Mobile Black Spot Program

Round 5A

Discussion Paper

April 2020

Response by Pivotel

Department of Infrastructure, Transport, Regional Development and Communications

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1. Background

1.1 Pivotel is pleased to provide a response to The Department of Infrastructure, Transport, Regional Development and Communications (the Department) discussion paper regarding the Mobile Black Spot Program (MBSP).

1.2 Pivotel is well placed to participate in the MBSP through its experience and focus on the provision of tailored voice, messaging and data solutions to rural and remote communities in Australia through its strategic Satellite holdings and LTE (4G) / NB-IOT Mobile Network.

1.3 Pivotel operates a mobile and satellite telecommunications network pursuant to a carrier licence issued by the Australian Communications and Media Authority in accordance with the Telecommunications Act 1997 (Cth) (Telco Act) and operates ground infrastructure in Australia, making it the fourth public mobile carrier in the country. It is the only Australian carrier with direct connection to all four major mobile satellite networks: Iridium, Inmarsat, Thuraya and Globalstar and is a reseller of the NBN Sky Muster and BSS satellite services

1.4 The company's suite of satellite and mobile technologies enable remote connectivity via satellite phones, satellite data modems, personnel and asset trackers, docking kits, machine to machine data terminals and specialist maritime communication.

1.5 Pivotel's 4G LTE mobile network, ecoSphere®, extends its carrier network to deliver complementary terrestrial wireless services to rural and remote Australians. Using our innovative off-grid ecoCell™ base station technology and network architecture, ecoSphere® can cost effectively delivery wide area cellular and IoT coverage to remote communities, transport corridors, mining, agriculture and pastoral properties using satellite or terrestrial backhaul complemented by satellite point to point IOT and high-speed data services.

1.6 Pivotel is uniquely positioned to participate in the MBSP program having commenced operations in 2003 with a dedicated focus on servicing remote, regional and rural Australians. Pivotel has over 130 staff and has Australian offices located on the Gold Coast, Sydney, Dubbo and Perth in addition to a number of overseas locations. In regional Australia, Pivotel supports over 160 dealers and 50 value added resellers.

2. Pivotel's General Comments

2.1 Pivotel welcomes the Department's renewed approach to the MBSP which allows for smaller, specialist mobile network operators such as Pivotel to participate. Specifically, Pivotel's ecoSphere® network design approach can be far more cost effective and flexible in delivering the infrastructure required to target the three priority areas identified by Round 5A namely:

2.1.1   high priority natural disaster prone areas including those affected or prone to bushfire

2.1.2   new technology solutions in areas where low population densities have discouraged applications under earlier rounds

2.1.3   major regional and remote transport corridors.

2.2 Pivotel's core focus is on providing communications for regional and remote Australia and is unique in its ability to integrate satellite services and 4G / LTE networks to create a unified environment where the most appropriate communications technology is used to service the end user need.

2.3 ecoSphere® forms the basis of Pivotel's 'defined area' coverage solutions. It is a custom designed, fully managed, 4G / NB-IOT and satellite connectivity solution specifically tailored for areas outside of the existing cellular networks footprint.

2.4 As a provider of 4G / LTE solutions Pivotel's network operates in licensed spectrum bands where it has control over interference sources and can therefore predict performance with confidence and with an expectation that it will be maintained over time.

2.5 The use of 4G LTE means that Pivotel has the ability to provide both a regional network build capability as well as single site solutions.

2.6 To date, Pivotel has deployed approximately 30 base stations, mainly in Western Australia, with a small network in NSW. Pivotel is currently in discussions regarding new networks in NSW, QLD, WA and NT. The WA network deployments include a major mining corporation and two agricultural networks co-funded by the WA Department of Primary Industry and Regional Development (DPIRD). The DPIRD networks are nearing completion and are planned to be operational in Q3 2020.

3. **Questions from MBSP 5A – discussion paper**

Question 1
Are there any comments on the coverage areas proposed to be targeted?

Please see below with regards to specific responses to the respective priority coverage areas:

a. **High priority natural disaster prone areas including those affected or prone to bushfire:** where *"the first component of Round 5A will allocate funding to areas that are highly prone to natural disasters, with a focus on macro cell base stations"*.

