

ACMA Consultation

Expiring Spectrum Licences: Stage 2

Prepared by Connected Farms

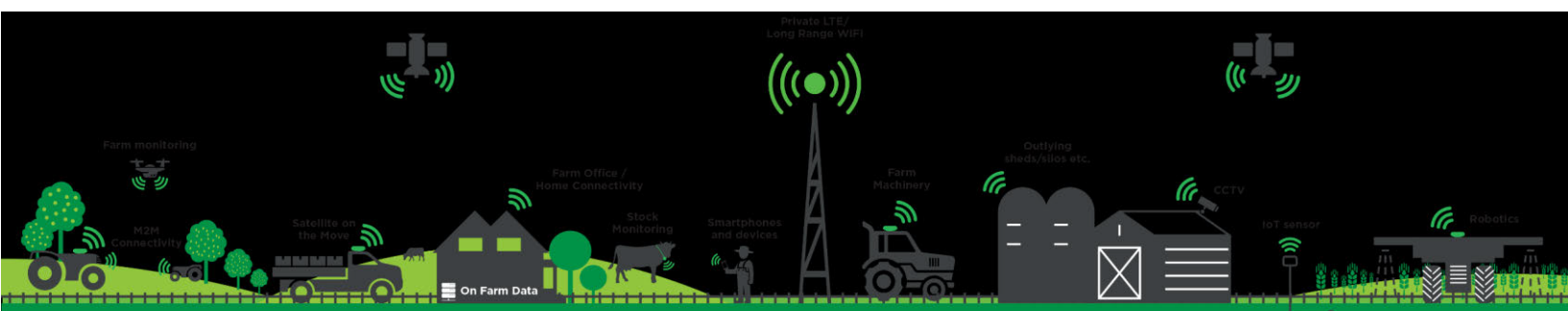
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ACMA consultation Expiring Spectrum Licences: Stage 2.

Connected Farms welcomes the consultation work the ACMA is conducting to gather information from prospective licensees about current or potential use of the ESLs and how this promotes the long-term public interest. Connected Farms is pleased to provide input based on our experience in rural and remote Australia and across agriculture settings about unmet demand, unused or underutilised spectrum, spectrum access issues, infrastructure build and deployment costs, alternative use cases and inefficient use of low band spectrum in these areas.

Based in Regional NSW, Connected Farms is an Australian-owned licenced carrier specialising in on-farm connectivity technology designed and customised for agricultural applications throughout Australia. Our solutions give farmers the means to increase their yields and reduce their inputs by enabling digital agriculture. We enable wide-area mobile (4G) broadband, narrowband IoT (LoRaWAN) and satellite on the move (SoTM) mobility connectivity across the farm which allows growers to adopt digital agriculture. Digital agriculture cannot be adopted without accessible on-farm connectivity.

Alternative licence conditions: rollout obligations and USOL1 and UIOSI conditions.

Alternative licence conditions and rollout obligations as post-allocation mechanisms to achieve more efficient spectrum use are widely employed in other spectrum jurisdictions. While secondary markets and third-party authorisation may be built into the Australian spectrum allocation framework and designed from a policy perspective to facilitate the movement of spectrum to its most economically efficient and productive end, there is little operational evidence of these intended outcomes being realised in the Australian market. As a policy tool, this lever is ineffective in encouraging greater efficiency of spectrum use, particularly in rural and remote Australia.



Post allocation alternative market examples

Examples of a range of post-allocation mechanisms, alternative licence conditions and shared RAN arrangements employed by international spectrum regulators to encourage more efficient use of spectrum include:

- In Indonesia, a recently introduced Omnibus Law allows the government to require spectrum sharing arrangements amongst telecommunications operators to optimise their use of the radio frequency spectrum. This means the same spectrum can be used by two or more operators located in different regions or across different technologies at the same time. While this requires more active involvement in the market by the regulator, it also facilitates more efficient use of available spectrum assets and broader coverage outcomes. The law also optimises the use of passive infrastructure. These innovations provide opportunities for new entrants without the barrier of spectrum access and promote investment and enhanced connectivity in regional areas.
- In May 2023, the Malaysian government announced the transition from a single wholesale network (SWN) model for 5G to a dual-network (DN) model which is a state-run network overseen by the Digital Nasional Behad (DNB). The decision to allow a second 5G network in the country was made with the aim of avoiding a single point of failure and to establish redundancy for 5G services. Under the terms, five local carriers agreed to each buy a 14% stake in DNB, with an investment of around \$50 million each.
- In the UK in 2019, OFCOM introduced a new licensing approach to provide localised access to spectrum bands that can support mobile technology and to ensure that the lack of access to the radio spectrum does not prevent innovation.

