28 Feburary 2022

The Manager
Radio Spectrum Managment
Ministry of Business, Innovation and Employment
PO Box 2847
WELLINGTON 6140

Re: Draft Five Year Spectrum Outlook 2022-2026

Dear RSM,

Kia ora koutou. Hewlett Packard Enterprise (HPE) is one of the world's largest providers of managed wireless local area network ("WLAN" or "RLAN") infrastructure and is a global leader in the Wi-Fi equipment marketplace. HPE's Aruba business unit ships millions of indoor and outdoor Wi-Fi access points ("APs") every year, representing approximately 15% of the global market for such devices.

In addition to being a global leader in the Wi-Fi equipment marketplace, HPE's Aruba business unit provides small cell solutions for the United States' 3.5 GHz CBRS band with plans to expand into international markets as the demand for private and neutral-host cellular systems continues to increase around the globe. HPE's Communications Technology Group (CTG) is a market leader in mobile communications, providing core network technology and services for 4G and 5G networks addressing the needs of Communications Service Providers (CSPs). HPE has made significant investments into the integration and/or convergence of Wi-Fi and cellular technologies, including building a Passpoint-based service that enables public cellular subscribers to leverage our existing and extensive high-quality footprint of indoor Wi-Fi coverage.

HPE is a top provider of wireless, wired and security products in New Zealand, serving different verticals from government agencies, District Health Board, universities to enterprises and small-medium businesses.

HPE appreciates the opportunity to comment on the consultation of New Zealand Five Year Spectrum Outlook 2022 – 2026. Please find on the following pages HPE's responses to the questions that RSM posed in the consultation. If you have questions, please contact any of the HPE signatories below.

Ngā mihi nui,

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Please see our answers to the consultation questions.

1. Have we identified the range of technological advancements and probable new demands relevant to New Zealand?

HPE agrees with RSM on the technology advancements and probable new demands relevant to NZ. We want to highlight the technology trend on private networks.

Enterprises and the public sector today have demonstrated a clear demand to build out and run their own networks. There is a new world of private cellular opportunities coming into vision for organizations, from retail, transportation to manufacturing, government and education. Private networks allow enterprises and the public sector to bring a customized experience to indoor or outdoor facilities where high-capacity, low-latency and massive connectivity is crucial. They also address the need for dedicated bandwidth capacity and range, mobility, security, high-quality connections and consistent, always-on services to help reduce downtime. Due to these characteristics, private LTE/5G networks play a complementary role to existing Wi-Fi solutions.

Private networks can be provided by third-party providers like equipment vendors, cloud providers, or directly by the vertical industry themselves. This opens a new business model and catalyses innovation for the ICT industry. It also increases market competition as there can be some overlap between "public" and "private" deployments with operators providing managed private network services to business customers.

Enterprises require a mix of technologies for different use cases. Among the technologies listed in Figure 1, which are used by enterprises today, private IMT and Wi-Fi provide the required capacity, latency and reliability for enterprise connectivity. The future of enterprise networks will be a multi-RAN architecture with Wi-Fi and IMT technologies taking different roles in the network. Private IMT, with its wider coverage characteristics and mobility support, will be complementary to Wi-Fi.
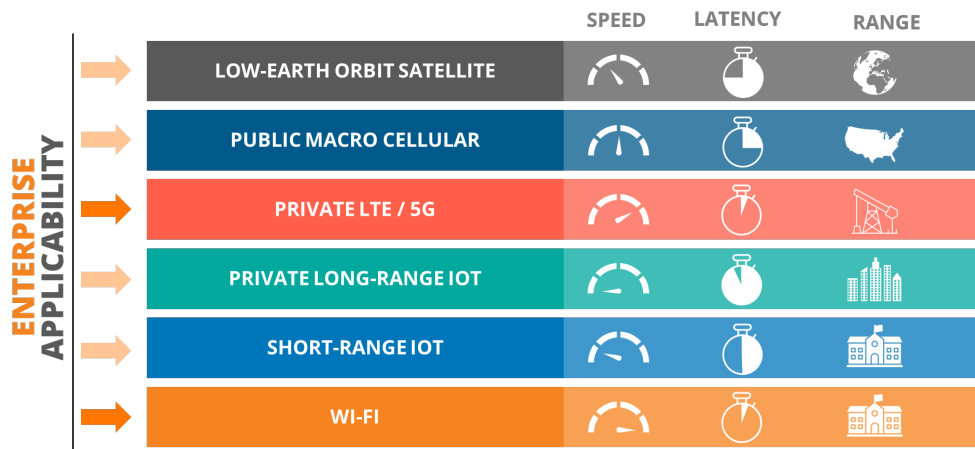

