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On Communications and the Arts
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Dear Committee Secretary

ACMA Submission – Inquiry into Co-Investment in Multi-carrier Regional Mobile Infrastructure

The Australian Communications and Media Authority (ACMA) is pleased to provide a submission to the inquiry examining Co-Investment in multi-carrier regional mobile infrastructure.

The ACMA's role and experience in radiofrequency spectrum management and telecommunications regulation is of relevance to the Committee's inquiry. The ACMA's submission describes these roles and then responds primarily to Terms of Reference 1 and 3 and the importance of the availability of spectrum in realising the opportunities arising from co-investment in mobile infrastructure in Australia.

The ACMA would be pleased to provide any additional information that would be useful to the Committee.

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Yours sincerely

[REDACTED]

Nerida O'Loughlin PSM
28 October 2022

Attachment ACMA Submission

Multi-carrier regional mobile infrastructure

Submission to House of Representatives Standing Committee on Communications and the Arts

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Introduction

The Australian Communications and Media Authority (ACMA) welcomes the opportunity to contribute to House of Representatives Communications and the Arts Committee inquiry into co-investment in multi-carrier mobile infrastructure sharing.

The ACMA's role and experience in radiofrequency spectrum management and telecommunications regulation is of relevance to the Committee's inquiry. The ACMA's submission describes these roles and then responds primarily to Terms of Reference 1 and 3 and the importance of the availability of spectrum in realising the opportunities arising from co-investment in mobile infrastructure in Australia.

ACMA regulatory role relevant to mobile infrastructure

Spectrum management

Spectrum is a critical input to the Australian communications industry, as its services rely on wireless and satellite connectivity. As Australia's spectrum manager, the ACMA is responsible under the *Radiocommunications Act 1992* (Radiocommunications Act) for ensuring that radiofrequency spectrum is managed in a way that promotes the long-term public interest derived from the use of the spectrum, having regard to:

- > Efficient planning allocation and use of the spectrum
- > Supporting commercial and non-commercial uses of the spectrum and
- > Supporting the communications policy objectives of the Government.

The Radiocommunications Act provides for a mix of regulator- and market-initiated activities that supports the acquisition of spectrum assets. The mix of regulatory tools provides flexibility to enable changes in spectrum use and holdings over time, and during the term of an individual licence.

Relevant provisions for ACMA-initiated allocation and licensing processes include:

- > allocation, reallocation and renewal of licences
- > determining licence types
- > determining allocation methods – such as via auction or administrative allocations.

Licensee-initiated changes to spectrum holdings and spectrum use include:

- > third party authorisations – enabling a person to obtain a right to operate radiocommunications devices via third party authorisations, for spectrum licences or apparatus licences
- > acquiring a spectrum licence through assignment – (i.e. trading rules)
- > a transfer of an apparatus licence (i.e. licence trading or transfer).

In addition, there are other avenues available for an interested party to gain access to spectrum, including where a person may engage the exclusive services of a spectrum licensee to provide radiocommunications services for the person in a specific area. The spectrum licensee retains the spectrum licence and does not authorise the first person to use radiocommunications devices under the licence but has agreed only to use its devices under the licence for the benefit and at the direction of the first person. The ACMA would generally be unaware of the existence or nature of these agreements.

The ability for licensees to initiate changes to how spectrum is used also provides flexibility to share spectrum. We note that the radiocommunications regulatory framework itself does not generally place restrictions on sharing communications infrastructure or assets.

Each of these mechanisms enable the allocation and re-allocation of spectrum to support its efficient use and may result in changes to the uses of spectrum over time, and the spectrum holdings of individual licensees.

The Radiocommunications Act makes clear that the issuing of, or third-party authorisation in relation to, a spectrum licence or apparatus licence is taken to be an acquisition for the purposes of section 50 and related provisions of the *Competition and Consumer Act 2010* (CCA) (see sections 68A, 71A, 106A and 114A of the Act).

Telecommunications infrastructure regulation

The *Telecommunications Act 1997* (Telecommunications Act) establishes regulatory arrangements that govern the operation of communications infrastructure providers and the installation of communications facilities which are relevant to the Committee's consideration of the provision of regional mobile infrastructure.

Under the Telecommunications Act, an owner of a telecommunications network unit that is used to supply a carriage service to the public must hold a carrier licence, unless an exemption applies, or a nominated carrier declaration is in place for that unit. Carriage services include telephone services and internet access services. After an assessment of an application, ACMA may grant a carrier licence under section 56 of the Telecommunications Act.

