

BAINZ

Consulting



Discussion Feedback for Radio Spectrum Management on use of 24 – 30 GHz spectrum in New Zealand

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INTRODUCTION

We want to thank Radio Spectrum Management (RSM) in presenting their discussion document on the use of the 24-to-30 GHz spectrum in New Zealand, and we are pleased to be able to respond to this paper in providing our views and opinions on this spectrum range and how it can better serve future communication services for New Zealanders.

In this discussion document, we emphasise the heterogeneous capabilities of the 5G core architecture that allows connectivity to multiple access type technologies that includes 4G/5G cellular radio, fibre access networks (5G residential gateways and fixed wireless access), satellite and other trusted, and untrusted access technology types. With this baseline, we do now agree with RSM that this spectrum should only be considered for use by the existing MNOs; and should primarily be assigned to UFB network operators and/or a fourth 5G MNO.

This RSM discussion paper has stated the 26GHz and/or 28GHz bands (24 to 30 GHz) would be allocated to an existing Mobile Network Operators (MNOs) and we fundamentally disagree with this view for a variety of reasons that include:

- The target service sector for this spectrum is for 5G Enhanced Mobile BroadBand (eMBB), which is a high bandwidth offering Fixed Wireless Access (FWA) service that directly compete with the Ultrafast Broadband (UFB) fibre industry,
- The investment that has been made over the past 10 years by the UFB industry far exceeds the investment made by the MNOs into their cellular network over this period,
- The MNOs have considerable influence on the connected UFB fibre subscription base (combined to be over 50-60%) that impact the UFB industry if the MNOs decide to divert their subscriber base onto an eMBB/FWA service over their own networks,
- Many of the MNOs have a large grab of radio spectrum that is not effectively utilised and this spectrum should be re-purposed for 5G services before assigning any more spectrum to these existing MNOs,
- This 24-30 GHz spectrum should be assigned to the UFB operators so they are able to offer consumers the benefits of FWA and would complement their fibre access networks and provide growth in their industry,
- The UFB industry provides a wholesale service offering to Retail Service Providers (RSPs) on a fair and non-discriminatory basis that has accelerated competition in New Zealand and this model should be encouraged to promote better competition, innovation, and services,
- The profit/margins made by the UFB industry is less than 10%, whereas the MNOs margins can be more than double this,
- The UFB industry has rigid service, operational and/or pricing metrics that are applied to them under regulation - that do not apply to the MNOs,
- There is scope for a fourth MNO in New Zealand that can make better use of any future 5G spectrum to offer a next generation network without the stigma and constraints of a legacy cellular MNO.

In support of our discussion we have referenced the findings from of the Commerce Commission Mobile Market Study paper in September 2019, that indicate that there is scope for a fourth MNO and 5G would offer this scope.