Figure 1 Access technology options for enterprise

Another use case for private networks is neutral host. Sub-6 GHz mid-band is the premium spectrum for 5G for its capacity and coverage. However, spectrum bands like n77 or n79 experience higher building entry and wall loss than low-band spectrum. In locations where outdoor to indoor cellular coverage is poor or unavailable (due to the propagation loss or energy efficient building structures) and/or the progress of area-wide or indoor deployment of mobile service is slow, neutral host networks deployed by 3rd party operators such as

enterprises, local councils or regional wireless infrastructure providers can provide cellular connectivity more efficiently. The parties that provide the neutral network, are not directly affiliated with any MNOs. Instead, they provide connectivity for the MNOs' subscribers via a neutral host "roaming" relationship.

The neutral host deployment model suits New Zealand very well. NZ is one of the most sparsely populated countries in OECD. There is a challenge for the government and MNOs to provide rural broadband coverage while maintaining a reasonable cost. The neutral host deployment model can facilitate public mobile coverage by enabling enterprises to deploy IMT infrastructure and directly addresses the building penetration issue.

2. Have we prioritized the right issues that we will need to actively manage through our work programme (to the extent this is possible to predict now)?

HPE agrees with RSM for the work program items set for 2022 – 2026. However, RSM should prioritize the following two work items.

(1) "Review and replan 3.8 – 4.2 GHz bands potentially, including technical consultation"

RSM should start the planning for 3.8 – 4.2 GHz spectrum for local, low power licences that could be used for private network deployments using IMT technologies. A strong equipment ecosystem operating in 3.8 – 4.2 GHz is forming and will continue to grow. 3GPP band n77 which includes the 3.8 – 4.2 GHz band is one of the bands known to be supported by most 5G devices. Subsets of n77 have been made available for cellular communications globally. For instance, in the United States, MNOs are deploying primary 5G networks in 3.7 – 3.98 GHz.

Alongside the strong ecosystem development, the planning of 3.8 – 4.2 GHz spectrum for private networks is gaining global momentum. Several countries and regions have already started planning the spectrum for such use.

In 2019, the UK regulator Ofcom began issuing local access licenses (low and medium power) in 3.8 – 4.2 GHz to facilitate private and vertical sector deployments[1]. There are several FSS earth stations in the band that require protection, and hence Ofcom is currently coordinating the local access licence requests manually on a first-come, first-served basis. This approach is seen as an initial/interim solution, and Ofcom has consulted on the development of an automated dynamic spectrum access (DSA) system for the band.

In December 2021, European Commission has mandated the CEPT to study the potential deployment of terrestrial wireless broadband systems providing local-area network connectivity for verticals within the 3.8 – 4.2 GHz frequency band in the Union[2]. This mandate instructs CEPT to assess the technical feasibility of the shared use of the 3.8 – 4.2 GHz frequency band by terrestrial wireless broadband systems providing local-area network connectivity with a focus on vertical users and other terrestrial wireless use cases and, on that basis, deliver harmonized technical conditions for the shared use of the band. This initiative aims at promoting the development of the vertical 5G ecosystem, the efficient use of spectrum and the deployment of innovative sharing conditions within this band between 5G vertical applications and incumbent users.

Similar spectrum planning activities are also underway in the UAE, Saudi Arabia, Canada, etc.

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[1] Ofcom. (2019). Statement - Enabling wireless innovation through local licensing, shared access to spectrum supporting mobile technology.
[2] European Commission. (2021). Radio Spectrum CEPT Mandates, Mandate to CEPT on technical conditions regarding the shared use of the 3.8-4.2 GHz frequency band for terrestrial wireless broadband systems providing local-area network connectivity in the Union.

(2) "Consider spectrum sharing, tiered and dynamic access mechanisms for 5G and other allocations"

A growing number of technologies and various industries' applications are driving increasing demands for spectrum access. This will require an innovative spectrum management approach. HPE recommends RSM take a forward-looking approach to spectrum management that acknowledges the needs of all spectrum users by promoting innovative spectrum sharing methods which will enable more efficient and dynamic use of spectrum.

