

Cisco Systems, Inc. Comments June 2021

Response to RSM 24 – 30 GHz use in New Zealand Discussion Document

Introduction

Cisco Systems, Inc. hereby files comments in response to Radio Spectrum Management (RSM)'s discussion document on 24 - 30 GHz use in New Zealand issued in April 2021.

Cisco is a global provider of Internet Protocol (IP)-based networking solutions with a strong presence in New Zealand. Among Cisco's many products are 3G, 4G, 5G mobile and Wi-Fi network solutions for Service Providers and Enterprises, supporting a wide range of wireless use-cases. Cisco applauds the efforts of RSM to take steps to enable "mmWave" spectrum for the latest generations of wireless technology in New Zealand. In this submission, Cisco responds to the specific question around the use and benefits of mmWave spectrum for 5G services with a focus on industrial use-cases.

Cisco Responses

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

Cisco is actively involved with 5G network deployments for Service Providers and Enterprises in several countries. While the majority of the Service Provider 5G networks utilise sub 6GHz spectrum bands initially, several, including in the United States and Japan, are also utilising mmWave. Enterprise local/private 5G networks are in early deployments and trials, utilising both sub 6GHz and mmWave bands in countries such-as Japan and Hong Kong. We are now starting to see wider deployments on the 26GHz and 28GHz bands across three main 5G deployment use-cases:

- 1. Mobile Broadband hotspot for both outdoor and indoor capacity (MBB).
- 2. Fixed Wireless Access (FWA) with point-to-multi point deployments for residential and enterprise sites.
- 3. Industrial local networks for new high bandwidth IoT services, enabling Industry 4.0 use-cases (IIoT).

The main verticals and use-cases for local 5G networks are summarised in Figure 1 below:



Figure 1 – Industrial 5G Verticals, Applications and Requirements

The key factors driving recent global interest and innovation in 5G Industrial IoT usage are:

- 1. More access to local spectrum: Several countries have allocated or are planning to allocate 5G spectrum with both national and local license schemes. These include Japan, USA, Germany, Taiwan, Hong Kong and Australia.
- Industrial groups such as the 5G Alliance for Connected Industries and Automation (5G-ACIA <u>https://5g-acia.org/</u>) are developing eco-systems for a wide range of IIoT solutions and applications.
- 3. New wireless standards such as 3GPP release 16 are adding technical capabilities for a wide range of IIoT requirements.

Local 5G Business Proposition -> Use Cases

Industry 3.0 Wireless as a sensor. Industry 4.0 Wireless as the control

Local 5G brings mobility, bandwidth and resiliency

- Business Driver:
 - 1. Process efficiency
 - Human Machine Interface
 - Sensors, Actuators, Robotics
 - Automated Guided Vehicles
 - 2. Collaboration/communication
 - Smart collaboration (Text, Voice, Video), PTT
 - Remote Expert & Augmented Reality3. Safety and situational awareness
 - Cameras & Drones for Video, Thermal, LiDar (High BW)
- Indoor and Outdoors, 100s m² 10s km²
- Number of Devices: 100s 10,000s
- Bandwidth per UE: < 1 Mbps 20 Mbps



Figure 2 – Industry 4.0 Wireless Benefits

As indicated in Figure 2 above, there is a range of different requirements for wireless connectivity, depending on the industries area of operation, density of connected devices, use-case requirements, and security policies. This leads to unique network requirements compared to macro Mobile Broadband networks. For example, typical IIoT use-cases require higher bandwidth uplink, and lower latency scheduling then a MBB network would be designed for.

To meet the full scope of IIoT requirements, a suite of spectrum resources, enabling ubiquitous coverage and local bandwidth capacity, for outdoor and indoor sites is required. Figure 3 below illustrates the different characteristics and uses of the various bands.

		Common Terms	Typ Coverage (inter-site-dist)	Typ Bandwidth (per network)	THP DL (~user rate)	Optimal Service
	Local Industrial IoT Networks					
5 G	mmWave 24-50 GHz	Millimeter Wave, NR FR2	200 m	800-1,000MHz (400MHz per enterprise)	2,300 Mbps (1,150 Mbps)	Hot-spot, P-MP. Indoor. IIoT.
Wi Fi 6	Unlicensed 5-7 GHz	Wi-Fi6/E 802.11n/ac/ax.	100 m	.5-2GHz shared (160MHz channel)	900 Mbps	Hot-spot data. Campus/Indoor
5 6	Upper mid bands 3-4 GHz	C-Band, sub 6Ghz, TDD, CBRS (US)	500 m	60-100MHz	290 Mbps	Campus wide out/Indoor. IIoT.

Figure 3 – Typical Local Industrial IoT Spectrum Requirements

Industrial IoT use-cases are forming based 3GPP 5G standards, on mid-band channels up to 100MHz in multiples of 10MHz, and mmWave up to 1,000MHz in multiples of 100MHz blocks.

As industrial 5G devices and network eco-systems continue to grow, local area networks are being enabled through 5G Mid-band (n78 and/or n79), Wi-Fi6/E and 5G mmWave (28GHz n257 and/or 26GHz n258) wireless connectivity.

Conclusion

Cisco appreciates the opportunity to provide the above input to RSM on the questions raised. This topic is important for the future of New Zealand to connect citizens and accelerate the industry digitalisation of the national economy. We would be happy to discuss further on any further questions or follow up that you may have.

Contact Information

For more information, please feel free to reach out to the following:

- Andrew Mackay, 5G Practice APAC, Cisco New Zealand (anmackay@cisco.com)
- Mark Krischer, Principal Wireless Architect, Cisco Asia-Pacific (<u>mkrisch@cisco.com</u>)
- Tim Fawcett, Director of Government Affairs, Cisco Australia (tifawcet@cisco.com)