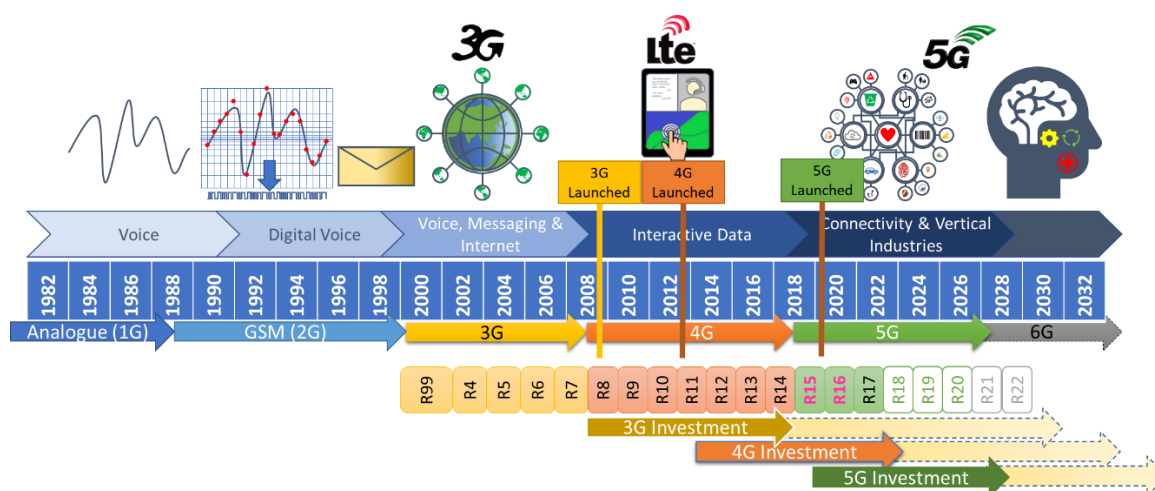
OVERVIEW

In 2004 New Zealand's communication network was in a poor state with its broadband uptake ranked 22nd in the OECD and through bad business/technology decisions lead New Zealand to abandon its CDMA cellular network. In 2012 New Zealand was reported in having one of the lowest download broadband speeds in OECD countries and its Fibre to the Home (FTTH) only accounted for 8% and was ranked 23rd (out of 37).

Significant leaps and advancements have since been made through New Zealand's Ultra-Fast Broadband (UFB) Initiative in rolling out FTTP and in 2020 Q2 New Zealand was ranked 9th in fibre connections for fixed broadband¹.

New Zealand's Mobile Network Operators (MNOs) currently operate a second, third, fourth and fifth generation (2G, 3G, 4G and/or 5G) cellular networks, the cellular 3G, 4G & 5G technologies are based on the 3GPP industry standards and roadmap.

FIGURE 2 – 3GPP Cellular technology releases



The lifespan of any cellular technology standard should be considered as obsolete/end-of-life after 20-25 years. In saying this, we should consider that the 2G network is no-longer a maintainable solution and 3G is fast approaching its effective lifespan.

Assuming the same 3G coverage is available (i.e. 98% population and 43% land mass coverage²) in the 4G cellular networks, then there is no reason for extending the life span of these technologies as they do not offer any technological advantage to its consumers. More importantly essential radio spectrum is being ineffectively utilised (for 2G/3G) that can be better utilised for newer cellular radio technologies (i.e. 4G & 5G).

Giving more radio spectrum to MNOs, when much of their existing spectrum allocations are not being effectively utilised would be a poor strategy on behalf of Radio Spectrum Management (RSM).

In the Commerce Commission (ComCom) 2019 Mobile Market Study Findings report³ (Dated 26 September 2019), it stated in its findings:

Finding 8: We do not believe there is a case for regulatory intervention to promote a fourth national MNO to enter the market. However, the design of the upcoming 3.5 GHz spectrum allocation process should not preclude new parties (including parties who may complement or compete with the existing MNOs) from obtaining spectrum.

¹ [Percentage of fibre connections in total broadband](#) (June 2020)

² [Commerce Commission Annual Monitoring Reports](#)

³ [Mobile market study final findings report published](#) (26 September 2019)

With regards to ComComs Finding 8: Unfortunately, the 3.5GHz spectrum allocation did not go according to plan, due to COVID-19 and this spectrum was allocated to MNOs⁴.

