

Remote Area Planning and Development Board

# Mobile Phone and Device Blackspots Connectivity Assessment for RAPAD

Overview Report

1 December 2014

Strategy, Planning & Development   
Implementation Programs   
Research, Analysis & Measurement   
Mobile Coverage Testing   
Digital Mapping 

## Document History

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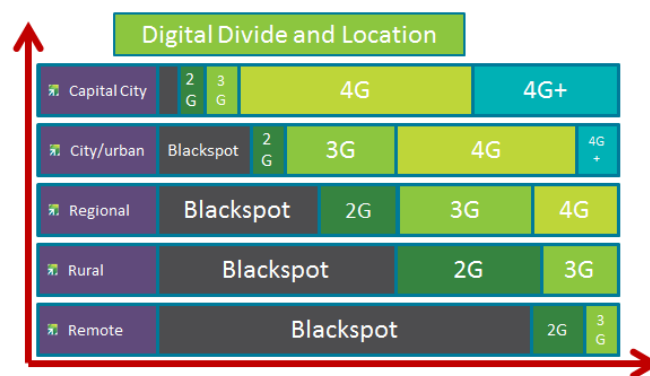
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## 1. Executive Summary

Mobile connectivity, for phone calls and broadband, has become a utility expected by business, residents and the community. 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 blackspots for coverage and rapid deployment of the latest generation of connectivity. On the other side of the ‘Digital Divide’ blackspots form the largest part of the landscape and their townships have technology a generation or two behind.




For RAPAD and the 5 Local Government areas selected to undertake this study, the challenge is to find ways to partner with the three privately owned carriers to reduce the extent of blackspot coverage and increase access to quality internet data transfer speeds. They must seek to drive expanded and advanced deployment of the best generation technology the carriers are prepared to invest in.

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



The Remote Area Planning and Development Board (RAPAD) has engaged the Digital Economy Group (DEG) to benchmark carrier performance and identify priorities to reduce blackspots and improve coverage across the region. This is the overview report for the whole region and draws the key finding of all 5 individual reports together and guides the regional priorities.

This report contains the following three elements:

-  identify the Voice and 3G blackspots,
-  test the network performance to identify where network upgrades are required
-  list the priority locations and short list for Council and the region to pursue

A total of approximately 2,142kms of roads were driven across the entire RAPAD Region. A total of 118 individual Network Performance Tests were also completed to test the validity of the coverage maps and confirm that the signal strength maps translated into actual connectivity. A total of 24 Time Series Network Performance Tests were performed to illustrate the quality of each respective network and associated reliability. The breakdown for each local government area can be seen in the Table below.

Table 1: Overview of test statistics for RAPAD

Local Government	3G & Voice	Network Tests	Time Series Tests
<b>Boulia</b>	228	17	4
<b>Winton</b>	423	20	2
<b>Longreach</b>	585	26	6
<b>Barcaldine</b>	591	35	6
<b>Blackall Tambo</b>	315	20	6
<b>Total</b>	2,142	118	24

*The Priorities and Actions for RAPAD are:*

The key regional priorities for RAPAD and individual councils are to:

- ✓ Short list the priorities in each of the 5 individual local government reports to the top 1 or 2 locations/ outcomes
- ✓ Build relationships with the Carriers using these reports and in partnership, identify the locations where carriers are prepared to build new sites, upgrade existing sites and deploy new spectrum. This can deliver reduced blackspots and improved coverage, competition and capacity
- ✓ Actively pursue the Commonwealth Government’s forthcoming Mobile Coverage Programme as a way to increase coverage beyond current carrier investment plans.
- ✓ Look for ways individually or collectively to share impartial information for the benefit of consumers and business to:
  - 📱 consider which carrier to use
  - 📱 use the best handsets available (for their location)
  - 📱 select technology that is available to amplify signals
  - 📱 consider whole of lifecycle cost for devices and plans

## 2. Introduction

Mobile phone and broadband services continue to be the major growth area of the Australian telecommunications market. Mobile use of the internet for business and personal use is a major influence in this growth.

At the time Australia's population had reached 22.8 million (30 June 2011<sup>1</sup>) there were 29.28 million mobile services (voice and data). Telstra reported recently that 4G data use for Australians was doubling every 4 months and the number of 4G customers had doubled in 6 months.

This is significant for all areas of Australia as the rapid growth is forecast to continue creating a digital divide for those areas where mobile connectivity is reduced or compromised compared with the capital cities.

RAPAD has engaged the Digital Economy Group to complete a Mobile Phone and Device Blackspots Connectivity Assessment for RAPAD. This includes the preparation of individual reports for the 5 local governments of:

- Blackall-Tambo Regional Council
- Winton Shire Council
- Boulia Shire Council
- Barcaldine Regional Council
- Longreach Regional Council

It is intended that this report be read as a companion document to all five individual reports.

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<sup>1</sup> Australian Bureau of Statistics, 2006 Census.

### 3. Methodology

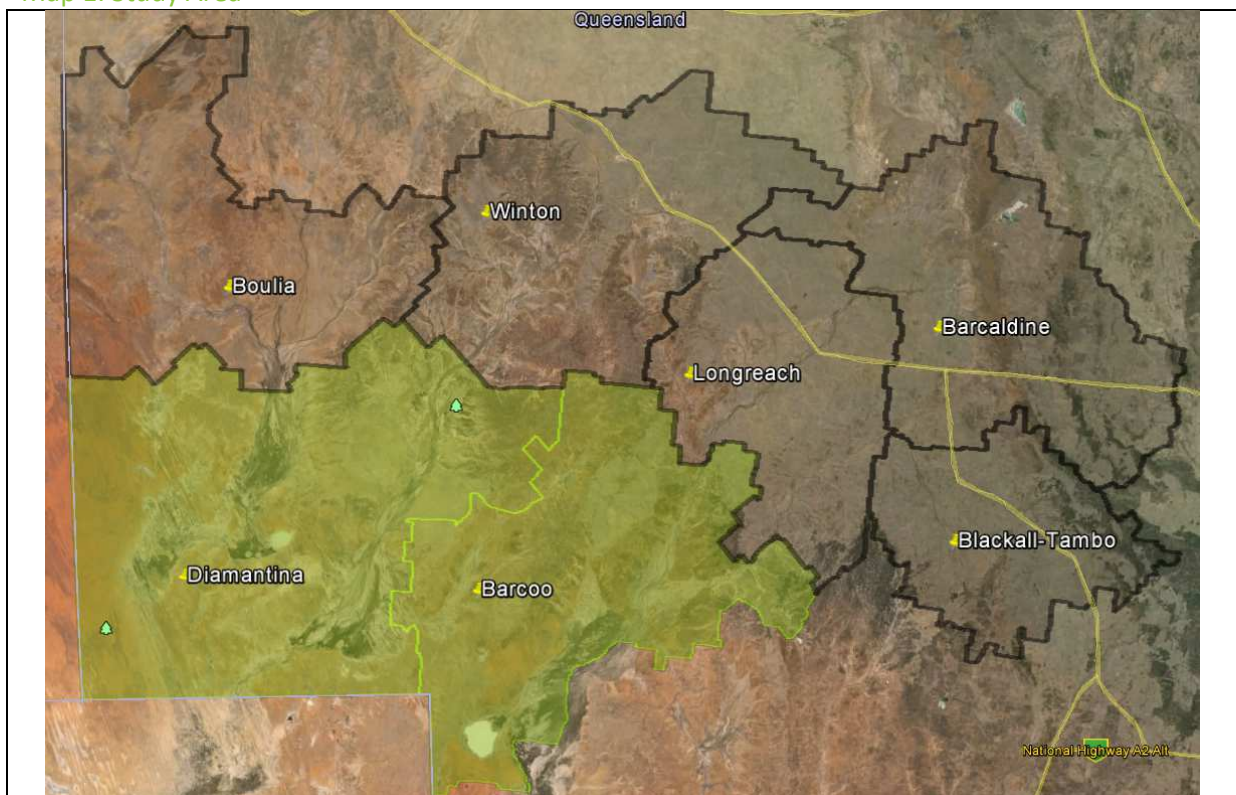
The methodology used by DEG for independent Mobile Coverage Testing (MCT) has been developed over four years of ground proofing and evolving discussions with carriers. The methodology follows six steps:

