TELSTRA GROUP LIMITED

Whitepaper: Driving efficient use of spectrum through alternative licence conditions

Submission to ACMA ESL Stage 2

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1 Introduction: Driving efficient use of spectrum

This whitepaper outlines Telstra's thoughts on driving more efficient use of spectrum through alternative licence conditions; in particular, Use-It-Or-Lose-It (UIOLI). UIOLI is often seen through the lens of negative connotations, in the context of the potential disruption to a licensee, should they lose their licence. This whitepaper provides a contrary view that alternative licence conditions such as UIOLI — if framed and implemented correctly — could provide incentives for licensees to increase the utilisation of their spectrum through secondary trading and/or enable a market-based reallocation of unused (or surrendered) spectrum assets.

In this paper we set out what we consider to be a good alternative licence condition (ALC) framework in the context of Australia's current Expiring Spectrum Licence (ESL) process to drive greater spectrum utilisation. This framework packages together three related and complementary elements. The first of these, an enabler, is the use of instalment payments for spectrum licences (which also has benefits for industry sustainability). The second element recognises that regulated spectrum sharing schemes generally harm allocative efficiency and have not proven to be effective for sharing spectrum with mobile services in other jurisdictions. Third, we propose a focus on harnessing UIOLI to encourage and incentivise the secondary trading market (far preferable to any administered or whitespace sharing approach).

We believe a good ALC framework will strengthen secondary trading, and thus help increase spectrum utilisation, but that a poor model — characterised by sub-optimal design choices — could seriously harm the industry, and ultimately the availability and quality of services to customers. Thus, careful consideration must be given to the design of any ALC framework in Australia.

Structurally, this whitepaper:

- explores *why* efficient use of spectrum is important to Australia;
- explains *how* licence conditions can be used to achieve the goal of increasing spectrum utilisation;
- describes *what* the attributes of a good, and a bad, ALC design are; and
- concludes by describing the framework (objectives, transparency, measurability, compliance, etc) that will ensure accountability for the effective implementation of a UIOLI licence condition.

2 Why efficient use of spectrum is important

Today, parts of Telstra's mobile network experience congestion in the radio access network. The most common ways to resolve this type of congestion are either to increase the number of base stations (i.e., smaller cell sizes so there is less population per cell), or increase the amount of radio spectrum available to each cell so that more users can be accommodated on that cell.[1] With mobile traffic continuing to grow, congestion is likely to remain a challenge.[2]

[1] Of course, there are other mechanisms to increase the traffic-carrying capacity of radio spectrum, such as new mobile generations (4G, 5G, etc) and MIMO antenna systems. However, these are evolutionary in nature, and occur at a comparatively slow pace. Cell densification and access to more spectrum (described in the paragraph above) can be actioned without waiting for a new generation / evolution in the technology.

[2] More information on congestion in our network, and the things we have been doing to resolve it, can be found in our submission to the 2024 RTIRC, https://www.infrastructure.gov.au/have-your-say/2024-regional-telecommunications-review.

In rural and remote parts of Australia, increasing the number of base stations is often economically unviable. Base stations in rural and remote Australia are considerably more expensive to establish and maintain. Without the economic justification to increase cell density, there is limited scope to use mid- and high-band frequencies in rural and remote locations, as the propagation is insufficient, increasing the required number of base stations that require a range of approvals, and add to the complexity, cost and time to build.

Additional low band spectrum (below 1 GHz) for is required for improving customer experience in rural and remote parts of Australia. However, this spectrum is scarce. The best approach for improving the customer experience (better speed, less congestion) in rural and remote parts of Australia is to utilise the available low band spectrum more efficiently. Leaving low band spectrum unused or dormant not only denies operators who could usefully employ the spectrum the ability to do so, it also denies Australians and the Australian economy the ability to derive social and economic gain from that resource. Thus, inefficient use is an undesirable outcome.

A solution is required that provides the opportunity and incentive for spectrum licensees to provide third party access to spectrum which is not being used, thus increasing utilisation and resulting in greater aggregate benefit for all Australians and the Australian economy.

3 Potential new licence conditions for the Australian context

Alternative licence conditions have the potential to shape the behaviour and actions of spectrum licensees, but crucially the way — and extent to which — this is realised will be a function of how any such conditions are designed.