Connected Farms would encourage the ACMA to consider applying alternative licence conditions and rollout obligations to the current ESLs. The absence of an active secondary market and the Australia-wide licensing of ESL bands currently precludes alternative users and use cases for place-based development and deployment of services. The use of market-based spectrum allocation processes for current ESLs and lack of post allocation controls do not support opportunities for new entrants and alternative use cases in the ESL bands.



Connected Farms supports the ACMA's proposed option of facilitating small spectrum licences covering specified geographic areas as a pathway for place-based service delivery. Appropriately set spectrum pricing charges may encourage more targeted investment by current ESL holders, and in areas where rollout obligations are not met within a certain time period, prospective alternative licensees could propose alternative use cases.

To ensure the operation of spectrum licences better aligns with the objectives of the MPS and encourage more efficient use of spectrum and better outcomes for rural and remote consumers, post allocation mechanisms should be adopted by the ACMA. These could include a range of levers such as:

- Geographic and coverage based rollout obligations and measures informed by data gathering to identify currently unserved areas where improved coverage would provide tangible benefits, rather than simply defining coverage by percentage of a population.
- 'keep what you serve', 'or use it or loose it' obligations across a specified time period, for example 12 months, whereby the unused part of a spectrum licence must be surrendered for reallocation by the regulator.

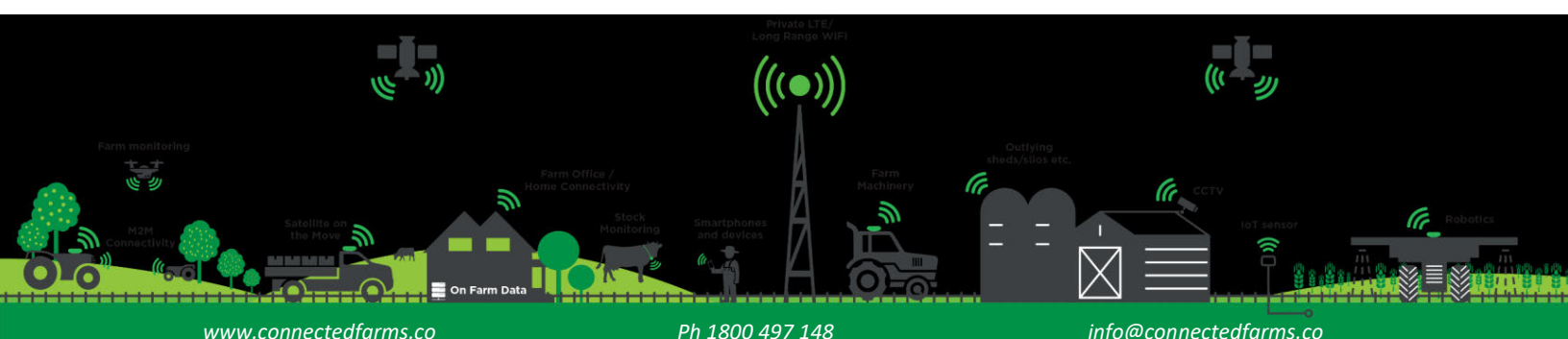
Such mechanisms, while requiring more active oversight by the regulator, would provide much needed certainty in spectrum access and availability and support opportunities for new entrants and business cases to meet unmet demand.

Public interest criteria

Criterion 1: facilities efficiency

While the current regulatory framework provides for licensees to subdivide and trade their spectrum licences, this is currently not a feature of the Australian spectrum market, regardless of whether alternative use cases and demand for allocated but under-utilised spectrum exist. Connected Farms has sought access to the current low band ESL spectrum through a range of available mechanisms provided for under the current framework and unfortunately this has not resulted in access to currently under-utilised spectrum in specific rural and remote locations.

Connected Farms has alternative use cases to deliver innovative low-cost services (including private 4G networks) to underserved rural and remote agricultural lands, however access to allocated but under-utilised low band spectrum is a barrier to meeting this demand. As shown in the case study



below, access to apparatus licensed spectrum in 1800 and 2100Mhz bands is also a challenge in some rural and remote areas.