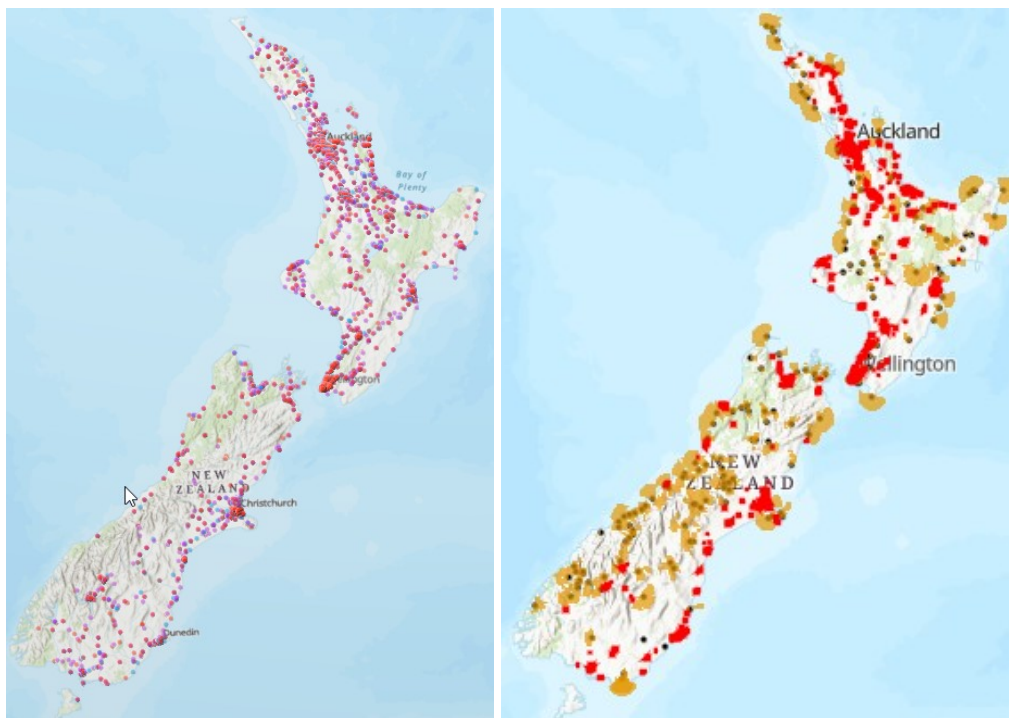
Further, the ComCom report also stated:

Finding 11: In light of this, we do not consider MVNO access regulation to be appropriate at this time. There would need to be greater evidence of market failure in respect of outcomes delivered to mobile consumers to justify wholesale access regulation. We intend to monitor the development of MVNOs, including the commercial terms being offered by the MNOs.

This ComCom report also stated, evidence existed for MVNOs to emerge with Trustpower and Kogan Mobile that will result in wholesale competition. However, with the sale of Vodafone New Zealand, which through Infratil also own Trustpower and therefore this level of competition is no longer valid.

In 2016, Crown Infrastructure Partners (CIP) issued an RFP tender for its Mobile Black Spot Fund (MBSF), with its original aim to deploy 200 cell sites in remote/rural areas. Rather than a competitive tender, a joint venture was established with the three MNOs that eliminated any competitive advantage. Of the original 200 cell sites, only 70 sites were tendered for and only a fraction of these have today been completed (40% complete as of March 2021)⁵. The MBSF initiative did not demonstrate any operational, performance and assurance metrics with little accountability. These are quite contrary to the rigid criteria that CIP applied for the rollout of its UFB fibre network rollout.

FIGURE 4 – MNO Cell Site distribution, MBSF sites⁶ & UFB areas



The UFB rollout is a true success stories for New Zealand, that offered a rigid and accountable service, operational and availability metrics – resulting in a global benchmark. The initial UFB (UFB1)

⁴ Spark News: [Spark welcomes spectrum allocation and preparing for 5G rollout over next 12 months](#)

⁵ Crown Infrastructure Partner: [March Quarter 2021 Report](#)

⁶ [Radio Spectrum Management – Spectrum Search Lite Database](#)

rollout has been completed and much of the government investment in UFB1 has been largely repaid ahead of time by many of the Local Fibre Companies (LFCs).

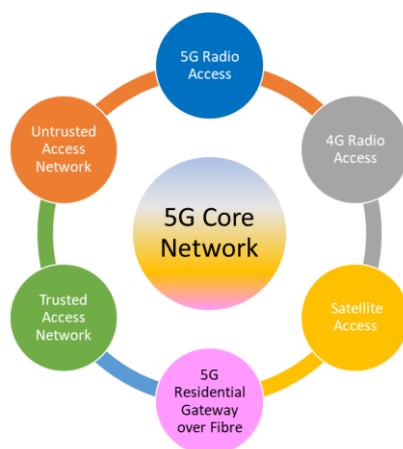
The UFB initiative introduced a Wholesale Service Agreement (WSA) model that allowed Retail Service Providers (RSPs) to be offered UFB services on an equal and non-discriminatory basis. This model witnessed a four-fold growth in the number of new RSPs offering UFB services and introduced healthy competition, high bandwidth services (up to 8 Giga Bits) and quality performing services.