3.1. A package of three elements to improve spectrum utilisation

When considering potential new licence conditions for the Australian context, we've identified the following 'package' of three measures which we believe could work together to improve spectrum utilisation.

1. **The use of instalment payments is essential to address industry sustainability and implement UIOLI**

Mobile networks are expensive to operate, and globally many operators have been experiencing return on invested capital (ROIC) challenges. These pressures also exist in the Australian market.

Between 2028 and 2032 spectrum licences in seven different bands will be expiring. To the extent these licences are renewed and the final pricing model, licensees could be facing significant renewal costs. Given the broad financial sustainability issues facing the telecommunications sector, there's a need to actively explore and adopt measures which can help improve industry sustainability, and in turn support better affordability for end users.

Telstra considers that the ACMA should adopt the use of instalment payments (for any future spectrum licence renewals) as part of the ESL framework, instead of upfront payments.

The possible renewal of multiple licences (with 20-year tenures) in a short space of time (2028-2032) means an upfront payment approach would be extremely burdensome financially for the local industry. It may mean that operators are not only bounded by their spectrum valuations in deciding whether or not to renew their licences, as well as a more challenging funding environment. It may also impact end user affordability.

Instalment payments enable better cashflow management, with lower commercial overhead. We suggest using the government's risk weighted cost of capital to determine annualised payments.

In addition to the industry sustainability benefits of instalment payments, such an approach would also simplify the use of 'UIOLI' licence conditions. In this scenario, were spectrum to be "foregone" due to use thresholds not being met, the corresponding annual payments would then simply cease. By contrast, under an upfront payment approach the entire licence payment would notionally be foregone, opening up complex questions around compensation in respect of the 'unused' portion of the licence period.

2. Regulated spectrum sharing schemes harm allocation efficiency and have been unsuccessful globally

In the context of increasing the utilisation of licensed spectrum, we believe secondary trading (and/or third-party authorisation) is far preferable to a regulated or administered spectrum sharing scheme.

Secondary trading and/or third-party authorisation allows a licensee to remain in control of how their spectrum is shared. Licensees can negotiate and determine interference management mechanisms to control how any spectrum access seeker can operate in relation to the licensee. Mutual development of boundary conditions, where parties work collaboratively to develop technical arrangements to maximise each operator's use of the spectrum, will necessarily improve spectrum utilisation.

By contrast, administered spectrum sharing schemes are generally a poor way to manage access to spectrum assets. Where such approaches have been adopted elsewhere, they have generally proven unwieldy with material practical inefficiencies (i.e. interference boundaries), diminishing overall spectrum utility. This is because a regulator must attempt to foresee all possible combinations of technology, geography and use cases that may be involved in sharing spectrum, necessitating a structured system that is conservative, complex or both.

For example, the Citizens Broadband Radio Service (CBRS) scheme in the US, a dynamic spectrum sharing scheme under which there are tiers of priority, has experienced poor uptake and utilisation. Sales of CBRS licences only generated USD$4B in licence revenue, compared to USD$81B from the comparable C-band auction. This demonstrates a lack of interest from the telecommunications sector in spectrum that is encumbered by other users along with rigid access and sharing rules.

Similarly, where there are prescribed interference boundaries, such as geographic boundaries between licensees, these create fallow dead zones, which detract from spectrum utilisation and allocative efficiency. While care is generally taken to ensure these are outside where people need coverage, this is not always the case, reducing the benefits realised for end users.

In the context of alternative licence conditions, we believe the emphasis should be on encouraging secondary trading and/or third-party authorisations because these allow incumbent licensees and access seekers to jointly find optimal interference management arrangements that suit their unique requirements. Within our proposed framework, UIOLI incentivises incumbent licence holders to engage in negotiated sharing with access seekers to increase spectrum utilisation. We consider negotiated sharing is vastly preferable to any mandated sharing or administered access scheme and should be encouraged in Australian.

3. Harness UIOLI to strengthen secondary trading

We believe a well-designed UIOLI model would lead to increased secondary trading, and by extension increased spectrum utilisation.

