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BETTER CONNECTIONS. EVERYWHERE. ALWAYS.

Pivotel response to 'Better delivery of universal services' discussion paper

July 2024

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Dear Regional Telecommunications Independent Review Committee,

Pivotel Group Pty Limited (Pivotel) is pleased to provide a submission to the 2024 RTIRC Committee into the experience, opportunities, and challenges for regional telecommunications.

Rather than answer the individual questions, Pivotel has provided some background information on shared mobile infrastructure approaches that can be deployed to improve mobile and wireless broadband solutions for regional and remote Australia, as well as feedback and thoughts on newer technologies that help bridge the digital divide and should be considered as part of the current Universal Services Obligations (USO) review.

Pivotel Background

Pivotel is an Australian-owned and operated company that commenced operations in 2003 and operates a licensed mobile network with ground infrastructure in Australia, making it the fourth mobile carrier in the country. Pivotel's network infrastructure, representing an investment of approximately $100 million over the past 25 years, is almost entirely dedicated to providing telecommunications services in regional, rural, and remote Australia.

In addition to operating its terrestrial 4G services, Pivotel utilises its mobile network infrastructure to provide mobile satellite services and is the only Australian carrier with direct connections to global mobile satellite networks (Iridium, Inmarsat and Globalstar), as well as NBN SkyMuster and emerging LEO and MEO satellite providers such as OneWeb, SES, and Starlink.

Pivotel employs over 120 staff, predominantly in Australia, with Australian offices located on the Gold Coast, Sydney, Melbourne, Dubbo, and Perth. In regional Australia, Pivotel supports over 150 dealers and 50 value-added resellers.

Pivotel's mobile network, marketed as ecoSphere® (see Appendix 1), delivers mobile and broadband services to rural and remote Australians. Using innovative small cell technology and a unique network architecture, ecoSphere® can cost-effectively deliver wide area 4G (and 5G where appropriate) cellular mobile and Fixed Wireless Broadband coverage to remote communities, mining, agriculture, and pastoral properties using high-speed terrestrial and satellite backhaul. With recent advancements in LEO and MEO satellite technologies, Pivotel's ecoSphere® can provide metro-like services in the most remote places of Australia's mainland and external territories.

With over 20 years of experience in regional and remote communications, strategic satellite holdings, and its 4G/5G/NB-IOT mobile network, Pivotel is well-placed to comment on the challenges facing regional and remote Australians and relevant technological developments that can help bridge the digital divide.

Comments on Terms of Reference

Two-thirds of Australia's landmass lacks mobile connectivity and high-speed terrestrial broadband, resulting in a lack of the digital access required to drive the adoption of new technologies that can improve quality of life, productivity, workforce capability, and deliver services such as e-education, e-health, and connectivity during natural disasters.

The recently published Agri-tech Expert Working Group (AEWG) report[1], commissioned by the DTIRDC and prepared on behalf of the Australian Broadband Advisory Council (ABAC), highlighted the issue of inadequate digital connectivity for regional and remote users. The report describes "salt and pepper connectivity," where localised connectivity gaps exist despite broad population coverage claims by national carriers.

National carriers primarily focus on serving townships and transport corridors, leaving broad rural areas with limited or no coverage. Alternative approaches have emerged, with small and medium enterprises deploying cost-effective connectivity solutions and LEO satellite communication solutions offering various coverage options.

Pivotel falls into this category of second-tier RSPs, with proven capabilities in building mobile networks connected via fiber backhaul and emerging LEO/MEO satellites, delivering broadband connectivity exclusively focused on regional and remote communities.

Historically, Commonwealth government programs have primarily funded incumbent operators (e.g., 80% of mobile sites funded through the Commonwealth MBSP program awarded to Telstra). This approach has extended Telstra's footprint and competitive dominance, despite the emergence of innovative providers that are well positioned to deliver targeted solutions.

Incumbent mobile network operators focus on townships and major roads, providing limited coverage at homesteads and across broader rural properties. Their business models do not support broad area coverage of remote communities and rural properties. Additionally, coverage on provider maps is inconsistently measured and have discrepancies when comparing handheld coverage versus external mounted antenna coverage.

