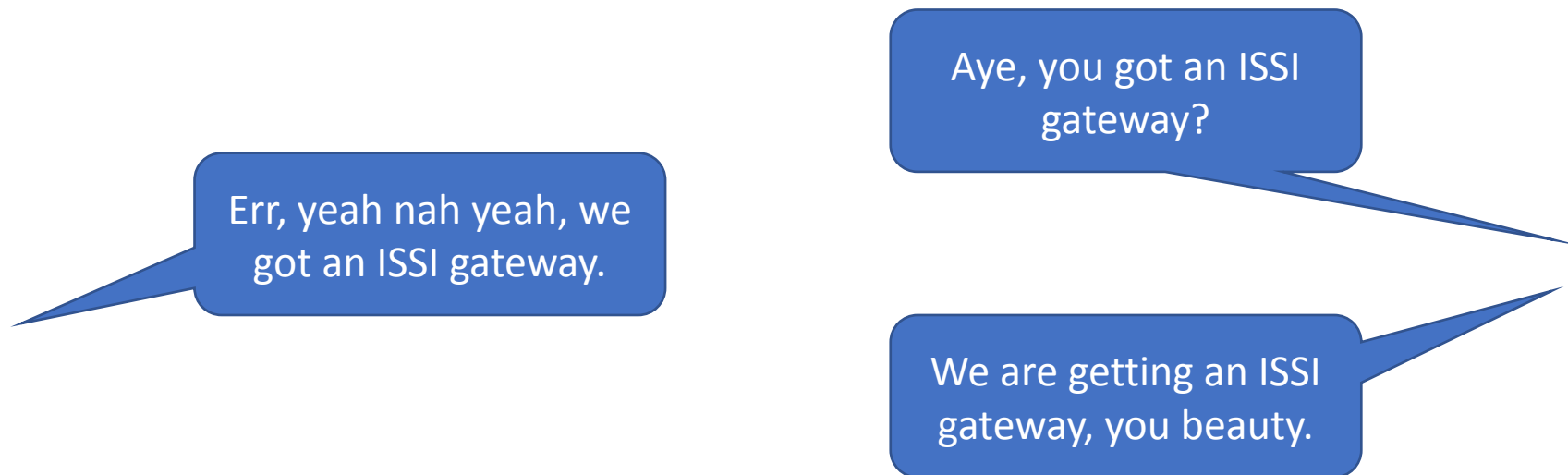# Qld GWN & NSW PSN Interstate Roaming Service:

From a random chat to interstate roaming and interoperability between Queensland and NSW Public Safety Agencies

Nick Ashby, GWN Radio Engineering Expert

GWN Contract Directorate, Dept of Transport and Mains Roads (Qld)

Introduction

- June 2015, Comms Connect Sydney. Ex-GWN Spectrum Manager Phillip Conder and myself started chatting to Ex-NSWTA's James Corkill.

- I forget the actual words, but it went something like this:

Aye, you got an ISSI gateway?

Err, yeah nah yeah, we got an ISSI gateway.

We are getting an ISSI gateway, you beauty.

- And we begun on our journey towards interstate roaming and interoperability...
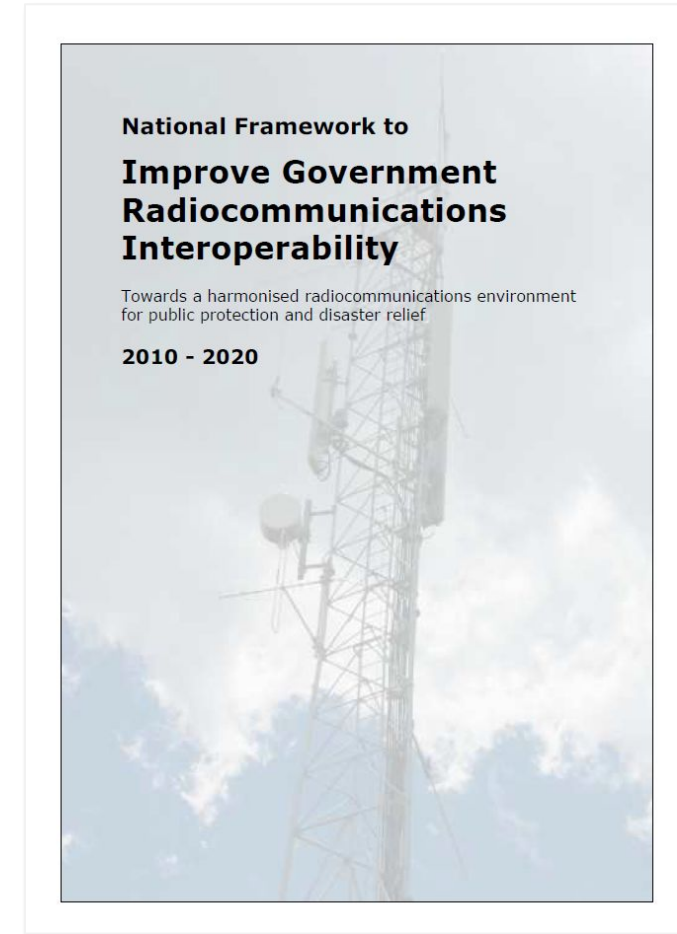
Government Wireless Network

