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**HEADQUARTERS NEW ZEALAND DEFENCE FORCE**  
Communication and Information Systems Branch

**SUBMISSION ON MBIE DISCUSSION DOCUMENT – RE-PLANNING OPTIONS FOR  
FREQUENCY BANDS WITHIN 1710-2300MHZ**

**Reference**

A. Ministry of Business, Innovation and Employment Radio Spectrum Management Business Update – March 2020, published on 02 Mar 2020.

**Purpose**

1. This submission outlines some NZDF views in response to the Ministry of Business, Innovation and Employment “Re-planning options for frequency bands within 1710-2300MHz – Discussion Document” notified in Ref A.

**Introduction**

2. The New Zealand Defence Force (NZDF) is a significant government user of radio communications and the frequency spectrum, both in terms of the diversity of radio applications it employs and the amount of spectrum it is allocated for military activities. In particular, the NZDF has an interest in the use of high density and high capacity spectrum capabilities and supports the initiative by MBIE to consult with interested parties on the future use of radio frequency spectrum in NZ.

3. Spectrum is a key component of NZDF capability for not only its military operations and training, but also its required readiness to lend support to NZ regional or national emergencies as one of its outputs.

4. Established in-service capabilities and emergent requirements in Defence Capability Plans, are forcing an increased NZDF reliance on access to spectrum. Increasing operational tempo and complexity continues to compound the need for spectrum. Given that spectrum is such a critical component for NZDF capabilities and operations, it is essential that spectrum considerations are included at all stages of the Capability Systems Lifecycle (CSLC) in development by NZDF. Further, in order to meet requirements for operational readiness, it is critical that NZDF is able to access the spectrum to conduct training.

5. Technologies recently introduced into service by the NZDF all depend on access to spectrum and this trend will not change. The NZDF is conscious of its responsibility to ensure that all utilisation of radio based systems are spectrally and spatially efficient within operational and economic constraints.

6. The NZDF is and will continue to be highly reliant on access to spectrum for a range of applications such as:

- a. Voice and data communications critical to the support of its command and control functions. This ranges from small bandwidth single channel voice to full multi-node mesh data battlefield networks,

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- b. Navigation, radio-location, positioning and timing. New or upgraded platforms such as the P8A, upgraded frigates, new ships and the Network Enabled Army project are driving spectrum requirements upwards,
- c. Intelligence gathering, surveillance and reconnaissance activities. These are key capabilities that place heavy demand on spectrum across multiple bands in order to operate effectively, and
- d. Weapons systems operations. Linked together with the above or operating remotely, these are also spectrum dependant.

### NZDF Requirements in this Frequency Band

7. The use of wideband capable Combat Net Radios is a new technology in the NZDF. Mesh capability additionally provides the ability to push data including Full Motion Video, Common Operating Pictures and Situational Awareness information. Wideband Combat Net Radio is a powerful tool in improving Command & Control, greatly enhancing the ability of our teams to respond and react in often fast moving situations.

8. As we upscale the size of our networks with multiple sensors and more end-user electronic data devices, the bandwidth required becomes both a driver and a limiting factor. At this time our only option is to push additional networks into the fight adding complexity, resource issues and overheads that lead to compromised effectiveness in operations.

9. There are two functions of the NZDF that currently wish to use devices and systems in this area of the spectrum, throughout NZ. These are the NZDF Domestic Counter-Terrorism (DCT) and Explosive Ordnance Disposal (EOD) response forces. Both provide immediate regional-based support to the New Zealand Police. In particular, EOD squadron conduct regular Improvised Explosive Device Disposal (IEDD) and have participated in national level Chemical, Biological, Radiological and Explosive (CBRE) incident response activities. Task elements are permanently deployed in New Zealand's major population centres.

10. These response forces are enduring outputs of the NZDF as directed by the Government of NZ. Having access to dedicated spectrum for these operational outputs will enhance the response of these NZDF capabilities (which are often in support of other government agencies) to all levels of security and safety incidents where the lives of New Zealanders are at risk.

