



## **GSA<sup>1</sup> response to RSM consultation on “Preparing for 5G in New Zealand”**

### **Summary**

The GSA (Global mobile Suppliers Association) is an international organization of leading mobile communication suppliers.

GSA welcomes the opportunity to submit our reply to the RSM in response to Preparing for 5G in New Zealand.

5G systems access different frequency ranges to address diverse requirements from envisioned 5G usage scenarios. The 3.5GHz band is being considered widely for the global introduction of 5G, generally offering a good balance between coverage and capacity in the spectrum below 6 GHz. Sub-1 GHz bands provide geographically broad coverage for eMBB and IoT services. The millimeter wave frequency bands above 24 GHz are also being considered widely and could provide significant bandwidth to meet 5G ultra-high capacity requirements.

GSA appreciates the efforts of RSM to consider re-planning the band of 3410 - 3690 MHz (hereinafter 3.5 GHz band) and possible approaches for early access before 2020 to facilitate 5G services in this frequency band. Wide contiguous nation-wide spectrum assignments to each mobile network operator in the order of 100 MHz or more will allow operators to reap the full benefits of the 3300-4200 MHz frequency range for 5G. In the millimeter wave frequency range above 24 GHz, the frequency ranges from 24.25 - 29.25 GHz and 37- 43.5 GHz (or parts thereof) are the most promising frequency bands for 5G early development, and these two frequency ranges have great potential for global or regional harmonization in WRC-19. Each mobile network operator may need at least 800 MHz – 1 GHz of contiguous spectrum within the millimetre wave bands for 5G deployment.

Exclusive national licences with broad geographic scope have been a key underpinning of the phenomenal success of mobile services, and give the mobile operators certainty that they can deploy their networks when and where there is demand from their customers. Whilst not delaying the process of re-farming of the 3.5 GHz band as set out in this consultation, we believe it is important for RSM to also address the possibility of making nationwide contiguous blocks available in the entire range 3410

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<sup>1</sup> *The GSA (Global mobile Suppliers Association) develops strategies and plans, and contributes studies and technical analysis to international, regional and individual country policy-makers and regulators to facilitate the timely availability of spectrum for use by mobile network operators. GSA has a focus group for spectrum topics for technical and regulatory matters of radio spectrum pertaining to the successful evolution of International Mobile Telecommunication (IMT) and associated radiocommunication systems and comprises a team made up of spectrum and regulatory affairs specialists from GSA Executive Member and GSA Member companies. The GSA Spectrum Group is participating in the study work leading up the World Radiocommunication Conference meeting in 2019 (WRC-19). In addition GSA reports regularly on global spectrum harmonisation efforts and developments including auctions, assignments, allocations, and re-farming activities.*

- 3690 MHz, and further investigate the possibilities to extend the band to cover the whole or parts of the range 3700 – 4200 MHz, in order to enable 100 MHz or more contiguous spectrum per operator.

In addition to the 3.5 GHz band, 5G development in bands above 6 GHz, L-band, and 600 MHz band could explore benefits of 5G services to meet requirements from various application scenarios. GSA encourages RSM to complete the necessary regulatory steps to make these bands available for future IMT use.

If the RSM requires any clarification to our response, please do not hesitate to contact:

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1. What are the likely uses for 5G in New Zealand initially and in the longer term?

**GSA response:**

5G is expected to support a number of new use cases and applications for eMBB (Enhance Mobile Broadband) with high capacity requirements, and new opportunities for vertical industries (e.g. smart manufacturing, autonomous driving, and massive IoT (Internet of Thing) connections).

5G can be deployed in early stages as an effective enhancement to LTE capacity in providing wireless broadband service, and then progressively moving towards providing eMBB service over 5G networks rollout into wider areas. Then mMTC (massive Machine Type Communication) and URLLC (Ultra Reliable & Low Latency Communication) will follow whilst the eco-system matures over time.

2. Do you consider competition should be encouraged at the infrastructure level or purely at the retail level for 5G? Why?