"The extent to which each MNOs network is accessible outdoors via a typical handheld device varies. In some cases, the difference between coverage areas accessible via handheld device and coverage accessible with the aid of external antennas could be significant. For example, Optus's 4G outdoor geographic coverage is around 83% of its 4G external antenna geographic coverage. This means around 17% of Optus's 4G network coverage can only be accessed via an external antenna. TPG's 4G outdoor geographic coverage is 74% of its 4G external antenna geographic coverage. On the other hand, Telstra's 4G outdoor geographic coverage is around 52% of its 4G external antenna geographic coverage."[2]

Shared Radio Access Network (Shared RAN) technology approaches are a cost effective and efficient way of delivering competition and coverage in regional and remote areas. This is where Mobile Network Operators can share active infrastructure in economically challenging regional areas to provide enhanced coverage and competitive choice. This could be implemented through various technological approaches, including domestic roaming, Mobile Operator Core Network (MOCN), or Multi Operator RAN (MORAN).

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[1] https://www.infrastructure.gov.au/sites/default/files/documents/agri-tech-expert-working-group.pdf
[2] ACCC | Mobile Infrastructure Report 2023 | November 2023, page 2

Definitions:

- **Domestic Roaming**: Allows end users to make and receive calls, send and receive text and data, and access other services using the host network's RAN outside their provider's coverage area.
- **MOCN**: Involves sharing radio access networks and spectrum, improving resource efficiency and trunking efficiency.
- **MORAN**: Involves sharing radio access networks while using dedicated spectrum by each operator.

Pivotel was an active participant in the Department of Regional NSW Mobile Coverage Project - Active Sharing Partnership, exploring various active sharing technologies to extend coverage through a shared RAN approach. This project involved participation from all Mobile Network Operators (MNOs), including Telstra, Optus, TPG, Pivotel, and prospective Mobile Network Infrastructure Providers (MNIPs). As a result of this Pivotel was awarded funding to provide mobile and wireless broadband services in Wilcannia and Brewarrina, currently only served by Telstra mobile and NBN Satellite (note after these funds being awarded it was announced that NBN would extend its FWA service to these townships).

Past Commonwealth and State government funding programs have focused on funding tower infrastructure to support expanded regional coverage, primarily benefiting Telstra. Despite passive sharing initiatives and substantial government funding, Telstra's network remains significantly larger than its competitors, creating challenges for other operators to secure funding for new coverage.

Whilst these programs have increasingly sought to enable passive tower sharing, circa 80% of sites funded under the MBSP has been granted to Telstra (see Table 3.4 below[3]), which has had the ultimate effect of further extending its network well beyond its competitors, thus creating an effective 'moat' between its outer coverage areas and competitor networks.

"In recent years, one of the most significant co-contribution programs is the Federal Government's Mobile Black Spot Program (MBSP). As at 31 January 2023, Telstra had deployed 809 sites with the assistance of funding from this co-contribution program. This is significantly higher than the number of co-funded sites deployed by Optus and TPG combined (Table 3.4). Table 3.4 also shows that an ongoing majority of the Federal Government's MBSP funded sites are in Inner and Outer Regional Australia. Additionally, there were a total of 311 co-funded sites across the MNOs in Remote and Very Remote areas in 2023, up from 273 in 2022.[4]"

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[3] ACCC | Mobile Infrastructure Report 2023 | November 2023, page 16
[4] ACCC | Mobile Infrastructure Report 2023 | November 2023, page 15

Table 3.4: Total number of Federal Government Mobile Black Spot Program sites by MNO & ABS Remoteness Area – 2020 to 2023

	2020	2021	2022	2023
Major Cities of Australia				
Telstra	8	11	14	15
Inner Regional Australia				
Optus	22	26	41	44
Telstra	187	222	234	233
TPG	8	8	8	9
Outer Regional Australia				
Optus	21	22	30	28
Telstra	276	320	340	343
TPG	44	44	43	41
Remote Australia				
Optus	16	17	22	27
Telstra	87	96	102	108
TPG	8	8	8	9
Very Remote Australia				
Optus	34	37	43	57
Telstra	72	87	98	110
Total				
Optus	93	102	136	156
Telstra	630	736	788	809
TPG	60	60	59	59

