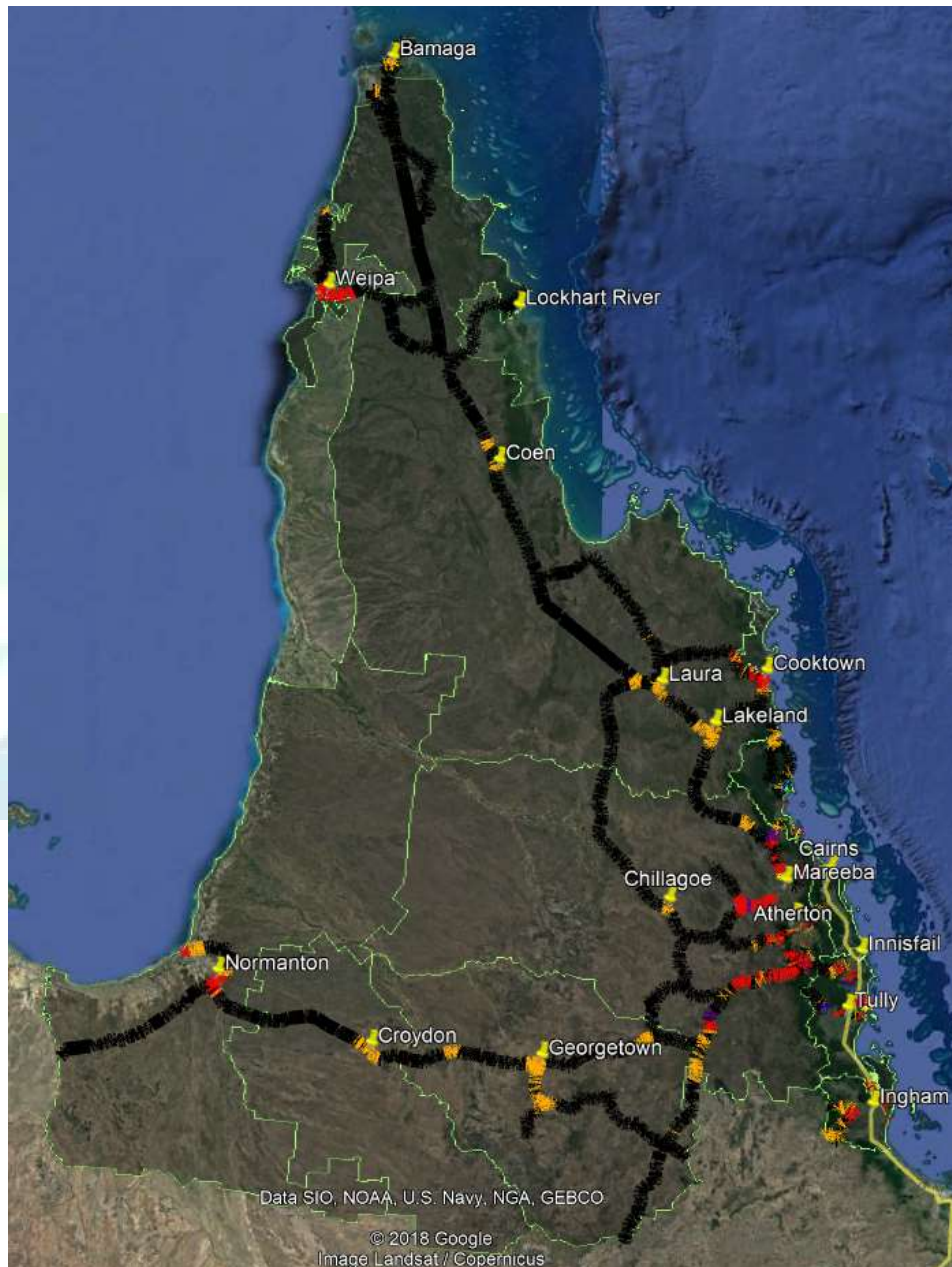


Far North Queensland Regional Organisation of Councils

Mobile Coverage Report

4 August 2019



Strategy, Planning & Development
Implementation Programs
Research, Analysis & Measurement
Independent Broadband Testing
Digital Mapping



Document History

Version	Description	Author	Date
V1.0	Mobile Coverage Report	Michael Whereat	29 July 2019
V2.0	Mobile Coverage Report – updated to include text results and recommendations	Michael Whereat	4 August 2019
V.2.1	Amendments to remove Palm Island reference	Michael Whereat	15 August 2019

Distribution List

Person	Title
Darlene Irvine	Executive Officer, FNQROC



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Executive Summary

For Far North QLD Regional Organisation of Councils (FNQROC) the challenge of growing the economy through traditional infrastructure is now being exacerbated by the need to also facilitate the delivery of digital infrastructure to meet the expectations of industry, residents, community and visitors or risk being left on the wrong side of the digital divide.

FNQROC engaged Digital Economy Group Consulting (DEGC) to undertake independent mobile coverage testing and prepare a report to support an advocacy program aimed to target additional investment in the region and reduce the mobile Black Spots that impact the safety, welfare and economic foundations of the region.

Testing undertaken to inform this report covered over 5,100kms along the Regional Road Investment Strategy identified 14 Tourism and Heavy Vehicle routes. This included signal strength and network performance of both the 3G and 4G networks provided by Telstra, Optus and Vodafone.

The results highlight the known user experience - FNQROC has extensive mobile Black Spots and where there is coverage it is not compatible to capital city locations due to distance to the core and lower network overlap. The contrasts are extreme. Both 3G and 4G areas where there is no signal strength for any of the three carriers sits at 3,550kms or almost 70% of the total distance covered. In capital cities this would be less than 1%.

The network performance tests simply confirm this user experience. Across the entire region 316 tests were completed and Telstra had the lowest number of Black Spots with 67% and 76% for 3G and 4G respectively. Optus and Vodafone were an equal second, a considerable air gap behind Telstra. They were within a few percentage points including both 3G and 4G. Again, the contrast with capital cities is stark and likely to be only one or two percentage points if any at all.

So how can the significant digital divide of this region be addressed? In a simplistic sense the obvious question is to ask how many new mobile sites would it take to provide capital city comparative coverage? It would take hundreds if not thousands of new sites as testing was only completed along the key routes. The answer however is not that simple. Networks require local access (from the tower to the user) and connection to their core and the internet by backhaul. To improve from this current relatively low base there is an urgent need to unlock significant funding in new and improved sites together with network improvements by all three major carriers.

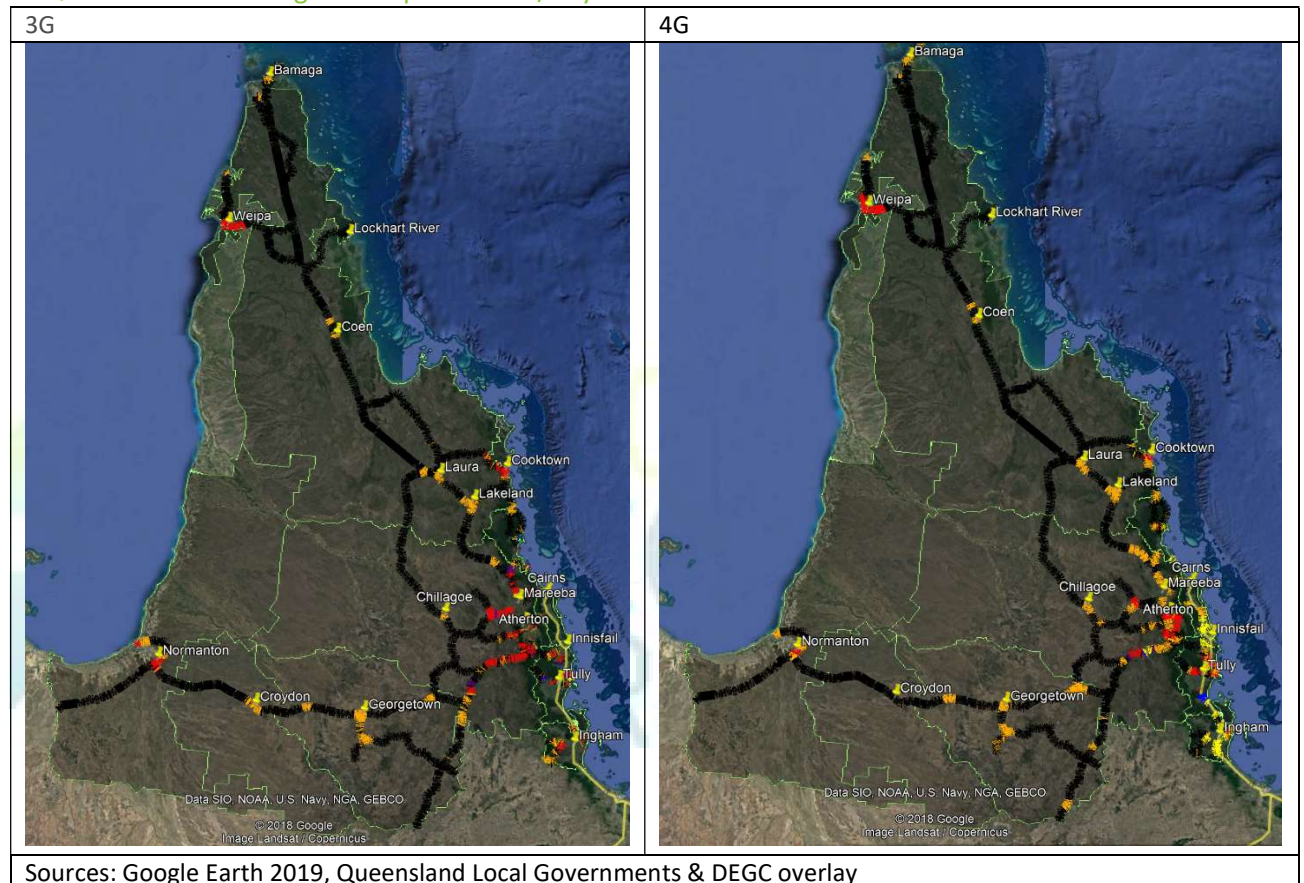
The Mobile Black Spots Program (MBSP) serves as one of the levers available to address the “divide”. Through the first rounds 31 new sites have been delivered or are committed for the region.

Successful regions have used mobile coverage reporting to inform and implement a long-term strategic action plan covering five key areas:

1. Target proportionate MBSP funding commensurate with the extensive Black Spots in the region. This involves sustained policy prioritisation and active political advocacy with federal and state governments
2. Partner with the three carriers to identify their priorities and FNQROC needs, focusing on:
 - a. Mobile Black Spot Program funding locations
 - b. Local access network upgrades and spectrum development
 - c. Backhaul and core network upgrades and development to reduce the lag (time distance) to their core

3. Partner with your regional industry and businesses to increase awareness, skilling and demand for digital connectivity.
4. Facilitate digital connectivity via emerging carrier and non-carrier systems that deliver wider coverage for the Internet of things and devices.
5. Build and maintain local capability to underpin the strategic action plan. Invest in relevant experienced staff to provide a consistent core officer level and capacity to build relationships and deliver outcomes. Maintain regular updates to the current baseline to inform the evolving priorities. Encourage Councils and industry to undertake localised testing to build out the coverage picture for their own area.

FNQROC Mobile Coverage Blackspots – June/July 2019



Consolidated Network Performance Test Scores

Network Performance Test Results N=316	Telstra 3G		Telstra 4G		Optus 3G		Optus 4G		Vodafone 3G		Vodafone 4G	
Hot Spot	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Very High	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
High	6	1.90	23	7.28	10	3.16	25	7.91	12	3.80	28	8.86
Acceptable	46	14.56	29	9.18	27	8.54	10	3.16	20	6.33	7	2.22
Low	33	10.44	20	6.33	14	4.43	8	2.53	10	3.16	6	1.90
Very Low	17	5.38	4	1.27	1	0.32	0	0.00	3	0.95	0	0.00
Black Spot	214	67.72	240	75.95	264	83.54	273	86.39	271	85.76	275	87.03

Terms and Abbreviations

Term	Definition
3G	short for third generation, is the third generation of wireless mobile telecommunications technology
4G	is the fourth generation of broadband cellular network technology, succeeding 3G
5G	the fifth-generation cellular network technology
Backhaul	Carriers refer to the connection from local access (i.e. mobile tower) to their core network backhaul
Black Spot	term used to define where no signal is available for a carrier or carriers
DEGC	Digital Economy Group Consulting
FNQROC	Far North Queensland Regional Organisation of Councils
GoMobile	Name of DEG Consulting independent mobile network application for Android
GPS	Global Positioning System
GSM	Global System for Mobile Communications
Hot spot	Term used to describe a location where a mobile carrier network has exceptionally high network performance for latency, download and upload scores.
IoT	Internet of Things
Latency	network delay, a measure of the time delay required for information to travel across a network
LTE	Long-Term Evolution, a telephone and mobile broadband standard
LoRaWAN	Long Range Wide Area Network is an open standard providing potentially 30km and above connectivity. Suited to devices typically using low power transmission of bytes of data a few times a day.
MCNO	Mobile Carrier Network Operator
Mobile towers	Major towers for mobile infrastructure including local access only or local access and microwave backhaul
MBSP	Mobile Black Spot Program a funding program managed by the Australian government to improve mobile coverage in non-metro Australia
Micro Cells or Small Cells	References smaller sized mobile infrastructure site for local access. Coverage is also typically smaller.
NB IoT	Narrow Band Internet of Things wireless network standard used by mobile carriers
NPT	Mobile networks are often measured in terms of latency, download speed and upload speeds. In this report NPTs capture the date time and locations as GPS coordinates together with the three network measures to capture and illustrate performance at that point in time.
Ping	Ping test is used to measure latency on a network
Sigfox	Sigfox is a French global network operator founded in 2009 that builds wireless networks to connect low-power objects
Signal Strength	Signal strength is the measure of a phones relative local access signal. Shown in this report as a Db measure out of 0-31 for 3G and 0-64 for 4G.
TST	Time Series Test – a repeat of the Network Performance test – typically 10 times over to capture and illustrate the variations in a network performance
Wireless	Wireless communication is the transfer of information or power between two or more points that are not connected by an electrical conductor