Pivotel questions the commercial viability of building macro cell base stations in disaster prone regions where there is not already an existing base station. The key determinant for whether a base station will be built, even on a co-funding basis, will be the anticipated return on investment which would be virtually non-existent. Pivotel recognises the benefits that will flow to emergency responders and the communities impacted by the disaster. However, with the exception of the small, unserved communities situated within the disaster prone regions, attempting to provide coverage to the vast areas of Australia that would fall within the definition of being disaster prone, would not represent value for money. Alternative technologies are available for emergency responders that will facilitate their connectivity needs during an emergency. Pivotel points to recent developments using mobile satellite services as a cellular failover connectivity option as being far more cost effective and flexible during an emergency.

Pivotel is supportive of the goals of the MBSP 5A to improve the resiliency of existing base stations situated in disaster prone areas through programs like the Government's Strengthening Telecommunications Against Natural Disasters package to improve the resilience of communications networks, and believes this approach would deliver the government better value for money.

Pivotel is also supportive of the goal to improve coverage to "rural and regional emergency services premises" and designated "evacuation and assembly points" as well as unserved small communities that sit within the disaster prone areas, but we question the need for base stations at these locations to be macro cell in design. Assembly areas in particular, will benefit the most from an Open Access model, where customers of all of the large MNOs can access the service, and we believe this should be the most important focus in awarding funding.

In Australia, Pivotel has pioneered the use of compact, power efficient, base stations (ecoCell™) specifically designed for rural and remote area coverage. ecoCell™ base stations can be independently powered from solar and/or wind generators, with battery backup systems capable of powering the base stations for 3-5 days in poor weather conditions, making them highly resilient even when used with grid power or backup generators.

Our 4G LTE ecoCell™ architecture delivers the same services as macro cells in terms of calls, SMS, IOT and data services, and can be very cost effectively deployed in the areas MBSP 5A is targeting. Our ecoCells™ support RAN sharing using MOCN (Multi-Operator

Core Network) technology, enabling access to the mobile subscribers of all carriers who choose to enter into a commercial access arrangement. Pivotel has also developed the use of a 'local core' solution that allows the network to maintain local communications even when backhaul connections to the main part of the network have been lost.

b. **New technology solutions in areas where low population densities have discouraged applications under earlier rounds:** with a requirement to deliver *"services to low population areas"* and *"remote and very remote areas"*, and is designed to *"encourage and support new innovative methods of mobile service delivery in these areas"*. Also noting that MBSP 5A will also *"prioritise solutions using a shared Radio Access Network (RAN) model"* such as that used in New Zealand's Regional Connectivity Group (RCG).

In line with previous submissions, Pivotel is a proponent and supporter of Open Access networks, and encourages the sharing and co-use of regional and remote networks to provide access to all mobile network users irrespective of the network they are subscribed to. As the Department has already highlighted, there are a number of different ways this can be achieved, and Pivotel's response covers this in more detail under Questions 3 and 4 of this submission.

c. **Major regional and remote transport corridors**: where funding will be used *"to target coverage along major regional and remote transport corridors, including to communities along these corridors"*.

As highlighted in the discussion paper, the economics of providing coverage to the remaining transport corridors are inherently more challenging due to the low usage along these routes.

Under the previous MBSP funding rounds there was no requirement for funded base stations to be built on an Open Access basis, and as a result the vast majority of funded sites are used exclusively by just one MNO. Without Open Access arrangements, it becomes virtually impossible for an MNO that does not currently provide significant coverage along a transport corridor, to bid to provide the additional coverage needed, and expect to receive a commercial return on the investment. Without a reciprocal Open Access agreement with the existing coverage provider along a corridor, even if that coverage is well below 50%, a 'new' MNO seeking to provide the additional coverage on an Open Access basis would simply be gifting the additonal coverage to their competitor. It is therefore imperative to improve network economics through suitable network sharing arrangement along the whole or a significant part of the transport corridor whereby the host operator receives appropriate financial consideration from other network operators for the provision of that coverage. The host operator need not be one of the incumbent operators. As has been demonstrated in New Zealand government backed structures involving the MNO's as JV partners is also a viable option.

In order to provide certainty to potential network builders for these sites a more defined approach is required, built around network sharing where each Mobile Network Operator (MNO) contributes to a fund, which is used to build and maintain these transport corridor

sites on an Open Access basis. Again, a similar approach such as that adopted in New Zealand, whereby there is one central organisation responsible for the building and provision of network access that is centrally funded by the respective MNO's may be a suitable approach to addressing this issue.