**GSA response:**

Services provided by 5G are expected to be more extensive and with broader scope than has been achieved by existing 3G and 4G networks. Competition should be encouraged at all levels of the ecosystem. Infrastructure needed to provide services desired by given subscribers may not be uniform property. An infrastructure level competition provides the freedom and flexibility to mobile network operators to customized network design in provision to its customers' requirements.

3. What regulatory issues need to be considered from a 5G perspective in New Zealand?

**GSA response:**

5G is expected to support a number of new applications and technologies, such as massive MIMO, IoT, network slicing, and vehicle communications, and overall 5G success will require attention to the low, mid, and millimeter wave bands of spectrum as well.

We recommend regulators review the actions taken on 5G in other jurisdictions as a baseline, and including, for example, the rules relevant to siting and EMF regulation according to European and international standardizations (e.g. CEPT, TRP, ICNIRP, IEEE, IEC, ITU) . In addition regulators should be mindful to avoid regulations that may have a negative impact on innovation, or discourage rapid deployment.

Specific to siting, regulators could consider 5G Small Cell aspects such as, street poles for easy site acquisition (country and/or city regulations), and also to develop long term plans for facilitating fiber deployment.

4. What aspects of these regulatory issues are most significant for 5G?

**NO RESPONSE**

5. Do you agree that the 3.5 GHz band is the top priority for allocation for 5G?

**GSA response:**

Yes.

In addition, all spectrum bands — low-band spectrum below 1 GHz, mid-band spectrum from 1 to 6 GHz, and high-band spectrum above 24 GHz also known as mmWave — are needed for the successful deployment of 5G, IoT, enhanced mobile broadband, and mission-critical applications and services.

Globally, spectrum availability for IMT in 3300 - 4200 and 4400 - 5000 MHz ranges is increasing. In line with the plans from many countries, the 3300-3800 MHz will be a primary 5G band with a great potential for global harmonization over time.

With the global momentum for the 3.3-4.2 GHz frequency range<sup>2</sup>, now is the right time for RSM to take the next step to make spectrum in that range available for 5G in New Zealand. We understand that this consultation is limited to the 3410-3690 MHz band, however, we would like to point out in this context that in order to reach the full benefits of 5G in mid-band spectrum like the 3.3-4.2 GHz frequency range, wide contiguous nation-wide spectrum assignments in the order of 100 MHz or more per operator will be required. We believe it is important for RSM to also address the possibility of enabling such wider channels in this spectrum range to facilitate the development of 5G. In Europe, CEPT is currently addressing a similar issue by developing guidance to administrations for defragmenting the existing authorizations in the 3.4-3.8 GHz band as set out in item A.2 of the CEPT Roadmap for 5G. Additionally RSM should further investigate the possibility to open up the 3700 - 4200 MHz band for MBB services to enable sufficiently wide channels for 5G in the future, which also further aligns with the spectrum situation in Europe, Japan and potentially other countries.

The 3300 - 4200 MHz frequency range is expected to be the primary band in the spectrum below 6 GHz for the global introduction of 5G, offering a good balance between coverage and capacity, which will support a broad range of 5G applications, including: Augmented Reality/Virtual Reality (AR/VR) and Ultra-High Definition (UHD) video, smart home, smart manufacturing, health care and drones; the 3300 - 4200 MHz range could provide both mobile connectivity “on the go” and Fixed Wireless Access (FWA) for domestic and business applications. 3GPP is working on the 5G-NR channel arrangements for 3300 - 4200 MHz, and the first release of 3GPP 5G standard (Rel-15) is scheduled to be finalized by June 2018, including both of the standalone and non-standalone systems. The 3GPP 5G NR specification will support 3300-3800 MHz from the start with using a TDD access scheme.

GSA expects that 5G NR initial ecosystem for 3.3 - 3.8 GHz or portions thereof will be commercially ready in 2018 or early 2019.

6. Do you have any comments on reallocating 3587 to 3690 MHz for 5G?

**GSA response:**

As mentioned in the reply of question 5, GSA supports reallocating 3587 -3690 MHz for 5G.

This frequency band has great potential to become one of the first 5G globally harmonized bands. CEPT, Japan and Korea and other countries already announced their official plans for 3.5 GHz band, and 3.5 GHz band is from 3400-3800 MHz in CEPT.