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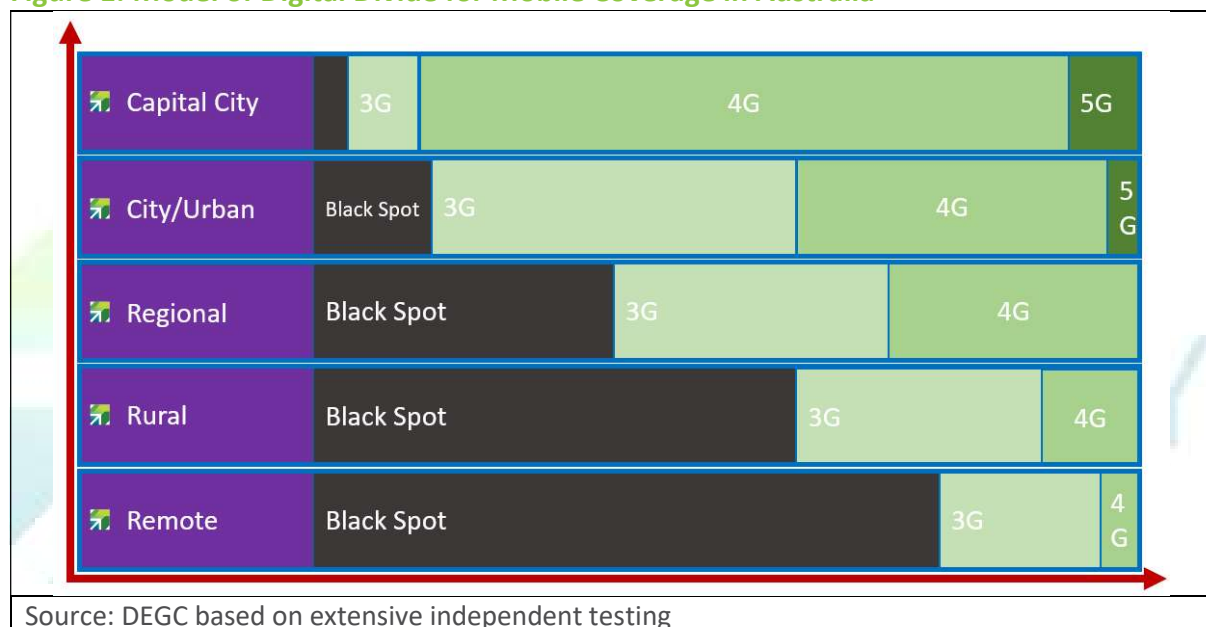
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Introduction

Access to quality connectivity for mobile phone coverage and internet services has become a critical feature of contemporary communities around the world. FNQROC has received 31 additional base stations through the Mobile Black Spot Program in Rounds 1-4. There remains extensive mobile Black Spots or non-coverage areas for all three carriers across FNQROC.

Mobile connectivity, for phone calls and broadband, has become a utility expected by business, residents and the community wherever they go. The rapid development of new technologies and faster connection options has resulted in regional and rural areas of Australia being on the wrong side of the 'Digital Divide'. In our capital cities, there are virtually no Black Spots for coverage and rapid deployment of the latest generation of connectivity. On the other side of the 'Digital Divide' Black Spots form the largest part of the landscape and their townships have technology a generation or two behind.

Figure 1: Model of Digital Divide for Mobile Coverage in Australia



According to the ABS, as of June 2018, there were about 27 million mobile handset subscribers in Australia. As users we are downloading more than ever on mobiles. In the three months ending June 2018¹, 246,765 terabytes were downloaded.

For regions like FNQROC, the challenge is to find ways to partner with the three privately owned carriers to reduce the extent of Black Spot coverage. A second challenge is having existing sites upgraded and coverage expanded with current generation technology. Another avenue to improve coverage is to access current and future rounds of the federal Black Spot Funding Program.

For local government, managing the region in times of disaster or emergency, to providing a positive experience for visitors and delivering greater productivity for businesses is now a constant requirement for successful regions.

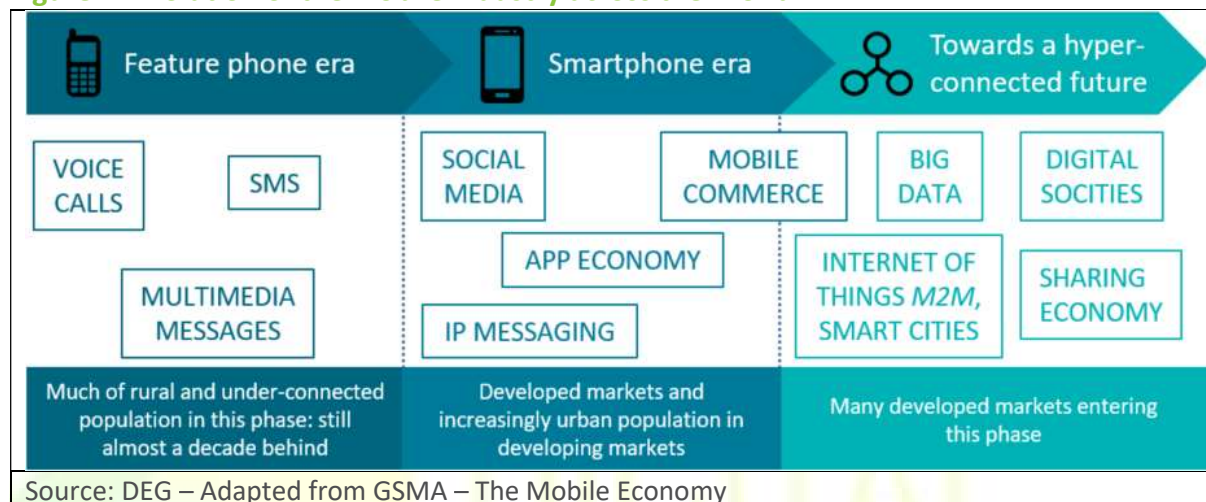
FNQROC has engaged DEGC to undertake independent mobile coverage testing and prepare a report to support an advocacy program aimed to target additional investment in the region and reduce the mobile Black Spots that impact the safety, welfare and economic foundations of the region.

¹ <https://www.communications.gov.au/departamental-news/australians-are-downloading-more-ever>

Looking beyond mobile phone and internet coverage

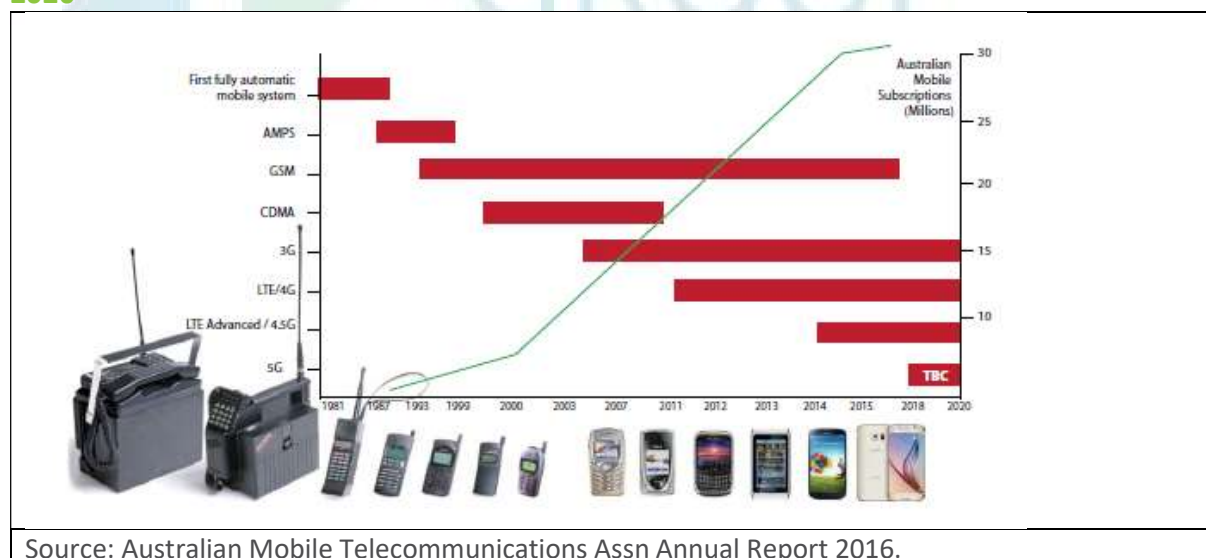
Mobile connectivity has moved in 25 short years from exclusive access to universal access and is expected. People now use these networks for voice calls through the app economy to a hyper connected future where Smart phones are becoming central devices to our lives. See the evolution of the mobile industry illustration below. The demand for data is doubling each year. The illustration is adapted from the international communication industry annual report by GSMA.

Figure 2: Evolution of the mobile industry across the World



The need to look beyond mobile black spots becomes ever more apparent as the demand for data doubles each year (reference <http://www.amta.org.au/>) and there are now 18,000 mobile sites around Australia with 3,000 in planning, acquisition or deployment at any one time by Australia's three major Carriers, Telstra, Optus and Vodafone.

Figure 3: Development of Mobile Technology and increases in mobile subscriptions 1981-2020



Baseline Assessment

The baseline assessment involves four components. They are:

- Client priorities and Study Area
- Review of carrier advertised coverage
- Mobile Black Spot Program data
- Local information assessment

Client Priorities & Study Area

DEGC understands that the FNQROC was founded with the purpose of cooperation and resource sharing between Councils, and to effectively advocate regional positions and priorities. The organisation works closely with regional partners and stakeholders to develop regional programs for the betterment of all member councils.

Members of FNQROC include the local government areas of Cairns, Carpentaria, Cassowary, Cook, Croydon, Douglas, Etheridge, Hinchinbrook, Hope Vale, Mareeba, Tablelands, Wujal Wujal and Yarrabah. These councils have endorsed five strategic economic priorities for the region:

1. Develop resilient transport infrastructure and connectivity;
2. Provide reliable and affordable water and energy;
3. Respect and manage our natural assets and environment;
4. Develop equitable social infrastructure; and
5. Provide equitable communication network.

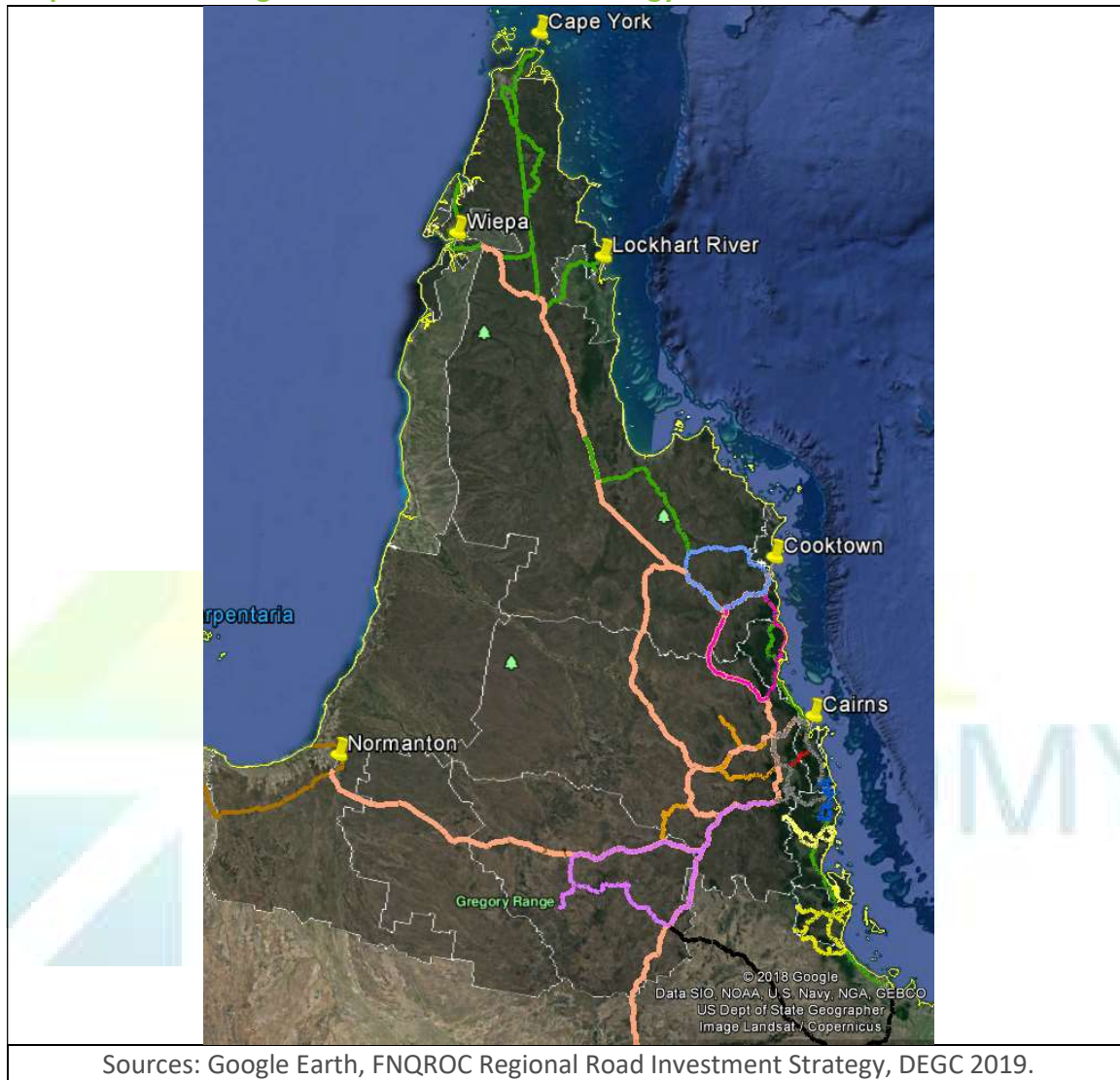
The testing of mobile coverage is part of a wider program of initiatives aimed to address the FNQROC regional priority to ***Provide an equitable communication network.***

The road transport infrastructure network provides the backbone of the region and basis for tourism, transport, safety and wellbeing of the communities it serves. Alongside the long-term development of these road networks, mobile communications is becoming increasingly critical to the effective functioning of regional and remote communities. The FNQROC priority routes to be tested as part of this project are:

- Canecutter Way Discovery Trail
- Chillagoe Discovery Trail
- Cooktown Discovery Trail
- Daintree Explorer
- Epic Cape York – **excluding the Telegraph Track & CREB Track**
- FNQ Heavy Vehicle Network (HVN) – **excluding Mount Mulgrave/Palmerville Rds between Bourke Development Road and Laura**
- Great Green Way – **excluding roads south of the Hinchinbrook Shire Council boundary**
- Great Tropical Drive – **excluding roads south of the Hinchinbrook Shire Council boundary**
- Hinchinbrook Discovery Trail
- Ravenshoe to Georgetown
- Reef to Rainforest
- Savannah Way – **to the outer border of Carpentaria Shire Council only**
- Tully Mission Beach Discovery Trail
- Waterfalls Discovery Trail

These routes extend over 1,000kms from the tip of Cape York to Ingham in the South and over 800kms to Carpentaria in the West (refer Map 1).