When installing telecommunications facilities such as mobile transmission towers and base stations, telecommunications carriers may enter land to determine its suitability for a telecommunications facility, or to install or maintain a facility already situated on it.

Telecommunications carriers may install or maintain a facility without local development approval if it is 'low impact' as defined in the *Telecommunications (Low-impact Facilities) Determination 2018*, 'Low impact' includes a separate antenna of not more than 1.2 metres in length and a cabinet not exceeding one cubic meter in a residential or commercial area.

Non 'low-impact' facility installations are subject to the applicable local government, state or territory planning laws.

In addition, telecommunications carriers are required to consult with local communities, councils, and interested and affected parties when the construction of mobile phone base station infrastructure is being proposed in their local area, under obligations set out in the Mobile Phone Base Station Deployment Industry Code (C564:2020) (the Deployment Code).

The ACMA has powers to enforce non-compliance with the Deployment Code provisions and has used these powers previously to impose formal warnings and directions to comply with the Deployment Code.

Role of spectrum in regional communications infrastructure deployments (ToR1)

Spectrum is a key input to the delivery of wireless broadband (fixed and mobile), satellite and broadcasting services, with over 170,000 commercial, government and individual licensees operating in Australia.

In terms of the role of spectrum to support regional communications, there are many factors that influence demand for particular pieces of spectrum. When considering whether to provide wireless communications, there are three broad options available for an operator to:

- > acquire additional spectrum
- > deploy additional sites
- > use more spectrally efficient technologies

In the ACMA's experience, each operator makes careful investment choices weighing these options.

Spectrum availability

Australia has just under 6 GHz of spectrum available for wireless broadband (WBB) services today, including low, mid and high band spectrum which is individually authorised and available under three different licensing arrangements—spectrum, apparatus and class licences.

A spectrum licence authorises the operation of devices within a defined frequency range and geographic area, with a high degree of exclusivity. The geographic area can vary in size and can comprise the entire country. Spectrum licences are usually allocated by an auction and have historically been utilised for most bands used to deploy commercial mobile broadband networks. Spectrum licences may be allocated for up to 20 years.

An inherent feature of spectrum licensing is technological flexibility—that is, the licence conditions and associated technical framework, while usually optimised for an expected technology, specify generic technical conditions¹ and do not usually expressly mandate or limit specific technologies or services. This allows a licensee to deploy any technology that complies with the conditions of the licence. For example, because technical frameworks for spectrum licences are designed to the extent possible to be technology flexible, this allows a licensee to use the spectrum for the technology (e.g 3G, 4G or 5G) that meets the frameworks. It is up to the licensee to manage interference between their devices (note that the adoption of international standards within the technical framework mitigates the potential for interference between devices).

Spectrum licences are more conducive to secondary trading than apparatus licences, due to design features such as their longer tenure and their ability to be sub-divided.

An apparatus licence authorises the use of a radiocommunications device (or group of devices) operating under a specific radiocommunications service type, in a specific

¹ Technical conditions include maximum power, frequency range, out-of-band emissions limits, geographical licence area, and out-of-area emission limits.

frequency range, and traditionally at one or more specific geographic locations for a period of up to five years. They are typically issued 'over-the-counter' in accordance with coordination rules developed by the ACMA. The ACMA charges fees and taxes for apparatus licences, which cover our costs and give people incentive to use spectrum efficiently.

The ACMA has now [determined](#) a new apparatus licence type called the area-wide licence (AWL). An AWL authorises the operation of one or more radiocommunications devices within a defined geographic area within frequencies specified on the licence, subject to the conditions included on the licence. The licence type is proposed to be scalable, enabling its use for authorising different-sized geographic areas and bandwidths. Unlike other apparatus licence types—which typically align with specific uses and purposes—the AWL type will be capable of authorising a variety of services, uses, applications and technologies.

Class licences are a standing authorisation to access spectrum without the need to apply to the ACMA for an individual licence (hence no fees or taxes are paid), subject to the conditions of the relevant class licence. These conditions can be, among others, technical, geographic and/or pertain to the type of use or class of user.

Class licensing options are available across a range of low, mid and high bands for different purposes, such as Internet of Things network technologies such as LoraWAN, Sigfox and Taggle, and Radio Local Area Networks (RLANs).