- Fully managed service contract with Telstra and Motorola.

- Originally built for Brisbane G20 in Nov-14

- Full SEQ build and transition completed in Apr-16

- GWN provides coverage from Rainbow Beach in the north, almost Dalby in the west and unofficially down to Byron Bay in the south

- P25 Phase 2, fully encrypted, 420-430MHz

- Portable link budget, DAQ4.0, 99% confidence, on hip

- 20,000+ radios, grown from 16,000 in 2016

- 20+ local, state, interstate & federal agencies

- 20+ communications centres

- 180+ radio sites, plus 2 Cairns radio sites

- 15+ inbuilding / tunnels DASs

- Cross River Rail, Queen's Wharf Brisbane & Brisbane Metro inbuilding under construction
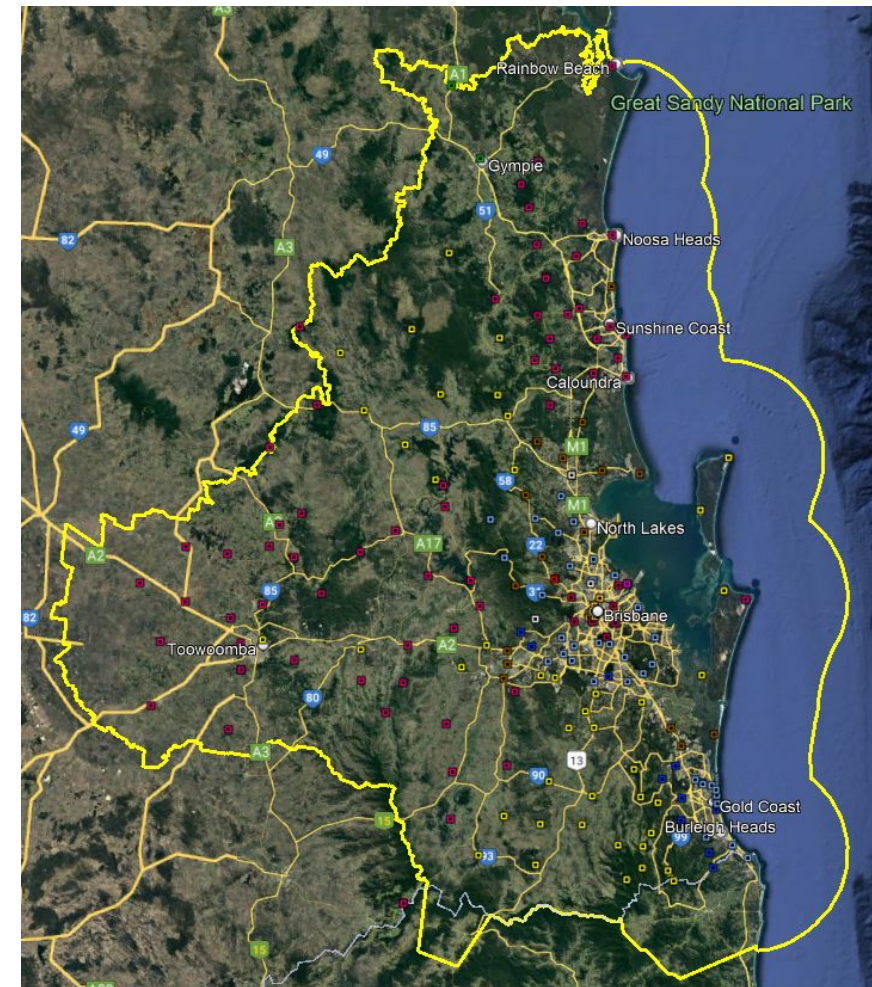
What is Interoperability?