A continuation of the previous approach, whereby Open Access or a shared RAN did not factor into the prioritisation of applications, will only lead to less competition in the delivery of mobile services to regional and rural communities. A more concerted effort and focus on Open Access arrangements, will deliver improved coverage outcomes along the transport corridors, as well as potentially leading to further investment in infrastructure in the small townships located along the corridors.

Question 2

Are there any comments on the types of proposals that would be eligible for funding, including the required coverage outcomes?

Pivotel supports the approach to "to encourage solutions that deliver coverage both along the transport route and to communities in the corridor." We do not think a simple 'area covered' model would be appropriate. Weighting should be given to coverage that extends to homesteads and the productive property around the homestead, enabling the 'digital farm' to become a reality for more farm owners and operators. This approach will help bias the location of base station sites to be closer to the small communities and productive properties along the corridor while limiting any bias towards macro cells over small cells.

Question 3

Is the RAN model an effective sharing model for Australia?

It is common practice for MNOs to consider each mobile base station as a cost/profit centre. As networks expand from high to low population density areas, a point is reached where the base station becomes non-profitable even with co-funding assistance. Notwithstanding, MNOs will generally push their networks beyond this limit, because the marketing of rural coverage capability drives additional take-up in profitable urban areas. Thus, to a certain threshold, even beyond base station profitability, healthy infrastructure-based competition is maintained with resultant benefits and choice for the consumer.

However, as seen today in Australia, beyond this threshold consumer choice is diminished, ultimately to a single MNO. In Pivotel's view, once consumer choice becomes limited, the rationale for national roaming or a RAN sharing model becomes valid.

RAN sharing results in greater cost savings than simple co-location and tower sharing. Network operators have used the concepts of MORAN (Multi-Operator Radio Access Network) and MOCN [1] to reduce the total amount of infrastructure required to support their services. The key distinction between MOCN and MORAN is that the former includes sharing of spectrum, whereas the latter only shares hardware, typically through modular partitioning inside indoor cabinets.

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[1] MORAN allows for sharing of many common RAN components such as antennas and power supplies, but with separate radio units dedicated to each operator. MOCN takes things one step further whereby all components located at the base station are common to all operators and the spectrum resource is pooled.

Antenna-only sharing is quite common where operators are constrained with headframe space, structural load etc.

Pivotel understands MOCN has been successfully used in Australia, and was the model adopted for the 3GIS shared network built by Telstra and Hutchison. Additionally, Pivotel understands MORAN was initially used by VHA and Optus to share network elements in some regional areas of Australia.

Question 4

What other design options could be considered that provide multi-provider outcomes?

Pivotel is supportive of active RAN sharing models to create Open Access networks. As networks have evolved towards an 'All IP' architecture, the technical difficulties in implementing active forms of RAN sharing have largely been eliminated.

While not currently used in Australia, MOCN is being successfully used on 4G networks in other countries such as the Nordic countries in Europe, several Asian countries, and notably for the rural shared network in New Zealand. One of the key benefits of the MOCN form of sharing is that it makes the most efficient use of spectrum; this is particularly relevant to rural deployments where there is great benefit in using the less abundant low band (sub 1 GHz) spectrum due to its superior propagation characteristics. MOCN also has the benefit that the architecture is largely transparent to the services provided by each MNO. This is not always the case with other solutions such as national roaming because certain services may not map correctly to the hosting MNO.

MOCN is therefore the most cost-efficient form of network sharing and would be strongly supported by Pivotel. Impediments to the use of MOCN are largely strategic and commercial; policy interventions by government have been shown to be necessary to break down such barriers.

Further enhancements to MOCN implementations are in development. The OpenRAN Alliance has the objective of decoupling RAN hardware and software, by making use of the O-RAN standard, thus allowing operators to undertake modular customisation and use multiple vendors for better competition. The main benefit is easy rollout, scaling and upgrades, using software defined concepts. It should be noted that this technology is in its early trials and is not currently available for commercial service.

The following options are available for sharing between multiple MNOs. Pivotel recommends that the MNO who becomes responsible to deploy a site provides MOCN access to other operators on a commercial basis:

Infrastructure Sharing	Tower	Power (AC, DC, Solar)	Shelter	Backhaul
A	▬			
B		▬		
C			▬	
D				▬
E	Share everything			

Equipment Sharing	BTS Radio (Indoor or RRU)	RF Feeder	Antenna
F	▬		
G		▬	
H			▬
I (MOCN)	Share everything		

Question 5

Are there any comments on the funding cap for Round 5A and eligible costs?