1. establish the study area
2. capturing current carrier coverage maps
3. create carrier infrastructure maps showing active sites
4. identifying testing routes and site test locations
5. completing the three selected core testing methods:
  - 5.1. signal strength
  - 5.2. network performance and
  - 5.3. time series network performance
6. establish carrier blackspot and determine priority network upgrades
7. providing a localised implementation plan

#### 3.1. The Study Area

The study area for the project covers significant parts of the RAPAD area. The shire councils included (areas outlined in black) consist of Boulia, Winton, Longreach, Barcaldine and Blackall-Tambo. Diamantina and Barcoo (shaded in pale green) were not included in the testing because a project to attract mobile coverage is current and Birdsville is the only town in these local government areas with a (degraded) mobile base station.

Map 1: Study Area



Source: Queensland Local government Boundaries 2014; Google Earth 2014

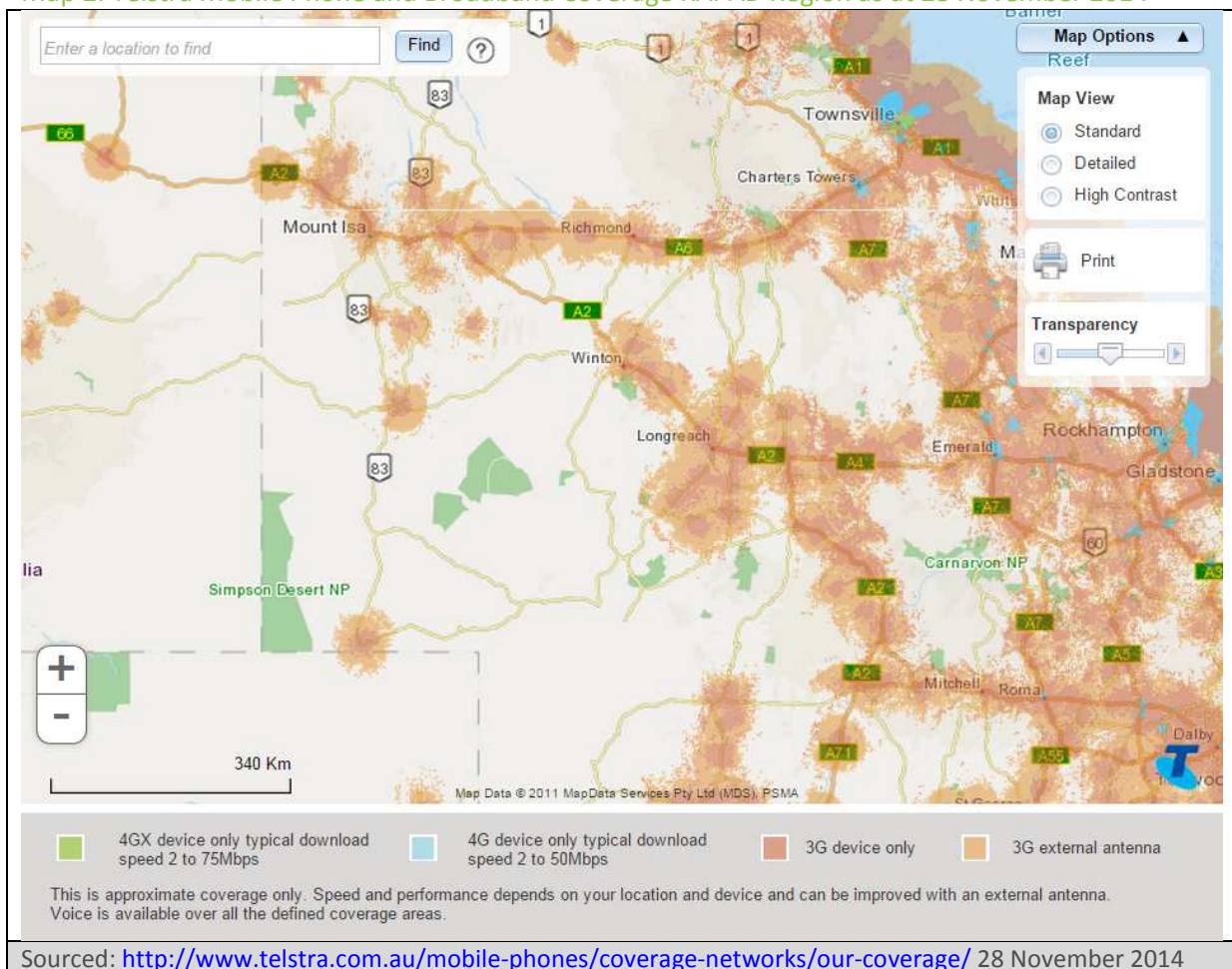


### 3.2. Current Carrier Coverage

Each of the three current active carriers publish indicative mobile broadband coverage maps on their respective websites<sup>2 3 4</sup>. Carrier coverage maps are updated and modified from time to time. The capture of this information allows DEG to establish the baseline coverage for each carrier in each of the 5 individual local government areas. These maps will allow the reader to compare current advertised coverage for each of the carriers as it relates to their own localities. This baseline information is a key reference point for expectations relating to the service levels of each of the carriers.

**Note:** Each of the carriers provides detailed caveats regarding the propagation characteristics of networks and mobile broadband. Current versions of these considerations can be found on the relevant carrier websites as it changes from time to time.

Map 2: Telstra Mobile Phone and Broadband Coverage RAPAD Region as at 28 November 2014



### 3.3 Current Carrier Sites and ACMA Licences overview

All carrier radio licences in Australia are registered and managed by the Australian Communications Media Authority (ACMA). The following map for all 5 local governments tested in RAPAD shows all current active radio licences for Telstra and Optus. Vodafone does not have coverage here. Carriers use different spectrum and technologies to deliver connectivity for mobile phone calls and mobile