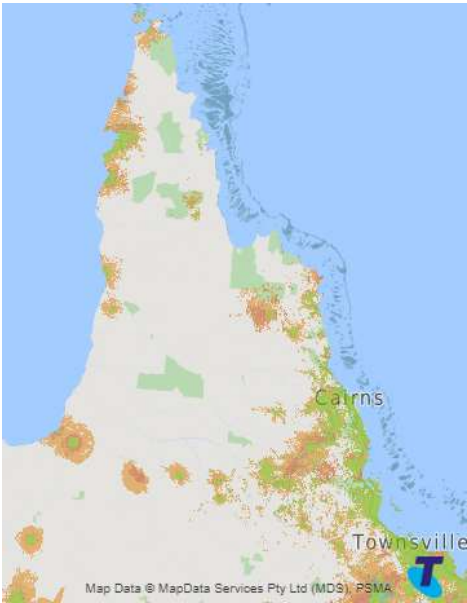
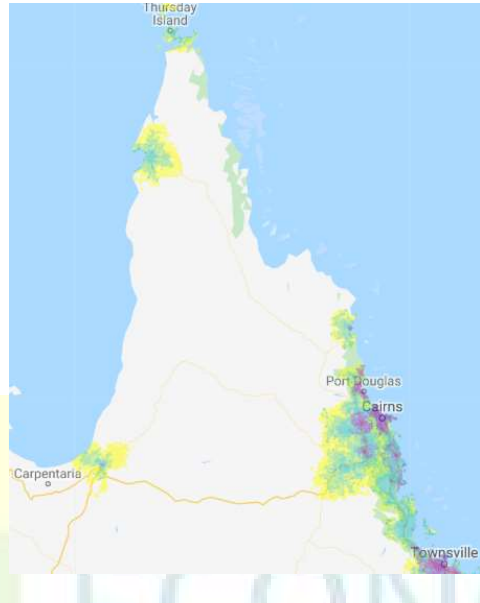
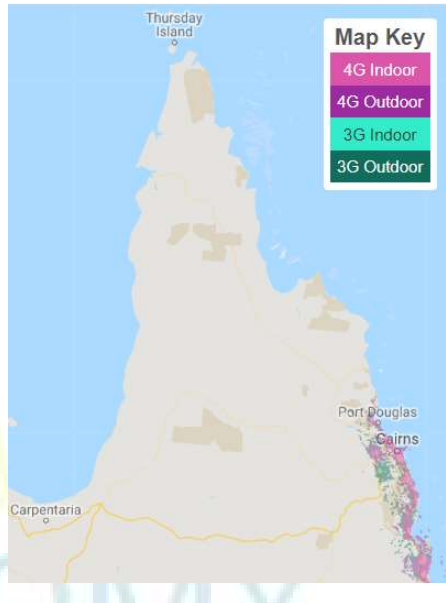
Map 1: FNQROC Regional Road Investment Strategy Routes



Carrier Coverage Maps

Each of the three Australian mobile network operators provide information about their coverage on their respective websites. Telstra has the most extensive coverage, followed by Optus, and Vodafone is third with coverage only in the urbanised coastal strip. Refer Map 2 below for a high-level overview of the entire study area.

Map 2: FNQROC Carrier Coverage Overview

Telstra	Optus	Vodafone
 <p>Map Data © MapData Services Pty Ltd (MDS), PSMA</p>		
https://www.telstra.com.au/coverage-networks/our-coverage	https://www.optus.com.au/shop/mobile/network/coverage	https://www.vodafone.com.au/network/coverage-checker

Mobile Black Spot Program

In 2015 the Commonwealth Government announced the Mobile Black Spot Program (MBSP). Since then a total of four rounds have been run and many of the approved sites have been completed. Advocacy by local political representatives in each region of Australia has proven key to the success of deployment there. An update by the department on 20 March 2019 stated that 683 base stations have already been activated as part of the program to date, delivering improved coverage outcomes and benefits to the Australian community.

Round 5 was announced 5 April 2019 and Mobile Network Operators and Infrastructure Providers have until 26 July 2019 to submit their applications. Up to \$80 million in funding has been allocated for this round.

As per previous rounds of the Program, Round 5 encourages the mobile industry and state and local governments to work together to address mobile black spots across regional and remote Australia. Interested communities are encouraged to contact the mobile network operators and state and local government authorities to make their needs known.

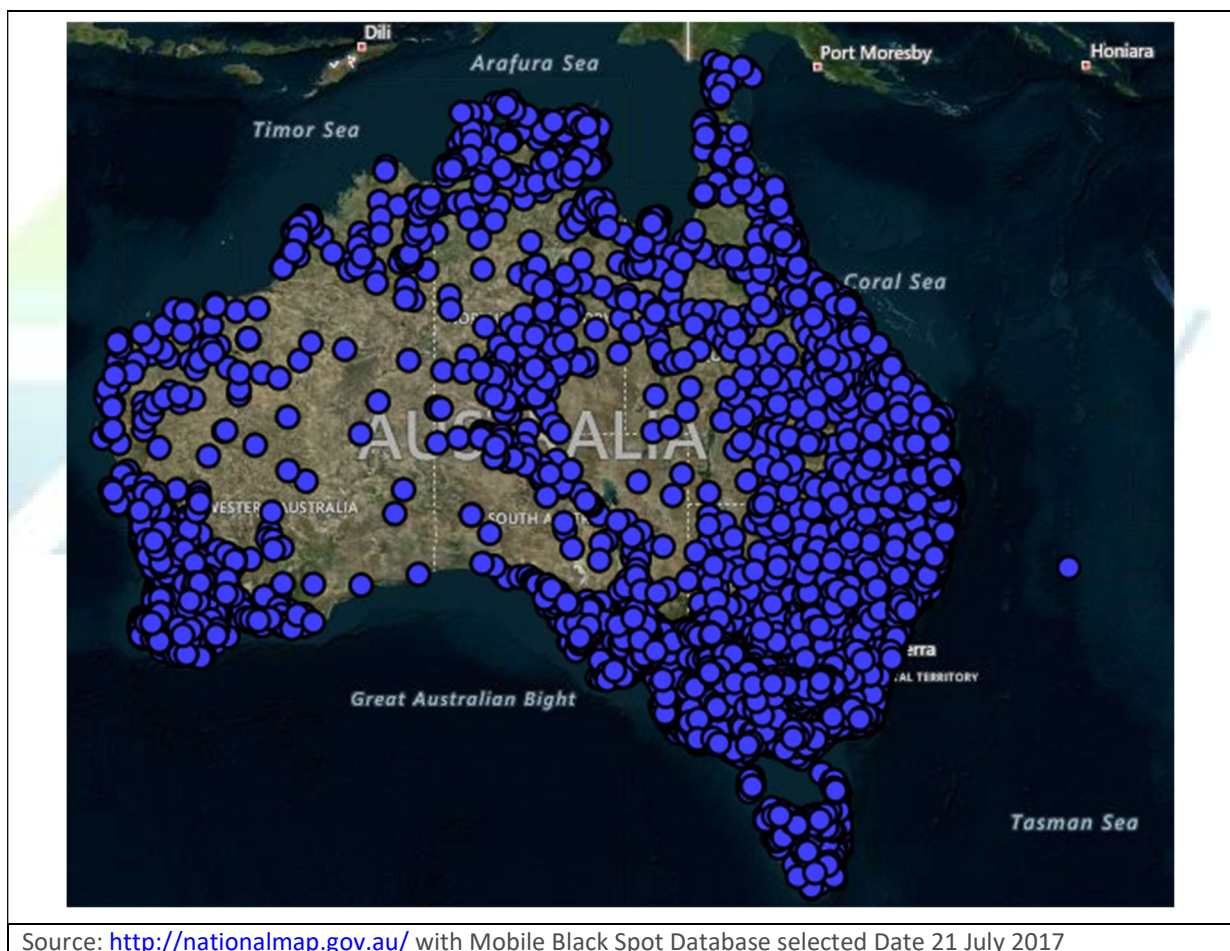
Round 6 of the program has also been announced and the government will commit a further \$80mil to this round to be actioned when round 5 is complete.

Mobile Black Spot Program Registration Database

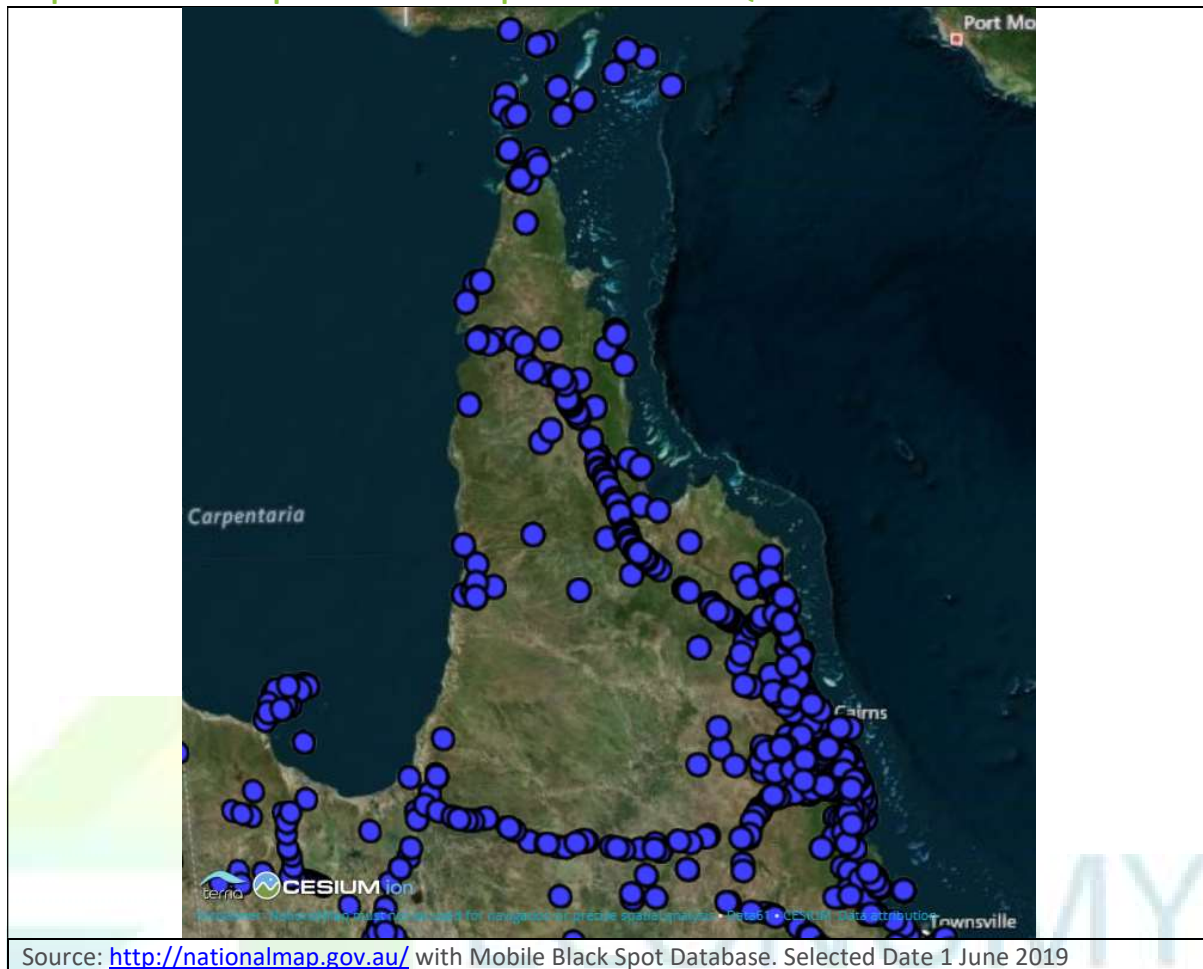
For the initial MBSP rounds the Department of Communications and the Arts (The Department) invited individuals and governments/councils to contribute to a map of black spot areas across Australia (see map below). By the end of consultation for Round 1, a database of 6,221 locations had been generated using registration from the public and other organisations. During the consultation for Round 2 (April 2016) the number of recorded black spots had increased to 10,802. This database has been the starting point for the competitive selection process under which the mobile network operators were asked to nominate where they would build new or upgraded base stations.

The key issue with the national database that the sites identified were not qualified in any way. For example, people with a Vodafone coverage issue could nominate where there was Telstra coverage and vice versa. It also did not discriminate between indoors and outdoors. In locations where the DEGC GoMobile independent mobile testing was undertaken, the identified black spots were taken more seriously by the carriers and both state and commonwealth governments.