A good UIOLI model consists of three elements:

i) A trigger for activation, based on known use thresholds (we suggest population coverage percentage thresholds);

ii) A grace period of fixed duration for the licence holder to address any shortfall in their usage; and

iii) A regulatory enforcement action resulting in the loss of the spectrum licence (either renewal not offered or a revocation of the licence).

Figure 1 provides a simple depiction of how these three elements would fit together in practice, with the key callout being that the risk of losing spectrum actively drives the market towards maximum spectrum utilisation through secondary trading. In practice, we do not anticipate that regulatory enforcement would be a common occurrence, as licence holders will prefer to either increase the utilisation of their spectrum or find an alternative buyer at market competitive rates before the grace period expires.

We highlight that the framework will benefit small and large players alike. Whether it is to rebalance spectrum portfolios between MNOs through direct secondary trading, or to enable small players to seek access to spectrum for localised deployments through authorisations, the framework incentivises the market towards an optimal state of increased spectrum utilisation.

The UIOLI construct outlined, however, can only operate effectively if licensees face the prospect of losing their entire licence should they fail to meet the usage threshold, after being warned of this possibility at an earlier date. It is this risk which heightens incentives for secondary trading or third-party access negotiations.

An alternative scheme in which a "lose it" action involves regulated sharing (a whitespace[3] approach) will not provide the same incentive. Furthermore, a whitespace approach is extremely undesirable and ill-suited to the Australian context — whitespace frameworks are impractical, complex to administer, and would create unhelpful spectrum fragmentation and boundary interference issues, greatly complicating spectrum management for both licensees and regulatory authorities.

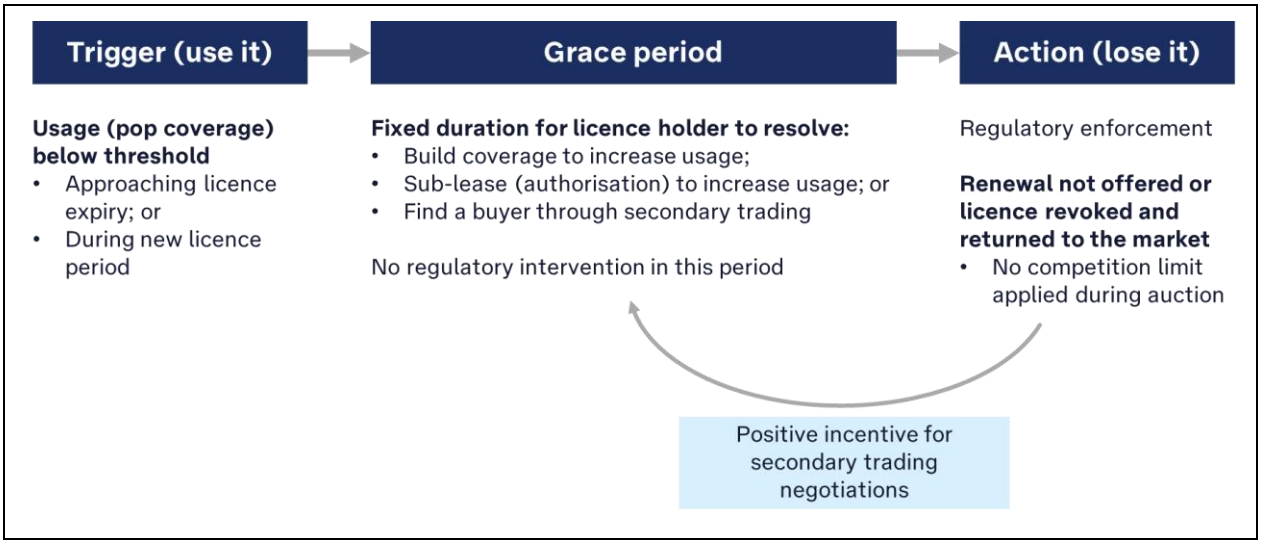

Figure 1: Elements of a UIOLI framework that will help increase spectrum utilisation

Benefits of the framework as outlined above include the potential for licensees to negotiate sharing arrangements which maximise the utility of the spectrum, the avoidance of possible unintended consequences from regulatory intervention, and fair and reasonable incentives to use spectrum efficiently.