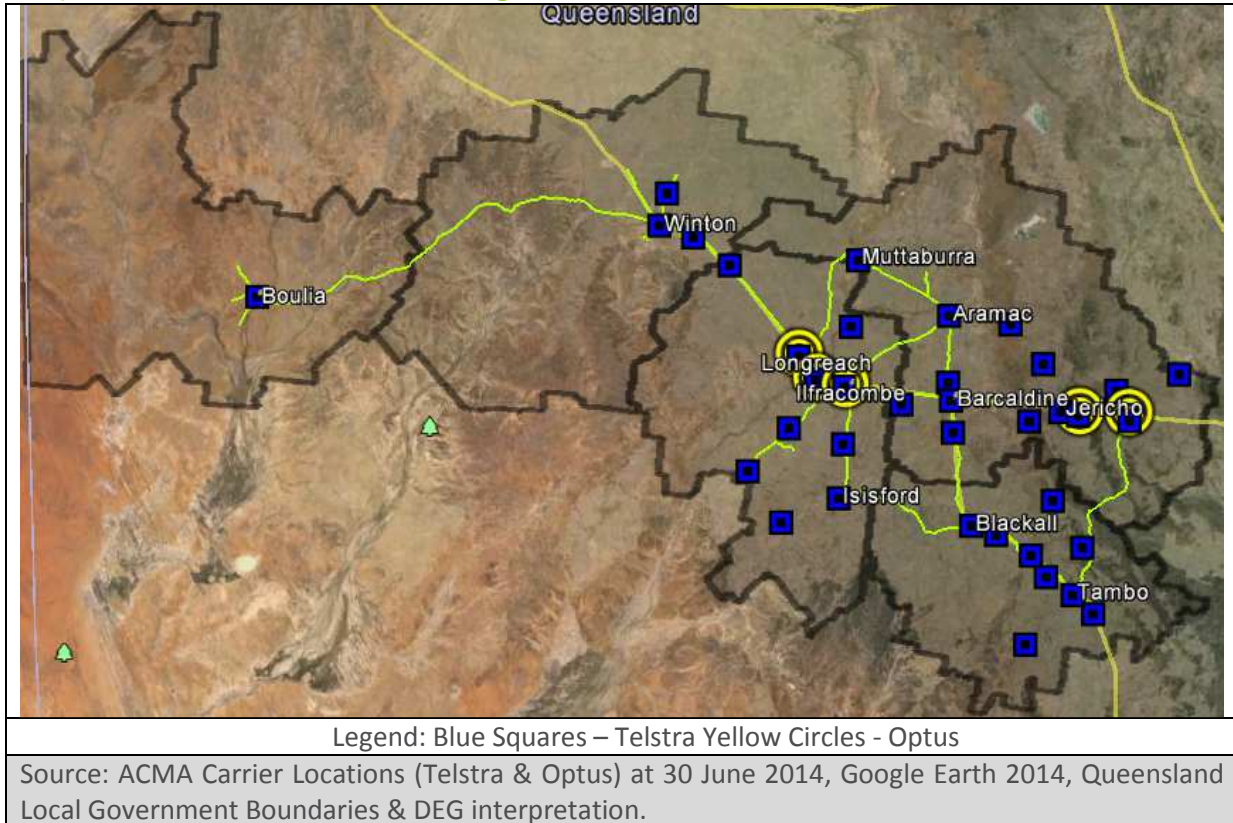
<sup>2</sup> <http://www.telstra.com.au/mobile-phones/coverage-networks/our-coverage/mobile-broadband/>

<sup>3</sup> <http://www.vodafone.com.au/aboutvodafone/network/checker>

<sup>4</sup> <https://www.optus.com.au/network/mobile/coverage>

internet. There is no consistent radius from a site nor can it be expected that every site will generate 360 degree coverage. Local topography and vegetation has a big impact on the ability of a device to secure a signal. Likewise, using a phone or internet connected device indoors can significantly reduce the user experience. Refer Attachment 1 for Maps of Individual Carrier Networks.

Map 3: Current Active Mobile Coverage Sites Carrier Sites – RAPAD



### 3.4 Carrier Baseline

The carrier baseline developed below uses the most recent release of ACMA data (capturing licence information up to the 30<sup>th</sup> June 2014). The full database contains over 30 columns of information and many thousands of licences for all radio frequency licences in Australia. This has been filtered to ensure only the Telstra, Optus and Vodafone radio licence information is used. This is further filtered to remove satellite earth receive and send sites, navigation and aeronautical equipment maintained by these companies.

Mobile broadband networks have two key components. The first is the transmission network, which sends and receives data signals to the site and the second is the local access network – from the user to the tower. The transmission network can be connected to a tower in two ways – either directly by optic fibre or by wireless microwave. Carriers prefer to have optic fibre connectivity for all sites, however, the microwave wireless network is more cost efficient to deploy to distant sites or in locations with relatively small data transfers. In rural areas it is more common to have microwave connectivity.

The transmission network usually consists of two types of set up. Point to point and point to multi point. Locations set up as point to point only are retransmission sites. They therefore have the potential to be upgraded with far less cost than a completely new site. A business case

demonstrating the number of clients served or strategic benefit is still required. Of the three carriers, Telstra has more of these assets than Vodafone and Optus.

The local access network has one or more bands of spectrum deployed based on spectrum for the areas, expected traffic demands on the site and other related factors. Local Access licences breakdown into the bands of spectrum deployed in the area. The acquisition of spectrum is expensive and complex, as parts of Australia are broken into areas including urban and non-urban. Depending on the area and the population, carriers will seek to deploy spectrum to reflect their licences and the strongest attributes to give ‘coverage’ to achieve the best possible results. Having two bands of spectrum deployed across the region is the minimum objective.

The table below identifies the carrier access networks for mobile coverage in each of the relevant RAPAD local governments. The spectrum (referred to as xxxxMhz or 2Ghz) is how the carriers deliver the local access to customer handsets/devices.




**Table 2: Carrier Sites and Spectrum Licences Overview – RAPAD**

Carrier	Barcardine	Blackall Tambo	Bouli	Longreach	Winton	Total Sites
<b>Telstra</b>						
900MHz	0	0	0	3	0	<b>3</b>
2100MHz	13	9	1	10	3	<b>38</b>
2GHz	0	0	0	0	0	<b>0</b>
<b>Total</b>	<b>13</b>	<b>9</b>	<b>1</b>	<b>13</b>	<b>3</b>	<b>41</b>
<b>Optus</b>						
900MHz	3	1	0	4	1	<b>10</b>
2100MHz	0	0	0	3	0	<b>4</b>
2GHz	0	0	0	0	0	<b>0</b>
<b>Total</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>7</b>	<b>1</b>	<b>12</b>
<b>Vodafone</b>						
900MHz	0	0	0	0	0	<b>0</b>
2GHz	0	0	0	0	0	<b>0</b>
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Source: ACMA Radio Frequency Licences (Telstra, Optus & Vodafone) at 30 June 2014, Google Earth 2014, Queensland Local Government Boundaries & DEG interpretation.

### 3.5 Testing Methodology

There are three testing methods used to inform this report:

-  Signal Strength
  - Voice and 3G
  - 4G LTE
-  Network Performance
-  Time Series Network Performance

Each testing method serves to build a comprehensive picture of the service standards from all three carriers and inform the priority builds across the tested area.

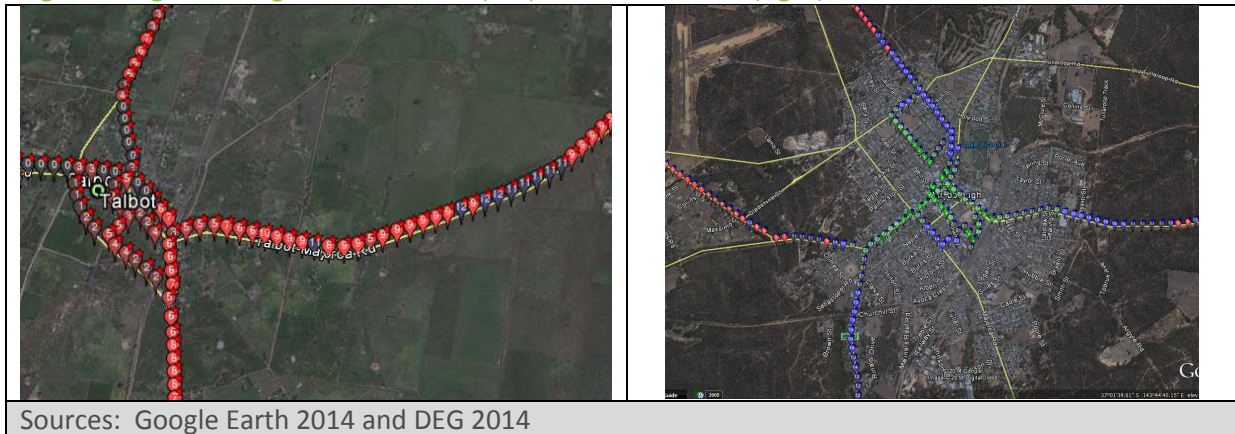


### 3.5.1 Signal Strength testing

The signal strength testing is undertaken for each of the three major carriers: Telstra, Optus and Vodafone. The smart phone devices are typically set to generate markers every 50m.

