16 April 2020

Radio Spectrum Management Policy and Planning
Ministry of Business, Innovation and Employment
PO Box 2847
WELLINGTON, NZ 6140

Email: Radio.Spectrum@mbie.govt.nz

Re: Re-planning options for frequency bands within 1710-2300 MHz

Omnispace LLC (Omnispace) appreciates the opportunity to submit a response to the Radio Spectrum Management (RSM) discussion document, "Re-planning options for frequency bands within 1710-2300 MHz" (Discussion Document).

Omnispace is particularly interested in the 2 GHz band planning because the company is the owner and operator of a global non-geostationary orbit (NGSO) satellite system in the 2 GHz S-band (1980-2010 MHz Earth-to-space / 2170-2200 MHz space-to-Earth) that has been brought into use in accordance with applicable International Telecommunication Union (ITU) regulations. Omnispace is leveraging over NZD$1 billion of assets the company has acquired to deploy a global constellation in non-geostationary orbit (NGSO) to provide mobile-satellite service (MSS) and hybrid connectivity.

Omnispace, headquartered in the United States, is managed by veteran satellite industry executives and has investments from leading private equity firms and strategic partners with a successful track record in the wireless and satellite domains. Omnispace's shareholders include Columbia Capital LLC, Telcom Ventures LLC, Greenspring Associates, and Intelsat S.A.

Omnispace currently offers MSS capacity in various markets through its existing operational on-orbit F2 satellite network. The F2 satellite network is the first element of the NGSO constellation that will be capable of providing 24 x 7 coverage around the globe (Omnispace System). Built around globally harmonized spectrum in the 2 GHz band and advanced technologies, the Omnispace System is ideally positioned to provide a wide array of commercial and government communications needs, subject to requisite licences and approvals.

Omnispace provides its views and comments in response to Question 12 raised by the Discussion Document. In respect of document questions not addressed in this submission, this submission should not be taken as Omnispace endorsing or otherwise the relevant matters described in those questions. Omnispace respectfully submits its comments to Question 12 below.

Question 12. What is the best value use for the Paired 2100 MHz band expansion?

Omnispace believes that the best value use for the Paired 2100 MHz Band expansion is adopting a regime consisting of the mobile satellite service with an ancillary terrestrial component (ATC) or also known as the complementary ground component (CGC) in this band. MSS connects the unconnected in remote and isolated areas, which is extremely beneficial for a country like New Zealand with its expansive rural areas. In addition, new MSS Internet of Things (IoT) applications create unprecedented connectivity for agricultural and logistical sectors, which are important for New Zealand's productivity. However, MSS is not widely utilized in urban areas so to combine MSS with an ATC/CGC component allows for terrestrial mobile services to exist in conjunction with MSS. The result is a highly efficient use of spectrum: a two-for-one application consisting of both satellite and terrestrial services in a common spectrum band that has a global ITU allocation for both MSS and Mobile Service (MS). This hybrid MSS ATC/CGC approach provides exceptional value, efficiency, and flexibility by allowing the market to determine the most relevant service offerings.

MSS ATC/CGC encompasses a broad range of services, including a wide array of possible commercial and government communications:

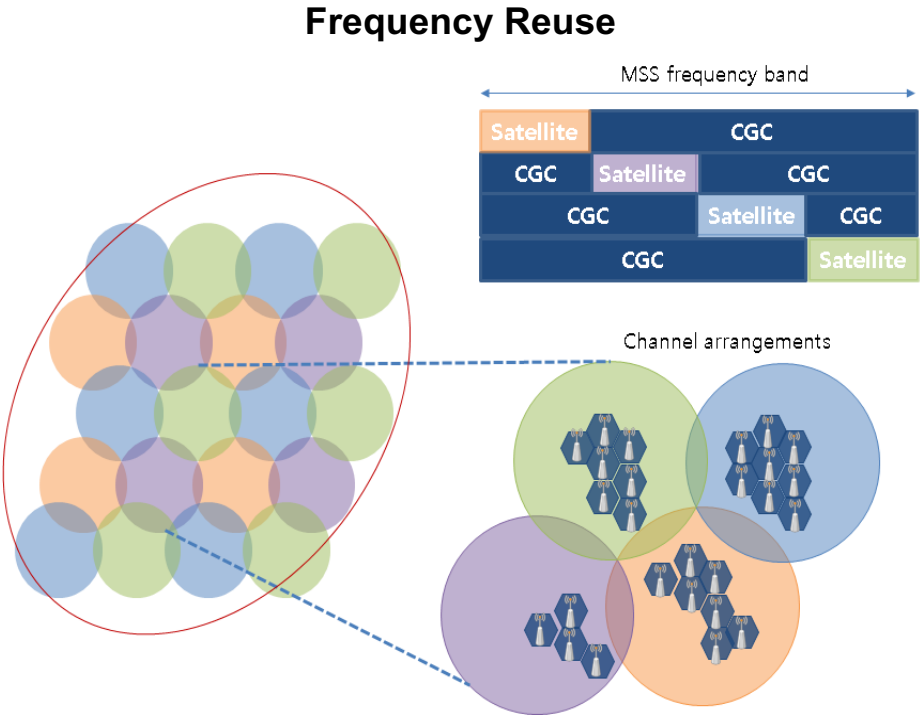
- **Industries**: Commercial MSS services to enterprises in agriculture, mining, fishing, etc.
- **Hybrid**: In areas that are lacking in coverage or capacity due to blockage or density;
- **Connectivity**: Internet connectivity in rural and remote areas;
- **Emergencies**: Communications during natural and man-made emergencies;
- **Public Safety**: Disaster warnings to the public and government agencies; and
- **Internet of Things (IoT)**: Connected car applications, smart city (urban and rural), transportation and logistics (on-shore and off-shore)
- **Aviation Networks:** hybrid network that utilizes both satellite and terrestrial networks to provide Internet access to airline flights.