We question whether it is in the public interest to have patterns of long term unused or under-utilised ESL spectrum combined with high levels of unmet demand across rural and remote Australia. Digital exclusion is pronounced in rural and remote areas, and as the ACMA notes approximately 11% or 2.8 million Australians experiencing digital exclusion. Spectrum is a key enabler of digital inclusion, and the current allocation policy of long-term Australia wide licensing of ESL spectrum is failing to facilitate competitive outcomes for prospective licensees to deliver a range of lower cost and innovative services.

Criterion 2: Promotes investment and innovation to encourage efficient use

National carrier business models of mobile network operators (MNOs) are fundamentally based on population density, connecting premises and servicing transport corridors. The economics of building towers and networks in rural and remote areas is challenged by these business models whereby multiple layers of subcontracting drive higher build costs, while lower population density reduces ability to secure returns on investment.

The economic challenges associated with delivering infrastructure and services to rural and remote Australia are well documented for MNO business models, for example in a submission to the 2021 Regional Telecommunications Review Telstra noted that *‘because of the challenging economics, there are likely to be few new economically viable sites in regional and remote areas without support from government funding’* and that *‘difficult terrain and low population density means that there will always be large parts of Australia’s land mass that will not get terrestrial based mobile coverage, even with funding initiatives’*.

While this is undoubtedly the case for MNO business models, this does not have regard to smaller regionally focused place-based operators with lower deployment and infrastructure costs and the growth of private network operators to address market failure in some rural and remote locations and agriculture sectors. The emergence of smaller specialised providers with alternative low-cost place-based business models introduces alternative economics and investment value into servicing rural and remote areas.



As previously noted a major barrier for alternate place-based operators to service unmet demand in these areas remains access to appropriate low band spectrum (sub 1 GHz). Using apparatus licensed spectrum (1800/2100MHz) in rural and remote locations and across agricultural lands imposes a build cost of approximately 4:1 (1800Mhz:700Mhz) because of different radio propagation characteristics, additional tower requirements for signal reach and equipment costs. By removing spectrum access as a barrier to entry, alternative providers may well be able to service these locations with low cost place-based delivery models.

Agriculture sector

Within the agriculture market numerous studies have shown the significant unmet demand and value to be unlocked by enabling digital agriculture and connectivity across farmlands. The [Australian Farm Institute](#), in its 2017 modelling and analysis of the economic benefit and strategies for the delivery of digital agriculture in Australia, determined that:

“If decision agriculture was fully implemented it would deliver an estimated boost to the value of agriculture of 25 per cent (\$20.3 billion) and lift the Australian economy by an estimated 1.5 per cent (\$24.6 billion).”

Separately, the Bureau of Communications, Arts and Regional Research estimates that the additional economic benefit from digital technologies could be between \$3.0 and \$10.6 billion per year (in 2017–18 dollars) for the agricultural sector by 2029–30, which represents an additional boost to economic activity in agriculture of between 4.7 to 16.9 per cent by 2030.

In 2021, The [Department of Agriculture, Forestry and Fisheries \(DAFF\)](#) noted that digital adoption in the Australia agriculture industry is estimated at just 10% and that a 3-fold increase in active technology users is required for agriculture to reach its ambitious goal to move to a \$100 billion industry by 2030. Digital technologies and data can enable farmers and the broader supply chain to make faster, more informed decisions, automate processes and predict future events. Uptake of digital technology could create a \$20.3 billion per year increase to industry production.

The National Farmers Federation, in its [National Connectivity and Digital Agriculture Policy Statement](#), outlined that connectivity and digital agriculture are intrinsically linked, with connectivity advancements underpinning the adoption of digital agricultural practices. Connectivity improving connectivity services are key to materialising the estimated \$20 billion AgTech opportunity.



Digitising agriculture will be critical to unlocking key markets, increasing sustainability, efficiency and productivity.

Widespread adoption of digital agriculture is critical to the achievement of the government's goal to grow the sector to \$100 billion by 2030. A key enabler to realising these benefits is access to appropriate low band spectrum in these areas. Better alignment between spectrum allocation policy and the stated objectives of the MPS are required. Spectrum allocation policy must promote opportunities for innovative and low-cost alternative solutions in rural and remote areas and across agriculture farmlands to deliver voice and data mobile network services, via access to low band and higher frequency bands that are most appropriate to the use case and geographic area (including private networks).

Criterion 3: Enhances competition.