Spectrum characteristics supporting regional terrestrial coverage

National and local providers of wireless broadband will usually seek the same spectrum because of technology and equipment availability and band propagation characteristics. The coverage radius achieved by a single tower varies greatly between bands – from perhaps 100s of metres for ‘millimetre’ wave bands such as 26 GHz to 10s of kilometres in sub 1 GHz bands and will also vary based on the specific circumstances of deployment (such as terrain and network configuration).

Low band spectrum (sub-1 GHz) is limited in availability but offers wide area coverage characteristics. Lower frequencies can travel further and penetrate obstacles more easily than higher frequencies, which means lower frequency bands provide good coverage. However, lower frequency bands have relatively less bandwidth (ie number of Hertz) than higher frequency bands. As the amount of bandwidth dictates how much data a network can carry, higher frequencies can usually carry more data.

There is 1000 MHz of low band spectrum with some 210 MHz of low band spectrum licensed to mobile network operators. Other uses of low band spectrum include defence, broadcasting (TV and radio), amateur, land mobile and citizen band radio.

Limited low band spectrum availability constrains the ability to meet multiple spectrum demand requirements. Any approach to increase the number of operators using this spectrum is challenging as the ‘wide area’ benefits of the band can be lost by disaggregation into smaller frequency blocks of spectrum. Disaggregation creates additional boundaries between each frequency block which introduces a zone of reduced utility around each boundary, with the size of the zone greater in lower bands. Therefore, minimising the number of boundaries and avoiding boundaries through or near population centres is important to maximising the overall utility of the spectrum.

There is no other low band spectrum currently available for allocation. However, there is 2x5 MHz in the 850 MHz band earmarked for public safety mobile broadband use by states and territory governments. The 600 MHz band, currently used for terrestrial broadcasting, is subject to further work examining digital television transmission standards, but any future change in use of this spectrum is expected to take a number of years to resolve.

Mid band spectrum (1-6 GHz) is of interest for a wide range of uses due to a combination of favourable propagation characteristics and reasonable bandwidth availability. This spectrum supports satellite, wireless (fixed and mobile) broadband and point to point links and is of increasing interest for 5G wireless broadband, including private network uses. There is currently 828 MHz of mid-band spectrum available for wireless broadband use, with an additional 300 MHz becoming available, under forthcoming allocation processes for spectrum and apparatus licensing arrangements.

High band spectrum (above 6 GHz) is both plentiful and enables closer co-existence, but it has less utility in providing wide area coverage. In recent millimetre wave allocations, there was take up of licences from fixed satellite, existing mobile operators, regional providers and new entrants. There is over 4800 MHz of high band spectrum currently available for wireless broadband use.

The current mix of low, mid and high band spectrum is used by mobile operators to provide national coverage and high-speed capacity for 3G, 4G and 5G services. 4G is available to 99% of the Australian population, with 5G available to 80% of the population, with network coverage expansion underway by each of the three mobile carriers.

More spectrum is available if class licensed spectrum, such as 60 GHz used for radio local access networks and WiFi, is included.

Multi-carrier outcomes and their applicability in the Australian context (ToR 3)

With relevant spectrum capable of providing national coverage currently licensed to each of the three mobile carriers, in the ACMA's view, spectrum availability and access is not a current barrier to terrestrial mobile network expansion.

In assessing whether additional incentives are required to support coverage extensions, it is useful to consider whether spectrum held by a range of other radiocommunications licensees could be used to provide alternative terrestrial communications infrastructure and/or provide voice and data services for regional Australians, in addition, or as an alternative, to mobile broadband services provided under a multi-carrier mobile infrastructure sharing model.

Relationships between the mobile network operators, other spectrum users, and telecommunications providers are evolving, with relationships and agreements emerging to facilitate new services, technologies, and business models.

From a spectrum management perspective, the need to coordinate to manage interference between the boundaries of separate wireless networks, influences opportunities for spectrum sharing. Where separate networks are not closely located with no overlapping boundaries, there are fewer constraints on spectrum sharing. The more closely located that two networks are, the greater the spectrum sharing challenges, meaning that formal agreements between operators may be necessary to achieve coexistence of networks. In some cases, forms of network sharing such as multi-operator core network (MOCN) or multi-operator open radio access networks (MORAN) may offer additional opportunities for spectrum and network use between carriers.

Through desktop research, we have identified several common 'types' of agreements/relationships that currently exist or are developing within the Australian communications market. We have focused on current commercial relationships that relate to either sharing of spectrum and/or network infrastructure that is used for delivery of a wireless or satellite service. We have excluded service-based agreements like mobile roaming and other commercial collaborations which can be used to enable a customer to connect to another network when outside their native network, as these service-based agreements are not directly related to extending terrestrial mobile coverage or regional communications infrastructure.