Under the UFB initiative, the UFB operators have been highly monitored under their Price Caps by CIP (and later under regulation by the Commerce Commission), to what quality of service they provide and/or the level of profit they are allowed achieve. These similar restrictions do not apply to the MNOs on their existing or future expansions – as demonstrated under the MBSF initiative.

Under the CIP agreement and regulations, the UFB operators (LFCs) have been restricted on their product pricing and under the Price Quality regulation may be restricted on the level of Return on Investment (ROI) and/or profit they are allowed to reasonably achieve. This situation puts the UFB industry on a fine line of achieving a very minimal ROI that could be less than 10%, whilst the MNOs margins have been undefined (between their investment on fixed & mobile), and in some cases been identified as being over 25%.

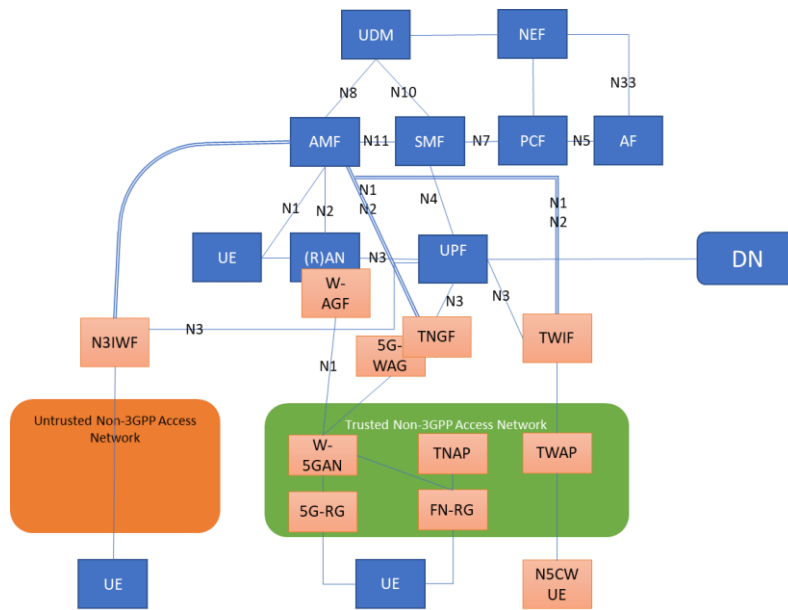
We fundamentally disagree with Radio Spectrum Management (RSM) of its understanding of the 3GPP 5G network architecture, features, and functionality that has been omitted in its discussion document. The 5G architecture, is designed to be a heterogeneous & integrated network architecture, which has the capability to support a variety of access network types.

FIGURE – High Level view of a 5G Heterogeneous Network



The following figure identifies the Systems Architecture for 5G (5G Phase 2 architecture) that identifies some of the key Features that supports this 5G Heterogeneous architecture (based on 3GPP standards).

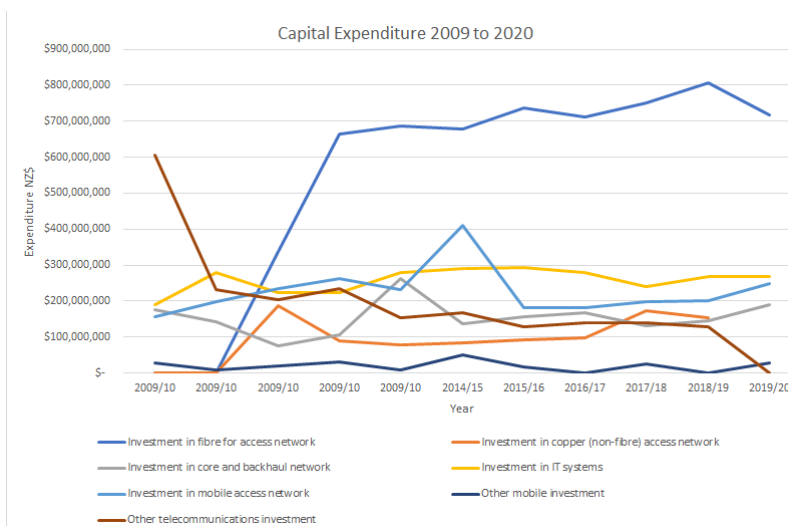
FIGURE 5 – 5G Functional and Entity Architecture



In giving the existing MNOs additional spectrum, and in particular where that spectrum directly target and compete with the fibre access industry, this would be detrimental to the (high levels of investment made by) fibre access business. Particularly when the MNOs as UFB RSPs have over 50% of the UFB fibre subscriber base.