Map 3: National Map- Mobile Black Spot Database



Map 4: National Map- Mobile Black Spot Database- FNQROC



Mobile Black Spot Program results for FNQROC

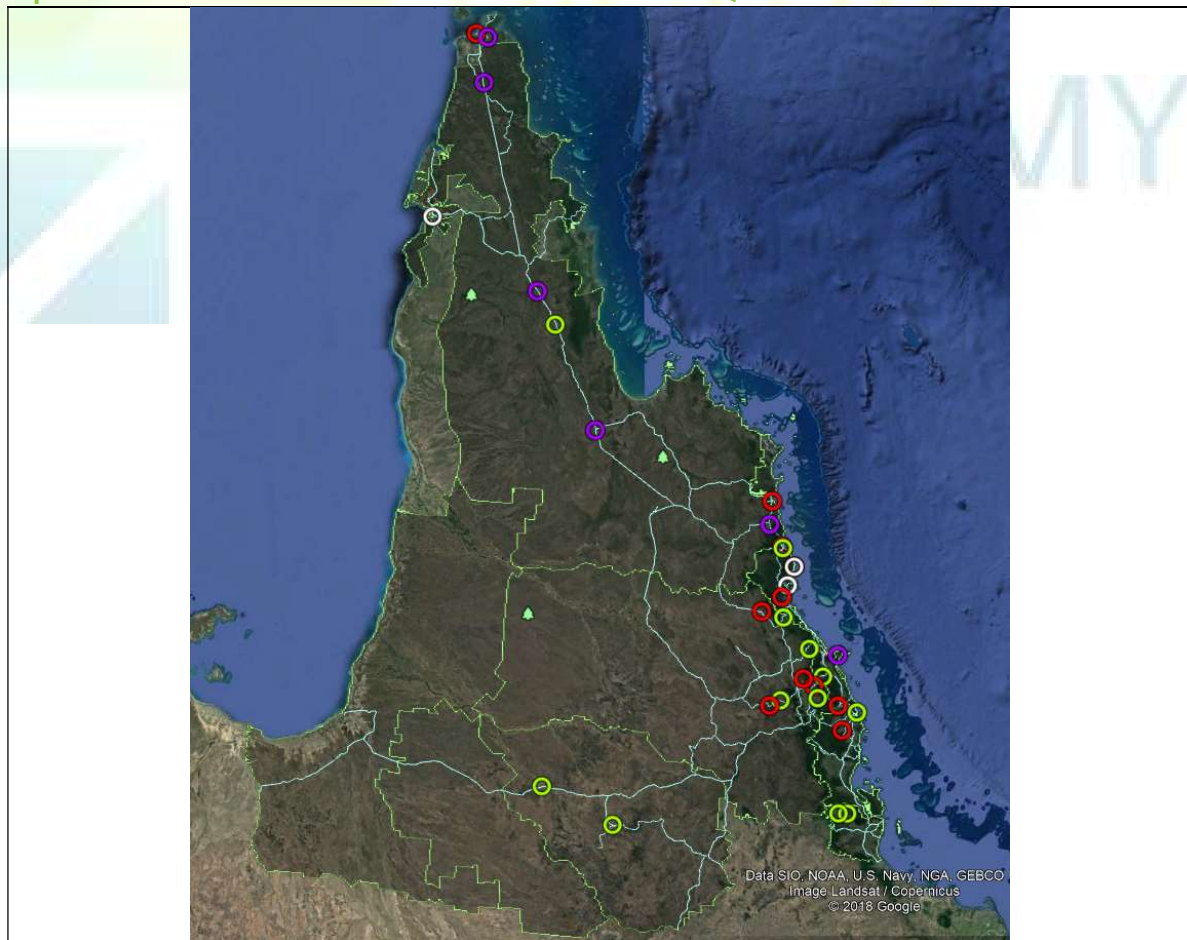
FNQROC has benefited from the first four rounds of the MBSP. A total of 30 sites have been approved and funded (Refer to Map 5 to locations by round). The majority have been approved for Telstra with 5 sites for Optus (Refer Table 1 below). Vodafone has either not been successful with the MBSP or not participated in the FNQROC area.

Table 1: Mobile Black Spot Program awarded sites in FNQROC – Rounds 1-4

Location	Telstra	Optus	Vodafone	Operational (as at June 2019)
Round 1 – 11 Sites				
Between Croydon and Georgetown	✓			Operational
Long Pocket	✓			Not tested
Flying Fish Point	✓			Operational
Bloomfield River	✓			Operational
Coen Airport	✓			Operational
Butchers Creek	✓			Operational
Goldsborough	✓			Operational
Julatten	✓			Operational
Watsonville	✓			Operational
Forsyth	✓			Operational
Speerwah	✓			Operational
Round 2 – 11 Sites				
Cooktown	✓			Operational

Location	Telstra	Optus	Vodafone	Operational (as at June 2019)
Cape Tribulation		✓		Not Operational
Lake Barrine	✓			Operational
Tinaroo		✓		Not Tested
Irvinebank	✓			Operational
Injinoo	✓			Operational
Mena Creek	✓			Operational
Pawngilly	✓			Operational
Mount Carbine	✓			Operational
Whyanbeel	✓			Operational
Ayton	✓			Not Operational
Priority Locations (Rd3) – 3 sites				
Wonga Beach	✓			Operational
Daintree	✓			Operational
Weipa	✓			Operational
Round 4 – 5 sites				
Musgrave River		✓		Not Operational
Eliot Falls	✓			Operational
Yarrabah South		✓		Not tested
Northern Peninsular Airport		✓		Not operational
Rossville	✓			Not operational

Map 5: Location of MBSP sites Rounds 1 to 4 across FNQROC



Source: Google, Qld Local Government Boundaries, FNQROC priority routes & <http://nationalmap.gov.au/> with Mobile Black Spot Program data

Local information assessment

Local information is key to a safe and successful test program. Advice received from FNQROC and their respective council members has helped identify and resolve potential risks:

Mount Mulgrave/Palmerville Rds between the Bourke Development Road and Peninsular Developmental Rd North of Laura

Following an active cyclone season, Mount Mulgrave/Palmerville Rds connecting Bourke Developmental Road and Peninsular Developmental Rd North of Laura is currently not passable. DEGC has reviewed the area and confirmed that the closest mobile network infrastructure is Chillagoe and Laura. This 117km section of road forms part of the FNQ Heavy Vehicle Network has no coverage for any to the three mobile network carriers.

Old Telegraph Road

The Old Telegraph Road is no longer maintained; however, it is still actively used by 4WD enthusiasts as a challenge track. This 105km section of road forms part of the Epic Cape York trail and does not have any coverage from the three mobile carriers.

CREB Track

The CREB track remains a high-risk route requiring two vehicles and dry weather for a successful drive. Advice from the FNQROC team during testing lead to this section not being tested. This 38km section of track forms part of the Epic Cape York Trail has no coverage for any to the three mobile network carriers.

In place of testing along these routes, a desktop assessment has been undertaken and this data is included in the summary tables and recommendations.

Test Results

As an independent testing organisation, DEGC provides impartial user experience-based reports and recommendations. The methodology used by DEGC to independently test mobile network performance and identify carrier blackspots has been developed and refined over the last 8 years.

We used six Samsung S9² handsets, as commonly used by members of the public, to capture information about the signal strength and network performance for each for the three national carriers - Telstra, Optus & Vodafone. This benchmarking process provides a robust methodology acknowledged and respected by the carriers.

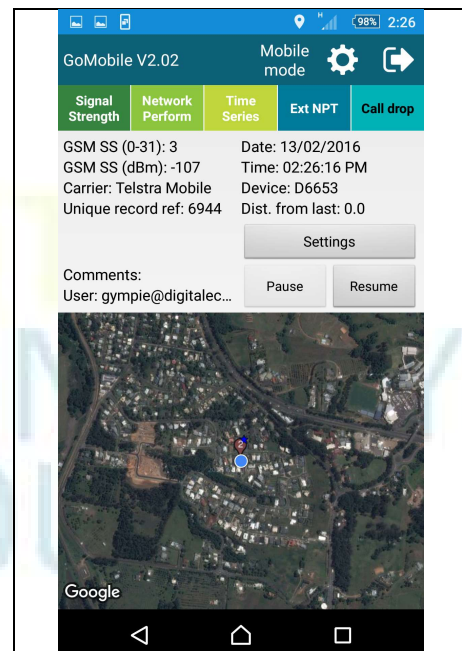
Clients typically use the report and specific recommendations to advocate for increased funding by Federal and State governments together with each of the three national carriers – often through the Mobile Black Spot Program.

We tested with an app we have developed specifically for this purpose – GoMobile Network Test (GoMobile) to capture all the information we can about the mobile network and the test device itself. An example of the GoMobile app screen can be seen below.







By providing the GPS location and current results in real time, testers can monitor and authenticate the testing accuracy in real time.

Our testing is now completed using Android handsets with the results available in near real-time from an online portal.

We installed three mobile phones (one for each carrier) across the front of the test vehicle for 3G and another three in the second row for the 4G. We comply with driver sight line requirements and achieve required separation distances to avoid radio interference.



There are six simple principles used to inform our testing methodology:

-  User experience based – we use handsets commonly owned by users rather than other more technical and theoretical approaches.
-  Same handset, same settings – this provides an equitable basis for bench marking network performance.
-  Simultaneous testing – all tests are carried out in the same vehicle – spaced to remove interference and completed at the same time in that location.
-  Signal Strength – for 3G and/or 4G
-  Network Performance Test – download, upload and latency
-  Time Series Testing - When network performance tests are done (download and upload of data to the internet) DEGC samples 10% of locations using time series.

² Telstra recognises Samsung S9 phones with their [Blue Tick](#) suitability for rural and remote areas.

Tested Routes

To help prioritise the routes for testing, FNQROC has nominated the Tourist and Heavy Vehicle Priority Routes as the basis for testing (see Table 1 below). If individually driven, the total distance for all priority routes in aggregate is 9,103kms. As the notes indicate, many of the routes overlap, so the estimated total drive is only a reflection of what is required to complete the active part of that route removing overlaps.

Table 2 - FNQROC Tourist and Heavy Vehicle Priority Routes including total distance

	Total Distance klms	Notes
Cane Cutter Discovery	143	Some overlap
Chillagoe Discovery Trail	613	Overlaps
Cooktown Discovery	285	Excludes overlap with other trails
Daintree Explorer	357	direct overlap of 3 other drives
Epic Cape York	1,691	overlap with other drives
FNQ HVM	1,954	Significant overlaps other drives
Great Green Way	298	overlap with Great Tropical Drive
Great Tropical Drive	1,052	Some overlap
Hinchinbrook Discovery	244	excludes overlaps
Ravenshoe to Georgetown	575	excludes overlaps
Reef to Rainforest	276	significant overlaps
Savannah Way	1,046	Significant overlap FNQ HVM
Tully Mission Beach	198	overlap
Waterfalls Discovery	372	overlap
	9,103	

The following test program has been developed to deliver test results for all routes identified by FNQROC. The testing team completed a total of 8,160kms with 2,793kms of the driving involving return or connecting driving. The net driven route distance was 5,106kms.

Table 3 Driven, return and actual

Description	Kilometres
Driven	5,106
Return or connecting	2,793
Desktop	261
Total	8,160

An assessment of the priority routes identified extensive overlaps. For example, the Great Tropical drive extends over 1,500Klms from Cairns to Townsville and then follows an inland route back to Cairns while the Great Green Way is the drive from Townsville to Cairns.

Signal Strength

We have tested mobile signal strength for each of the three mobile network operators (Telstra, Optus and Vodafone) in both 3G and 4G modes at approx. every 50m for the 5,106kms across the designated routes. This has generated approx. 102,120 markers for each of the three carriers and 306,360 in aggregate. As testing has been completed for both 3G and 4G, a total of approx. 612,720 markers have been generated in total. This methodology will comprehensively demonstrate the quality of coverage by carriers in each area tested.

Table 4 Distance driving plan combined with number of signal strength markers 4G & 3G

Kilometres	Telstra Signal Strength Markers	Optus Signal Strength Markers	Vodafone Signal Strength Markers	Total Signal Strength Markers
5,106 klms for 3G	102,120	102,120	102,120	306,360
5,106 klms for 4G	102,120	102,120	102,120	306,360
10,212 Total Klms	204,240	204,240	204,240	612,720

The contrast between Black Spots and hotspots of coverage is clearly shown in both the 3G and 4G tables and maps below.

The results for FNQROC show extremely low levels of coverage and equally high levels of non-coverage. For example, the 3,516klms or 68.87% of three carrier Black Spots is very high and the proportion of coverage by all three carriers at 911klms or 17.85% is extremely low.

These results are driven primarily by the relatively low population communities interspersed with long stretches of highway (road or track) represented by all areas North to the Tip and West to Carpentaria. In the coastal, urban and tableland areas including Ingham in the South to Mossman in the North and Atherton/Mareeba in the west, there is reasonably good network coverage from all three carriers. Telstra is outperformed in some hot spots by either Optus or Vodafone. Overall though, Telstra maintains its consistently high presence and coverage across network types. The strong presence of the Orange highlights the areas where Telstra has network and both Optus and Vodafone do not (267klms or 5.24%). It is their coverage in over 20 locations that makes the user experience of the Telstra network a standout for visitors, residents and businesses.