Pivotel has no specific comments in regards to the amount of the funding cap, however would like to reiterate the cost advantages that an ecoCell™ based network can provide over macro cells, and that these may be a more economic and cost advantageous way to achieve the same or similar coverage outcomes.

Given that regional and remote transmission backhaul is the largest single operational cost item for rural networks, Pivotel supports the change in MBSP 5A to allow these costs to be capitalised in addition to satellite backhaul costs. Due to the potential for large up-front capital costs such as installation and Special Linkage Charges (SLCs) charged by transmission providers, it is necessary for these costs to be included in the cost to build and to also be eligible for grant funding.

Question 6

Are there any comments that you wish to make in relation to eligibility to apply for funding?.

As a licenced Mobile Network Operator involved in the delivery of mobile services in Australia, Pivotel is interested and willing to work with other MNO's to improve mobile connectivity in remote and very remote parts of Australia. This can be delivered through open access network arrangements or through joint partnerships to target specific sites and/or locations.

Pivotel is also willing to partner with Infrastructure providers to (co-)build sites in remote areas where appropriate.

It would be beneficial for the Department to encourage all MNO's to work together and be open to exploring ways to further enhance regional and remote mobile network coverage. This could be explored through a joint working forum which could be chaired by the Department.

Question 7

Are there any comments that you wish to make regarding ways the program could assist potential state government and third party co-contributors?

MBSP 5 was under subscribed and it is likely that future MBSP rounds, including MBSP 5A, will be under subscribed if the program continues to be run in largely the same format, whereby applications must be submitted by a single designated close date. With the business case for building new infrastructure now more challenging, encouraging co-contributions from state and territory governments and third parties is more important than ever.

However, it is often not possible to close out commercial commitments from multiple parties in the time available between the call for applications and the application closing dates. Pivotel recommends the government consider allowing the submission of applications on a rolling basis until all funds available in the round have been allocated. State government and local communities will have greater motivation to work with MNOs on an ongoing basis to define the mobile coverage requirements of each community, seek off-take commitments from members of the community and plan their co-funding contribution, lowering the ROI risk for all parties and improving community outcomes.

Question 8

Are there any comments regarding the need for a shorter minimum operational period, particularly in remote and very remote areas?

Pivotel is supportive of the requirement to provide 4G mobile phone services as a minimum defined period in order to receive funding.

Due to the requirement to provide 4G, and the likelihood of a longer payback due to the more remote nature of these sites, Pivotel is ambivalent about the potential for shorter operational timeframes for sites co-funded under MBSP 5A.

More importantly and as previously opined by Pivotel, it will be critically important to ensure the service remains commercially viable for the committed term, irrespective of the timeframe. This will require managing the potential risk of incumbent operators 'over building' with a similar solution, which would have the effect of diverting traffic away from a project funded by the MBSP. This can be mitigated in a couple of ways:

- Mandating 'open access': ensures all end users have the capability to access the funded solution and removes incentive to 'overbuild', and/or;

- Exclusivity: successful bidder has exclusive access to service that location for committed term after service goes live,

Question 9

Are there any comments on the proposed equivalency requirement and 4G reference power levels for handheld and external antenna coverage?

Pivotel considers that the outdoor thresholds in Attachment A are reasonable. These levels would typically allow for solid outdoor coverage and for the signal to penetrate inside a residential building or a car with a reasonable strength.

Question 10

> What criteria should be used to identify key sites where independent power systems or redundant backhaul could be funded?

We note from the discussion paper *"Extended backup power resilience - Applicants will be asked to identify key sites in their proposed solutions that would offer benefits if extended backup power was available during an extended disaster event. Applicants will be asked to provide a costed option for deploying power solutions that can operate independently of the power grid indefinitely. This would include utilising solar power or other innovative solutions. Round 5A funding will prioritise funding these options."*

As noted in our response to Question 1, the use of solar and wind to power Pivotel's low powered ecoCell™ based network architecture, provides an inherent independence from grid power limitations. The ecoCell™ power systems are designed to provide at least three days of autonomy to cater for periods of low solar radiation and/or lack of air flow. We consider three days of autonomous operation the minimum acceptable standard for a primary service. Pivotel will be pleased to provide specifications and costs for the power systems we have deployed.