Despite this level of funding, particularly in regional and remote Australia, the level of passive sharing to date has been limited, "Telstra had the lowest percentage of co-location across the MNOs. Of its total active sites in 2023, 34.3% (35% in 2022) were co-located with another MNO. The percentage of co-location was much higher for Optus and TPG with co-location occurring at 69.4% (70.5% in 2022) and 89.8% (90% in 2022) of their total active sites, respectively, in 2023 (Table 3.6).

Table 3.6 also indicates that the level of co-location varies significantly across MNOs and across ABS Remoteness Areas. For example, co-location in 2023 is as high as 92.9% of TPG's total sites in Major Cities but as low as 4.8% of Telstra's sites in Very Remote Australia. The level of co-location declines across all MNOs as their site locations move from Major Cities to less populated Regional and Remote areas."[5]

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[5] 2022 ACCC Mobile Infrastructure Report, page 17

Table 3.6: Co-located sites as percentage (%) of total sites by MNO & ABS Remoteness Area – 2020 to 2023

	2020	2021	2022	2023
Major Cities of Australia				
Optus	84.9	83.4	80.3	79.0
Telstra	46.0	46.2	46.4	44.3
TPG	92.2	89.1	92.9	92.6
Inner Regional Australia				
Optus	63.4	62.5	60.9	60.5
Telstra	35.5	35.3	35.8	36.3
TPG	85.3	85.4	85.4	85.0
Outer Regional Australia				
Optus	52.9	52.9	52.4	51.9
Telstra	26.1	25.9	25.6	25.4
TPG	75.7	75.3	75.7	75.9
Remote Australia				
Optus	40.9	41.2	40.9	39.8
Telstra	11.8	11.7	11.9	12.2
TPG	61.7	62.9	64.5	65.0
Very Remote Australia				
Optus	26.7	25.8	28.0	28.4
Telstra	4.7	4.4	4.8	5.3
TPG	62.5	62.5	62.5	62.5
Total				
Optus	73.7	72.7	70.5	69.4
Telstra	35.1	34.9	35.0	34.3
TPG	89.5	87.2	90.0	89.8

Traditional funding programs have had a focus on providing new coverage which has primarily benefited Telstra at the expense of improved choice and competitive outcomes for regional and remote users. This inequity could have been addressed by ensuring that all government funded sites are made available to all MNOs, ideally via Radio Access Network (RAN) sharing (including MORAN and MOCN) technology solutions, resulting in greater cost savings and more efficient use of spectrum.

Open access networks are a far more efficient and effective way to provide ubiquitous regional network access, unlocking productivity improvements across various sectors. It is essential that future government funding programs mandate shared RAN solutions to ensure all users, irrespective of their chose provider, can access these sites and benefit from the enhanced coverage co-funded by the public. Consideration should also be given to how previous co-funded sites can be made accessible to all MNO's.

USO

There have been substantial developments and advances in telecommunications technology that have had far-reaching consequences for digital connectivity in regional and remote Australia. As the DITRDCA 'Better delivery of universal services' discussion paper[6] highlights, recent developments, including the NBN fixed wireless expansion and launch of LEOSat networks, have delivered an improved level of digital connectivity for a large number of users who were previously only able to be reached via NBN Skymuster and/or Telstra's legacy copper or mobile network solutions. The timing is therefore ripe for considering suitable alternatives likely to deliver a substantially improved service more cost-effectively and help narrow the digital divide.

Data has become the dominant service for the delivery of all connectivity needs. With data as the underlying bearer of all forms of communication almost all retail CSPs provide data as a primary service with voice as an optional extra. This is an opportunity for the USO to be broadened to include fixed data services as currently provided under the SIP regime.