7. Do you agree that the 26 GHz band is a high priority for allocation to 5G in New Zealand??

**GSA response:**

Yes.

Globally, spectrum availability for IMT/5G in the 24.25 – 27.5 GHz range as one of the candidate bands listed in WRC-19 Agenda Item 1.13 is increasing. In line with the release plans for many countries such as China, Europe, etc. this band will be a key 5G mmWave band with a great potential for global/regional harmonization over time. Products supporting this band or portions thereof will be available from 2019/2020 onwards to support deployments in countries. Therefore, GSA agrees that the 26 GHz band as promising 5G spectrum band is a priority for allocation to 5G for early deployment in New Zealand.

8. Would this band be of interest to your organization for trials for 5G services in New Zealand?

**NO RESPONSE**

9. Do you agree that the 31.8 to 33.4 GHz, 40.5 to 42.5 GHz and 42.5 to 43.5 GHz bands are a low priority for allocation to 5G in New Zealand?

**GSA response:**

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<sup>2</sup> For further details see the White Paper, “The future of IMT in the 3300-4200 MHz frequency range” as recently published by the Global mobile Suppliers Association (GSA) – [www.gsacom.com](http://www.gsacom.com)

GSA is of the view that 40.5- 42.5, 42.5- 43.5 GHz, even 37- 40.5 GHz are also priority as candidate frequency bands in the millimeter wave range. RSM could further study these bands based on WRC-19 result to consider IMT identification in these frequency bands.

For 31.8-33.4 GHz, we believe this band has lower priority than other possible 5G candidate frequency bands in millimeter wave, i.e. 24.25-29.5GHz and 37-43.5GHz. IMT use in this frequency band may require a guard band to protect the passive service allocation, which is in immediately adjacent band. In addition, this band is not included in the list of 3GPP 5G NR bands.

10. When do you think equipment is likely to become available in the bands identified in Q9?

**NO RESPONSE**

11. Do you have any comment on the possible allocation of 27.5 to 29.5 GHz to IMT?

**GSA response:**

The frequency band of 27.5-29.5 GHz, though not included in the WRC-19 Agenda item 1.13, is considered for 5G in the USA, South Korea and Japan. We encourage RSM to consider allocating 28 GHz band for 5G under existing mobile allocation in ITU-R radio regulation. In 3GPP, the entire 28 GHz band from 26.5 GHz to 29.5 GHz has been defined as n257 for 5G NR. A number of 5G leading markets also defined this band as 5G Frontier band<sup>3</sup>.

In line with the release plans for many countries, the 24.25 – 29.5 defined by 3GPP as n257 and n258 range will be a primary 5G mmWave band with a great potential for global/regional harmonization over time. Products will be available within the range 26.5 – 29.5 GHz or portions thereof from 2018 or early 2019 onwards to support deployments in countries such as Europe, Japan, Korea and the USA. We believe that equipment that supports 26.5 – 29.5 GHz is available from 2018 that supports this frequency range.

12. Is there demand for alternative uses other than IMT of the 1400 MHz band? If so, what uses?

**GSA response:**

The allocating all of the 91 MHz of spectrum in the L-Band to IMT in particular as SDL mode would provide an opportunity for operators in New Zealand to deploy 5G services while offering the advantages with mixing of good coverage (indoor, rural, etc.) and higher capacity. SDL band plan would be the best solution when the L-band is combined frequency bands below 1 GHz (e.g. 700, 800, 900 MHz). From an ecosystem perspective, New Zealand can benefit from the economy of scale of L-band development in Europe.

13. When is the demand likely to require consideration of reallocation of the 1400 MHz band for IMT, if at all?

**GSA response:**

The regulation work for allocation of L-band 1400MHz for IMT should be started as early as possible, considering incumbents usage in this frequency band. We encourage RSM to coordinate with IMT and incumbent users to develop a relocation plan for IMT usage rights after year 2020.

14. Is there a need for more sub 1 GHz spectrum for IMT/5G?

**GSA response:**

5G systems need access to different frequency band to address diversified requirements from envisioned 5G usage scenarios. The sub 1GHz spectrum, especially 600 MHz, could provide large coverage for eMBB, and for IoT.