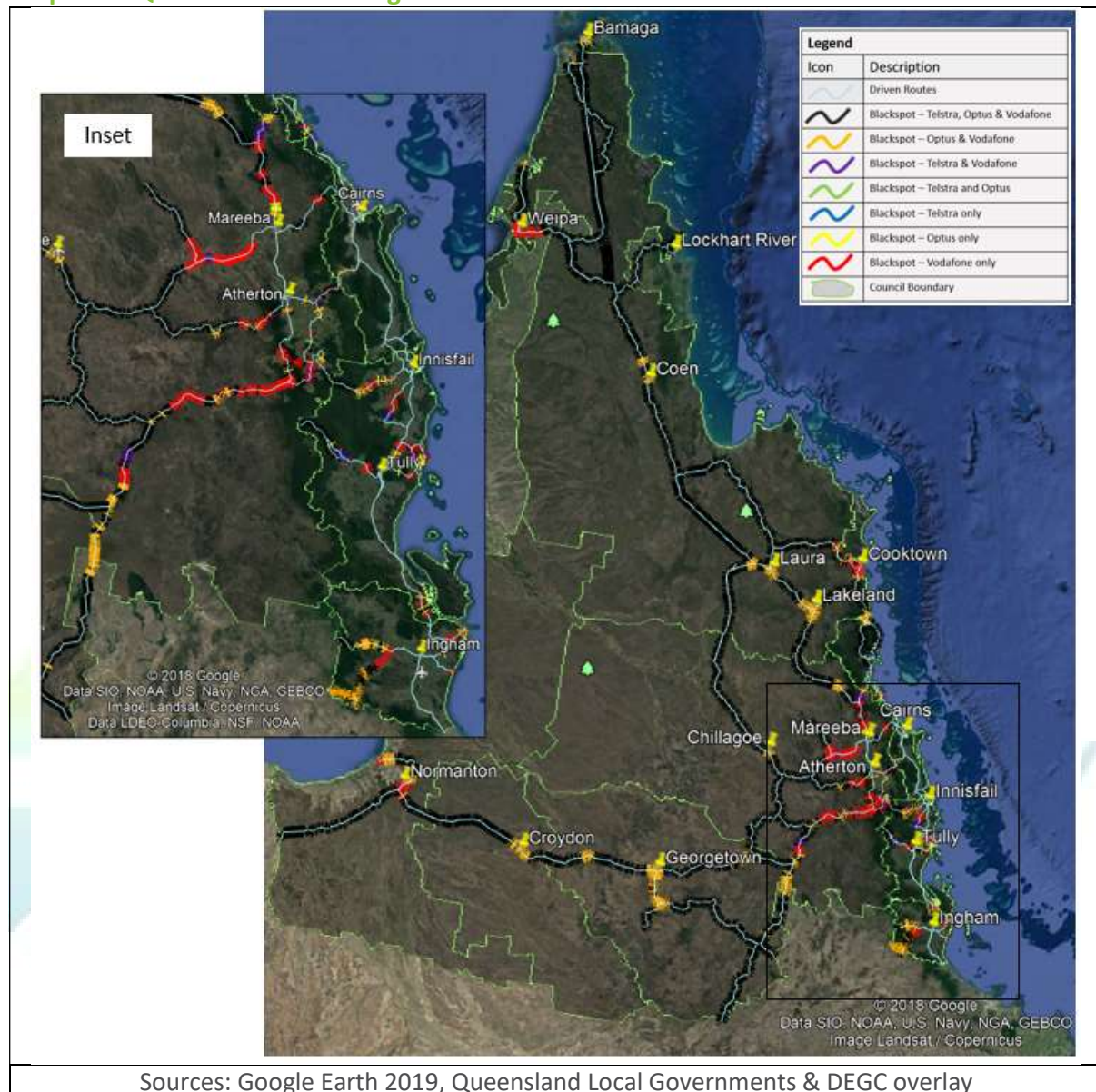
Optus does have a presence in Normanton, Weipa and Bamaga and its network joins Telstra to outshine Vodafone across the coastal and table lands as shown by the high proportion of red seen on the maps.

Signal strength by itself is not the best indicator of a network performance as it only shows where local access is possible. The signal strength information combined with the network performance testing provides a clear assessment on the networks in the region of study.

Table 5: Summary of 3G mobile coverage

3G Signal Strength	kilometres	percent
White - coverage from all three carriers	911.70	17.85
Black – no signal for Telstra, Optus and Vodafone	3,516.69	68.87
Orange - Optus and Vodafone have no signal – Telstra has signal	267.66	5.24
Yellow – No Optus signal – Telstra and Vodafone have signal	14.67	0.29
Red - No Vodafone signal – Telstra and Optus has signal	351.84	6.89
Blue – No Telstra signal – Optus and Vodafone has signal	6.69	0.13
Green – Telstra and Optus have no signal – Vodafone has signal	4.91	0.10
Purple – Telstra and Vodafone have no signal – Optus has signal	31.24	0.63
Total	5,106.03	100.00

Map 6: FNQROC Mobile Coverage 3G



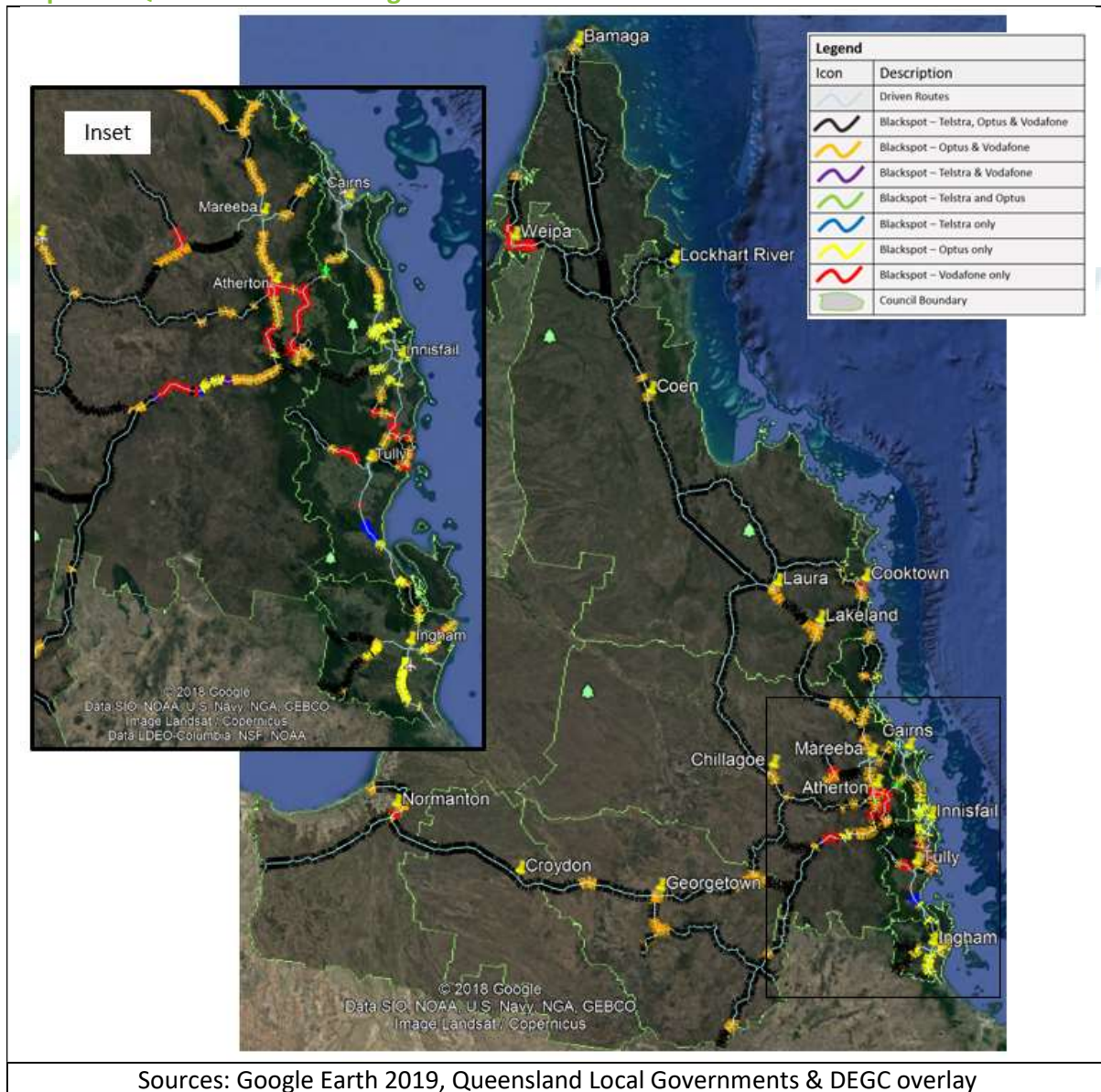
The 4G testing largely reflects the 3G except that the digital divide here is more extreme. Coverage from all three carriers (white) drops by a significant 400kms from 17.85% to 9.91%. In total the proportion of three carrier Black Spots does not move more than just a few kms between 3G and 4G. The difference in this case is driven by the Optus and Vodafone (Orange) 4G coverage slumping due to a low or comparative lagging investment in network upgrades or comparable existing and new sites. The stronger performance of Telstra is underlined in both 3G and 4G by the very low percentage of Blue or Purple results where Vodafone or Optus may have a presence and Telstra does not.

Across all three carriers there was a high level of variability between advertised coverage and actual signal strength. Carrier coverage maps only show coverage for a particular network with limited qualification of the actual strength. Hence, a projected single bar or less on a phone will be shown as coverage. The user experience, however, is that these are scattered weak signals is distant from the towers and does not translate to reliable consistent network performance.

Table 6: Summary of 4G Mobile Coverage

4G Signal Strength	klms	percent
White - coverage from all three carriers	506.02	9.91
Black – no signal for Telstra, Optus and Vodafone	3,541.94	69.36
Orange - Optus and Vodafone have no signal – Telstra has signal	656.86	12.86
Yellow – No Optus signal – Telstra and Vodafone has signal	128.55	2.52
Red - No Vodafone signal – Telstra and Optus has signal	247.52	4.85
Blue – No Telstra signal – Optus and Vodafone has signal	12.49	0.24
Green – Telstra and Optus have no signal – Vodafone has signal	4.27	0.08
Purple – Telstra and Vodafone have no signal – Optus has signal	8.65	0.17
Total	5,106.03	100.00

Map 6: FNQROC Mobile Coverage for 4G

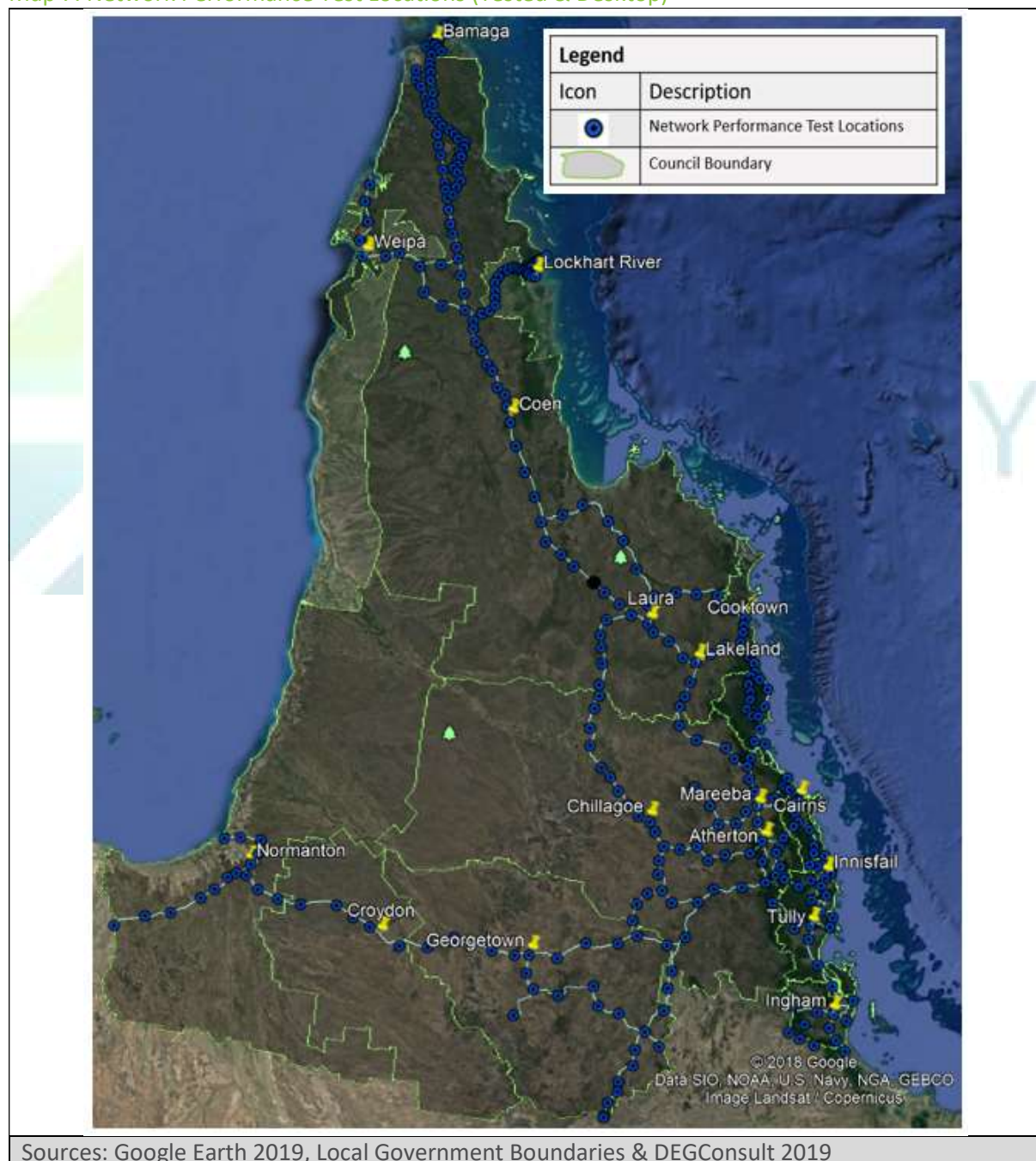


Network Performance Test Results








The Network Performance Test (NPT) assesses the quality of mobile internet connection at a location by highlighting the download speed, upload speed and ping/latency (time taken to reach the internet and back). A total of 316 locations are represented in the results below. 16 of these test locations were simulated through desk top analysis of the routes and not driven due to road closure and risk considerations. In total, 1,896 individual test results were captured for 3G & 4G for each of the three Mobile Carrier Network Operators (Telstra, Optus and Vodafone).

These generate samples to identify both Black Spots Funding Program and Mobile Carrier Network Operator (MCNO) investment upgrade recommendations.

Map 7: Network Performance Test Locations (Tested & Desktop)



The overall performance of each of the three carriers is highlighted in seven colour bands to inform the assessment and proposed priorities as follows:

-  **Hot Spot:** – Exceptional results. Typically, nearby 5G LTE cell in a major capital city with short distance to the Carrier core network.
-  **Very High:** Typically, within range of 5G in an inner urban metro location. Highlights locations with results that stand out for the location.
-  **High:** results - matched expectations set by coverage maps and current technologies used to service that location. Typically, 4G or 3G close to cell and core networks.
-  **Moderate (white):** Acceptable results, largely consistent with coverage map expectations. 3G and 4G able to connect with a good experience for streaming and cloud based services.
-  **Poor:** Connecting but occasional network drop out or longer waiting times for internet web pages and content to load.
-  **Very poor:** Calls drop out or fade. Cloud business connections are unreliable and require repeated connections to complete tasks. Typical of the edge of coverage and impacted by vegetation, buildings and building materials.
-  **Black Spot:** - where internet connectivity is not achievable. Also where the latency test may work but the download or upload is unable to be completed.