The decline in fixed-only voice usage, as shown in the ACCC's Communications Market Report, 2022–2023, demonstrates that the number of services in operation for fixed-line services over Telstra's legacy copper network has declined substantially since 2016. While voice-only services have declined continuously since 2008, voice and DSL bundled services on the legacy copper network experienced a slight and steady increase between 2010 and 2016 and then decreased sharply until 2021, after which it started to stabilize (Figure 15)[7].

Figure 15: Telsta legacy fixed line services 2008−2023
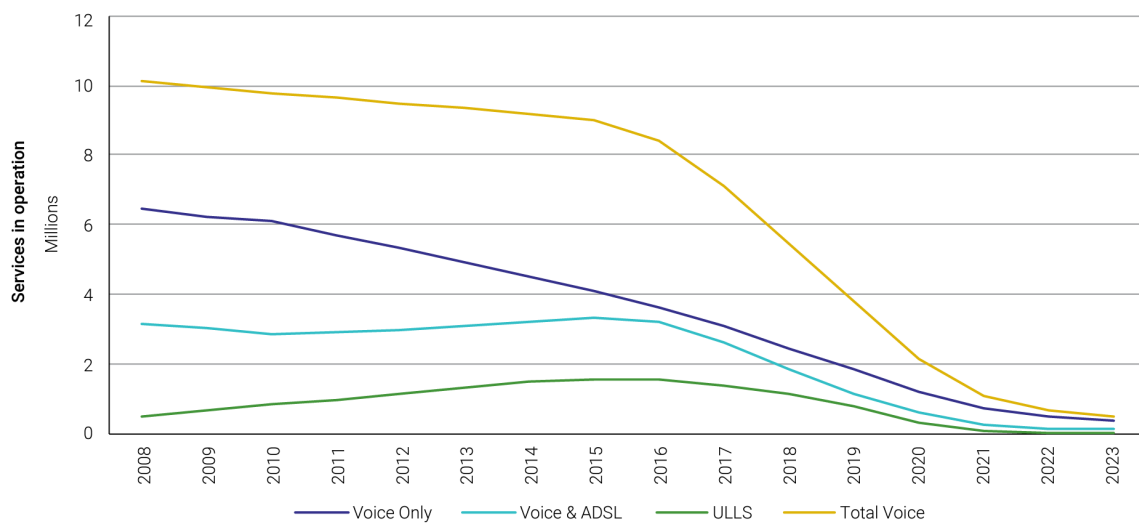
Source: Quarterly snapshots of Telstra's customer access network.

Additionally, the Australian Communications and Media Authority (ACMA) reported in its Trends and Developments in Telecommunications report that around 23% of Australians reported using fixed-line voice services in 2022, down from around 40% in 2020[8].

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[6] DITRDCA, Better delivery of universal services, Discussion Paper, October 2023
[7] ACCC, Communications market report, 2022–2023, page 24
[8] ACMA, https://www.acma.gov.au/publications/2023-07/report/communications-and-media-australiatrends-and-developments-telecommunications-2021-22, July 2023.

This demonstrates that the usage of fixed-line voice-only services is in rapid decline. The provision of fixed voice services via the USO has become a huge economic burden for a more limited number of services that can now be far more cost-effectively serviced via a suitable broadband service (e.g., satellite, fixed wireless, mobile broadband) with a VoIP connection.

Even for the most technologically challenged, the end-user experience can be very similar to the service they receive today, as demonstrated during the recent AVST trials commissioned by the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA). VoIP over Wi-Fi can be considered a logical extension of the HCRC capabilities, in many cases using equipment likely to be in situ at the customer's site.

Traditional fixed-line telephony services have been in decline as consumers favour the mobility and individuality that come with having a personal phone number as part of mobile phone services. The ageing HCRC infrastructure should be phased out over a predetermined time, allowing for the introduction of more advanced services to end customers, rather than simply replacing a fixed-line voice service with a more updated version with the same functionality.

As properties transition away from the old copper network for voice and data services, the ability to recover costs from households taking the service will diminish while the cost to the service provider (Telstra) may stay largely unchanged. It will be important to set a sunset date for the copper network so as not to burden the industry with additional expense during any transition period. Savings should be achievable by moving to new and alternative technologies, with those savings reinvested and supplemented by the government to support the transition.