While promoting competition is a stated policy objective for the ESL process, current spectrum allocation settings do not create the certainty in spectrum availability to encourage competition and innovation in rural and remote locations. With much of the current sub-1 GHz spectrum held under spectrum licences by MNOs and a non-operational secondary market in Australia, spectrum access is a significant barrier for new entrants to deliver low cost, innovative service and address unmet demand.

The failure of the market to deliver quality service and coverage outcomes in rural and remote Australia (as evidenced through the findings of successive regional telecommunications reviews and ongoing government funded regional connectivity and mobile coverage programs to address the shortfall in these areas) is indicative of inefficient use of national ESL spectrum. The ACMA is encouraged to consider whether such market allocation arrangements are allocatively and dynamically efficient and whether spectrum is being put to its most economically efficient and productive use in rural and remote locations. Unused spectrum is not generating value in the Australia economy, yet economic research from the [Australian Farm Institute](#), found that delivering digital connectivity capability across farmlands would lift the Australian economy by an estimated 1.5% (\$24.6 billion).

The recently announced TPG/Optus network sharing deal will see Optus use the TPG 700MHz spectrum in the 98.4% of the population areas where Optus currently has coverage. Under this arrangement (if approved), TPG would retain its 700MHz holdings for the remaining 1.6% of the population which is currently unserved by this combined footprint. Given the current TPG coverage footprint in rural and



remote is approx. 96%, then an additional 2.4% of the population will receive the benefits of enhanced competition and service offerings.

While it may not be economically viable to ever reach 100% population coverage, significant parts of productive agriculture areas remain unserved under current Australia wide spectrum allocation arrangements. The population based business models of MNOs mean that there is unmet demand across productive agriculture lands and opportunities exist to provide contiguous coverage to these areas. There is a role for spectrum allocation policy to assist in facilitating the servicing of this market more effectively by introducing post allocation controls or reallocating part of the unused or underutilised spectrum to alternative use cases.

This is supported by the ACCC's findings in its Regional Mobile Infrastructure inquiry *"To the extent that regional-focused operators can develop alternative means of providing mobile coverage in regional Australia, there may be benefit in providing those operators with access to [currently allocated, and particularly low-band] spectrum, particularly where the spectrum may be not currently used"*.

Lack of access to low band spectrum for non-MNOs removes the incentives for the incumbents to be competitive and acts as a barrier to the delivery of competing and innovative services to address unmet demand. A case study of the spectrum access barriers that exist in the current spectrum market experienced by Connected Farms is set out below.



Case study – alternative use case: spectrum access challenges and unmet demand in remote Northern NSW.

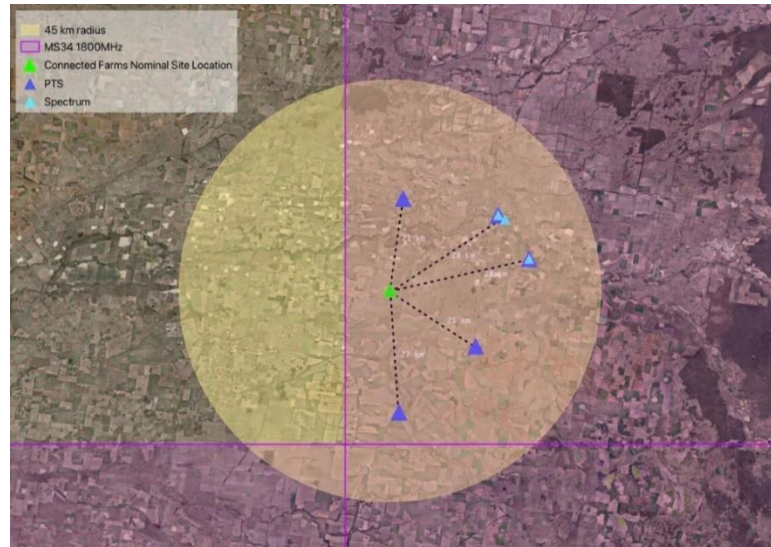
Connected Farms was recently commissioned by an agribusiness in remote northern NSW to deliver a private 4G network across the entire farm. The farm has some connectivity to the farmhouse but not sufficient coverage over the land to enable digital agriculture adoption and automation. Approximately 85% of the farm lacks acceptable connectivity from the major mobile networks. Decision and precision digital agriculture practices require farm wide high-speed connectivity to realise the benefits of digitisation and automation.

The Connected Farms nominal site location is part of a farming precinct area of over 100km². The farming area spans the border of ACMA designated low and remote density areas. However, gaining access to spectrum – any spectrum not just the most cost effective and suitable spectrum – can be difficult even in areas bordering on those defined as ‘remote’ by the ACMA.