- NCCGR define interoperability as:

"the ability of users to communicate, by radio, with whom they need to, when they need to, when authorised."

National Framework to
Improve Government Radiocommunications Interoperability
Towards a harmonised radiocommunications environment for public protection and disaster relief

2010 - 2020

Interoperability

- 'Interoperability' is the main benefit of the GWN.

- From the GWN Project Expression of Interest:

"Improve the interoperability of public safety communications within Queensland (including with local government, Government Owned Corporations and other utilities and community safety providers, as well as interstate agencies) and the rest of Australia"

"Interoperability between PSAs and other agencies would enable all agencies (including Federal counterparts) to use the same systems and promote situational awareness"
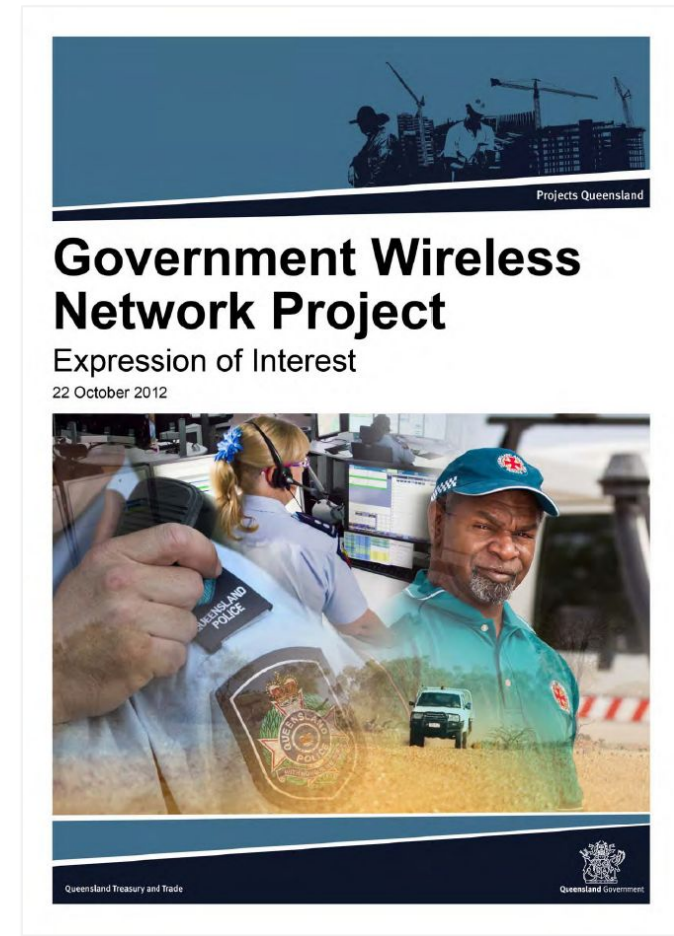
Interoperability

- Interoperability requires a common technology platform and common channels.

- All GWN radios have a common set of interoperability talkgroups and channels, including simplex and deployable repeater channels with standardised aliases.