Pivotel has also successfully tested the use of secondary backhaul mechanisms using satellite. The transmission management is designed such that it will automatically cut-over to the satellite bearer should the terrestrial line fail, and then return again once the main link is re-established. We have found no issues in using this mechanism, except for the fact that the satellite link generally has a more limited bandwidth capability and higher latency. The higher latency issue can be mitigated through the use of our previously described 'local core' solution: local traffic continues to enjoy low latency connections and double-hop satellite links are avoided. Pivotel also uses secondary satellite links to provide an out-of-band monitoring and management capability to improve the visibility of the networks operation and reduce outage times

In general, we consider that funding should be made available to deploy off-grid or extended backup power and redundant backhaul links on <u>all</u> mobile black spot sites serving local communities located in areas that are deemed as high risk disaster-prone areas by the Australian government.

Question 11

Are there any comments regarding the requirement for at least 12 hours of auxiliary backup power for small cells?

Where macro base stations are deployed, or where suitable power lines are in close proximity, then use of the power grid is a valid solution. In Pivotel's experience, the likelihood of a grid outage in rural areas is significantly higher than for urban environments, and the mean outage time is also longer, extending to days in the worst cases. Therefore, we would suggest that an auxiliary backup time of 12 hours is insufficient where the base station is providing the primary communications service. In these instances 24 hours should be the minimum requirement, with a target of 48 to 72 hours. This would allow for more time for support crews to access sites, undertake repairs, and replenish generator fuel supplies if necessary.

Question 12

Do you have any comments on the proposed assessment criteria?

Pivotel is broadly supportive of the proposed assessment criteria with additional comments as per below:

1. New Coverage outcomes: This criterion relates to ensuring eligible solutions deliver additional and new coverage compared to an MNO's existing coverage and/or compared to other MNO's coverage. Given Round 5A's focus on using shared RAN outcomes, Pivotel supports the notion that any additional coverage should ultimately be used to improve coverage outcomes for all MNO's. Open Access and shared RAN approaches have already been discussed above, and Pivotel supports the idea that all public funding should be used to benefit all mobile users, irrespective of the network they are on, noting the dependency on MNO's agreeing on appropriate commercial and technical terms.

2. Coverage benefit: Pivotel considers that the cost over coverage formula as drafted in its current form is potentially a deterrent for both existing and new MNOs entering the market as contemplated in MBSP 5A:

   • Firstly, those operators with an existing but smaller footprint are at an inherent disadvantage. MNO's seeking to enhance their network coverage in areas where another carrier already has existing coverage are effectively penalised by a factor of two (as only 50% of the additional coverage is included in the assessment formula). This outcome promotes further build out by the incumbent with the largest network, and places other competing MNO's at a disadvantage when seeking co-contributions under the MBSP. To receive full benefit, a competing MNO must build beyond the incumbent's coverage, in an area that is likely isolated from their own existing coverage footprint, with a consequential poorer return on investment. Once again mandating shared RAN outcomes would alleviate this issue to some extent, but only in areas where there was no existing coverage.

   • The other significant issue with the cost over coverage formula, that has not been relevant in previous rounds, is with regard to access to low band spectrum. Low band spectrum (i.e. < 1 GHz) has superior propagation characteristics than high band spectrum (ie. > 1.8 GHz), and this has a material impact on the cost to cover a particular area, as more base stations are required to cover the same area. For historical reasons, the national licensing approach has resulted in all low band spectrum being held by the incumbent MNOs. This nationwide spectrum allocation applies despite it only being used in around one third of Australia's land mass. The result is that regionally focussed MNOs, such as Pivotel, must resort to using high band spectrum, with associated additional infrastructure costs, placing them at a material disadvantage when competing for MBSP funding. Fair access to low band spectrum would negate this issue, as well as driving the optimum use of Government funds.

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3. Overall Value for money: This criterion appears to add a level of subjectivity to the final assessment which will require transparency to ensure all solutions are taken on their relative merits and coverage outcomes which need to be weighted accordingly.

4. Closing remarks

Pivotel appreciates the opportunity to provide input to the Departments MBSP and looks forward to participation in the program when finalised and playing an active role in improving mobile digital connectivity for regional, rural and remote Australia.

For any questions in relation to this submission please contact:

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Yours sincerely

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