The tests are exported to a GIS platform to allow a rapid on site assessment of the full range of signal strengths from Low Signal Range to High Signal Range and blackspot locations. This assessment phase also involves a comparison of the test results with the carrier advertised coverage maps. The Signal Strength Test evaluates the strength of the signal from the local tower to the testing location.

Figure 1: Signal Strength – Rural Town (left) & – Town Centre (right)



The Signal Strength Test involves the capture of phone signal strengths from 0 through to 31. Where the signal is zero, a blackspot is registered. The remaining 31 bands are broken into:




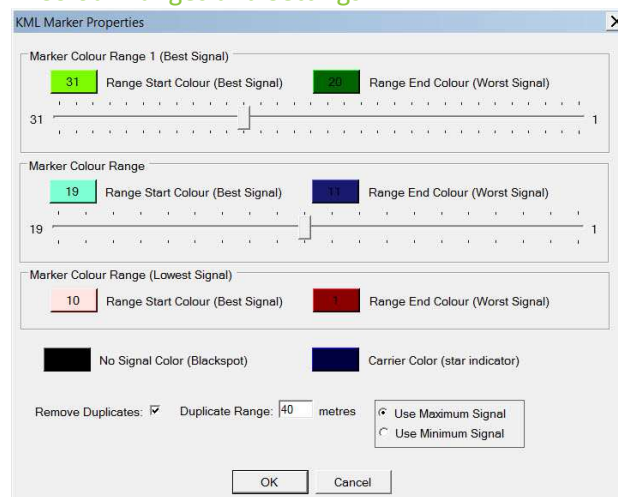
-  1-10 (red shades) as the Low Signal Range, poorest signals
-  11-20 (blue shades) as the Mid Signal Range representing the middle of the spectrum and
-  21-31 (green shades) representing the High Signal Range and the strongest signals possible

Figure 2: Signal Strength – Colour Ranges and Settings



### 3.5.2 Network Performance Tests

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 testing methodology reflects a real world

scenario for a user, downloading a 2Mb item and uploading a 500Kb item. Both tests are aggregated into a score as seen in the Table below.

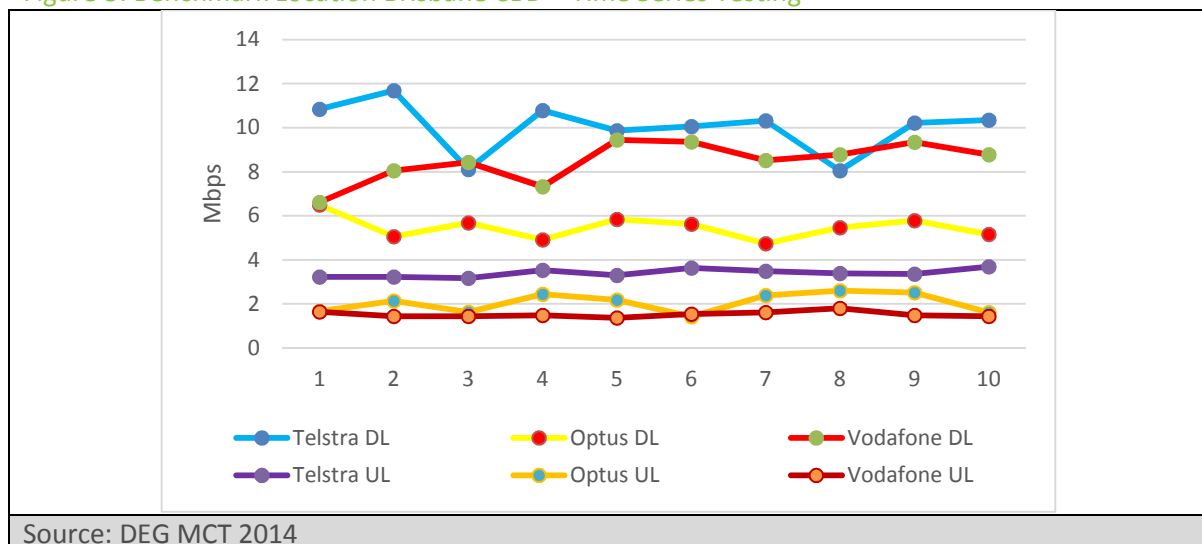
Table 3: Network Performance Test Scores

Score	Latency/Ping (ms)	Download Speed (in Mbps)	Upload Speed (in Mbps)
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+

### 3.5.3 Time Series Network Performance Testing

The primary Time Series Test used in the Mobile Coverage Testing program is 10 Network Performance Tests in a series. This serves to validate the individual Network Performance Tests and puts the individual networks and the devices under a spot light. The overlay of all three carrier test results onto the same graph (sample below) clearly illustrates the network performance over repeated tests.





Figure 3: Benchmark Location Brisbane CBD – Time Series Testing



The Time Series Tests combined with the individual Network Performance Tests establishes a robust profile of the carrier performance confirming strengths and highlights weaknesses.

### 3.5.4 Testing Equipment and Presentation Limitations

While all care is taken to ensure the highest quality data capture and result presentation, there are a number of known limitations:

-  tests are taken at a point in time and repeated tests may show some variation due to network performance, weather and electronic interference. Where Time Series Testing is used, this serves to validate the Network Performance Test results.
-  any network based on radio technology, device quality or local conditions may prevent or interfere with mobile reception within coverage areas. e. g. inside concrete buildings, lift wells, basements, tunnels and road cuttings. High rise buildings may also suffer degradation of service
-  all results are indicative of signal strength at one point in time at any given location from a given provider, are not represented in a time scale over, and therefore are not necessarily representative of the mean signal strength in any place over a given period of time
-  variations between equipment can assist or limit the results. DEG use identical smartphones to remove most of the potential variables.

## 4. Mobile Coverage Testing Results

The Mobile Phone and Device Blackspots Connectivity Assessment for RAPAD highlights the digital divide that the region is seeking to overcome. Telstra has a presence in all of the larger towns but has vast areas of no coverage. Optus is only present in some of the towns. Vodafone does not have a presence. There are no 4G or 4G advanced services in the area. The RAPAD area can be characterised as being Remote when referenced against the Digital Divide and Location Comparison developed by DEG for mobile coverage assessment.

Council and regional stakeholders will need to focus on reducing the extent of mobile phone and mobile broadband blackspot coverage and push for 4G and 4G Advanced services. Capital cities and urban locations may always have another level of technology first, but regions need to push to narrow the divide and remain attractive to retain population and attract new local investment.