Interjurisdictional Interoperability

- *"In 1974, emergency services from all over Australia went to Darwin to provide assistance following Cyclone Tracy, just as they did in NSW in 1994, 1999 and 2001, Canberra in 2003 and Victoria in 2009. In each case, the same situation prevailed – the visiting units found it difficult, if not impossible, to interoperate with local units using radio."*[1]

- *"Since then, we have seen interoperability issues cited in Government reports and/or Royal Commissions on the QLD floods in 2011, Tasmanian fires in 2013, QLD cyclones in 2013 and 2017 and the 2019/2020 fires which raged across the country."*[2]

[1] National Framework to Improve Government Radiocommunications Interoperability 2010-2020, NCCGR 2009.
[2] What happened to Australia's National Strategic Radio System? Ben Cosier, Impulse Wireless, 2020.
https://www.abc.net.au/news/2020-06-01/calls-for-national-radio-network-bushfire-communication/12303546

ABC NEWS

Critical cross-border interstate communication missing at height of Black Summer bushfires

By national regional and rural reporter Jess Davis
Posted Mon 1 Jun 2020 at 6:07am, updated Mon 1 Jun 2020 at 7:01am

Walwa CFA volunteer Robert Newnham says not being able to communicate with fire units from other states is distressing. (ABC News: Jess Davis)

Help keep family & friends informed by sharing this article

abc.net.au/news/calls-for-national-ra...   COPY LINK   SHARE

As a bushfire roared towards the Murray River the day before New Year's Eve, firefighters on either side of the state border couldn't talk to each other.

Interjurisdictional Interoperability

- Numerous previous inquiries into natural disaster events have recommended the need for interoperable communications.

- Most recently the Royal Commission into National Natural Disaster Arrangements (2020) provided a recommendation (6.3) for State governments to address interjurisdictional interoperability.

- How is interop done today? Dual radios fit, trigger bases, radio caches, simplex, deployable suitcase repeaters, console patching, UHF CB radio, VHF mid-band, VHF high-band, UHF PMR and UHF PSN/GWN radio, or… mobile phones…
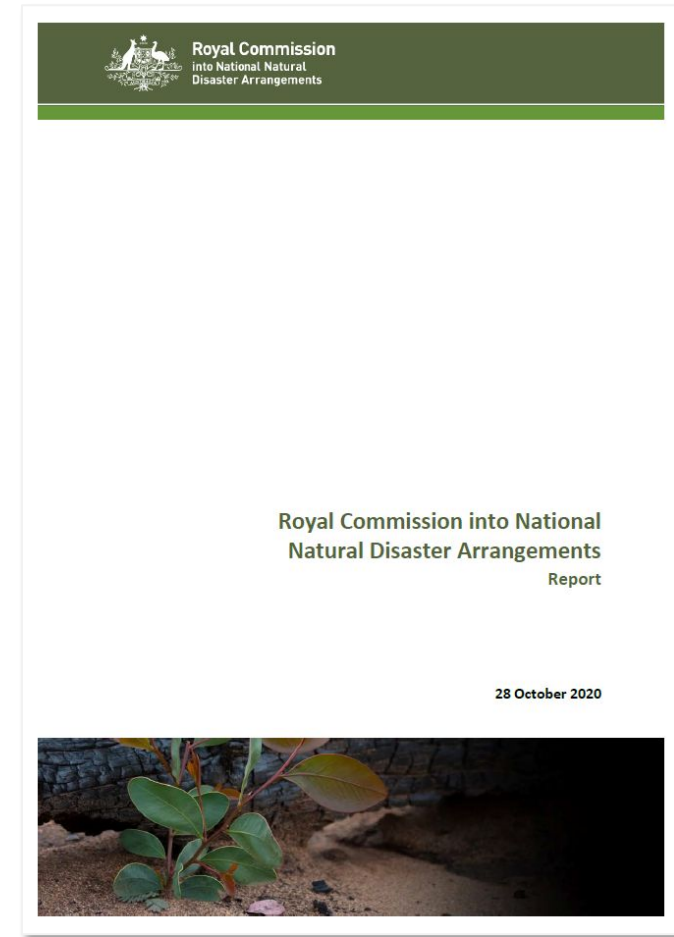
P25 Inter-RF Sub System Interface

- The Inter-RF Sub System Interface (ISSI) is an interface defined in the P25 standards to allow connection of two or more P25 radio networks.

- Each P25 network requires an ISSI Gateway.

- The ISSI provides a global roaming like service, no manual intervention required.

- BUT requires radio reprogramming to enable roaming and requires common interoperability talkgroups to be able to interoperate with foreign network users.