MSS ATC/CGC is intentionally broad in the services it enables and leaves it to market demand to determine what might be the best services for a country like New Zealand. As mentioned previously, because the Paired 2100 MHz Band is one of the few allocated for both MSS and MS, it is an optimum band for global IoT so that devices can seamlessly move from one destination to another using MSS and terrestrial technologies in the same spectrum. For instance, animals on a farm or wool packaged for export at the source of a sheep farm are equipped with a small IoT sensor. The farm is in a rural area without terrestrial coverage so the IoT sensor is connected via a satellite signal. Satellite coverage tracks the shipment from the farm via truck until it enters an urban area or shipping port covered by a terrestrial network, at which point the signal is seamlessly handed off to the terrestrial service. When the shipment heads out to sea and away from the terrestrial networks, the sensor signal again seamlessly switches back to a satellite that tracks the shipment across the ocean to its destination (where it switches back to a terrestrial signal when available, and so on). Throughout the life of this shipment chain, the IoT sensor monitors the goods in real-time alternating between satellite and terrestrial coverage using the same spectrum band. This hybrid process – enabled by a MSS ATC/CGC regime – increases security, efficiency, and the flow of information all while seamlessly using the same frequencies in the Paired 2100 MHz Band.

New Zealand exporters of high value products, such as merino wool, already leverage sales based on tracking products from specific points of origin. This type of application may be expanded for use with any products exported by New Zealand industries as the use cases are unlimited as they can adapt to any specific need.

While 2 GHz MSS ATC/CGC deployments are just beginning, the growth and ubiquity of IoT provide a new business case in the S-band that has not existed before. As the demand for IoT continues to grow exponentially, RSM should keep in mind that IoT is just one of many types of customer services that MSS can provide, so the S-band should not be limited to satellite IoT given the long development cycle and expense involved in launching a global MSS system.

Under suitable technical sharing conditions with MSS managing the spectrum usage of the terrestrial mobile services component, the Paired 2100 MHz Band could easily be shared between MSS and ATC/CGC. While band segmentation can allow the shared use of the MSS spectrum, frequency reuse is a more spectrally efficient use of the MSS band. In this case, the MSS ATC/CGC permits not only multiple MSS satellite spot beams (each with a larger bandwidth than possible under band segmentation), but also for MSS ATC/CGC within each MSS spot beam. The ITU has shown this sharing mechanism in the graphic below.



Source: ITU, Working Party 4B

As noted in the Discussion Document, RSM is aware of the increasing interest to access the 2 GHz spectrum to provide a variety of services. Countries that have adopted MSS ATC/CGC include the United States, Canada, European Union countries, and Mexico. If New Zealand were to choose a

CGC model consistent with the European Union, New Zealand could take advantage of economies of scale for equipment and other services, as MSS and terrestrial services can coexist when the directionality of the mobile service uses 3GPP Bands 1 and 65, as is already in operation in New Zealand. Suitable modems for the Paired 2100 MHz Band are already available and more are under development.

Other countries are also examining the Paired 2100 MHz Band to determine its best utilization. In 2019, Mexico became the first country to use a public auction to award ATC/CGC licenses to the MSS operators in the 2 GHz band. Australia and Brazil have both begun regulatory proceedings to determine how to license the Paired 2100 MHz Band.

One of the reasons that the Paired 2100 MHz Band has recently experienced more regulatory activity is that WRC-19 settled outstanding issues and there are quite a few companies interested in providing mobile satellite and terrestrial services in the S-band. As mentioned earlier, Omnispace has a currently operating NGSO satellite (F2) and has recently selected Thales Alenia Space to design and build an initial set of two satellites for the next generation non-geostationary orbit system. These satellites will support 3GPP-defined (the 3rd Generation Partnership Project telecommunications specifications that unite standard development organizations) Narrow-Band IoT radio interface and will serve to advance the development and implementation of Omnispace's global hybrid network. The development of these satellites has begun, and they are scheduled for launch at the end of 2021.

Administrations are aware that the implementation of MSS ATC/CGC allows an expansion of coverage areas with a highly efficient use of spectrum. Incumbent local terrestrial mobile operators may partner with MSS operators to expand coverage nationwide without further deploying costly wire infrastructure. The dual benefit of connecting the unconnected in isolated communities through MSS with the possibility of partnering with terrestrial mobile operators is a highly valuable use of a scarce resource.

Omnispace is interested in having an opportunity to provide the same services in New Zealand that it provides in other countries and, therefore, would urge RSM to prioritize planning of this band to facilitate the timely introduction of important new services. Omnispace has extensive experience working with regulators designing the MSS ATC/CGC regime, including auctions if appropriate, and would be keen to work with and share insights with RSM.

On a final note, MSS ATC/CGC represents great potential value to the Paired 2100 MHz Band for New Zealand with its efficiency and flexibility, proffering a dual satellite-terrestrial approach that enables a breadth of service options which the market determines. Omnispace has multiple MSS ATC/CGC pilot projects around the world with its existing MEO satellite and looks forward to exploring the possibility of a similar trial in New Zealand and sharing the results with RSM.

Thank you again for the opportunity to provide comments on RSM's Discussion Document and please contact me should there be a need for clarification or additional information.

Sincerely,

Mindel De La Torre
Chief Regulatory and International Strategy Officer
Omnispace LLC
Email: mdelatorre@omnispace.com
Phone : +1 202.930.7922
www.omnispace.com