Table 4: Digital Divide and Location Comparison

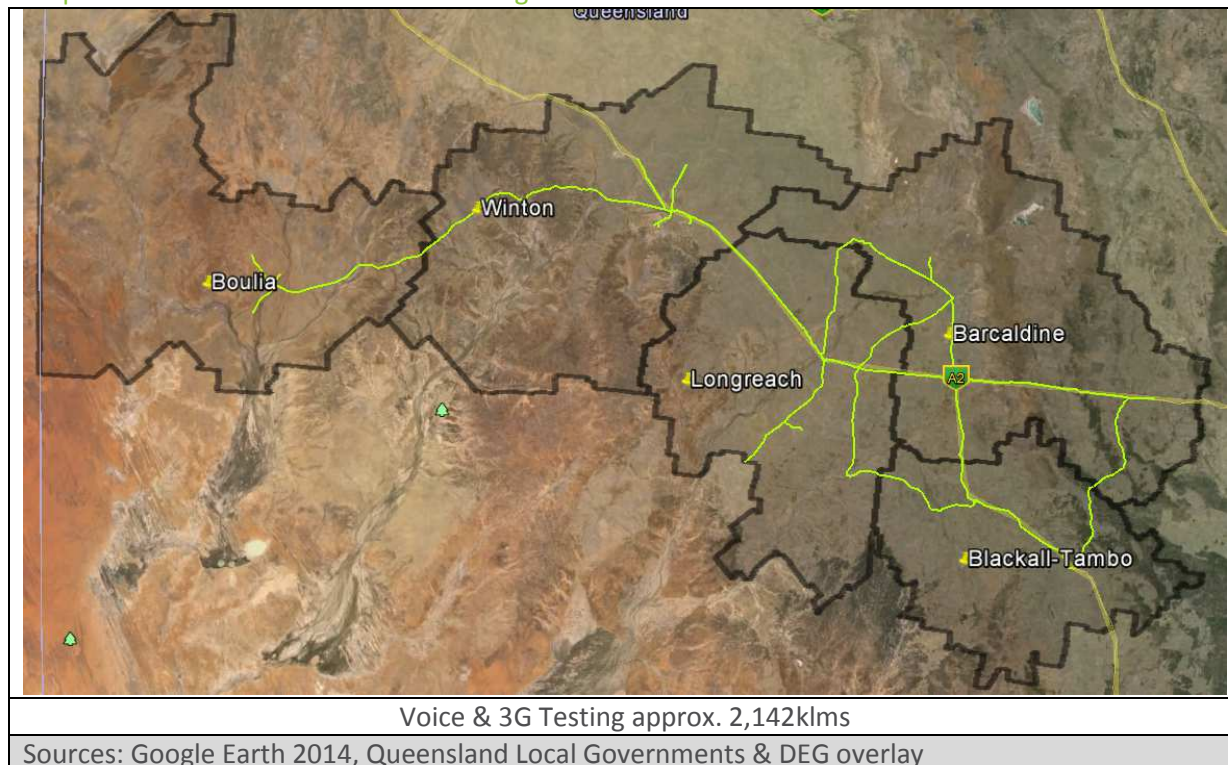
Digital Divide and Location				
Capital City	2G	3G	4G	4G+
City/urban	Blackspot	2G	3G	4G
Regional	Blackspot	2G	3G	4G
Rural	Blackspot	2G	3G	
Remote	Blackspot	2G	3G	

Source: DEG 2014

## 4.1. Tested Routes

The proposed testing routes for the RAPAD Region included approximately 2,142kms of testing capturing Voice and 3G results. The Maps below illustrates the actual Voice and 3G testing routes.

Map 4: Routes used for Voice & 3G testing



## 4.2. Voice and 3G Blackspots

Blackspots are locations or sections of road where no signal can be found, resulting in failure to connect to the network. The identification of a blackspot (Map below) begins with the signal strength markers collected across the region.








The Voice & 3G signal strength testing for whole of the RAPAD Region covered approx. 2,142kms and generated approx. 42,840 markers for each of the three carriers (with signal strength taken every 50m). The resultant 128,520 markers provide a strong and detailed evidence base showing the real extent of network coverage for mobile phones.

Table 5: 3G & Voice distance and total number of tests for all 3 Carriers.

Local Government	3G & Voice	Per Carrier	all three Carriers
Boulia	228	4,560	13,680
Winton	423	8,460	25,380
Longreach	585	11,700	35,100
Barcaldine	591	11,820	35,460
Blackall Tambo	315	6,300	18,900
<b>Total</b>	<b>2,142</b>	<b>42,840</b>	<b>128,520</b>



This data has then been filtered and mapped to highlight coverage blackspots. The individual Council reports contain details maps showing the roads tested and the extent of blackspots in the area. The colour code is as follows:

-  Black – no signal for Telstra, Optus and Vodafone
-  Orange - Optus and Vodafone have no signal – Telstra is generating a signal
-  Yellow – No Optus signal – Telstra and Vodafone have signal
-  Red - No Vodafone signal – Telstra and Optus have signal
-  Blue – No Telstra signal – Optus and Vodafone have signal
-  Green – Telstra and Optus have no signal – Vodafone has signal
-  Purple – Telstra and Vodafone have no signal – Optus has signal

The Table below highlights the concentration of blackspots on rural roads away from urban centres. Over 937klms or 43% of the roads tested had no coverage for any of the three Carriers. The distance travelled with no Optus or Vodafone (with Telstra only coverage) is a huge 866klms or 40.43%. The area where there is two carrier coverage (Telstra and Optus) is only 319klms or 14.90%. A very small 20klms or less than 1% identifies areas (in purple) where Optus had coverage and Telstra did not.

Council and regional representatives will need to remember when talking to carriers, that the testing was done with a smart phone with a strong antenna. Users with handheld devices with smaller antennas or seeking to call/connect indoors will experience further degrading of the signals strength.

Table 6: Summary of Voice and 3G Blackspots

GSM & 3G Signal Strength Coverage Category	Boulia	Winton	Longreach	Blackall- Tambo	Barcaldine	totals	Percentages
White	0	0	0	0	0	0.00	0
Black	153.33	232.17	145.68	150.5	255.43	937.11	43.75
Orange	74.17	191.22	252.9	164.5	183.22	866.01	40.43
Yellow	0	0	0	0	0	0.00	0
Red	0	0	182.16	0	136.93	319.09	14.9
Blue	0	0	0	0	0	0.00	0
Green	0	0	0	0	0	0.00	0
Purple	0	0	4.41	0	15.42	19.83	0.926
Total	227.5	423.39	585.15	315	591	2,142.04	100

### 4.3. 4G LTE Blackspots

The testing in the RAPAD area did not include 4G LTE signals. The following is based on the carriers own coverage maps and what the test results would have been if also tested. This approach has been used to highlight the extent of the digital divide for the RAPAD area. With the switch on of the 700MHz spectrum and recent announcements by the three national Carriers, urban areas are now experiencing the next level of technology, thereby creating a greater gap than ever.