The final three are considered to be a priority for improved coverage/capacity to deliver the economic and community objectives of the local government and regional organisations.

The Network Performance Tests are sited to evaluate the performance of specific carrier sites and, where possible, also test spectrum performance. The Network Performance Tests (NPTs) are completed to validate the Signal Strength results and to challenge the carrier network with download, upload and network response time. This test methodology reflects a real world scenario for a user, downloading a 7.5Mb item and uploading a 5Mb item. Both tests are aggregated into a score as seen in Table 2 below.

Table 7: Network Performance Test Scores

Score	Latency/Ping (ms)	Download Speed (in Mbps)	Upload Speed (in Mbps)
0	0	0	0
1	2000+	0.01 – 0.25	0.01-0.249
2	1500-1999	0.26-0.50	0.250-0.500
3	1200-1499	0.51- 0.99	0.500-0.749
4	1000-1199	1.00 -1.99	0.750-0.99
5	800-999	2.00 -2.99	1.00-1.99
6	600-799	3.00 – 3.99	2.00-2.49
7	500-599	4.00 – 4.99	2.50-4.99
8	300-499	5.00 – 9.99	5.00-7.49
9	200-299	10.00 – 19.99	7.50-9.99
10	100-199	20.00 – 49.99	10.00-14.99
11	75-99	50.00-74.99	15.00-19.99
12	50-74	75.00-99.99	20.00-29.99
13	30-49	100-124.99	30.00-39.99
14	20-29	125-149.99	40.00-49.99
15	Less than 20	150 +	50+

Table 8: Consolidated Network Performance Test Scores

Network Performance Test Results N=316	Telstra 3G		Telstra 4G		Optus 3G		Optus 4G		Vodafone 3G		Vodafone 4G	
Hot Spot	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Very High	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
High	6	1.90	23	7.28	10	3.16	25	7.91	12	3.80	28	8.86
Acceptable	46	14.56	29	9.18	27	8.54	10	3.16	20	6.33	7	2.22
Low	33	10.44	20	6.33	14	4.43	8	2.53	10	3.16	6	1.90
Very Low	17	5.38	4	1.27	1	0.32	0	0.00	3	0.95	0	0.00
Black Spot	214	67.72	240	75.95	264	83.54	273	86.39	271	85.76	275	87.03

Consistent with the signal strength tests, The NPT results show extensive non coverage Black Spots and very low numbers of positive network performance for all three carriers. The distance between towers was compounded by the time to connect to the internet via the carrier core networks. Locations that normally achieved a sustained connection failed on the upload due to timeouts caused by generally very poor latency in the remote locations.

Across the entire region and all tests, Telstra had the lowest number of Black Spots with 67% and 76% for 3G and 4G respectively. Optus and Vodafone were an equal second, a considerable air gap behind Telstra. They were within a few percentage points including both 3G and 4G.

The best way to visualise the pervasive nature of the black spots and very poor results is to look at the black and red in Attachment 2. This is the full table of results for all 316 locations including both 3G and 4G

Moving from the lower end of the table, the performance of Optus and Vodafone is equivalent or in some areas stronger than Telstra - around the coastal, urban centres from Ingham north to Mossman and in parts of the Atherton Tablelands. Telstra's results are more balanced – reflecting their more consistent coverage, whereas Optus and Vodafone have more results in the green “high” category.

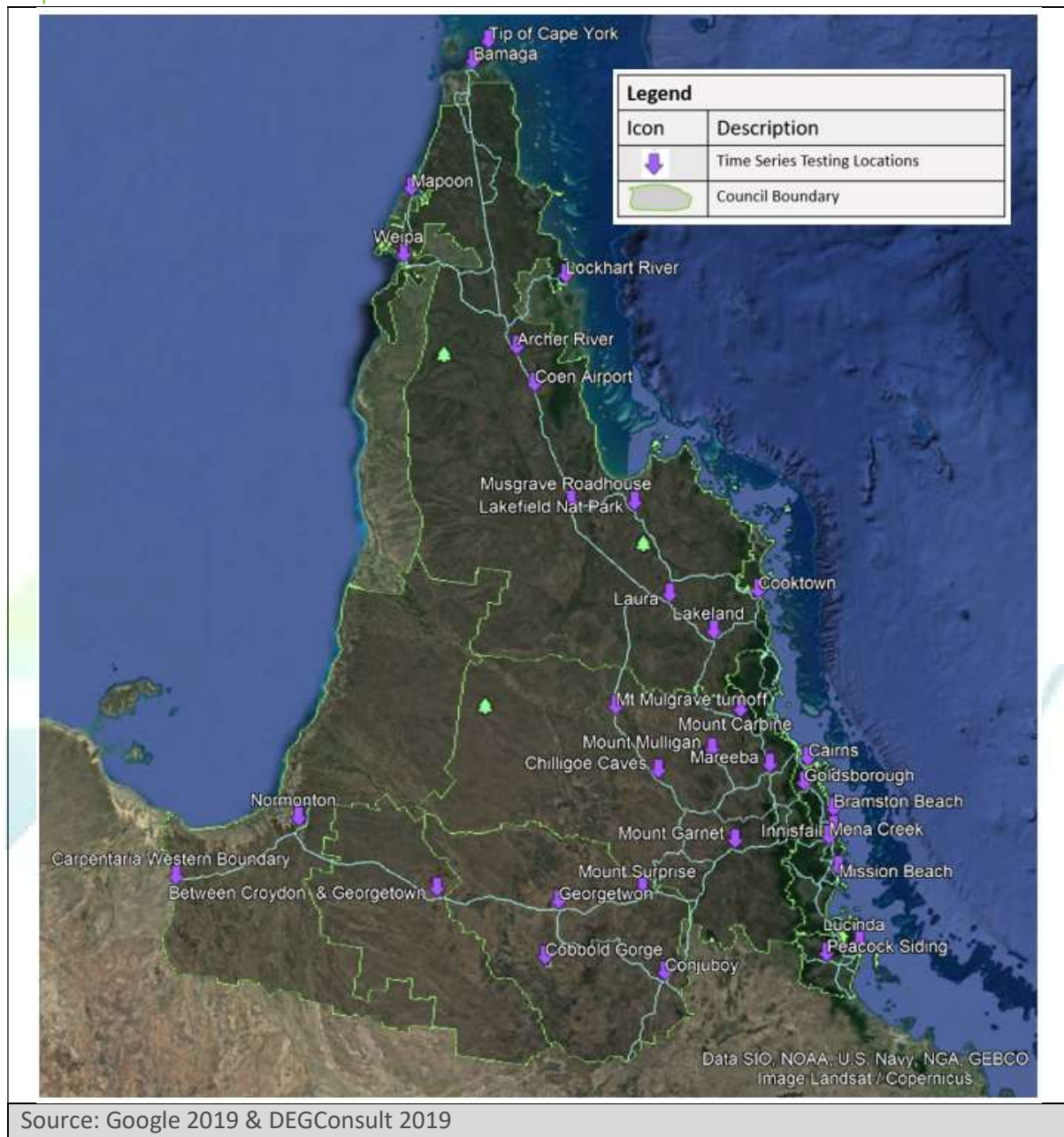
Overall the Network Performance Tests reinforce the message illustrated by the Signal Strength results as discussed above.

Time Series Tests Results

Carriers will seek to challenge the Network Performance Test (NPTs) results as examples of a point in time when the network was under extreme pressure and therefore not a true representation of day to day experience. The Time Series Test, where we complete 10 NPTs in a row, is done in approximately 10% of NPT locations validating the individual results and give insight into the network under pressure. For FNQROC, 33 individual locations were tested for both 3G and 4G and each carrier generating a total of 1,980 data points.

The identified locations for TST testing (refer Map 4) have been selected to test and highlight the network performance in a mix of towns and mid-point locations towards the edge of published coverage areas.

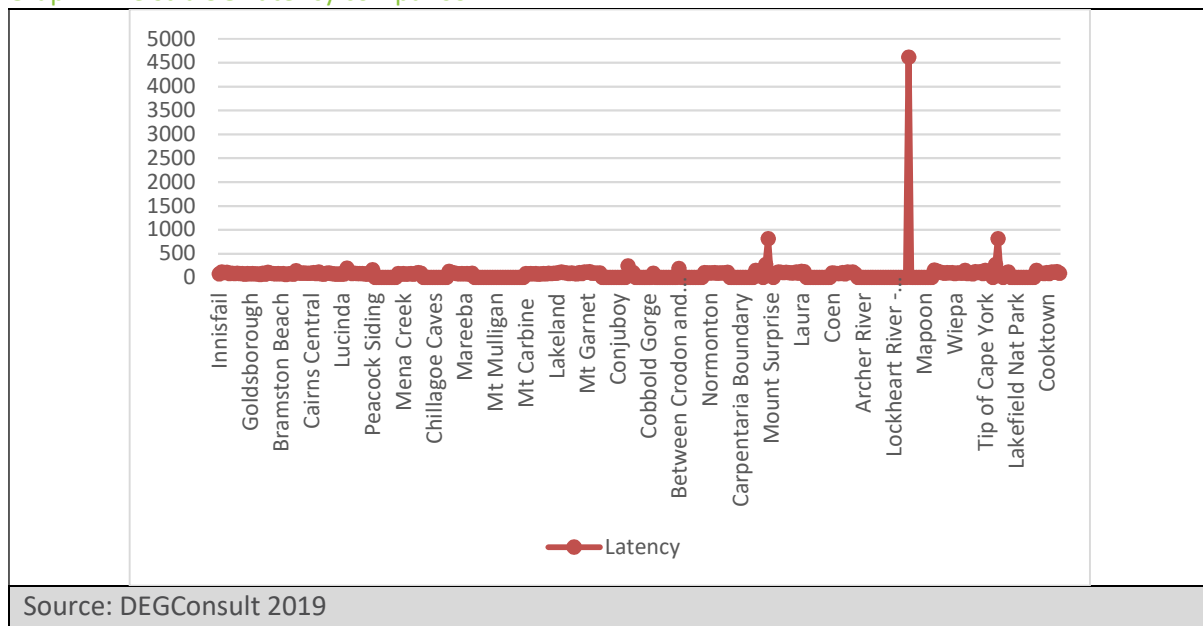
Map 8: Time Series Test Locations



Latency is a key determinant of the network performance. You can have a strong signal from the local tower to your device but still have a poor user experience due to the time to connect the internet for calls or data.

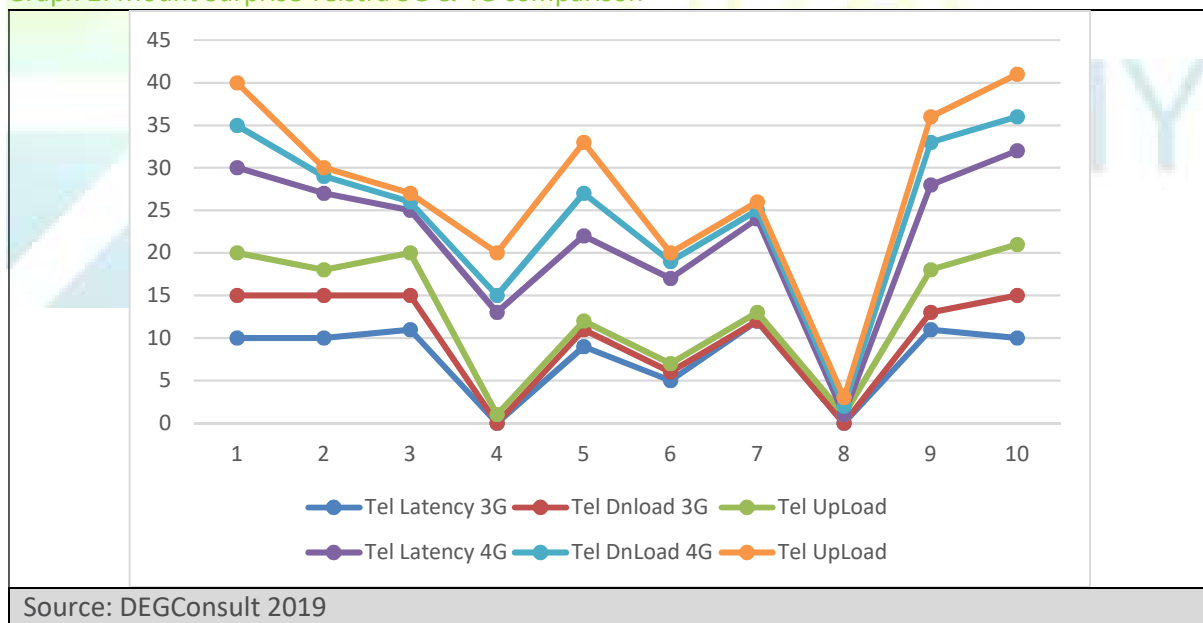
Telstra has the poorest performing results for latency, however that is a direct correlation to the extent of coverage they provide over FNQ. Their lowest latency result was 61 and highest 4,611 (at Lockhart River). In contrast, Optus and Vodafone have maximum latency scores of 83ms and 70ms respectively. The Telstra site in Lockhart River is not currently connected to their network by optic fibre and the microwave backhaul tower is still being rebuilt following previous cyclonic events. Other locations affected by the microwave backhaul challenge are Mount Surprise and the Tip of Cape York. See Graph 1 below.

Graph 1: Telstra 3G Latency comparison



Several locations provided mixed results. The example below (Graph 2) of Mount Surprise shows how over approx. 10mins network performance can vary significantly.