Figure 1 - Typical System Model Depicting ISSI (G Interface)
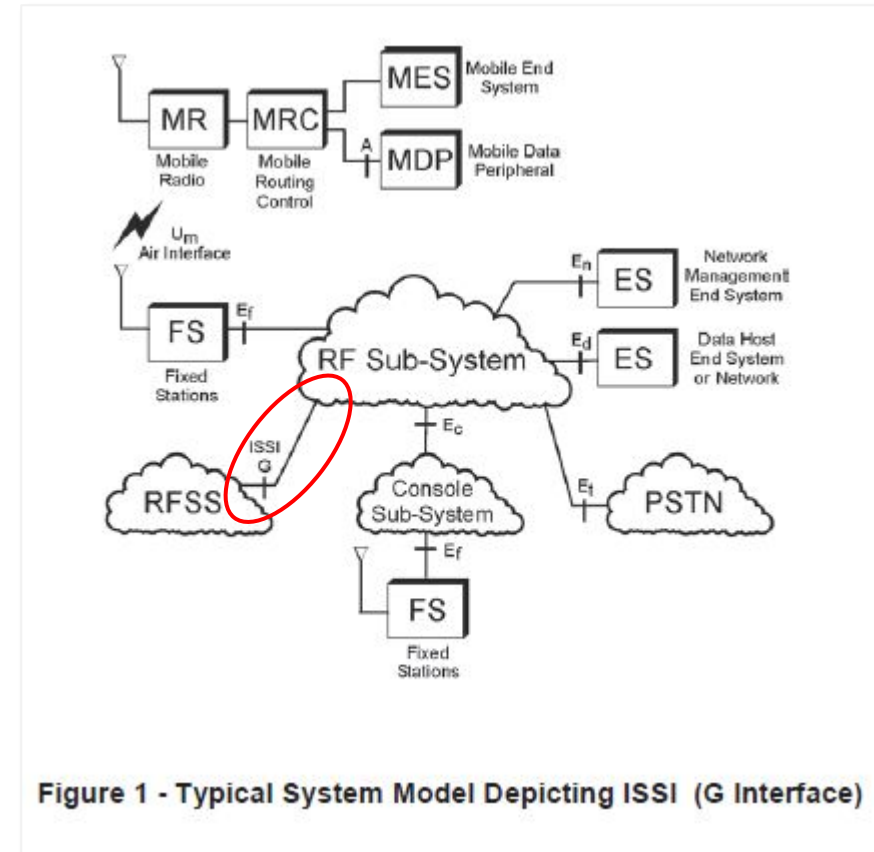
TIA-102.BACA-B, Project 25: Inter-RF Subsystem Interface Messages and Procedures for Voice Services, Mobility Management, and RFSS Capability Polling Services, 2012.

Proof of Concept

- Post discussion in 2015, GWN and NSWTA agreed to perform a Proof of Concept on the GWN test network by reparenting one of the test sites onto the NSW PSN production network.

Figure 1: Project PIRATE Test Network Configuration.
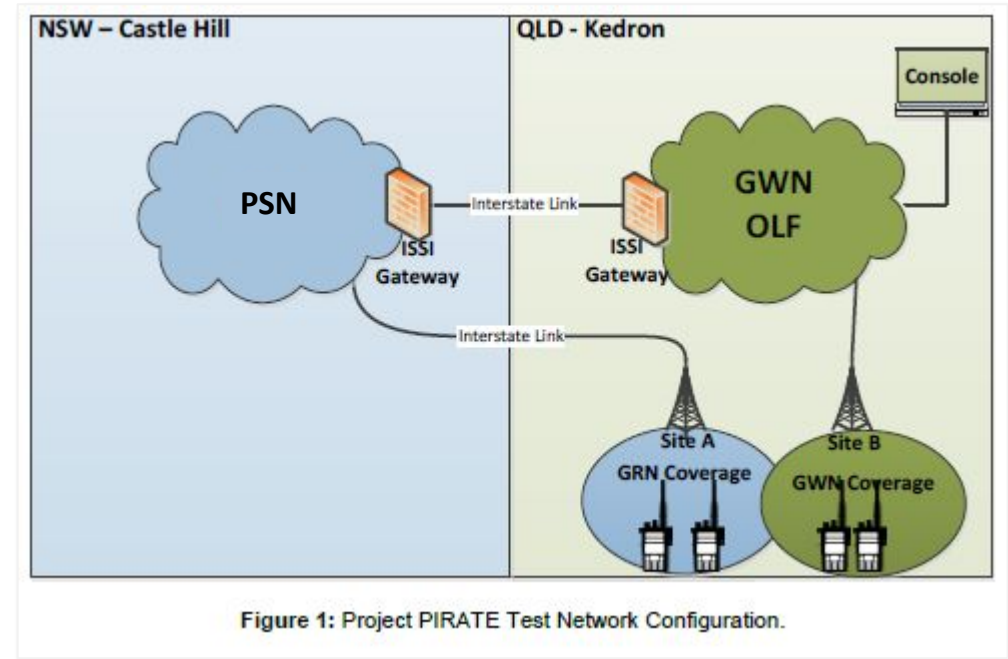
Proof of Concept