Map 5: RAPAD 4G LTE Blackspots

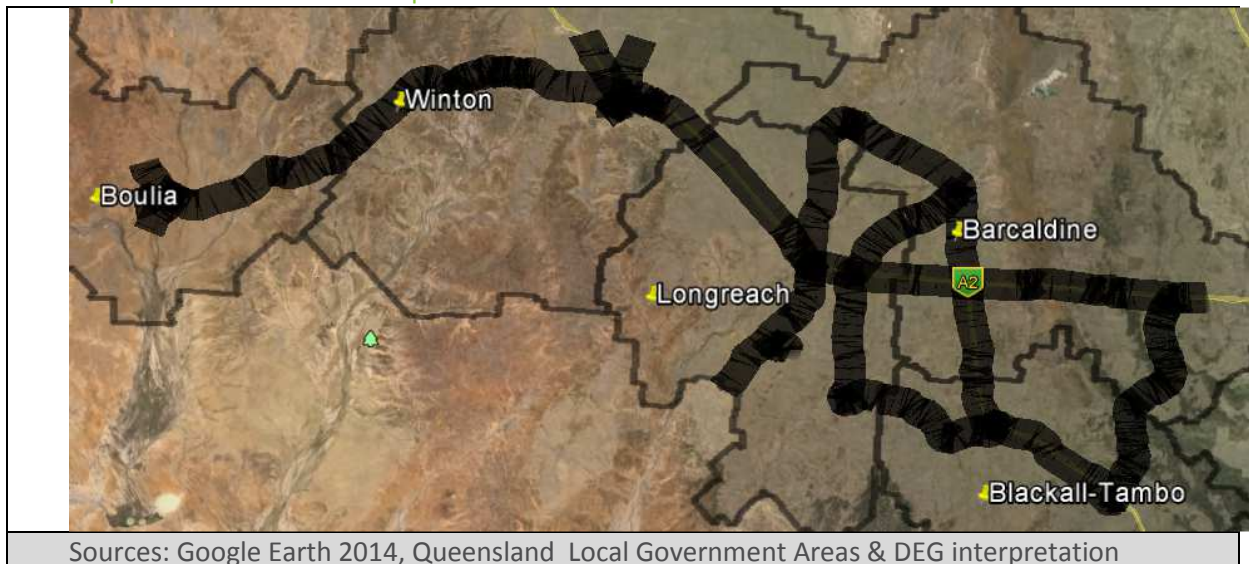


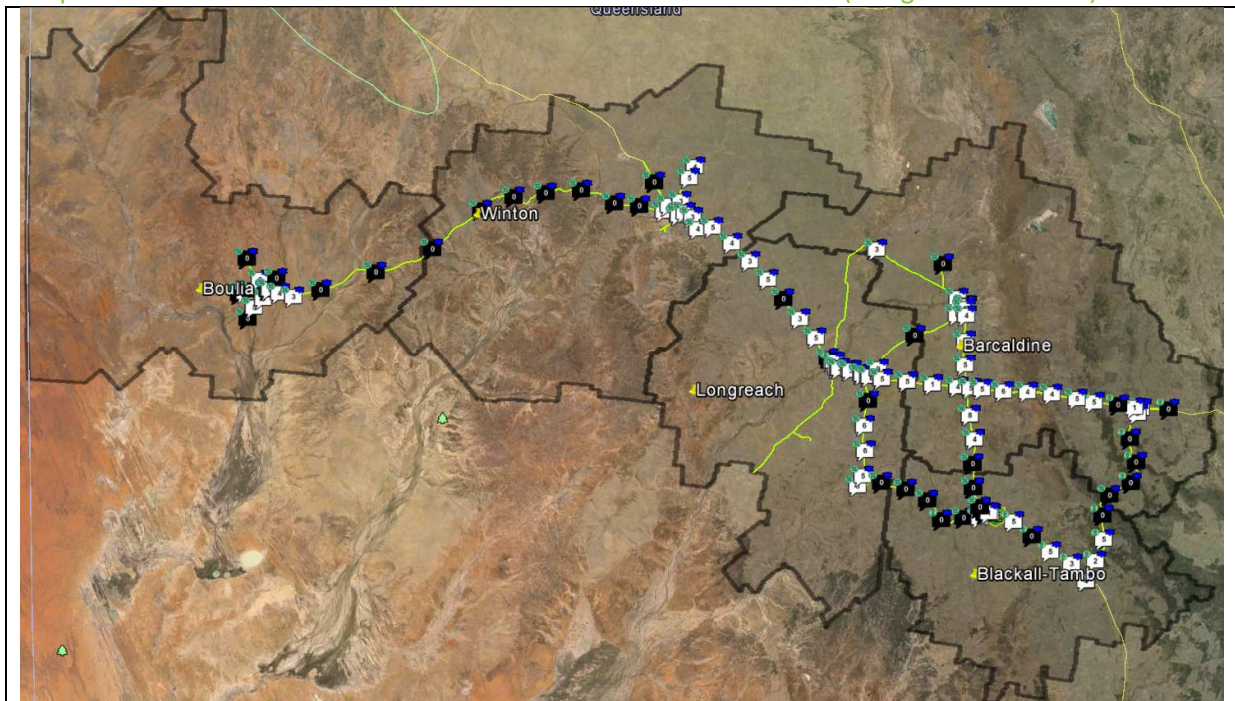
Table 7: Summary of 4G Blackspots as identified for RAPAD

4G LTE Signal Strength Coverage Category	klms	percent
White - coverage from all three carriers	0	0
Black – no signal for Telstra, Optus and Vodafone	2142	100
Orange - Optus and Vodafone have no signal – Telstra has signal	0	0
Yellow – No Optus signal – Telstra and Vodafone have signal	0	0
Red - No Vodafone signal – Telstra and Optus have signal	0	0
Blue – No Telstra signal – Optus and Vodafone have signal	0	0
Green – Telstra and Optus have no signal – Vodafone has signal	0	0
Purple – Telstra and Vodafone have no signal – Optus has signal	0	0
Total	2142	100

#### 4.4. Network Site Test locations and assessment overview

Network Performance Tests were conducted in 118 locations across the RAPAD Region in October 2014. The testing methodology (outlined above) replicates a real world user experience. Whilst the individual site tests do allow for network performance variation, the sample Time Series Tests below demonstrate that network performance generally remains within a band. As a result, network performance results are generally within plus or minus one of that score achieved when repeated over time. The Map below shows the results for Telstra across the whole of the RAPAD. To see all three carrier results together refer to Attachment 2.






Map 6: Network Performance Test Locations as identified for RAPAD (using Telstra results)



Sources: Google Earth 2014, Local Government Boundaries & DEG interpretation

To illustrate the strengths and weaknesses of the respective networks, three tables are shown below. They have the aggregate scores from 'very good' to 'very poor' for each of the five local governments for Telstra, Optus and Vodafone. These three tables are based on the detailed assessments documented in the five individual council reports.

The overall performance of each of the three carriers is highlighted in five colour bands to inform the assessment and proposed priorities for this local government. The five colour bands are:

-  Blue: Very Good results – highlights locations with results that stand out for the location
-  Green: Good results - matched expectations set by coverage maps and current technologies used to service that location.
-  White: Acceptable results, largely consistent with coverage map expectations but not necessarily reaching the advertised technology speeds of the carrier.
-  Amber: Poor results inconsistent with coverage maps and/or not performing to the standards/expectations set by advertising, this is a location that is considered to be a priority for improved coverage/capacity to deliver the economic and community objectives of the local government and regional organisations
-  Red: blackspot or very poor results and may be inconsistent with coverage maps or not performing to the standards/expectations set by advertising or a location that is considered

to be a priority for improved coverage/capacity to deliver the economic and community objectives of the local government and regional organisations

**Table 8: Consolidated Network Performance Test Scores –Telstra**

Council/Rating	Boulia	Winton	Longreach	Barcaldine	Blackall-Tambo	Totals	Percentages
Extremely Good	0	0	0	0	0	0	0.00
Very Good	0	0	0	0	0	0	0.00
Good	2	2	8	7	2	21	17.80
Acceptable	6	8	9	12	5	40	33.90
Poor	2	2	4	7	3	18	15.25
Very Poor	0	0	0	1	0	1	0.85
Network Fail	7	8	5	8	10	38	32.20
Total	17	20	26	35	20	118	100

Telstra is the primary network in most of RAPAD and for 3 of the 5 council areas tested, it is the only network. Out of 118 tests none scored 'extremely good' or 'very good'. Telstra generated 21 sites with a 'good' score and 40 with 'acceptable'. Taking these two results together, only 61 or just over 50% would provide a user experience of a reasonable standard. 19 of the sites attracted a score of 'poor' or 'very poor'. In the category of 'network fail' Telstra had 38 or 33% of sites unable to connect or effectively use the internet.

**Table 9: Consolidated Network Performance Test Scores -Optus**

Council/Rating	Boulia	Winton	Longreach	Barcaldine	Blackall-Tambo	totals	Percentages
Extremely Good	0	0	0	0	0	0	0
Very Good	0	0	0	0	0	0	0
Good	0	0	0	0	0	0	0
Acceptable	0	0	6	4	0	10	8.47
Poor	0	0	8	2	0	10	8.47
Very Poor	0	0	0	0	0	0	0
Network Fail	17	20	12	29	20	98	83.05
Total	17	20	26	35	20	118	100

Optus only has a network presence in 2 out of the 5 councils tested. This is reflected in the scores for those three councils – Boullia, Winton and Blackall Tambo. Where they do have an active network, Optus still had no sites with ‘extremely good’, ‘very good’ or ‘good’. This is disappointing as Telstra was able to push a higher proportion of ‘good’ scores for testing at the same locations on the same days. At the other end of the scale Optus had 98 ‘network fails’ which leaves room for improvement in their network.