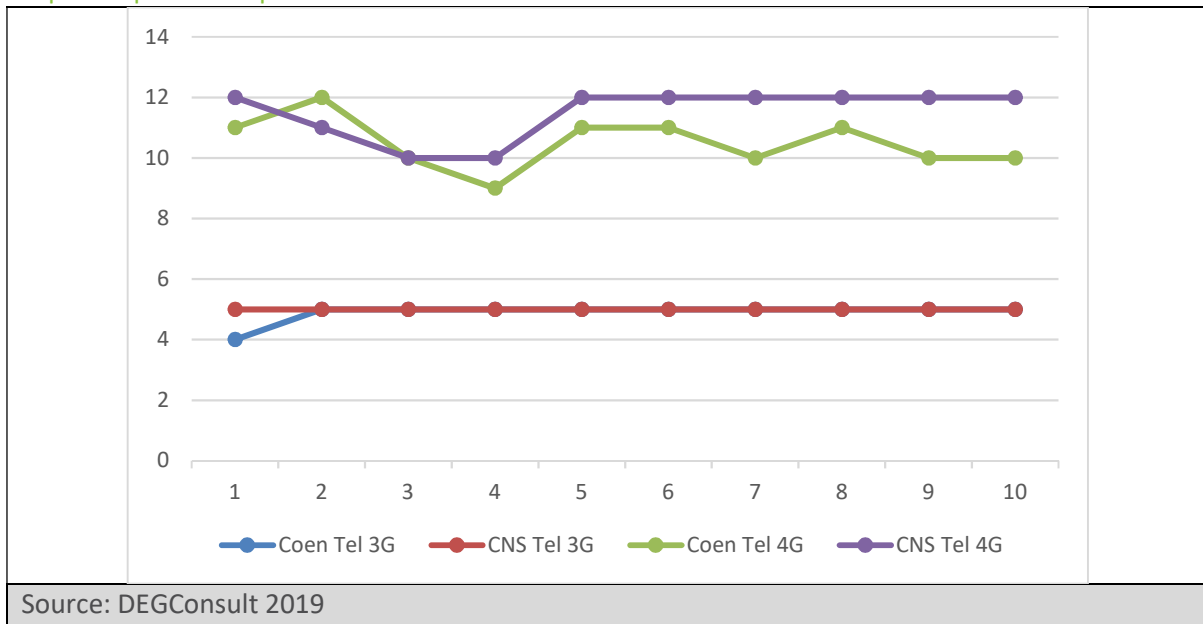
Graph 2: Mount Surprise Telstra 3G & 4G comparison



Comparing upload speeds of 3G and 4G highlights the value of 4G where it is available. The comparison below (Graph 3) uses just Telstra 3G and 4G shows the 3G upload speeds in Cairns and Coen as within the same band. The contrast with 4G is dramatic – 4G upload is slower than in Cairns, however the improvement for both on 3G is significant.

Strong upload speeds support businesses who use cloud-based systems and tourists who want to be able to upload images and videos showcasing the highlights of their travels. Advocacy for network upgrades to 4G are vital to reduce the digital divide. As 5G continues to roll out, the gap between urban centres and rural remote will increase.

Graph 3: Upload comparison 3G & 4G for Telstra for Cairns and Coen




Priority locations and Recommended Actions

Shortlisting priority locations where there are so many potential candidates is extremely difficult and will need active local involvement to shortlist based on local priorities.

The following framework and targets have been used as a filter to inform an initial priority list and associated proposed actions:

1. Mobile Black Spot Program - Current

a) Residential and business communities not currently serviced – target 100%

-  Examples include Einasleigh, Conjubouy, Petford, Carrington, Cardstone Weir, Cardstone, Palmerston, Upper Stone, Palmer River Roadhouse, Desailly, Rossville, Cow Bay, Diwan, Thornton Beach, Cape Tribulation, Hann River Roadhouse, Musgrave Roadhouse, Archer River Roadhouse, Mission River, Bramwell Junction Roadhouse


b) Agricultural Stations - In addition to the station residence there are often workers on site and increasingly tourism related visits or simply through traffic

-  Examples include: - Lyndhurst, Inverleigh, Fairlight Outstation, Batavia Downs.

c) Tourism locations – target 100%


-  Examples include: - Chillagoe Caves and Cobbold Gorge, Mount Mulligan, Wallaman, Chuulangun Campground, Moreton Telegraph Station, Punsand.

d) Selected national park sites – target 50% in 5 years:


-  Examples include: - Ranger facilities in Lakefield National Park, Chilli Beach in Iron Range National Park, Morehead River Crossing -Lakefield National Park

e) Key sites in times of natural disaster – floods, cyclones and fires – target 50% within 5 years



Major river crossings are key to reopening the major transport routes and status of the bridges and causeways. Many already have remote monitoring. Expanding these and providing mobile small cell connectivity could provide for contact where it is likely to be needed. An example location already selected and serviced is Gilbert River crossing on Gulf Developmental Rd.

-  Examples include: - Leichardt River Crossing, Copperfield River Crossing, Kennedy River Crossing



f) Identify acceptable distances without any mobile coverage – target mobile coverage minimum every 100kms within 5 years and ever 50kms within 10 years

-  Consider the potential to use existing microwave backhaul towers. These are scattered across the FNQ region and represent an option given they are existing towers, have power and backhaul already. Progress on this can be made through a dialogue with primarily Telstra, but also Optus and Vodafone



2. Mobile Black Spot Program (MBSP) Policy and Advocacy


- a) Seek the continuation and expansion of the MBSP
- b) Consider ways to influence both criteria and connectivity mechanisms of the MBSP:
 -  Criteria - The criteria for the MBSP has led to some areas with comparatively higher levels of coverage achieving funding reflective of providing an even spread of spending nationally to on an eligible electorate basis. Electorates are based on population which immediately impacts FNQROC disproportionately.
 -  Connectivity mechanisms - Currently the MBSP supports macro towers and small cell sites to be delivered by a carrier. There are several ways of adapting the program to deliver greater coverage using changes to policy/legislation or methods of delivering connectivity. If FNQROC adds its voice to the national dialogue, significant advances may be made for the region without significant cost. Examples of this include:
 - Use of satellite to provide the backhaul for remotely located macro and small cells. Lag or latency would potentially still be an issue but an improvement from Black Spot to acceptable standards would be a marked improvement. Note this is not using satellite phones but normal phones connected to calls serviced by a satellite service.
 - A more contentious approach would be to advocate in remote locations for the existing carriers to service the other two carrier network services. This would be a new form of roaming but introduced at the core and not be intended to add cost to the end user in these locations. This may be applied to future rounds to drive community benefit further.

3. Carrier network upgrades – locally, back haul and the core

- a) Work with Carriers to seek to have local access locations upgraded to 4G and 3G maintained, unless 4G provides same or better coverage
- a) Backhaul and core network upgrades and development to reduce the lag (time distance) to their core.
 -  Optic Fibre backhaul to all local access sites. Eg. currently – according to local advice Lockhart River is not currently serviced by optic fibre. The latency results there reflect this and serves as an immediate win for that, if implemented.
 -  FNQROC exec to meet with all three carriers to understand their network status and upgrade plans. What partnership opportunities can help accelerate the private sector investment?

Note: Carriers look to councils for two key types of support:

-  The first and most important is facilitation through the approvals process. Councils need to see the investment in new mobile sites (upwards of \$800,000 per site) in the same way that a development application delivering new employment or business growth gets support.
-  The second is the support where leases are required for use of council owned or controlled land. Often legal firms acting for councils or councils' own representatives do not seek to facilitate the timely completion of a standard legal agreement. Each protracted completion or delay creates a reputation profile for the local government.




-  Carriers enter a more productive dialogue when a local government or Regional Organisation of Councils has independently tested blackspot mapping and have a strong knowledge of the digital infrastructure of the area. Carriers ultimately have many sites in various locations and jurisdictions. Locations where approvals and leases are completed easily will have networks established faster and sooner.

4. Non-Carrier Internet of things networks

For and with industry, business- establish a baseline of current coverage in Internet of Things, Smart Cities and connectivity innovation through wireless networks such as NBIoT, LoRaWAN, SigFox and others Narrow Band low power wide area networks.

5. Consider the development of a strategic Action Plan

Successful regions have used mobile coverage reporting to inform and implement a long-term strategic action plan covering five key areas (refer to Attachment 3 for an expanded version for consideration):

- a) Target proportionate Mobile Black Spot Program Funding commensurate with the extensive Black Spots in the region. This involves sustained policy prioritisation and active political advocacy with federal and state governments
- b) Partner with the three carriers to identify their priorities and FNQROC needs, focusing on:
 -  Mobile Black Spot Funding locations
 -  Local access network upgrades and spectrum development
 -  Backhaul and core network upgrades and development to reduce the lag (time distance) to their core
- c) Partner with your regional industry and businesses to increase awareness, skilling and demand for digital connectivity.
- d) Facilitate digital connectivity via emerging carrier and non-carrier systems that deliver wider coverage for the Internet of things and devices.
- e) Build and maintain local capability to underpin the strategic action plan. Invest in relevant experienced staff to provide a consistent core officer level and capacity to build relationships and deliver outcomes. Maintain regular updates to the current baseline to inform and drive the evolving priorities. Encourage Councils and industry to undertake localised testing to build out the coverage picture for their own area.

Conclusion

Having the mobile broadband black spots independently tested and mapped is the first step towards improving the mobile broadband basis for a strong digital economy. In the same way that local governments know, understand, and seek funding for priority infrastructure in their area, carrier network infrastructure is also critical.

By actively pursuing the existing funding programs and working in partnership with the carriers, industry and other levels of government, FNQROC will be in a good position to improve coverage and close the digital divide.

Attachments

Attachment 1: FNQROC_MobileCoverage_Final.kmz

Note1: Separate Google Earth File

Note 2: includes the following sub files:

- Final Driven
- Final 3G Blackspots
- Final 4G Black Spots
- Towns and Points
- Mobile Black Spot Program Sites – Rounds 1-4
- FNQROC Local Government Boundaries
- Network Performance Test Locations (approx.)
- Time Series Test Locations



Attachment 2: Detailed Network Performance Test Scores by location including both 3G and 4G

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Cairns Central	10	8	5	11	9	12	12	8	8	12	9	12	12	6	7	12	9	13
Edmonton	11	8	5	12	5	10	12	8	8	12	9	8	11	8	5	12	1	8
Goldsborough	10	8	7	11	8	10	0	0	0	0	0	0	0	0	0	0	0	0
Lake Eacham	11	6	5	12	8	5	0	0	0	0	0	0	12	3	4	12	9	5
Gordonvale	10	8	5	11	8	11	12	8	7	13	10	9	0	0	0	12	5	10
Fishery Falls	7	2	6	11	7	3	10	5	2	0	0	0	11	6	5	0	0	0
Babinda	10	3	5	10	3	7	12	8	7	12	5	5	12	8	7	13	10	11
Bramston Beach	10	10	11	10	10	11	0	0	0	0	0	0	12	8	7	13	10	12
Garradunga	10	5	4	11	5	7	0	0	0	11	4	5	12	7	3	12	10	7
Flying Fish Point	10	9	7	12	8	3	12	9	8	13	9	8	12	6	5	11	5	5
Bartle Frere	10	6	5	11	8	5	12	8	8	13	9	8	0	0	0	12	7	7
Innisfail	10	8	4	11	8	10	10	9	8	12	7	10	12	9	7	13	10	11
Mourilyan	10	8	6	11	9	9	12	8	6	12	9	7	12	8	5	13	9	4
Silkwood	10	5	3	8	2	2	11	8	3	0	0	0	12	8	7	13	9	7
Mission Beach	10	8	6	11	8	4	12	6	7	12	6	8	12	6	6	12	6	8
South Mission	12	7	3	10	7	5	12	8	7	12	10	12	12	8	7	13	10	12
Tully	10	8	5	11	8	4	12	9	8	12	9	9	13	9	7	13	10	12
Dingo Pocket	11	8	7	11	8	5	12	9	7	12	10	12	12	9	7	13	10	12
Upper Cardstone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardstone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tully West	11	8	5	11	9	9	9	4	2	12	9	9	12	9	5	13	9	9
Kennedy	11	3	2	0	0	0	12	8	8	12	10	8	12	8	7	12	9	11
Cardwell1	10	2	1	11	8	9	10	9	5	12	9	9	12	8	7	12	9	10

