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**Response to ACMA's consultation on 'Five-year  
spectrum outlook 2023–28 and 2023–24 work  
program'**

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**[PIVOTEL.COM.AU](https://www.pivotel.com.au)**

Pivotel welcomes the opportunity to comment on ACMA's consultation on Five Year Spectrum Outlook for the 2023 -2028 period and 2023-24 work program.

## CONTEXTUAL STATEMENT

- Pivotel is well placed to play a unique and relevant role in delivering improved high speed mobile coverage and fixed wireless services enabling innovation to parts of regional and remote Australia while also developing its plans to deliver public-private 5G services to metropolitan regions. This is however predicated on access to suitable spectrum at a cost that enables a reasonable return on investment.
- Pivotel's view is that a more dynamic and flexible approach to managing spectrum access is critical to ensuring a competitive 5G/6G marketplace can develop and thrive. While long term, nationwide spectrum licences provide greater certainty to incumbent national MNOs, it can be at the expense of new players in both metro and regional markets. Newer market entrants such as Pivotel are often unable to deliver new network coverage due to the unavailability of appropriate spectrum that is licenced to incumbent MNOs that provide coverage to less than 35% of the Australian land mass (excluding NB-IOT).
- A flexible spectrum management approach consisting of Spectrum Licences covering large geographic and even national regions combined with Apparatus and Area Wide Licences (AWL) that enable place-based networks will encourage a larger and more diverse range of network operators **creating a more competitive and innovative connectivity market**. Licence fees also need careful consideration with place-based networks typically targeting very specific populations, often with very low density and high natural operating costs that reduce the potential for operators to receive a commercial return on investment.
- As a mobile operator focussed on regional and remote Australia, we observe that rural community communication needs are constantly evolving, and Pivotel is keen to see appropriate spectrum allocation methodologies that enable these markets to be served in new and innovative ways, now and into the future.

## **Pivotel Response**

Pivotel has noted the planning arrangements being considered under FYSO – 2023-28 and provides further comments as follows:

- The Industry 4.0 revolution is set to evolve Operational Technology (OT), Communication Technology (CT) and Digital Technology (DT) to deliver far greater productivity, efficiency and safety (including cyber security). The key word for the revolution is ‘automation’ and its main enabler is 5G technology offering ULRRC and eMBB. Cloud orchestration and slicing ensure ease of deployment and ensure resources are allocated efficiently. Applications such as Digital Twin and Augmented Reality (AR) in conjunction with AI/ML enable a business to make real-time decisions for higher productivity and more positive outcomes.
- Edge clouds and private networks will play a major role in enabling Industry 4.0. The far-edge and on-premise edge clouds will not only enable Ultra Low Latency and Reliable Communication (ULLRC) but will be essential for cyber security. As ACMA is aware, there has been a recent serious security breach on at least one of the main public operators due to hacking. This threat is not to be taken lightly by the industry. Massively scalable controls at far edge with AI/ML adaptable security measures would be required which are enabled by private networks. Many parts of Australia struggle to have fibre backhaul connectivity, for such cases (e.g., mines, large farms), a stand-alone autonomous private network becomes essential. Therefore, Pivotel sees rapid proliferation of private networks across the entirety of Australia. As such, spectrum allocation via apparatus and AWL licensing mechanism, in metro, regional and rural markets is critical to support the industry needs.
- With 5G, new capabilities such as Integrated Access Backhaul (IAB) over TDD and FDD mechanisms will allow ease of deploying base stations without needing to use dedicated microwave radio transmission links. Sidelink capability provides device to device connectivity which can extend the coverage further into areas where a base station is not able to reach. Drones and V2x (Vehicle to anything) can make use of the new capabilities to further enable emergency and safety operations. ACMA is urged to ensure that the regulatory framework does not pose any barrier to the adoption of the new 5G connectivity distribution methods i.e., further connectivity distribution via vehicles, tethered and non-tethered drones and devices.
- ACMA is urged to ensure that any Communication Technology (CT) spectrum barriers for private networks be removed to support Industry 4.0 use cases in the three dimensions:
  - Underground
  - Terrestrial
  - Aviation (eMBB to aircraft passengers, and drones)

## **LOW BAND SPECTRUM**

- Pivotel’s approach to rural network deployments is not to over-build coverage with our 4G coverage beginning where other MNOs end. Our primary target market for new coverage is rural and remote Australia which has a low population density however our ability to develop innovative new methods to build, connect and operate rural networks has allowed us to see an opportunity to expand mobile coverage into areas where today there is none. This market is most cost-effectively addressed with low-band spectrum which provides the best radio propagation characteristics. An equivalent mid-band solution requires at least three times the infrastructure to deliver equivalent coverage compared to a low-band

solution. With the driver to acquire low-band spectrum, Pivotel took part in the recent 850/900 MHz auction, however, due to the spectrum licencing approach and bidding rules, and the resultant competitive bidding from the main MNOs, Pivotel was unable to acquire spectrum on terms that would provide a commercial rate of return without the ability to 'cross-subsidise' the regional service with revenue from metro services.