- The PoC was successful and demonstrated:
  - Network interconnection
  - Seamless roaming
  - Interoperability
  - Compliance to standards
  - Supported & unsupported features
  - Operational functionality to Public Safety Agencies

NCCGR
National Coordinating Committee for Government Radiocommunications

Project **PIRATE**
(Public Safety Interoperability Radio Testing)
Completion Report

Apr 2016

NSW GOVERNMENT | Telco Authority

Queensland Government

Report available upon request.

Interstate Interconnection and Interoperability Initiative

- Post completion of PoC, NSWTA wrote to GWN requesting to interconnect the GWN and NSW PSN to provide roaming and interoperability to Qld and NSW Public Safety Agencies.

- A project MoU was executed between the State's and the *'Interstate Interconnection and Interoperability Initiative'* was established.

- It was later decided to call the service the *'Interstate Roaming Service'*.
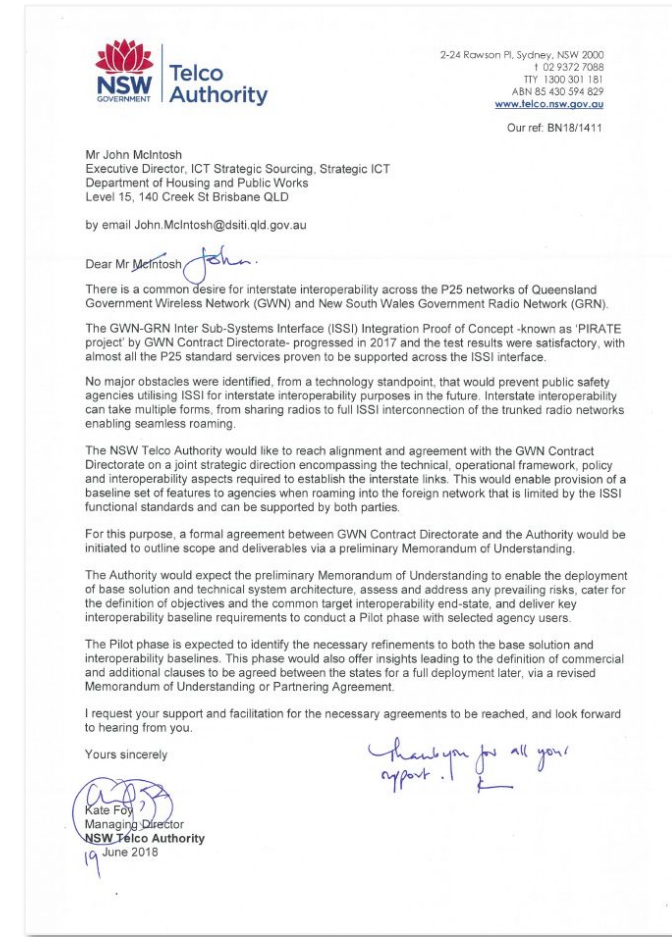
"It's just a very long blue cable, right?"