11. Two of the spectrum dependant systems these functions are currently fielding are:

- a. **Persistent Systems MPU5 Radio.** A software defined radio that can mesh voice and data networks.
  - (1) These can operate with various radio modules such as L-band 1350-1390MHz, S-band 2200-2507MHz, lower C-band 4400-5000MHz and higher C-band 5100-6000MHz. They are aimed at the military, law enforcement and mobile broadcasting markets.
  - (2) The NZDF purchased these with the S-band modules only. These are currently only operated in the 2400-2483MHz WiFi band under the GURL. Being able to operate these on discrete spectrum as full mesh radios at up

to 40MHz bandwidth will enable all that they are capable of, without disruption or interference to other spectrum users.

- b. **EOD Robot Systems.** The EOD teams use small, medium and large ground robots to complete their work safely. Those robots utilise the MPU3, 4 and 5 family of radios in S-band as detailed above<sup>1</sup>.

12. Like all militaries, the NZDF has an active experimentation, research and development program. Two spectrum dependant systems that are currently being investigated and/or acquired are:

- a. **Mobile Tactical Communications Systems.** This is a program that is replacing and enhancing the Army's primary tactical radio systems that have been in operation since the 1990s. Some of these new handheld and manpack radios from L3Harris are capable of operating in specific modes as high as 2500MHz.
- b. **Unmanned Aeronautical Systems (UAS).** The NZDF is seeking military UAS systems to meet its requirements in the tactical and operational areas. The military-use specific UAS's tend to operate away from general frequency bands such as the 2.4 and 5GHz WiFi bands that light commercial UAS use. This is for two reasons:
  - (1) To avoid interference from overloaded frequency bands; and
  - (2) The ability to plan for and obtain discrete wideband channels to enable the passing of full motion video and other data.
- c. Two UAS that the NZDF has been investigating are:
  - (1) **AeroVironment Puma AE Small UAS.** A small battery powered, hand launched fixed wing UAS with a powerful camera system payload. There are RF module options including between 2200-2290MHz, 2310-2390MHz, 2370-2395MHz and 2400-2500MHz. Initial testing has been carried out using the 2400-2500 module in the WiFi band but the preferred option is to be able to use the 2200-2290MHz module which is inside the frequency band of this consultation.
  - (2) **AeroVironment Wasp AE UAS.** A Micro Air Vehicle weighing just over 1kg, again fixed wing design, with a high quality camera system payload. They primarily operate between 2200–2290MHz and are compatible with the Puma AE ground control system.

## Conclusions

13. The NZDF is a significant government user of radio communications with a diverse range of radio frequency spectrum applications supporting multiple, concurrent and interlinked activities. Recently introduced technologies all have a dependency on access to spectrum and the trend is that they will all require increasing additional allocations of spectrum.

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<sup>1</sup> The older MPU3 and MPU4 S-band modules operate from above 2300MHz. These are planned to be upgraded to the MPU5 version of the radios.

14. Specifically, the NZDF is currently using equipment that could be enhanced by being able to operate with discrete spectrum within the band in this discussion document. That equipment is currently being used to support NZ Domestic Counter-Terrorism, IEDD and CBRE capabilities, as directed by the NZ Government.

15. The NZDF is also acquiring new military radio equipment and RPAS systems that are capable of, or are engineered to operate in this band. The NZDF will have an increasing demand for segments of the 1710-2300MHZ frequency band.

16. The NZDF supports the initiative by MBIE to consult with interested parties on the future use of radio frequency spectrum in NZ. The NZDF is cognisant of its responsibilities to ensure radio based system utilisation is spectrally and spatially efficient within operational and economic constraints.

### Recommendations

17. It is recommended that either:

- a. An administrative allocation of discrete spectrum be extended to the NZDF to utilise for these current and future technologies; or
- b. There is an expansion of the conditions in all the frequency bands in this consultation that would allow the NZDF to obtain enduring spectrum to support the capabilities outlined in this submission.

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