15. If so, how should we deal with radio microphones in the 600 MHz band?

**GSA response:**

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<sup>3</sup> Available at <https://gsacom.com/paper/initiative-develop-global-5g-market-28-ghz-spectrum-band/>

We suggest further study about the coexistence between 5G system and radio microphones study to determine if and how reallocation for radio microphones may be achieved. The coexistence study could include consideration of the regulatory actions in other regions such as the U.S.

16. When is the demand likely to require reallocation of the 600 MHz band to IMT, if at all?

**GSA response:**

The 600 MHz band is being considered for mobile service by some countries in APT as well as in Region 2. Several countries joined the footnotes during WRC-15, and AWG is now developing a frequency arrangement for this band. In the U.S, the 600 MHz band licenses have been auctioned, and the clearing or relocation of broadcasters is underway. Commercialization has begun, but the relocation of TV broadcasters will be a multi-year process. We recommend consideration of the 600 MHz band as part of the overall plan for 5G mobile service.

17. Which allocation methodology should be used for allocating spectrum bands identified for use with 5G? Why?

**GSA response:**

Competitive frequency auctions have been widely adopted globally wide as an effective method to allocate spectrum bands. We believe this method can be beneficial for New Zealand 5G spectrum allocation.

18. Should different allocation mechanisms be used for rights for regional providers and national providers? Why?

**GSA response:**

Nation-wide MNOs could efficiently manage 5G network planning and deployment, and for better 5G service.

19. Should deployment of 5G technology be specified for some or all bands? If not, why not?

**NO RESPONSE**

20. What implementation requirements should be specified and how should these be expressed? – time, extent, etc –?

**NO RESPONSE**

21. What should be the consequence of non-implementation – lose spectrum, additional payment, other?

**NO RESPONSE**

22. Should the implementation requirements be different for regional and national providers? What should these be and why?

**NO RESPONSE**

23. Should acquisition limits be imposed on 5G bands? If so, what should these be and why?

**NO RESPONSE**

24. Should acquisition limits be imposed for regional providers? If so, what should these be and why?

**NO RESPONSE**

25. What term should be used for management rights suitable for 5G? Why?

**NO RESPONSE**

26. Should the 5G bands be replanned as TDD bands or some bands or parts of bands be retained as FDD? Why?

**GSA response:**

The 3.4-3.7GHz should be re-planned as TDD bands, as it's being defined as TDD band in 3GPP, and globally Europe, China, and etc.

27. What bandwidth should be used as the basis for allocation? Why?

**GSA response:**

The envisioned 5G requirements demands large bandwidth for both 3.5GHz and 26GHz, and continuous bandwidth per 5G network will reduce the complexity of system design and facilitate low cost infrastructure and device, and also maximize the spectrum utilization.

Many countries are working to make available 300-400 MHz contiguous bandwidth in 3.5 GHz band for 5G with a target of at least 100 MHz of contiguous spectrum per MNO within the 3.3-3.8 GHz range. For millimeter wave development, GSA is of the view that contiguous bandwidth of 800-1000 MHz per MNO will be necessary to meet the 5G ultra-high capacity requirement.

In general allocation should facilitate large continuous bandwidth and avoid the spectrum fragmentation.

Based on above consideration, it's suggested that bandwidth as basis for allocation as,

- 3.5GHz: no less than 20 MHz
- 26GHz: no less than 400MHz.

28. What out of band emission limits should apply to management rights when first created for allocation? Why?

**GSA response:**

We suggest study about out of band emission limits in New Zealand could refer to study outcomes from 3GPP. 3GPP specifications should be applied to enable the operators with fast deployment and enjoying eco-system

29. Should out of band emission limits be different if the band is technology neutral? If so, what out of band emission limits should be applied?

**GSA response:**

GSA is of the view that technology neutrality should be applied as long as it does not cause an undue degradation of the utility of the band or its economic value to deliver 5G services. The regulation work which is developed in CEPT could provide a good example for technology neutrality in 3.5 GHz band and 26 GHz band, meanwhile, we also need to consider incumbent development in New Zealand.