3 A whitespace approach is where only the unused portions of the licence are reclaimed.

One further proposition in respect of the UIOLI framework outlined above is the importance of consistency between competition policy and spectrum policy — where use thresholds are not being met, and that spectrum is to be reallocated to the market, there would be a strong case to relax any competition limits that may have previously applied to the previous allocation of that licence, in support of both allocative efficiency and increased spectrum utilisation.[4] Competition limits can be a blunt and arbitrary tool, especially if applied without consideration of geography (metro versus regional) or traffic load. At the very least, if competition limits are to be applied when unused spectrum is returned to the market, they must be more flexible and sophisticated to recognise geographic market dynamics (e.g., market share, traffic/data volumes, coverage investment) and the commercial limitations outlined above of building new infrastructure in regional Australia.

3.2. A poor ALC framework will not drive increased spectrum utilisation and will harm the industry

It is important to highlight that our support for an ALC framework is contingent on an optimal model being adopted, as the alternative of a 'poor' framework could be highly detrimental to the local industry.

Aspects of a 'poor' model could include:

- Upfront licence payments – as outlined above, such an approach would complicate any UIOLI model compared to the alternative of instalment payments which also contribute to the sustainability of the industry.
- Use-it-or-share-it (UIOSI) obligations – UIOSI is complex, and there are material disadvantages around the management of any 'sharing' arrangements which extend to administration, technology and case neutrality, and possible edge case complexities.[5]
- A whitespace approach to "losing it" – as also outlined above, whitespace approaches are undesirable and come with multiple downsides.
- Incremental rollout obligations – in our view, where Government rollout priorities exist (e.g., highways), these should be targeted through dedicated funding programs, rather than as a licence condition. This is because rollout priorities tend to be technology specific and short term in nature, whereas licence conditions must remain relevant for the entire 15-20 year licence term.

4 UIOLI design

In this section we review some of the design considerations for a UIOLI framework, including observations on UIOLI frameworks in other jurisdictions, and highlight some of the key elements we've identified as being relevant for a future UIOLI framework in Australia.

4.1. UIOLI is normally used to drive coverage

In considering the experiences of countries elsewhere, we found there were many differences in approach to adopting UIOLI and the way in which 'use' was defined. These in turn, reflected many differences between countries in terms of their geography, policy objectives, particular bands, new technologies, rollout objectives

4 Note there is a difference between allocative efficiency, where spectrum is allocated to those who can extract the highest benefit (consumer benefit, and benefit to Australia more generally) from it, and the technical utilisation of the spectrum.

5 Further detail on these points can be found in s.7.2 of Telstra's submission to Stage 2 of the ESL process, available at: https://www.acma.gov.au/consultations/2024-03/expiring-spectrum-licences-stage-2-information-gathering-and-views-uses-frequency-bands-and-alternative-licence-conditions

and/or service outcomes.[6] A common theme was using UIOLI to increase coverage, which in turn increases spectrum use.

Of the different approaches to measuring use internationally, the one we concluded was most suitable for Australia is population percentage coverage. In practice this would be the percentage of the population with mobile coverage, per operator, for each spectrum licensed area, and for each spectrum licensed band.

An approach based on square kilometres of geography is not suitable given Australia has an expansive landmass with many large licence areas, noting also that not all bands are good for wide area coverage. As noted earlier, we consider incremental rollout objectives (in respect of specific public infrastructure provision) are better targeted through dedicated funding programs, not as a licence condition. We also considered that designating specific service outcomes was not a pragmatic or suitable approach either, for various reasons including the differential size of coverage footprints between operators, the inherent variability of mobile wireless technology performance, and the fact that competitive market dynamics already underpin high levels of investment and service availability in Australia (which have supported an intensive growth in demand over the last 5 years).

4.2. Key elements for a UIOLI framework in Australia

We consider the key design elements of a UIOLI framework for Australia are reasonably straightforward.

Table 1 below sets out some of our early thoughts about six key design elements.