- The legacy regulatory mindset which assumes that low band IMT spectrum should be exclusively allocated under national/regional Spectrum Licence is no longer appropriate. Incumbent MNOs provide coverage to less than 35% of Australian land mass. The lack of low band spectrum access via AWL mechanism is a major barrier in deploying cost-effective private networks that span over large areas. There are many large farms and mines situated in dense vegetation and undulating terrain where infrastructure based on mid-band spectrum becomes cost-unviable to provide the target coverage. Such enterprises have established that a low band enabled private network is the appropriate Communications Technology (CT) for the business.
- We therefore request the ACMA create provision for allocation of AWL based low-band spectrum to MNOs such as Pivotel, who are well placed to deliver more targeted and innovative solutions for reducing the digital divide in Australia. The targeted solutions will deliver a more active and high impact outcome for remote Australia which suffers from little to no connectivity.
- We strongly advocate that **a portion of future 600 MHz (second digital dividend) spectrum be set-aside for AWL allocation in regional, rural and remote areas**, and the development of instruments to allocate low-band AWLs be prioritised.

With a view to making the deployment of infrastructure more affordable in rural and remote regions, network sharing is becoming increasingly popular via neutral hosting or active radio sharing, often realised through government co-funding. However, neutral host services still require access to spectrum which can be problematic when the neutral host does not 'own' spectrum. As a result, as part of future band reviews, the ACMA should establish a framework that supports the setting aside of low-band spectrum for neutral host.

## MID BAND SPECTRUM

- **1.5 GHz Band:** We welcome the decision on transitioning to preliminary planning stage and look forward to the ACMA options paper for the extended band in Q2 2023. Pivotel has responded in previous consultation that the band be allocated for private IMT use as there is currently no low band option available under apparatus/AWL mechanism.
- **1.8 GHz Band (remote area):** We observe that 1.8 GHz is a popular band for LA-WBB and IoT use. Pivotel has missed opportunities because the apparatus spectrum was fully utilised indicating that there is a solid demand. LTE technology is typically deployed in the band which is understood to remain globally popular for many years to come. As the 3.8 GHz band does not support LTE, and its equipment ecosystem is not mature, and has a higher propagation loss, we see that the incumbent demand for 1.8 GHz apparatus licensing would not cease to exist in the short term.
- **1.9 GHz Band:** Pivotel in its previous consultation response has supported mixed use cases e.g., coexistence of DECT NR+, PMP, rail. However, as per AMTA's recent response on the consultation, ACMA should allow coexistence only if a good interference management framework is established to protect apparatus licensees. Class license devices could be

easily obtained on eBay-like ecommerce platforms and pose an interference risk due to their quality.