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Cardwell2	11	6	3	11	4	3	12	8	7	12	8	5	0	0	0	12	8	5
Rungo	11	8	4	10	8	4	11	8	1	0	0	0	0	0	0	12	8	6
Bemerside	12	4	3	12	4	3	12	8	8	13	9	8	12	8	5	13	10	12
Lucinda	12	8	7	12	4	5	0	0	0	0	0	0	0	0	0	0	0	0
Forrest Beach	11	4	2	11	4	2	10	4	2	10	4	2	12	8	6	13	10	8
Helens Hill Sth	11	3	7	11	9	9	12	8	8	13	8	6	9	3	1	12	8	1
Bambaro	12	9	12	12	9	12	12	8	7	13	10	10	12	8	7	13	10	11
Sth Boundary	11	8	5	12	8	5	12	8	6	13	8	5	12	5	4	12	6	7
Ingham	10	8	6	11	8	7	12	8	7	12	9	10	13	10	7	13	10	12
Peacock Siding	12	9	5	10	3	2	0	0	0	0	0	0	12	8	2	0	0	0
Ingham West (Trebonne)	10	5	1	12	9	8	0	0	0	10	8	6	0	0	0	0	0	0
Wallaman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Stone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mountain Range	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Fox	11	6	3	10	7	5	0	0	0	0	0	0	0	0	0	0	0	0
Sth West Bdy	10	7	5	12	8	3	0	0	0	0	0	0	0	0	0	0	0	0
Birkalla Nth	11	3	7	11	9	12	0	0	0	0	0	0	0	0	0	13	9	11
Japoonvale	11	5	3	11	9	10	0	0	0	0	0	0	0	0	0	13	10	12
Mena Creek	12	8	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coorumba	11	8	4	12	10	8	0	0	0	0	0	0	0	0	0	0	0	0
East Palmerston	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmerston	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mungalli	9	4	5	11	8	7	0	0	0	0	0	0	10	5	2	13	9	7
Mid Milla Ravenshoe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Ravenshoe east	12	8	3	12	8	4	0	0	0	0	0	0	11	8	7	0	0	0
Milla Milla +10 to Atherton	11	5	5	11	8	11	0	0	0	0	0	0	12	8	7	12	10	11
Atherton	11	8	5	12	10	12	11	6	7	10	6	5	12	9	7	12	8	10
Herberton	8	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Watsonville	10	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Irvinebank East	11	8	7	11	9	12	0	0	0	0	0	0	0	0	0	0	0	0
Irvinebank West +10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Irvinebank West +17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Almaden	0	0	0	6	10	12	0	0	0	0	0	0	0	0	0	0	0	0
Chillagoe Sth 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chillagoe	11	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chllagoe +15 (Caves)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chilagoe 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chillagoe +35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chillagoe +45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chillagoe +55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chillagoe +65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chillagoe +75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dixie Rd Turn off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 to Dimbulah (West)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dimbulah	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 to Mt Mulligan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 to Mt Mulligan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Mt Mulligan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 to Mareeba	12	5	2	12	6	5	0	0	0	0	0	0	11	5	7	0	0	0
Mareeba	10	4	3	12	4	5	11	5	8	11	5	8	12	9	7	0	0	0
Mareeba + 15 Nth	11	7	3	11	8	7	0	0	0	0	0	0	10	4	4	12	8	6
Mount Molloy	11	7	6	10	9	9	0	0	0	0	0	0	12	6	7	0	0	0
Mount Molloy + 15 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Carbine	11	8	5	11	8	5	0	0	0	0	0	0	0	0	0	0	0	0
Mount Carbine + 15 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Carbine + 30 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Carbine + 45 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Carbine + 60 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Carbine + 75 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Carbine + 90 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Carbine + 105 Nth	10	5	4	11	5	5	0	0	0	0	0	0	0	0	0	0	0	0
Lakeland	11	5	4	11	6	5	0	0	0	0	0	0	0	0	0	0	0	0
Lakeland +15 to Ctown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakeland +30 to Ctown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakeland +45 to Ctown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bloomfield 25 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bloomfield 15 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bloomfield 10 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bloomfield Airstrip	11	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bloomfield 7 Sth	0	0	0	11	9	7	0	0	0	0	0	0	0	0	0	0	0	0
Wujal Wujal	10	7	4	11	6	3	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Bloomfield Track 10 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bloomfield Track 20 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bloomfield Track 25 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cape Tribulation Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cow Bay Nth	11	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daintree River Ferry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wonga Beach	10	8	3	10	8	10	0	0	0	0	0	0	11	8	5	12	10	9
Mossman	10	6	1	10	9	10	12	8	8	12	8	8	12	9	7	13	10	13
Julatten East	11	8	6	0	0	0	11	8	5	0	0	0	12	8	5	0	0	0
Port Douglas	11	9	6	11	8	10	12	6	7	12	9	11	12	9	7	12	10	13
Wangetti Nth	10	3	1	0	0	0	11	4	5	0	0	0	0	0	0	0	0	0
Clifton Beach	12	8	2	0	0	0	11	4	6	12	8	5	12	9	7	13	10	13
Smithfield	11	7	3	0	0	0	12	6	7	12	9	10	12	8	7	13	10	13
Manunda	10	6	7	0	0	0	12	6	7	12	8	6	11	5	5	12	1	3
10 to Kuranda mid-range	10	3	3	0	0	0	11	8	8	0	0	0	11	7	5	12	6	7
Speewah	11	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mareeba 15 East	10	3	2	0	0	0	0	0	0	0	0	0	11	3	6	0	0	0
Mareeba 15 Sth	11	8	2	0	0	0	12	8	7	12	9	10	0	0	0	0	0	0
Atherton 12 Sth to Rhoe	10	5	4	10	6	5	11	6	6	12	6	9	0	0	0	0	0	0
Atherton 24 Sth to Rhoe	11	4	2	0	0	0	11	6	7	12	5	8	0	0	0	0	0	0
Atherton 36 Sth to Rhoe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ravenshoe	11	8	5	12	8	5	12	8	7	13	10	12	0	0	0	0	0	0
Ravenshoe 15 West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mt Garnet	11	7	4	11	6	4	12	9	7	13	9	8	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Mt Garnet 12 SW	1	2	6	0	0	0	1	7		0	0	0	0	0	0	0	0	0
Munderra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Munderra +15 West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130 to Conjuboy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115 to Conjuboy	11	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100 to Conjuboy	7	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85 to Conjuboy	10	7	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70 to Conjuboy	10	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55 to Conjuboy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40 to Conjuboy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 to Conjuboy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 to Conjuboy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conjuboy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conjuboy +15 to Greenvale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conjuboy +10 towards Hughenden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conjuboy +35 towards Hughenden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conjuboy +70 towards Hughenden	0	0	0	6	10	11	0	0	0	0	0	0	0	0	0	0	0	0
Conjuboy +100 towards Hughenden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cboy t+10 to Forsyth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cboy t+25 to Forsyth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einasleigh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einasleigh +15 to Forsyth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forsyth	7	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forsyth +15 to Cobbold Gorge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Forsyth +30 to Cobbold Gorge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cobbold Gorge	7	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forsyth +15 to Georgetown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Georgetown	11	6	4	11	5	4	10	9	11	0	0	0	0	0	0	0	0	0
120 to Croydon- East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100 to Croydon - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80 to Croydon - East	10	8	7	10	8	6	0	0	0	0	0	0	0	0	0	0	0	0
60 to Croydon - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40 to Croydon - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 to Croydon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Croydon	10	4	1	11	4	4	0	0	0	0	0	0	0	0	0	0	0	0
120 to Normonton - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100 to Normonton - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80 to Normonton - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60 to Normonton - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40 to Normonton - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 to Normonton - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Normonton	10	8	4	11	10	11	11	9	7	12	9	12	0	0	0	0	0	0
50 to Karumba - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30 to Karumba - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 to Karumba - East	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Karumba	11	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130 to Carpentaria border	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110 to Carpentaria Border	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
90 to Carpentaria border	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70 to Carpentaria border	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 to Carpentaria border	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30 to Carpentaria Border	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 to Carpentaria border	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carpentaria Boundary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gtown +15 to Mt Surprise	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gtown +30 to Mt Surprise	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gtown + 55 to Mt Surprise	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gtown + 75 to Mt Surprise	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gtown to MrGarnet Rd +15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gtown to MrGarnet Rd +30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mt Surprise	11	6	4	11	6	4	0	0	0	0	0	0	0	0	0	0	0	0
Springfield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fossilbrook - East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fossilbrook - East +15 towards Almaden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fossilbrook - East +30 towards Almaden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barwidgi - Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakeland +15 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakeland +30 Nth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakeland +45 Nth	10	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laura	10	8	5	10	8	5	0	0	0	0	0	0	0	0	0	0	0	0
Laura East 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Laura East 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laura Nth 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmerville Rd West 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmerville Rd West 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen 220 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen 200 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen 180 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen 160 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Musgrave Roadhouse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen 120 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen 100 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen 80 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen 60 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen 40 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen 20 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen	11	8	5	10	10	11	0	0	0	0	0	0	0	0	0	0	0	0
Coen Airport	11	7	7	10	9	7	0	0	0	0	0	0	0	0	0	0	0	0
Coen Nth 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen Nth 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen Nth 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archer River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coen Nth 100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75 to Lockart River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 to Lockhart River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
25 to Lockhart River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 To Lockhart River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chilli Beach Lockhart River turn off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chilli Beach	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Accom 10k to Lockhart River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lloyd Bay Lockhart River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Penn Dev Rd & Old telegraph Rd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wiepa 130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wiepa 115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wiepa 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wiepa 85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wiepa 70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wiepa 55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wiepa 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mision River/RAAF Base	10	8	5	0	0	0	10	3	1	0	0	0	0	0	0	0	0	0
Nanum, Wiepa	5	6	1	10	6	2	11	8	7	12	9	7	0	0	0	0	0	0
65 to Mapoon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 to Mapoon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35 to Mapoon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 to Mapoon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 to Mapoon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mapoon	8	2	1	6	3	1	0	0	0	0	0	0	0	0	0	0	0	0
Tunding, Wiepa	9	5	2	11	8	11	11	8	7	0	0	0	0	0	0	0	0	0
Batavia Downs 30 West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Batavia Downs 15 West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs/ Peninsular Dev Rd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 210	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs Nth 240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jardine River Ferry	8	6	1	10	5	1	0	0	0	0	0	0	0	0	0	0	0	0
Jardine River Nth 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Injinoo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Siesia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bamaga Airport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bamaga Fuel Airport Rd	11	6	5	11	10	12	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Bamaga - Tip 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Punsand Turn off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Somerset Turn off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tip of Cape York	8	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Punsand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs 10 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs 20 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs 30 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia Downs 40 Sth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakefield/Cooktown 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakefield/Cooktown 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakefield/Cooktown 45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakefield/Cooktown 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakefield/Cooktown 75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakefield/Cooktown90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakefield/Cooktown 105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakefield/Cooktown 120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakefield/Cooktown 135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Laura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HopeVale Cooktown 150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HopeVale Cooktown 165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HopeVale Cooktown 180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HopeVale Cooktown 195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HopeVale Cooktown 210	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
HopeVale Cooktown 225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HopeVale Cooktown 240	0	0	0	11	5	7	0	0	0	0	0	0	0	0	0	0	0	0
HopeVale Cooktown 255	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HopeVale Cooktown 270	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cooktown	11	8	4	10	10	12	11	9	7	11	9	7	0	0	0	0	0	0
Lakeland to Cooktown -12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lakeland to Cooktown -24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 to Daintree East	0	0	0	0	0	0	10	5	6	0	0	0	0	0	0	0	0	0
Daintree	10	7	2	0	0	0	12	9	6	12	9	10	0	0	0	0	0	0
CREB first crossing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barron River Nth CNS	10	9	2	12	9	7	12	8	8	13	10	9	11	8	7	13	8	11
CNS Sheridan Rd nth	10	7	7	10	4	5	12	8	8	13	8	10	12	9	7	13	5	13
CNS Marlin Pde	11	8	5	12	8	7	12	8	10	12	8	10	12	9	7	13	10	13
CREB Track 15 klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CREB Track 15 klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CREB Track 15 klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mt Musgrave to Palmerville Rd - klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mt Musgrave to Palmerville Rd - klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mt Musgrave to Palmerville Rd - klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mt Musgrave to Palmerville Rd - klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mt Musgrave to Palmerville Rd - klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Location	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload	Latency	Dload	Upload
	Telstra 3G			Telstra 4G			Optus 3G			Optus 4G			Vodafone 3G			Vodafone 4G		
Mt Musgrave to Palmerville Rd - klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mt Musgrave to Palmerville Rd - klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Telegraph Track - 15klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Telegraph Track - 15klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Telegraph Track - 15klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Telegraph Track - 15klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Telegraph Track - 15klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Telegraph Track - 15klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Telegraph Track - 15klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Telegraph Track - 15klm spacings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0







Attachment 3: Strategic Action Plan (Proposed)

The following proposed Strategic Action Plan is based on experience with other regional organisations of councils and the characteristics that made individual groups more successful than others in achieving MBSP funding and carrier network upgrades together with the specific context of FNQROC.

Long-term strategic action plan covering five key areas and actions:

1. Political Advocacy and Policy Objectives

Target proportionate Mobile Black Spot Program Funding commensurate with the extensive Black Spots in the region. This involves sustained policy prioritisation and active political advocacy with federal and state governments.

- a. Create 5-minute pitch versions of the report for member councils and representatives meeting with federal, state and carriers.
- b. Build meetings in Canberra, Brisbane and local members with mobile coverage as one of your top 3-5 priorities, including regular updates on progress and setbacks.
- c. Target Mobile Black Spot Program sites based on:
 -  Residential and business communities not currently serviced – target 100%
 -  Tourism locations – target 100%
 -  Key sites in times of natural disaster – floods, cyclones and fires – target 50% within 5 years
 -  Acceptable distances without mobile coverage – target mobile coverage every 100kms within 5 years and every 50kms within 10 years
- d. Mobile Black Spot Program (MBSP) criteria and connectivity mechanisms
 -  Criteria - the criteria for the MBSP has led to some areas with comparatively higher levels of coverage achieving funding reflective of providing an even spread of spending nationally to an eligible electorate basis. Electorates are based on population which immediately impacts FNQROC disproportionality.
 -  Connectivity mechanisms - Currently the MBSP supports macro towers and small cell sites to be delivered by a carrier. There are several ways of adapting the program to deliver greater coverage using changes to policy/legislation or methods of delivering connectivity. If FNQROC adds its voice to the national dialogue, significant advances may be made for the region without significant cost. Examples of this include:
 - Use of satellite to provide the backhaul for remotely located macro and small cells. Lag or latency would potentially still be an issue but an improvement from Black Spot to acceptable standards would be a marked improvement. Note: this is not using satellite phones but terrestrial phones connected to calls serviced by a satellite service.

2. Partner with the Mobile Network Carrier Operator (Telstra, Optus & Vodafone)

- a. Identify their priorities and FNQROC needs, focusing on:



Mobile Black Spot Program locations (as per 1C above)

Mobile Black Spot Program criteria and connectivity mechanisms
(seek to identify potential alignment)

- b. Local access network upgrades and spectrum development
- c. Backhaul and core network upgrades and development to reduce the lag (time distance) to their core

3. Partner with your regional industry and business

- a. increase awareness, skilling and demand for digital connectivity. Education is critical to managing expectations. Awareness and skilling are the first two stages in the process to inform investment by your community in the use of increasingly reliable digital infrastructure and demand for greater, more robust networks.

4. Look beyond traditional mobile coverage to drive IoT connectivity investments

- a. Facilitate digital connectivity via emerging carrier and non-carrier systems that deliver wider coverage for the Internet of things and devices.
- b. Beyond the carrier offerings, there are several alternative providers delivering for industry and councils



Meshed Group www.meshedgroup.com.au

Sigfox Thinxtra www.thinxtra.com/

National Narrowband Network - NNN Co www.nnnco.com.au/

5. Build and maintain local capability

- a. Invest in relevant experienced staff to provide a consistent core and capacity
- b. Build relationships and harness opportunities as they arise to deliver outcomes
- c. Maintain regular updates to the current baseline to inform and drive the evolving priorities
- d. Encourage Councils and industry to undertake localised testing to build out the coverage picture for their own area.