDD Bands:

Active Antenna Systems (AAS) use new technologies like Beamforming. Therefore, 3GPP Technical Specifications 38.104 proposes that the transmission counters of the new AAS base stations are represented by over the air (OTA) measurements, as it is not possible to measure the power at the port. The measurement condition for AAS is defined as Total Radiated Power (TRP)s, not Effective Intrinsic Radiated Power (EIRPs). TRP is more accurate in assessing interference between 5G and other mobile systems.

From the current ICASA RFSAPs, there is a maximum radiated power limit of 61dBm/5MHz EIRP. It can be seen that from the CEPT ECC Decision (11)06 that in-block power limit is not obligatory, and if it is desired by an administration, a value not exceed 68dBm/5MHz EIRP per antenna for non-AAS and 47dBm/5MHz TRP for AAS may be applied. It may be prudent for the Authority to reconsider its position on EIRP and conduct further research into recent global developments, then update the definitions of “maximum radiated power limits” as discussed above, in the related RFSAPs for the 2300-2400MHz, 2500-2690MHz, 3300-3800MHz bands.