Low band (sub 1GHz) spectrum is of high value to rural/remote farming agriculture use cases because of the favourable radio propagation characteristics and the capital build cost profile which is approximately 1:4 compared to apparatus licenced 1800 or 2100MHz spectrum. Low band spectrum is not available for apparatus licensing and only parts of the 1800 and 2000MHz bands are available for private apparatus licensing in Australia. The 1800MHz band is only available for apparatus licensing in remote areas, while the 2000MHz band is more readily available, across remote and more populated regional areas of Australia.



Agriculture use case: Spectrum availability challenges



Note : of the six PTS available licences in this area, five are held by MNOs, despite also holding ESLs.

For this particular location and site:

- the image above shows both apparatus and spectrum licensed services (triangles);
- the preferred Connected Farms site location (green triangle) and most of the required coverage area is within the 1800MHz band spectrum licences only zone, so no 1800MHz channels are available for apparatus licensing;
- some of the 2000MHz band is available for PTS apparatus licensing (4 x 10MHz channels or 8 x 5MHz channels) and an additional part of the 2000MHz band is only available for spectrum licenses in this area;
- RALI MS 33 defines a minimum separation distance of 45km between PTS base stations of different licensees (i.e. no frequency re-use within 45km);
- all licensable 2000MHz band channels are already assigned to exiting services within 45km of the desired site, meaning there are no options for new PTS licence systems;
- of the six existing PTS apparatus licensed services, five are assigned to MNOs effectively locking out alternative providers from delivering services in the PTS bands, despite also holding national low band spectrum licences.



Despite demand by this farm for digital connectivity (in this case a private 4G network) and despite ESL bands not being fully utilised by incumbents, the lack of spectrum availability across any band means Connected Farms is unable to meet the demand from this consumer and deliver a service. In this case, spectrum is not being put to its most productive and efficient use. In some instances we are observing MNOs using apparatus licensing in conjunction with spectrum licences, and in this case, five of the six existing PTS licenses are assigned to MNOs who already hold national ESL spectrum but provide inadequate coverage to this location. This effectively prevents operators like Connected Farms providing connectivity tailored to enhancing digital agriculture.

Criterion 4: Balances public benefits and impacts

Criterion 5: Supports relevant public objectives and priorities

Successive regional telecommunications inquiries have detailed the profound social, economic, health and educative disadvantages experienced by rural and remote consumers because of lack of access to digital internet technologies and reliable connectivity. As noted above, economic studies have also identified the significant economic benefit to the Australian economy of enabling digital technologies across Australian agriculture sector. These are significant public interest issues that spectrum allocation policy can play a role in addressing.

The Australian Broadband Advisory Council found that in the agriculture sector:

Salt and pepper connectivity is holding back online business and administrative functions, the full use of digital functionality on existing equipment, the use of digital technologies that need reliable and ubiquitous connectivity and is forcing costly offline work-arounds for farmers and agri-tech providers. It is also affecting regional economic growth by holding back online farm-based businesses and has particular social impacts on women and online learning for children.

Government and spectrum policy would benefit from additional levers to address the current unused or underutilised spectrum in ESLs resulting in underserved areas and unmet demand. This should include examination of different spectrum allocation and sharing models which better align with the objectives in the MPS relating to connectivity and investment, together with improving regional and remote coverage and service delivery. We note the ACMA's preference that the market determine the efficient allocation of the spectrum resources, however we would encourage the ACMA to consider



within this context whether this predisposition is best servicing the needs of rural and remote Australia and the well documented existing unmet demand.

Mechanisms to deliver on these objectives could include:

- Providing regionally focused operators with the means of providing alternative mobile coverage in regional and remote Australia with access to allocated but unused low band ESL spectrum.
- Reserving and reallocating 5 MHz of unused spectrum for alternative providers to deliver low cost innovative services to these markets using an AWL style allocation mechanism, where alternative providers are able to bid first on spectrum similar to the processes undertaken in the 3.4-4.0GHz AWL allocation.
- Reallocating 10MHz to facilitate a multi-operator shared RAN arrangement which encourages collaboration and cooperation amongst carriers to service under and non-served areas.

This will require the regulator to take a more active role in delivering on these policy objectives by employing spectrum allocation mechanisms that are fit for purpose and are by design, built to achieve these objectives in practice.