Design element	Comments
Clear objectives	There should be a clear focus on: • supporting the efficient use of all spectrum, to maximise public benefit; and • supporting government communications policy objectives (e.g., economic development, prosperous regions, digital inclusion etc).
Regulatory guidance	Any UIOLI framework will require clear regulatory guidance which promotes understanding about how the framework will work. Matters we foresee being covered include: • Instalment licence payment arrangements • Outlining the overall process, roles and responsibilities (similar to Figure 1) • Defining the situations covered by the framework (e.g., exclude fragmented spectrum blocks, but include rail and TV outside broadcast services) • Define use thresholds, how use is measured, how thresholds are to be applied (discussed further below) • A process for future use reservations (i.e., potential scope to accommodate build plans/ intentions) • How 'lose it' is to be implemented if use thresholds are not met (also discussed further below)
Use thresholds / Measurement	Measuring use: • Define unit (metric) for threshold measurement. Population coverage (percentage) thresholds are most suitable for Australia; area-based coverage thresholds (or simplistic site count approaches) are not suitable • Low band coverage threshold should be higher than mid / high band (given the different role low-band plays in delivering coverage versus capacity)

6 Appendix 1 provides more information.

Design element	Comments
	• Identify and review situations where spectrum is currently underutilised to determine suitable thresholds (most spectrum is well utilised, so any outlier scenarios will be visible) • The thresholds need to focus on efficient use; incremental (differential) rollout obligations will generally not achieve this
Transparency	It will be important for usage determination (measurement) to be transparent: • Existing ACMA (RFNAS, HCIS) and ACCC RKR data is sufficient for measuring population coverage percentage (usage), minimising regulatory burden – this can be done with geospatial tools, overlaying HCIS blocks to operator coverage maps • Usage should be measured independently for each licence geography (DTH[7] use included) • Usage determinations should be made public through a regular cadence.[8]

Compliance	Multi-step compliance framework (broadly aligned with Figure 1).
	• Warning notice to a licensee is triggered if use is below the usage threshold (pop coverage percentage) during the licence period
	• Grace period for licence holder to resolve by:
	  ○ Building coverage to increase use;
	  ○ Sub leasing (by third party authorisation) to increase use; or
	  ○ transfer through secondary trading.
	• Lose it means losing the entire licence
	• Licence is revoked and returned to market via auction.

Reallocation	How can underutilised spectrum be quickly reallocated to market? • Auction is the best approach to help ensure allocative efficiency ; no direct allocation of spectrum • Competition policy must be aligned with spectrum policy: competition limits in isolation can detract from allocative efficiency and spectrum utilisation objectives

Table 1 Key design elements for a future UIOLI framework

7 Direct to handset.

8 This could be in the form of an attestation by the licensee, or through a review of the licensee's use conducted by the ACMA.

Appendix 1: Examples of UIOLI design considerations in international markets

Category	Criteria	General description	Suitability	Comments
Coverage	Population % coverage by licence area	Used to encourage technology rollout, including : • Drive 3G, 4G and 5G rollout; • Increased footprints; • First Nations connectivity; and/or • Ecosystem creation Also used for coverage maintenance, infill and improvement objectives.	Secondary trading support - good Driving "rollout" - low	• Local population distribution and large landmass are very different from foreign markets • Networks are mature, not at a "rollout stage" – competitive dynamics drive terrestrial coverage • First Nations connectivity addressed via dedicated Government funding programs • Market already responsive to new ecosystem needs (e.g. 4G on 700 MHz, mid band 5G)
	Square km of geography covered	Used to drive coverage rollout, typically in small licence areas.	Low	• Typically used in licence areas with a small geographical footprint – Australia, in contrast, has a large landmass and many large licence areas. • Not all bands are good for wide area coverage
	Specific public infrastructure coverage provision	Used to drive service for the community – e.g. motorways, railways etc	Low	• Better to address via dedicated Government funding programs
Service	Voice coverage per band or basket of bands (more a carrier licence condition)	Used to drive coverage quality. Progressive improvement may be required over the term of a licence.	Low	Differential coverage between MNOs – service claims are measured by commercial benchmarking, leading to marketing claims.
	Throughput (where to measure? At a customer handset? Where in the cell?)	Used to drive quality. Progressive increase in available throughput in more places, especially where there is a FW focus. Not very common.	Low	Differential coverage between MNOs – service claims are measured by commercial benchmarking, leading to marketing claims.