Table 10: Consolidated Network Performance Test Scores -Vodafone

Council/Rating	Boullia	Winton	Longreach	Barcaldine	Blackall- Tambo	Totals	Percentages
Extremely Good	0	0	0	0	0	0	0
Very Good	0	0	0	0	0	0	0
Good	0	0	0	0	0	0	0
Acceptable	0	0	0	0	0	0	0
Poor	0	0	0	0	0	0	0
Very Poor	0	0	0	0	0	0	0
Network Fail	17	20	26	35	20	118	100
Total	17	20	26	35	20	118	100

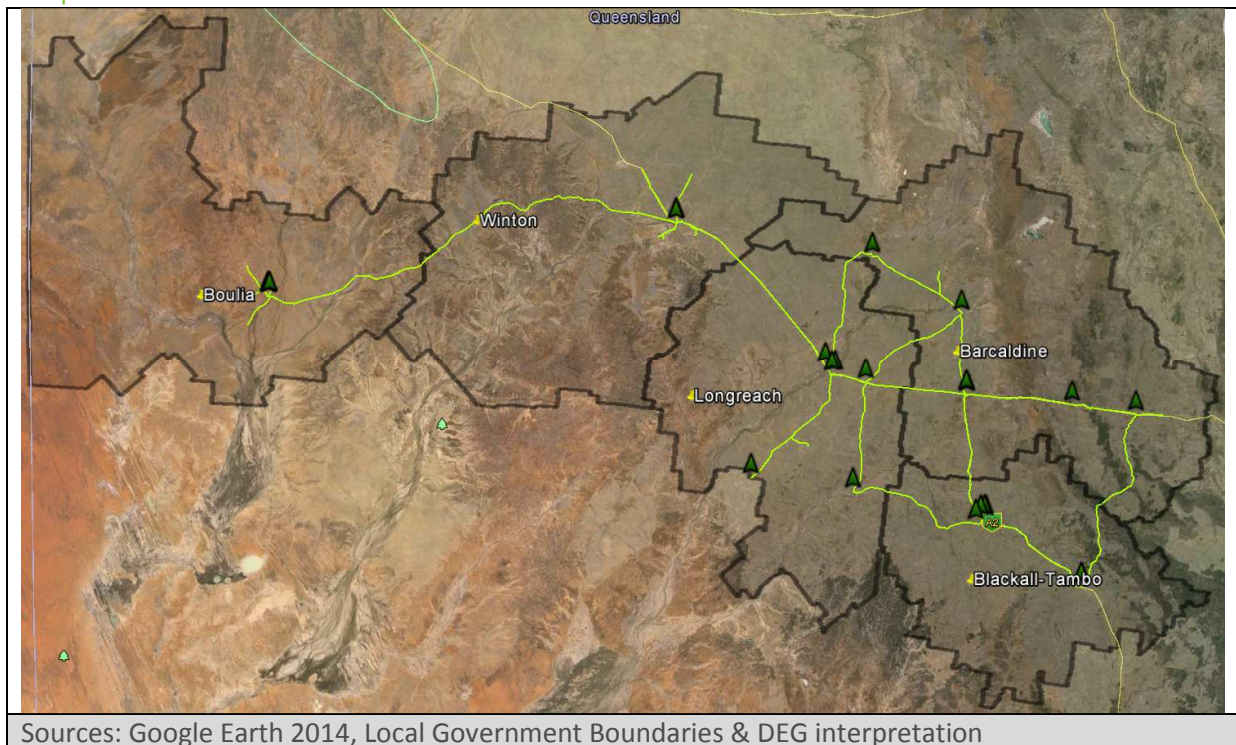
Vodafone has no active mobile network in RAPAD. The 118 network performance tests produced 118 ‘network fail’ results. Vodafone continues to prioritise large urban areas and Capital City deployments. Vodafone should at the very least be encouraged to activate their roaming agreement with Optus in this area. RAPAD would then be able to focus on Telstra and Optus and the Vodafone network availability would potentially grow as the Optus network does.

## 4.5. Time Series Network Performance Tests

Network Performance tests in a time series serve to amplify the quality of the network over 10 repeated Network Performance tests. Three network characteristics are separately recorded: Ping (latency or time to connect to the internet and return), download and upload. Across the Region, 50 test locations were used to highlight the strengths and weaknesses of the respective networks.

The individual local government reports contain the results and commentary for each test by location and each carrier. Overlapping the 24 test location results on a graph would result in a congested illustration. The condensed network performance test results in the tables above adequately highlight and amplify the results of individual locations. Readers are encouraged to review the results of the Time Series Tests in each for the 5 individual local government reports. The Map below illustrates the locations where the 24 Time Series Tests were undertaken and reported.

Map 7: Network Performance Time Series Test Locations for all of RAPAD



## 5. Regional Priorities

The key regional priorities for the RAPAD Region and individual councils are to:

- ✓ Short list the priorities in each of the 5 individual local government reports to the top 1 or 2 locations/ outcomes
- ✓ Build relationships with the Carriers using these reports and in partnership, identify the locations where carriers are prepared to build new sites, upgrade existing sites and deploy new spectrum. This can deliver reduced blackspots and improve coverage, competition and capacity
- ✓ To actively pursue the Commonwealth Government's forthcoming Mobile Coverage Programme as a way to increase coverage beyond current carrier investment plans
- ✓ Look for ways individually or collectively to share impartial information for the benefit of consumers and business to:
  - 📱 consider which carrier to use
  - 📱 use the best handsets available (for their location)
  - 📱 select technology that is available to amplify signals
  - 📱 consider whole of lifecycle cost for devices and plans

## 6. Conclusion

Having the mobile broadband blackspots 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.

The difference between mobile digital infrastructure and traditional council infrastructure is that it is privately owned. The primary tactic for facilitating increased investment is knowledge of the network, its performance and choosing priority locations (in partnership with the carriers.)

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 recent studies by Ericsson and Chalmers University<sup>5</sup> demonstrating that doubling broadband speeds increased the GDP by 0.3% needs to be considered.
- 📱 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 into 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 a large number of sites in various locations and jurisdictions. Locations where approvals and leases are completed easily will have networks established faster and sooner.