It is important to recognise the comparative investment already made over the past decade by both the UFB and MNOs. The level of investment that went into the UFB rollout has far exceeded the investment that was put into the cellular network.

FIGURE – Capital Expenditure in New Zealand’s Telecommunications since 2009 to 2020⁷



It is our experience that select MNOs have not demonstrated its ability to allow wholesale competition or competitors to compete as MVNOs.

Further, due to their high stake in UFB subscribers, they have significantly influence on the success factors of the UFB network that could potentially damage to fair competition and long-term economic stability of the communication industry in New Zealand.

⁷ [Commerce Commission – Annual Monitoring Reports](#)

It is our opinion; this spectrum would be better served and provide better connectivity if it was allocated to:

1. Wireless Internet Service Providers (WISPs) to support rural/remote connectivity to eMMBS/FWA services,
2. Local Fibre Companies (LFCs) for Fixed Wireless Access (FWA) services in their coverage and surrounding areas, to further enhance and complement their wholesale UFB business,
3. Fourth 5G cellular Mobile Network Operator that offers MNO and MVNO services on an equal and non-discriminatory basis,
4. Satellite 5G service provider that offers MNO and MVNO services on an equal and non-discriminatory basis.

The above approach of allocating this spectrum, will safeguard investments made by the LFC and offer better coverage and connectivity for the WISPs. It will also introduce a new competitive model that existing RSPs currently enjoy under the UFB Wholesale Agreement (WSA), and allow them to offer wireless broadband services and mobility broadband solutions.

We do not recommend this spectrum to be assigned to any MNO that owns a disproportionate spectrum for cellular use and where their allocation includes legacy spectrum that is not adequately being utilised on a local and wide area basis.

RESPONSE TO QUESTIONS

This section includes our responses to the various questions that have been asked in response to this discussion paper.

Q1. What are the most likely use cases in New Zealand for mmWave based 5G services?

The best use case for New Zealand's mmWave based on 5G would be to have this spectrum assigned to Local Fibre Companies (LFCs) in their UFB coverage and surrounding areas so that they can further complement their fibre access services and protect their investment against MNOs who are also large stakeholders in the fibre customer base.

The mmWave should also be offered to a new fourth 5G MNO to be established in New Zealand, which will be consistent with the Commerce Commissions view in its Mobile Market Study that suggests that a fourth national operator should not be precluded in offering national 5G services. This operator may include a fixed cell site operator and/or satellite 5G service operator. With the introduction of a fourth national MNO we will see better innovation and competition to the existing oligopoly that exists in New Zealand.

We would also recommend allowing Wireless ISPs (WISPs) in using this spectrum to better serve their communities through a MNO/MVNO setup.

Q2. What are the likely use cases for Ka band satellite services in New Zealand in the short and long term?

Satellite will play an important role in shaping the communication industry in New Zealand and in particular its role in supporting 5G and its future as a 6G architecture (that is yet to be defined). For this reason, it is important that some bandwidth be reserved to support the emergence of satellite and/or other 5G services.

We agree that narrow beam-forming will be important for 5G satellite services to ensure it can effectively provide effective bandwidth services and does not interfere with land-based systems that operate at similar or neighbouring frequencies.

The characteristics of the Ka band are impacted by atmospheric conditions including heavy rainfall, which is very prevalent in the lower south island, for this reason further assessment of this technology may be necessary to ensure any investment in this option will meet its objectives.

Q3. What are the spectrum requirements for ESIM use in New Zealand?