- **2.1 GHz IMT Band (apparatus in regional and remote areas):** Pivotel has deployed public and private networks in the 2.1 GHz band. Some business opportunities have been missed where neither 1.8 GHz nor 2.1 GHz spectrum was available due to demand. The 3.8 GHz band is not a substitute for 2.1GHz spectrum under the current use cases due to the higher propagation loss. In addition, the 3.8 GHz band does not support LTE and its equipment ecosystem is not mature. Pivotel sees that the incumbent and new opportunity demand for apparatus licensing in the 2.1GHz band will continue. Without providing alternative low band substitute spectrum, available on an AWL or Apparatus licence basis, Pivotel has a strong objection to this band to be fully assigned as Spectrum Licence only. A move to full spectrum licencing of the 2.1GHz band would likely leave existing infrastructure investments and customer installations stranded.
- **2.1 GHz MSS Band (3GPP Band-65):** Pivotel is pleased to see ACMA’s plans to allocate 2x 25 MHz spectrum in 3GPP Band 65. We have submitted our detailed formal response on the consultation in 2022 and is summarised as follows. There are many use cases to provide wireless data to aviation mostly requiring high bandwidth and low latency. The current aviation solutions delivered using satellite services are limited in bandwidth, bulky in size and are expensive to run. As a result, the use of satellite services in aviation is largely restricted to:
  - • Military aircraft
  - • Limited deployments of in-aircraft passenger Wi-Fi services due to the high cost of the equipment and the satellite data subscription.
  - • Very limited public safety and First Responder organisations who predominantly use terrestrial LTE connectivity for their data needs and thus are limited to ground coverage.
  - MSS solutions largely incapable of meeting the needs of large swathes of the aviation market that could be serviced by a DA2GC only solution, forcing DA2GC operators to offer a MSS component to the service, where there is no standard or global scale to be leveraged, will drive up equipment and service costs to the detriment of end users and potentially destroy the investment case for operators.
- Under the scientific licence mechanism, Pivotel has successfully carried out a field trial of A2G technology to validate network performance. The provision of A2G services are well established in many regions of the world but is critically lacking in Australia. Band-65 services used in the European Aviation Network (EAN), operating as MSS/CGC, demonstrates the inherent capability and value of the ground component of the EAN. **We believe the ability to operate such a ground-based service should not be restricted by the requirement to operate an MSS component** where such a capability is not available or in the delivery stage in Australia for the 2 GHz spectrum band. Pivotel’s understanding is that MSS operators planning to provide 5G satellite (NTN) services will only be capable of offering low speed/voice/IoT type services and will not address the gap to provide high speed data services to passengers inside an aircraft. Therefore, as per our previous representations, we request ACMA remove any barriers in providing the Air to Ground technology to Australia as quickly as possible to enable commercial deployment of A2G in Australia.
- **3GPP Band-53 (2.4 GHz):** Pivotel offers Globalstar satellite service to its customers. In Australia, the Space-to-Earth spectrum licences (2 483.5 to 2 500 MHz) were owned by Pivotel in the past and then transferred to Mobile Satellite Services Australia Pty Ltd (MSSA) in June 2021. Pivotel supports MSSA’s desire in Australia to rollout privately operated, TDD-LTE or 5G terrestrial mobile services as a Complimentary Ground Component (CGC) using small cells. Operation of the terrestrial networks, will use both TDMA-TDD LTE and 5G

equipment which has been standardised by 3GPP for the 2.4 GHz band. MSSA intends to deploy a *Network Operating System* as done in other countries to ensure that any potential interference between co-band MSS customers and future terrestrial network customers is managed and mitigated in real time. We request that ACMA remove any barriers in granting Band-53 for CGC use case by mid-2024.

- **3.4-4.0 GHz Band:** Pivotel is pleased to see that ACMA is providing multiple opportunities to secure spectrum through allocation of geographically disaggregated spectrum and apparatus licences through SL, AWL and Restricted categories. We believe ACMA has carried out good consultation with industry and the planned release of spectrum will deliver a positive outcome for Australia as it will foster an innovative, diverse and competitive 5G market. In particular, availability of national 3.8-4.0 GHz AWL spectrum is essential for private 5G networks which will enable Industry 4.0 revolution.
- **RLAN 6 GHz (5925-7125 MHz):** Regarding upper 6 GHz, Pivotel and MSSA had provided a joint response to ACMA's consultation in Feb 2022 whereby indicating serious concerns if anything was done to potentially worsen the interference landscape in the 6 425-7 125 MHz band around MSSA earth station sites as class licenced devices are hard to control and coordinate. However, Pivotel would support IMT use in the upper 6 GHz band as satellite earth stations can be protected through formal coordination with IMT base stations in contrast to class licensed WiFi6e devices.

## HIGH BAND SPECTRUM

- High-band spectrum in mmWave region is suited to dense deployments and short range connectivity. There are now several suppliers offering PMP and 5G equipment. The mmWave technology is considered as a major enabler for Industry 4.0 automation when mMIMO and beam steering are coupled to support large number of simultaneous high definition videos streams offering low latency and agility to serve Autonomous Robots and Autonomous Vehicles. mmWave Spectrum via AWL provision is essential to enable private networks. The technology is still evolving and cost-effective mMIMO solutions are yet to be seen.

## APPARATUS LICENSING

- Pivotel is pleased see ACMA's consultation with industry on reforming the apparatus licence pricing structure by change from CPI to ABS population method.
- Pivotel is also happy to see reform on Assigned and Non-Assigned licensing.

For any questions in relation to this response please contact:

Raminder Sahota  
Chief Solutions Architect

Email [REDACTED]

**Pivotel Group Pty Limited**