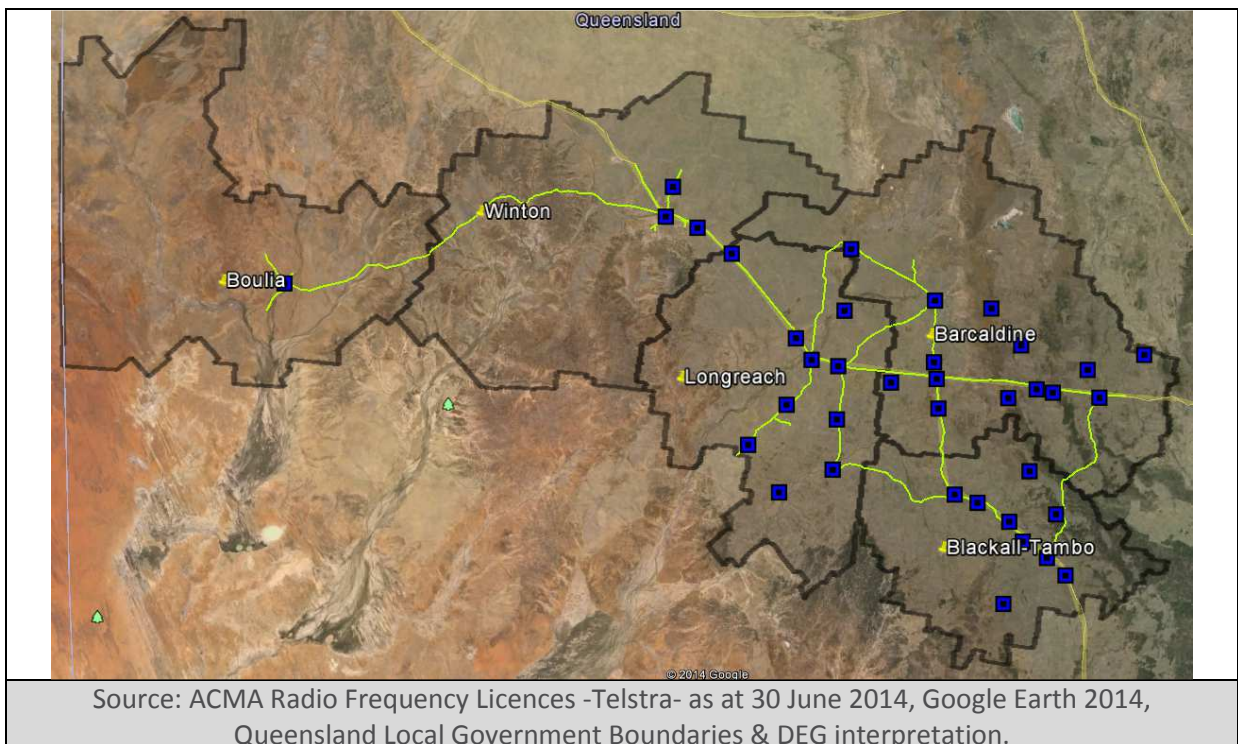
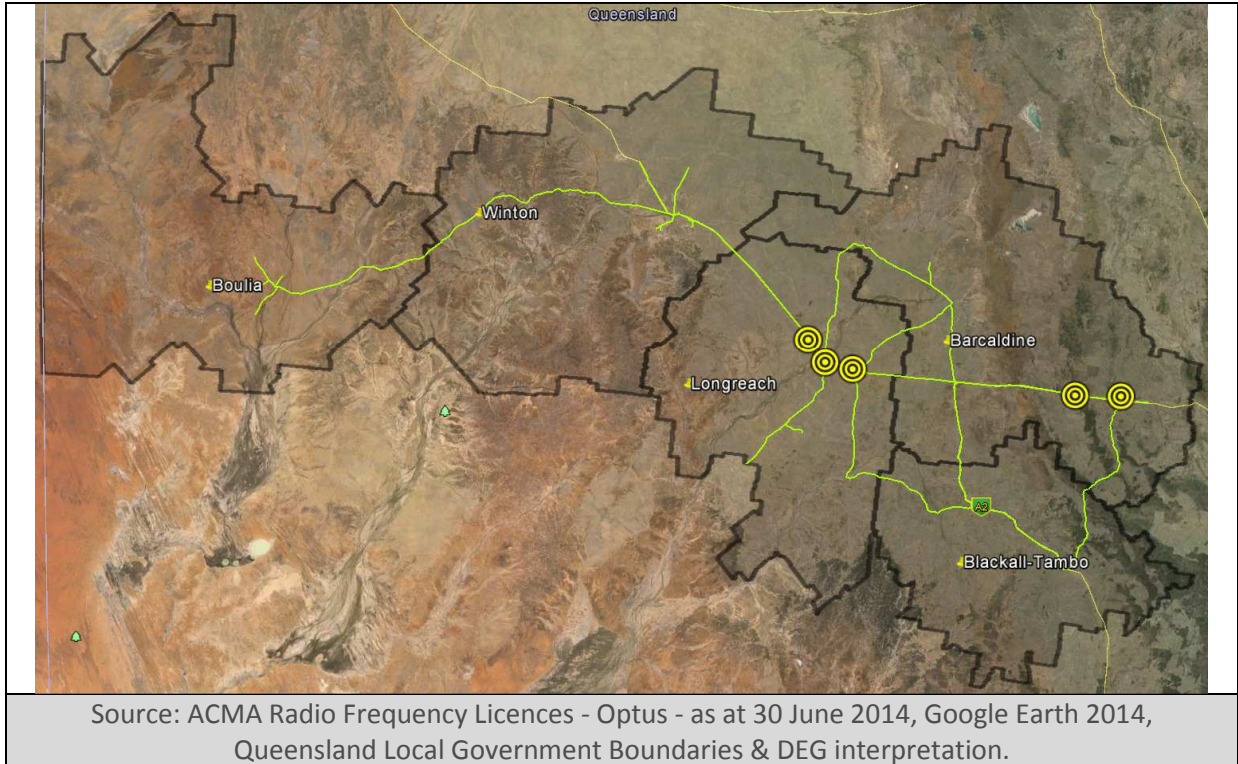
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<sup>5</sup> <http://www.ericsson.com/res/thecompany/docs/corporate-responsibility/2013/socioeconomic-effect-of-broadband-speed.pdf>

## 7. Attachments

### Attachment 1: Current Carrier Infrastructure

The following two Maps show the current (as at 30 June 2014) carrier infrastructure providing local access services for mobile phone and mobile internet. Only Telstra and Optus have active infrastructure for mobile coverage in RAPAD.

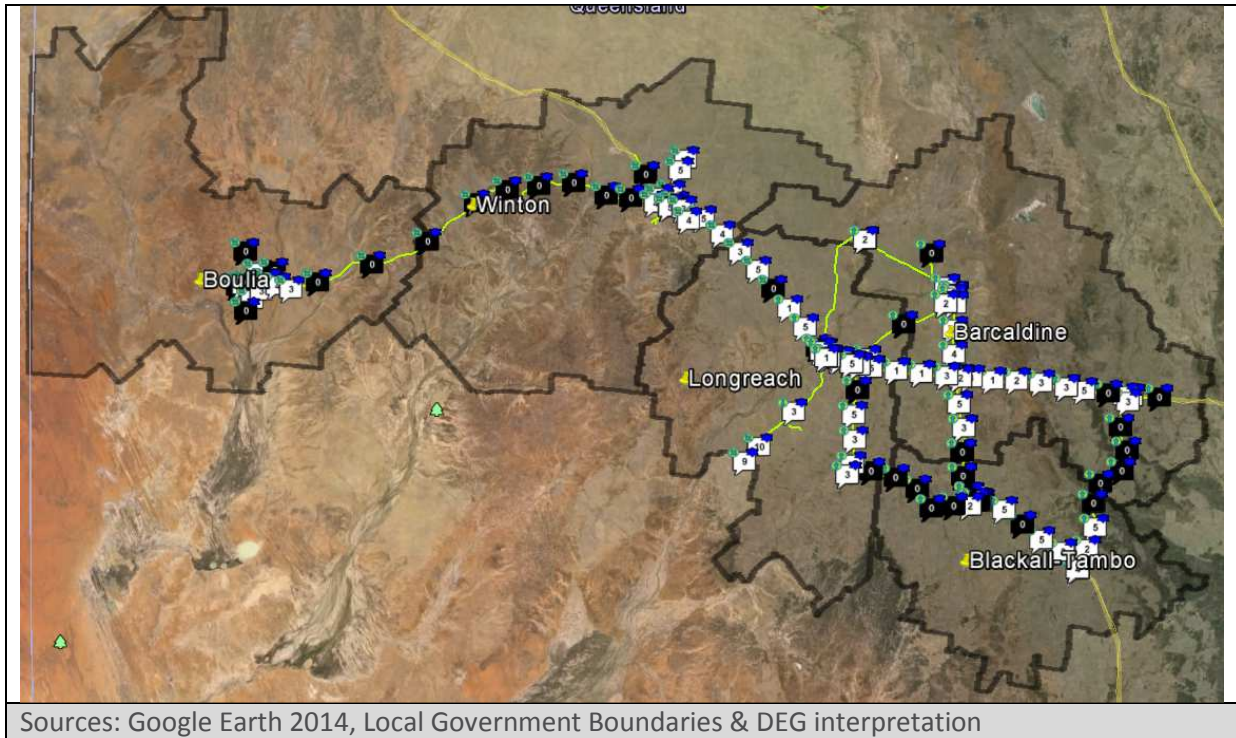




### Attachment 2: Network Performance Test Results by Carrier

Maps showing the location and high-level indication of mobile internet coverage and blackspots for all three national carriers. A table showing individual results can be seen in the report above.

#### Network Performance Test Locations - Telstra



#### Network Performance Test Locations - Optus