Pivotel's two trial solutions for the AVST trials demonstrated the viability of multiple voice services over satellite as a replacement to the legacy HCRC network. Use of a VoIP application for voice and messaging provided an innovative solution for end users in the HCRC footprint, who typically have no viable mobile coverage at their home and were able to make and receive calls and SMS from a standard Australian number while connected to their Wi-Fi network at home, or any other data bearer away from home.

The following scenarios were trialled as part of Pivotel's AVST trials:

1. Replacement of the fixed HCRC voice service with a standard VoIP landline with a single geographic landline number,
2. Replacement of the fixed HCRC voice service with multiple VoIP services each with a standard Australian mobile number and capability to make and receive calls and SMS within the home Wi-Fi coverage and externally wherever there is a suitable data bearer,
3. Replacement of the fixed HCRC voice service with both a standard VoIP landline with a single geographic landline number and multiple VoIP services each with a standard Australian mobile number and capability to make and receive calls and SMS within the home Wi-Fi coverage and externally wherever there is a suitable data bearer.

The solution was fully compliant with Australian regulatory requirements and included a small Uninterruptible Power Supply (UPS) unit to supply power to the satellite Network Termination Device (NTD), router and analogue telephone adapter (ATA), ensuring the equipment remains fully operational during power brownouts or short blackouts. The service fully supported voice traffic interconnected with the PSTN, including 000 emergency dialling, and mobile SMS texting functions.

These trials took place using multiple handsets connected to a single NBN SkyMuster TC1 service between July 2021 and June 2022. Service uptime was typically reported as 99.9%, mostly impacted

by NBN availability, with network uptime mainly affected by temporary weather-based outages at NBN Co's satellite gateways[9].

It is well established that NBN Skymuster, as a geostationary satellite constellation, is mostly suitable for non-latency-sensitive applications such as video streaming but is less suitable for latency-sensitive applications such as voice and video conferencing where latency and bandwidth can negatively impact the customer experience. Recent developments in LEOSats negate this problem, as these constellations typically deliver speeds and latency at similar rates to terrestrial broadband services with download and upload speeds quoted between 100-200 Mbps and 22 Mbps respectively, and latency of 20-40 ms.[10]

Despite the trial being delivered as a VoIP voice service over NBN Skymuster, 69% of triallists rated the service as Excellent or Good. [11] Service quality is likely to substantially improve where a similar VoIP service is delivered over a vastly improved (LEOSat) satellite service that is now commonly available in Australia, with ongoing improvements in reliability and service levels as the technology evolves.

Based on the results demonstrated by the AVST trials by all participants and recent improvements in remote broadband availability, outdated and redundant copper and HCRC technologies are fast becoming redundant and can be replaced by far more suitable technologies (Satellite, Fixed Wireless, Mobile, etc.) that are more widely available and sufficiently mature.

In order to protect end users, consumer safeguards and minimum service standards can be put in place, similar to the Customer Service Guarantee (CSG). A competitive marketplace should ensure services are delivered and there is the potential for some form of compensation or rebate being made available (in place of USO funding) for qualifying regional and remote services to ensure these users are not commercially disadvantaged relative to their metro-based peers. Any qualifying service can also be required to provide voice services with a defined set of criteria covering quality, reliability, redundancy and cost.

For example, a LEOSat service could provide USO/USG services and be eligible to receive funding as a contribution towards a service that meets and exceeds the USO minimum service standard (currently the minimum 25/5 megabits per second (Mbps) per the SIP). A fully compliant with Australian regulatory requirements VoIP service could be part of the minimum service standard.

Under a broadened USO/USG scheme, NBN would be the fallback broadband provider when no better alternatives are available. Similar to the above proposed compensatory regime, the NBN should receive funding on a competitive basis to provide the USO service to eligible USO recipients. Blanket industry cross-subsidisation of those recipients under the SIP should end, ensuring greater transparency, accountability, and competition around the cost of delivering the USO service.