30. How should interference between adjacent frequency 5G TDD networks be managed? Should this be the same for all frequency bands?

**GSA response:**

We believe inter-operator synchronization (i.e. common clock and alignment of UL and DL transmissions between TDD networks operating in adjacent frequency blocks, especially for overlapping macro cells, is spectrally efficient since it avoids interference between MNOs 5G networks without requiring inter-operator guard bands nor additional filtering. Other options for minimising interference include geographic separation, and network topology (e.g. femtocells).

31. How should interference between different technologies within the same band be managed, if bands are technology neutral?



**GSA response:**

Inter-operator synchronization is feasible and can ensure spectrally efficient coexistence also in case of NR TDD and LTE TDD networks operating in adjacent frequency blocks, but comes at the expense of 5G NR flexibility. When possible, a combination of inter-operator synchronization and band segmentation between “NR only” segments, and “NR and LTE” segments will preserve 5G NR flexibility in part of the band, but a guard band would be needed between the two segments.

32. Should regional uses be provided for in the 3.5 GHz band plan? Why?

**GSA response:**

Same reply as question 18.

33. If allowed in the 3.5 GHz band, how could this be managed or facilitated?

**NO RESPONSE**

34. Which alternative bands may be suitable for regional allocation? Why?

**NO RESPONSE**

35. Is early access to the 3.5 GHz band required for roll out of 5G networks prior to the expiry of existing rights in 2022? If so, why?

**GSA response:**

As we mentioned in the reply of Question 5, the 3.5 GHz band is the top prioritized band for 5G system deployment. Some GSA members have plan to rollout 5G NR commercial products before the end of 2018. Therefore, we believe that early access to this band before 2022 is necessary.

36. How could early access to the 3.5 GHz band be achieved?

**GSA response:**

Continuing the open, transparent consultation process will strengthen confidence and balance interest for both IMT and incumbent right holders.

37. Should the government be involved in early access arrangements for the 3.5 GHz band?

**GSA response:**

It is important for regulators to develop consistent national 5G policy that promotes and guides New Zealand 5G networks and services development.

GSA encourages RSM to play an important role in coordinating between incumbent rights holders and MNOs, and to enable this band for 5G development before 2022 with early access.

38. Is early access to the 26 GHz band required for roll out of 5G networks prior to the expiry of existing rights in 2022? If so, why?

**GSA response:**

Yes, we foresee necessity for early access to the 26 GHz as soon as possible before 2022.

The 26 GHz band is included in the study of WRC-19 Agenda item 1.13, the WRC-19 outcomes will enable the eco-systems from global and regional harmonization of millimeter wave bands for 5G, and introduce experiences from leading markets on regulatory, technical, operational and business aspects of 5G on millimeter wave bands.



If New Zealand could allocate this band by 2019/2020 time-frame , it would keep New Zealand in the forefront of 5G mmWave development in line with countries in Europe, Korea, Japan and the US, etc. And as mentioned above, equipment supporting this band/range is available from 2018 and 3GPP technical specifications for 5G NR will be ready by June 2018. Moreover, from the consultation paper, GSA fully recognizes that management rights in the lower part of the 26 GHz band (24.549 to 26.4 GHz) will be expired in 2022, meanwhile, management rights in the upper part of the 26 GHz (26.4 to 28.35 GHz) already expired in January 2018. And these bands show low use rights and largely vacant. This means that the upper part of the 26 GHz band (26.4 or 26.5 GHz to 28.35 GHz) could be used to use 5G service immediately in New Zealand.

Therefore, GSA suggests that New Zealand, as one of the leading countries in the world, to define a roadmap as soon as possible towards early releasing of the 26 GHz band, including both lower and upper part of 26 GHz, taking into account the progress of preparation for WRC-19 AI 1.13 in order to take the benefit of 5G millimeter wave system.

39. How could early access to the 26 GHz band be achieved?

**GSA response:**

Same reply as question 36.

40. When is demand for the bands above 30 GHz likely to eventuate?

**GSA response:**

We suggest to it will likely be after 2020

41. When is demand for the 600 and 1400 MHz band likely to eventuate, if at all?

**GSA response:**

We suggest to it will be likely after 2020