Spectrum can be shared by frequency, time and locations arrangement. Innovations in Dynamic Spectrum Access (DSA) are going to have a similarly transformational impact on spectrum management. The latest DSA systems involve tunable/configurable radio access networks, spectrum sensing systems, and centralized databases that dynamically coordinate the spectrum access request. The most successful DSA example today is the CBRS system in the United States. CBRS equipment operates in the 3550 – 3700 MHz band under the coordination of centralized spectrum access system (SAS) databases. A sensing network is also implemented in the CBRS framework to protect Federal and military incumbent operations. Some of the principles of the CBRS framework could be applied to dynamic coordination approaches in frequency bands like 3.8 – 4.2 GHz by other administrations. Indeed, Ofcom UK has solicited industry input on the possibility of evolving to a dynamic database-coordinated regime in 3.8 – 4.2 GHz.

While DSA may be a longer-term solution for New Zealand, RSM could consider a light licensing approach for private network users under the current radio licence regime in the interim. The light licensing regime can allow the first-come, first-serve approach with a limited geolocation area such as a building or campus. To encourage using the spectrum efficiently, RSM could charge a low licence fee for management cost recovery and adopt the "use it or lose it" licence renew clause.

3. Are there other matters that we should cover?

HPE recommends that RSM monitor the global spectrum planning activities in the 4.6 – 4.9 GHz band. The spectrum is a portion of 3GPP n79. There are already a few countries starting to promote this band for industry vertical use, most notably Japan and South Korea.

Japan's Ministry of Internal Affairs and Communications (MIC) has envisioned several use cases of local 5G from stadium operators, local CATV, telemedicine to smart factory, remote supervision and smart agriculture[3]. To drive the industry transformation, MIC established a specialized group with the aim of setting out a plan to allocate local 5G spectrum resources. This includes the 4.6 – 4.9 GHz band[4].

In 2021, South Korea also made 4.7 – 4.8 GHz spectrum available for non-telecom companies for promoting industry use cases such as smart factories, healthcare, robotics and smart farms.

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[3] Ministry of Internal Affairs and Communications, Japan. (2020). Determination on Contents of FY2020 Development Demonstrations for Realizing Local 5G to Solve Local Issues.
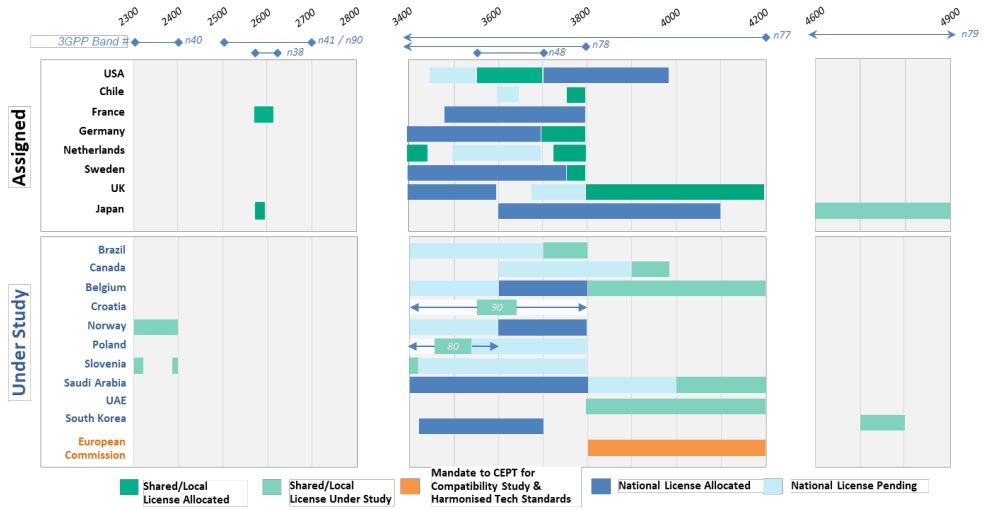[4] Policy Tracker. (2021). South Korean government seeks to boost local 5G deployments.

Figure 2 Spectrum for Private/Local Uses – A Global Movement