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# Dynamic Spectrum Alliance response to consultation on the draft New Zealand Five-year Spectrum Outlook 2017-21

## Introduction

The Dynamic Spectrum Alliance (DSA) is a global organization advocating for laws and regulations that will lead to more efficient and effective spectrum utilization. Our membership spans multinationals, small-and medium-sized enterprises, and academic, research, and other organizations from around the world, all working to create innovative solutions that will increase the amount of available spectrum to the benefit of consumers and businesses alike[1]. The DSA's three goals are closing the digital divide globally, enabling the Internet of Things and alleviating the "spectrum crunch".

The DSA welcomes the inclusion of spectrum sharing approaches as a topic in section 4.2 of the draft 2017-2021 Spectrum Outlook. However, we are disappointed at the overly cautious approach taken to sharing techniques and the unduly negative appraisal of dynamic sharing opportunities. This response to the consultation on New Zealand's 2017-2021 Radio Spectrum Management (RSM) work programme therefore focuses on a call for the final version of the Outlook to take a more positive approach to spectrum sharing as a way of maximizing the efficient use of New Zealand's spectrum resources.

## Sharing will be an important tool for meeting increasing capacity demands

The demand for wireless capacity continues to increase dramatically, especially with the exponential growth in the Internet of Things. Cisco's Visual Networking Index[2] forecasts the monthly Internet traffic in New Zealand more than doubling between 2015 and 2020[3], while the number of networked devices in will almost double in the same period[4], with much of that growth coming from an explosion of machine to machine devices[5]. The majority of the Internet traffic in New Zealand is carried over unlicensed spectrum – in 2015, 63.9% of traffic was carried over unlicensed Wi-Fi connections, compared to 4.5% over licensed mobile spectrum[6].

[1] A full list of DSA members is available at www.dynamicspectrumalliance.org/members/
[2] www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html
[3] In New Zealand, Internet traffic will reach 211 Petabytes per month in 2020, up from 102 Petabytes per month in 2015
[4] In New Zealand, there will be 36.5 million networked devices in 2020, up from 19.6 million in 2015
[5] In New Zealand, M2M modules will account for 70% (25.7 million) of all networked devices in 2020, compared to 52% (10.1 million) in 2015, (20.4% CAGR).
[6] Fixed/Wi-Fi was 63.9% of total Internet traffic in 2015, and will be 64.4% of total Internet traffic in 2020; Mobile was 4.5% of total Internet traffic in 2015, and will be 12.9% of total Internet traffic in 2020; Fixed/Wired was 32% of total Internet traffic in 2015, and will be 23% of total Internet traffic in 2020.

The traditional approach of static allocation of spectrum to individual services means that the bulk of spectrum is not being used at any given time or place, creating artificial spectrum scarcity. Sharing will be key to maximizing the use of spectrum as demand for wireless connectivity grows in New Zealand, particularly where sharing can increase the availability of the unlicensed spectrum which carried the majority of Internet traffic.

**In terms of coordinated sharing approaches, ASA is better than LSA**

The Spectrum Outlook explores Licensed-shared access (LSA) and Authorised-shared access (ASA), explaining how the two approaches enable sharing between two and three tiers of users respectively. In a choice between the two, the DSA would note that ASA is clearly preferable, not just because where it enables use of the unlicensed spectrum which carries much of the Internet traffic, but because LSA's sharing between two tiers is by nature more limiting and less spectrally-efficient than ASA's sharing between three tiers.

**Sharing is more established than implied in the Spectrum Outlook**

The Spectrum Outlook mentions the ASA model being used in the 3.5 GHz band in the US, where rules allow for licensed and unlicensed operations side-by-side. The model protects co-primary incumbents and new entrants, with a mixture of static and dynamic sharing – static sharing through use of databases to identify exclusion zones to protect satellite earth stations and dynamic sharing environmental sensors to detect radars on naval ships while also providing general authorization for spectrum which is not being used. This three-tier model is a good example to investigate as it has already resulted in trials by Google Fiber to transmit superfast broadband over this spectrum in a number of US cities and the development of standards and protocols for spectrum sharing in this band through the Wireless Innovation Forum industry alliance.

Another existing sharing approach not mentioned in the Spectrum Outlook, and used in the US and elsewhere, is Dynamic Frequency Selection (DFS). This is a dynamic sharing technique that protects incumbent users of military radar and Doppler weather radar and is currently being used in New Zealand by General User Radio Licence for Short Range Devices accessing the 5250-5350 MHz and 5470-5725 MHz[7].

**The Spectrum Outlook should take a more positive view of dynamic sharing of TV white spaces**

As noted in the Spectrum Outlook, a prominent DSA approach is the sharing of TV White Spaces, and we very much welcome that New Zealand has made available RSM licensing rules for TVWS. The Spectrum Outlook mentions rules in 3 countries; in fact, rules are also in place in Canada. In addition, draft rules are being considered in Botswana, Colombia, Ghana, Malawi, the Philippines, South Africa, and Trinidad & Tobago. In addition to these countries, trials have taken place in Bhutan, Cote d'Ivoire,

[7] https://gazette.govt.nz/notice/id/2017-go415

India, Indonesia, Jamaica, Japan, Kenya, Mozambique, Morocco, Namibia, Nigeria, Tanzania, Taiwan, and Uruguay.

The Spectrum Outlook talks about risks of interference under DSA approaches, but the numerous trials and experience in the countries listed above have proven that TVWS does not cause harmful interference to incumbent users. DSA members have been involved in all of these trials and are still to receive a single report of harmful interference to incumbent users.

Indeed, protection of incumbents from interference is at the heart of dynamic sharing – whether it be through the geo-location databases established for use in TVWS rules or other means such as access control technologies, sensing, and data analytics used to allocate the available spectrum in the most efficient manner.