Although there is a viable case for requiring ESIM for use, much of this is based on mobility that is probably better served by the existing MNO allocated spectrum in the 700 -1800 MHz bands as this provides a better range and reliable connectivity for Public Land Mobile Network (PLMN) use. ESIM for use with maritime and aircrafts can be achieved provided its allocated frequencies does not interfere with land-based communication solutions in the same or neighbouring frequencies.

The ESIM use for man-made or natural force majeure event can be justified but needs ideal conditions and line of sight for it to be effective.

There is a trade-off in allocated spectrum for ESIM services and its practical use that needs to be carefully considered before assigning any dedicated bandwidth for its intended use.

Q4. Do you think the existing fixed service licenses in 26 GHz can be migrated to the 23 GHz and/or 38 GHz fixed service bands?

There is a strong justification by RSM as to why the existing licences in the 26GHz can be migrated to alternative bands (23 &/or 38 GHz) however, there is a dependency on the existing parties who use this band, if they are prepared to release this band for the greater good of New Zealand 5G services.

There may be costs incurred by the existing spectrum users in adapting their equipment to the alternative frequencies that may prevent the current licence holders in releasing these frequencies.

Q5. If not, do you think the existing fixed services should be allowed in the 26 GHz?

No comment.

Q6. Do you agree New Zealand should allocate 24.25 - 27.5 GHz primarily for IMT use?

We agree with RSM that the 24.25 - 27.5 GHz should be allocated for use for the purpose as identified by IMT.

Q7. How should RSM accommodate other use in this band such as space services?

If there is limited use of this frequency for space services, then we should consider allocating these services to an alternative frequency – possibly the 27.5 – 30GHz if this is possible.

Alternatively, we could see if these space services can co-exist with IMT services if limited interference of restricted use of the 27.5 – 30GHz in areas that may impact with these space services.

Q8. How do you see our proposal of the 28 GHz band allocation?

We agree with RSM that the 28 GHz band would only offer marginal benefits if it was allocated for fixed services.

Our view is that the 28 GHz band would be better served by current and future satellite solutions and for this reason we should preserve and effectively assign this band where it is necessary for satellite services.

Q9. Which option do you prefer for allocating 28 GHz band? Or is there any other option for managing the shared use of IMT, ESIMs and FSS in the 28 GHz band?

Both these allocation options have their pros and cons. We should not consider technical difficulties in deciding the final allocation as these difficulties will be overcome as satellite technologies become more intelligent in dealing with complex spectral models.

Our view is that allocation option 1 would be ideal if we intended to consider extending IMT use for indoor coverage, but this may not be necessary as alternative frequencies may be more suitable for indoor use, and for this reason we would recommend using allocation option 2.

Q10. If you prefer option 1, do you agree with the proposed sharing mechanism (defining satellite coordination zones) between IMT use and FSS ground stations?

Not applicable.

Q11. If you prefer option 2, how much spectrum do you think RSM should allocate to ESIM, IMT private network/FWA? And what's the preferred spectrum placement?

It is advised not to assign the complete spectrum but to allocate the spectrum based on current and future needs by the various access types.

Q12. Are there any other issues of sharing use between satellite earth stations and ESIMs that you would like to bring to our attention?

Satellite beam forming would offer significant advantage in ensuring that sharing spectrum does not cause undue disadvantages. In addition to this for ESIM devices, they should have capabilities to adapt to alternative spectrum channels that offer lower interference.

Q13. Do you agree that the current satellite allocation and licensing regime for 29.5 - 30 GHz should remain?

Yes, we do.

Q14. What's your preferred licensing option in 26/28 GHz spectrum?

For the use of 5G services in the 26 GHz band, we would strongly promote the use of the General User Licence, to promote open network services and Unlicensed 5G services – this will promote competition for new operators who have the ambition to offer fixed wireless access services without high costs.

Our second preference would be to have Regional Rights to organisations such as LFCs or WISPs in better serving their communities using Fixed Wireless Access.

Q15. Do you see any need for general user licence spectrum for IMT? If so, what use case might there be?

Yes, we do see the need for a General User Licence for the IMT. This will promote unlicensed 5G services and easier access for new operators, LFCs and WISPs to enter the 5G FWA segment without the high spectrum costs.