Some of the current forms of carrier and service provider infrastructure or spectrum sharing agreements in operation in the Australian market include:

- > Wholesale services – where an operator deploys and operates a network and then acts as a wholesaler, selling services on its network to or through third party retailers. Each of the mobile operators have relationships with various Mobile Virtual Network Operators (MVNOs) to provide those MVNOs with mobile broadband services. Some MVNOs are owned by the mobile operator and use the mobile operator's network. However, some MVNOs are owned by other spectrum licensees with their own separate communications infrastructure but use the mobile operator networks to retail mobile broadband services. There is also a wholesale mobile satellite industry, with various providers (including the mobile operators) selling mobile satellite services from domestic and international satellite operators.
- > Backhaul - Backhaul agreements are taken between service providers, rather than to end users. Backhaul services are sometimes offered as a wholesale service by providers, to other local network operators. Many backhaul providers are vertically

integrated and compete within markets that they are also serving. Backhaul can be provided through fixed fibre services, through wireless fixed links or satellite.

- > Fixed backhaul, provided by fibre connections, is often used to facilitate various wireless services, including mobile broadband. Parts of the fixed backhaul market are also regulated by the Australian Competition and Consumer Commission through the declaration of the Domestic Transmission Capacity Service.
- > Wireless backhaul, particularly via satellite, is prominent in areas where fixed backhaul would be impractical or cost prohibitive, such as remote and regional areas. Wireless backhaul is licensed under apparatus (e.g. fixed licences) and class licenses, due the site-specific nature of the application.
- > Active (network) sharing – These are agreements between parties to share access to active communications infrastructure, such as the radio access network (RAN) (i.e. last mile service) and depending on the sharing technology, spectrum. Active network sharing models can be differentiated by technology deployment and business models
 - > Technologies - Under a multi-operator core network (MOCN) system, operators use a shared RAN, and spectrum is pooled/shared between all users, but traffic is routed to separate core networks. Under a multi-operator radio access network (MORAN), operators can differentiate operation parameters at the RAN level, and requires that different operators use separate dedicated frequencies.
 - > Business models - Under a neutral host model, a neutral third party operates active equipment and provides access to third parties, such as mobile operators, wireless internet service providers, and enterprise solutions providers, on a wholesale basis or through agreement. Under other sharing scenarios, one mobile operator or spectrum user may extend access to other mobile operators through an agreement, or wholesale arrangement.
- > Passive (infrastructure) sharing - These include agreements between parties to share access to passive communications infrastructure, such as towers and cell sites. Agreements to co-site equipment (cell site sharing) have long been a part of the radiocommunications industry in Australia, with mobile operators previously agreeing to enable other operators to deploy infrastructure at some sites, or by forming joint-ventures to deploy and manage infrastructure. In recent years, many parties, particularly the mobile operators have sought to divest their passive infrastructure holdings, either partially or completely.
- > Leasing/Third party authorisation - These include agreements between parties to lease spectrum or enable a party to use spectrum licensed to another party to deploy own services, such as in areas where the licensee has not deployed infrastructure.

The design of additional incentives for either infrastructure or service extensions needs to consider the different ways that communications infrastructure is used in delivery of a service to regional and remote Australians, noting that multiple operators may contribute either spectrum or infrastructure involved in provision of a mobile service.

A further consideration is that any additional programs or investment incentive schemes coordinate with, and do not duplicate various co-investment programs currently in operation at a Commonwealth and state government level. To the extent that different programs establish different forms of network or spectrum sharing, this introduces the prospect of multiple spectrum interference management models, ultimately impacting on the efficient use of the spectrum, network design and the incentives for program participation.

ACMA has an interest in the design of any co-investment programs, to the extent that these programs stimulate additional demand for spectrum access and/or changes to technical and licensing frameworks necessary to support multi-carrier infrastructure outcomes.

It is also useful to note other technology developments occurring globally that will enable ‘standard’ mobile phones to communicate directly with satellites, providing functionality in areas where there is no terrestrial mobile coverage. Initially at least, this functionality is likely to be limited to text messaging location sharing and emergency messaging.

These developments are relevant to the Committee’s consideration of opportunities to extend mobile network connectivity. While initial developments are focused on the United States market, many of the operators involved in these developments are also active in the Australian communications market. The ACMA is working with satellite companies and mobile network operators, to ensure that regulatory arrangements for satellite communications will enable Australia to benefit from these developments.