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[9] Alternative Voice Services Trials, Summary Report to 30 June 2022 (update 2), August 2022, https://www.infrastructure.gov.au/department/media/publications/alternative-voice-services-trials-summaryreport-30-june-2022-update-2, page 3
[10] https://www.ozbroadbandreview.com/blog/starlink-vs-skymuster-satellite/#:~:text=Is%20Starlink%20better%20than%20Sky,on%20how%20you%20use%20it
[11] Alternative Voice Services Trials, Summary Report to 30 June 2022 (update 2), August 2022, https://www.infrastructure.gov.au/department/media/publications/alternative-voice-services-trials-summaryreport-30-june-2022-update-2, page 11

A mobile service could also be considered as suitable if it can be accessed inside the premises and the carrier can deliver a minimum level of service availability and resiliency.

However, mobile coverage in general should not be part of the USO. Satellite direct-to-handset mobile service will complement terrestrial coverage but will not be a complete alternative to terrestrial mobile service due to the likely limitations around high-speed data for many years to come.

Any technological changes, and to the USO, must be accompanied with a substantial education campaign in order to ensure end users are well aware and fully informed of their available options.

Improvements in satellite services that bring higher bandwidths, capacities, and lower latencies, combined with IP-based voice calling means that this can be adopted at any time to take advantage of these enhancements without the need to materially change or modify equipment. Additionally, much of the end-user equipment required to enable this (e.g. Wi-Fi router, mobile phone(s)) will already be owned by end users.

VoIP over alternative technologies (NBN fixed, fixed wireless or LEOSat) are effective and suitable as genuine regional and remote digital connectivity solutions that are far more efficient and cost effective. Performance and pricing will be vastly improved through the adoption of newer technologies.

First Nations communities could be considered a special group within the USO. Normal USO recipient obligations to pay a standard price for the basic USO service should be reviewed and may not apply within Indigenous communities. Due to the often very remote location of First Nations communities, the provision of a limited area mobile service together with high-speed data and voice services could form the USO service package with direct funding provided to the service provider to offer a service at nominal or 'free' access rates, recognising the limited economic activity that often occurs within the communities and the limited capacity to pay for normal commercial services. Where mobile coverage is included, it should be available on a shared RAN, open-access basis as described above.

Payphones could also be provided for under a competitive tender process although it makes more sense for this to remain a national USO service.

In summary, baseline regional and remote digital communications services can be best provided by a mix of new technologies, including LEOSat, Mobile, and the NBN. There is no one size fits all, but rather a combination of technologies that can provide redundancy and a better user experience compared to old and outdated technologies that are the current focus of the USO. These services are best delivered via a competitive process that includes both broadband and voice services as these services have become increasingly intertwined and interdependent.

This approach has the ability to bring regional and remote regions into line with the services and expectations of urban-based users, where the bulk of person-to-person calls, and social media interactions are undertaken using mobile devices. The replacement of the HCRC capability is an opportunity to further 'close the gap' between the telco services available to the urbanised and rural/remote communities in Australia.