Project Deliverables

Project Scope

The initiative scope is to deliver the interconnection of the Queensland GWN and NSW PSN that meets the technical, operational, user and commercial needs of the Queensland GWN and New South Wales PSN stakeholders. The following are the major activities of the initiatives:

- Facilitate the network interconnection

- Acceptance of the service

- Facilitate development of operational processes

- Establish the management of the operational service

Project Success Factors

- GWN and PSN users will be able to roam between networks seamlessly

- GWN and PSN users will be able to interoperate

- While roaming, GWN and PSN users will be able to maintain radiocommunications with their respective communication centres

- Operational MoU will be drafted and agreed upon by GWN Contract Directorate and NSW Telco Authority

Project Activities

- GWN installed a GWN PoP at NSW Castle Hill & Silverwater datacentres via geo-diverse transmission to facilitate interconnection.

- NSWTA completed their North Coast NSW build program.

- 'Connected CEN' required for Location Services & Status Messaging.

- 'Adjacent Site Lists' were updated in the border region.

- Service Management process development.

- Agreement on Interstate Interoperability Talkgroups (encryption)

- Testing codeplugs.

- Talkgroup Whitelisting.

- Field Testing, which was performed in Killarney.

- Network Acceptance of service.

- Disaster Recovery Planning and testing.

- Documenting of supported and unsupported services.

Supported / Unsupported Services

Supported	Unsupported
ISSI / Connected CEN - Registration - Radio Affiliation - Roaming (Automatic) - Group Voice Call (Clear & Secure) with PTT ID - Radio Alias Transmit - Broadcast Call - Announcement Group Call (aka Multigroup Call) - Emergency Alarm and Call with Talkgroup Revert or Tactical Talkgroup - Console Talkgroup Patching with Takeover and Busy - Radio Authentication (GRN only) - Location Services (Motorola & Tait radios) - Advanced Messaging Solution (as deployed in GWN) - OTAR (Key Management via KMF) - OTAP (Remote Programming of radios using Radio Manager (RM)) - Status Update (Status Messaging) - Radio Inhibit / Uninhibit - Talkgroup Mapping & Affiliation Control	- Telephone Interconnect - Unit to Unit Call (aka Private Call or Individual Call) - Dynamic Dual Mode for foreign talkgroups - Radio Status Check - Remote Monitor - Text Messaging between Users of different systems - Broadcast Data from Home System - Broadcast Data from foreign system - Transit Data from home system - Unconfirmed Outbound data from home system to roamed location - Data Usage statistics at home system for roaming duration - Location on PTT - Location on Rx