Q16. If there is a need for general use spectrum for IMT and ESIM, how much spectrum should we set aside for it? Should RSM mandate technical conditions on the general use licence?

No comment.

Q17. Do you agree RSM should adopt 3GPP NR FR2 based channel bandwidth to design a channel plan in the radio licence regime for IMT services?

This would be a sensible approach but must restrict dominating MNOs from over subscribing to spectrum when their existing spectrum on legacy cellular technologies is not being effectively utilised.

Q18. Do you agree RSM should refer 3GPP standards to set the regulatory requirements for spectrum allocated to IMT?

The 3GPP standards are a good foundation for setting the regulatory requirements for spectrum allocation to IMT. Consideration should also be given to any appropriate guidelines from the GSM Association (GSMA) for the certification of 5G NR where appropriate.

Q19. Should we introduce a break point for MR technical conditions mid-way through the duration of the MR? Or is it sufficient to set AFELs based on current technology and standards only?

This approach to introduce a break point for MR technical conditions mid-way through the MR would be welcomed. This may assist operators to migrate their allocated spectrum bandwidth to alternative modern radio technologies as and when the need arises, without them getting stuck with a prolonged legacy technology that offers limited efficiencies.

Q20. Do you agree RSM should mandate equivalent ETSI harmonised standards for radio licences in Radio Standards Notices and review these standards regularly?

The ETSI harmonisation standards is a good idea, but may incur additional costs that may be hard to offset at the initial investment stage. Maybe this can be looked at later if there is a strong need for this to be introduced due to harmonisation issues.

Q21. Which option do you prefer to set the unwanted emissions?

It is our view that the First Option would be the correct approach, but we recognise the difficulties and delays this may pose in getting changes made to the Radiocommunications Regulations.

Q22. If we use a TRP option for setting AFEL and UEL, do you have any recommended solutions on TRP measurement in field?

No.

Q23. Do you agree that RSM should set unwanted emissions limits (in UELs and AFELs) base on 3GPP category B requirements? If no, please explain the reasons and provide your suggestions?

No comment.

Q24. Do you agree that we should we implement (e.g. through UELs and AFELs) the ITU Radio Regulations, Resolution 750 limits, including the 1 September 2027 transition date and grandfathering clause for the protection of the EESS (Passive) Band? If not, please explain what limits and transition dates you consider to be more appropriate.

Yes.

Q25. Do you have any insights on equipment availability at, or close to, the edge of 24.25 GHz that can meet both pre-1 September 2027 and post-1 September 2027 unwanted emission limits? Is there any additional technical solution such as frequency separation or filtering required for some equipment types?

No.

Q26. Do you agree with RSM's position to not establish a framework for coordination zones for RAS?

Yes.

Q27. Do you see a need for RSM to allow EESS and SRS earth stations to operate in the band?

Yes.

Q28. Do you agree a semi-synchronised or unsynchronised network should be used in 5G high band deployment?

No comment.

Q29. If the network is unsynchronised, what is the best way to manage the interference between unsynchronised operators?

No comment.

Q30. If your preference is a semi-synchronised network, what is your suggestion on setting the synchronized parameter?

No comment.

Q31. Do you agree that think RSM should implement ITU Radio Regulations, Resolution 242, resolves 2.1 in the management rights and licences conditions? If not please explain why or propose an alternative?

No comment.

Q32. Do you see a need for RSM to allow continued FSS gateway access to 27.0 - 27.5 GHz on a case by case basis? If so, how should we coordinate FSS Earth stations and IMT?

No comment.

Q33. Do you have any comments regarding the spectrum sharing approach proposed by RSM between FSS and IMT FWA in the 28 GHz band?

No.

Q34. If RSM were to apply an EIRP limit on horizontal plane for FSS, what is the maximum EIRP value we should assume?

No comment.

Q35. Which option do you prefer for arranging the existing fixed service in the 26 GHz band?

Our preference would be Option 1.

Q36. Do you think RSM should mandate the regulatory requirements as laid out in Resolution 169 (WRC-19) for ESIM use if a shared use between 27.5 – 28.35 GHz?

Yes.