Appendix 1

Pivotel ecoSphere®
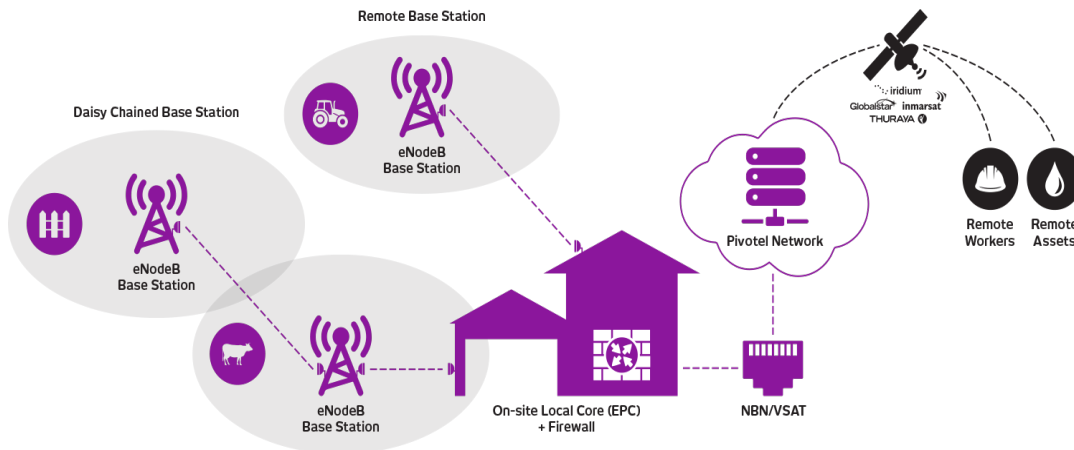


The benefits of ecoSphere®

- 4G and 5G custom-built mobile network designed to meet the specific requirements of organisations operating in remote areas.

- Tailored solutions for agriculture, mining, oil, gas and community needs.

- Support for telephony and data connectivity – voice over LTE and high speed data services.

- Support for NB-IoT for narrow-band IoT to facilitate long range, low power, long battery life M2M communications and satellite point-to-point terminals for cost effective connectivity to very remote locations.

- 4G voice connectivity utilises a Pivotel SIM card based service with 4G handsets running voice over IP applications with standard Australian "04" mobile numbering.
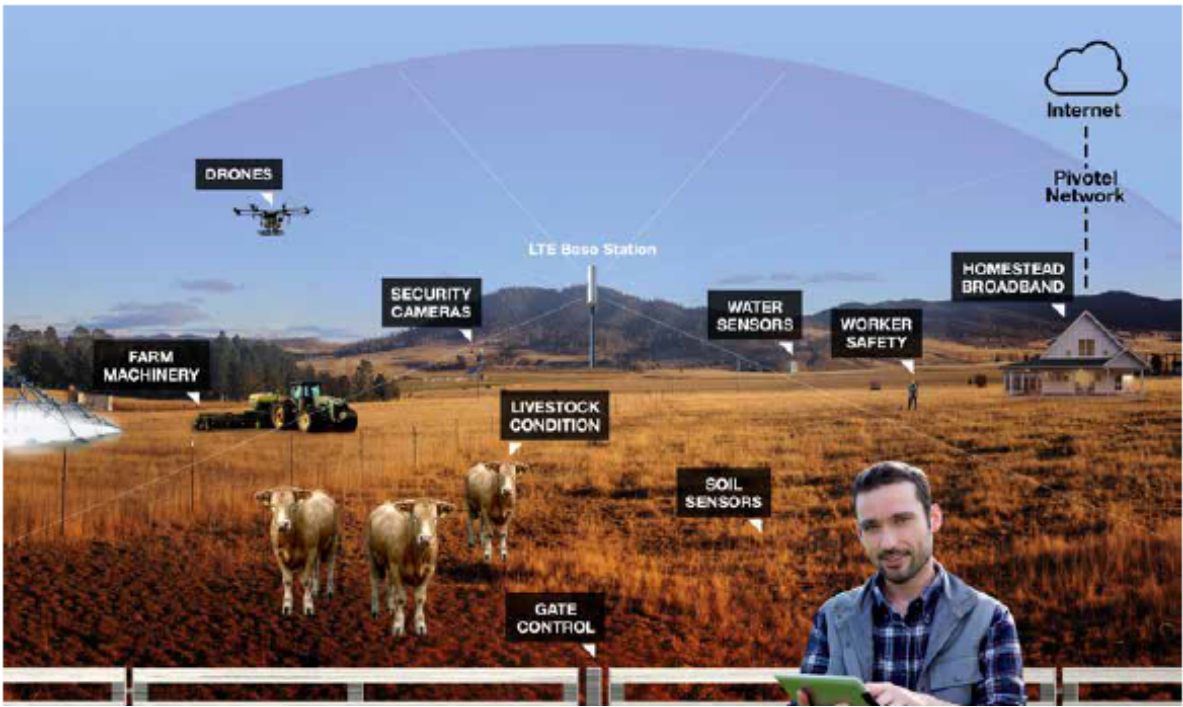
Overview of an ecosphere network deployed in an agricultural environment