Service Management

- Incident Management

- Change Management

- Service Requests

- Approach:
  - All PSAs contact their Service Desk / NOC to triage requests.
  - Only NOCs will contact the other NOC.
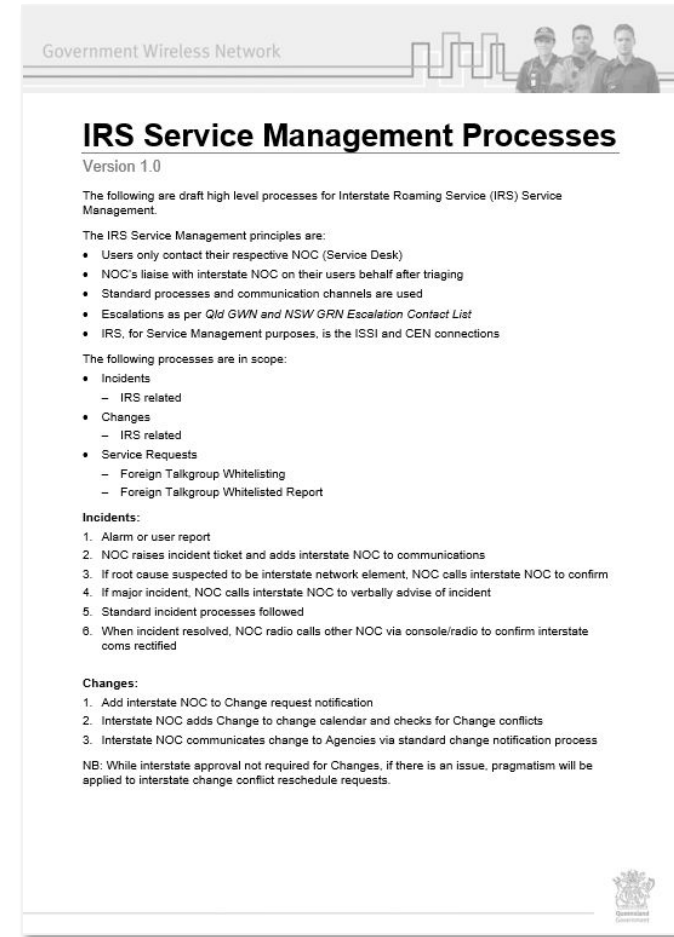
Incident Management
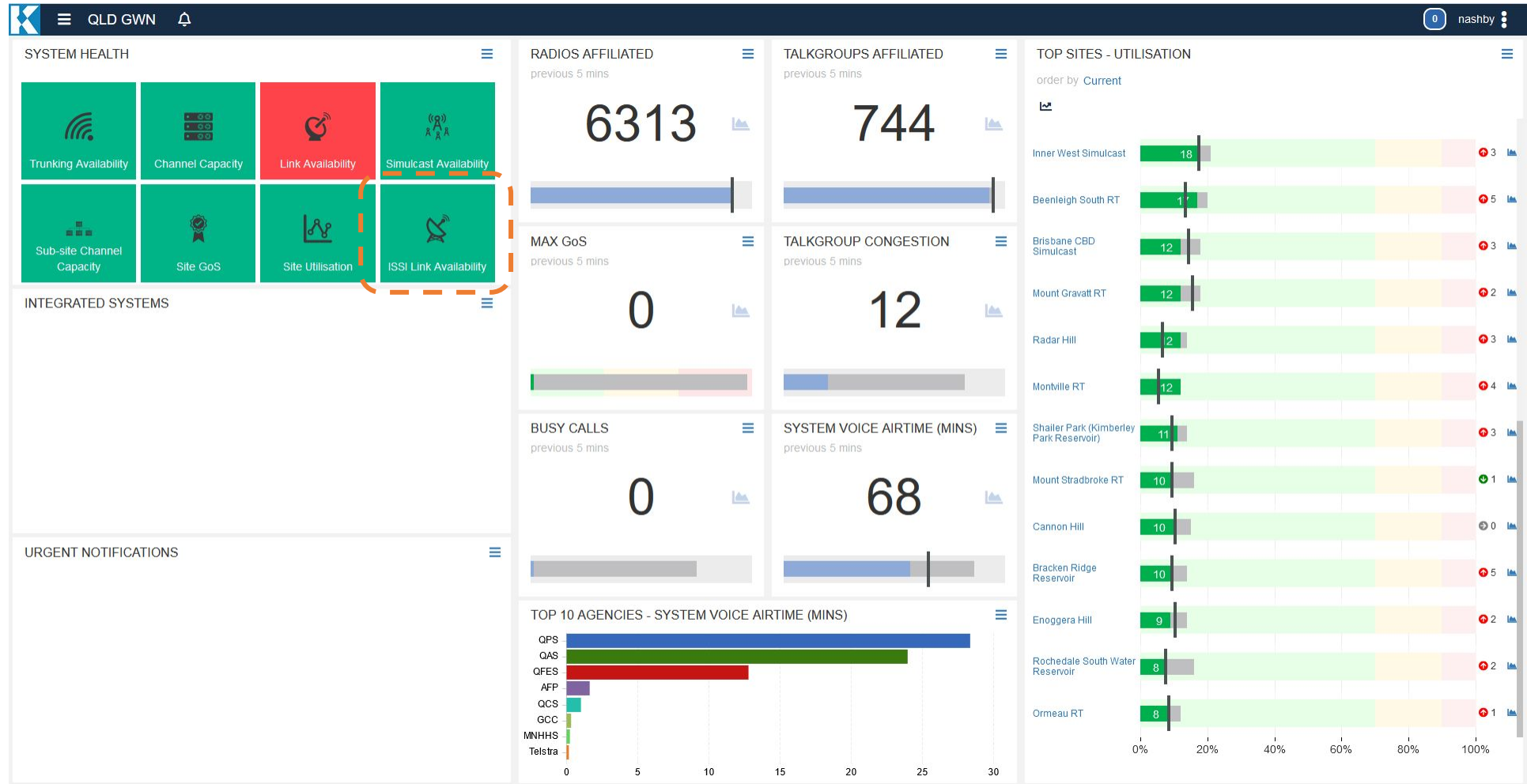
Incident Management
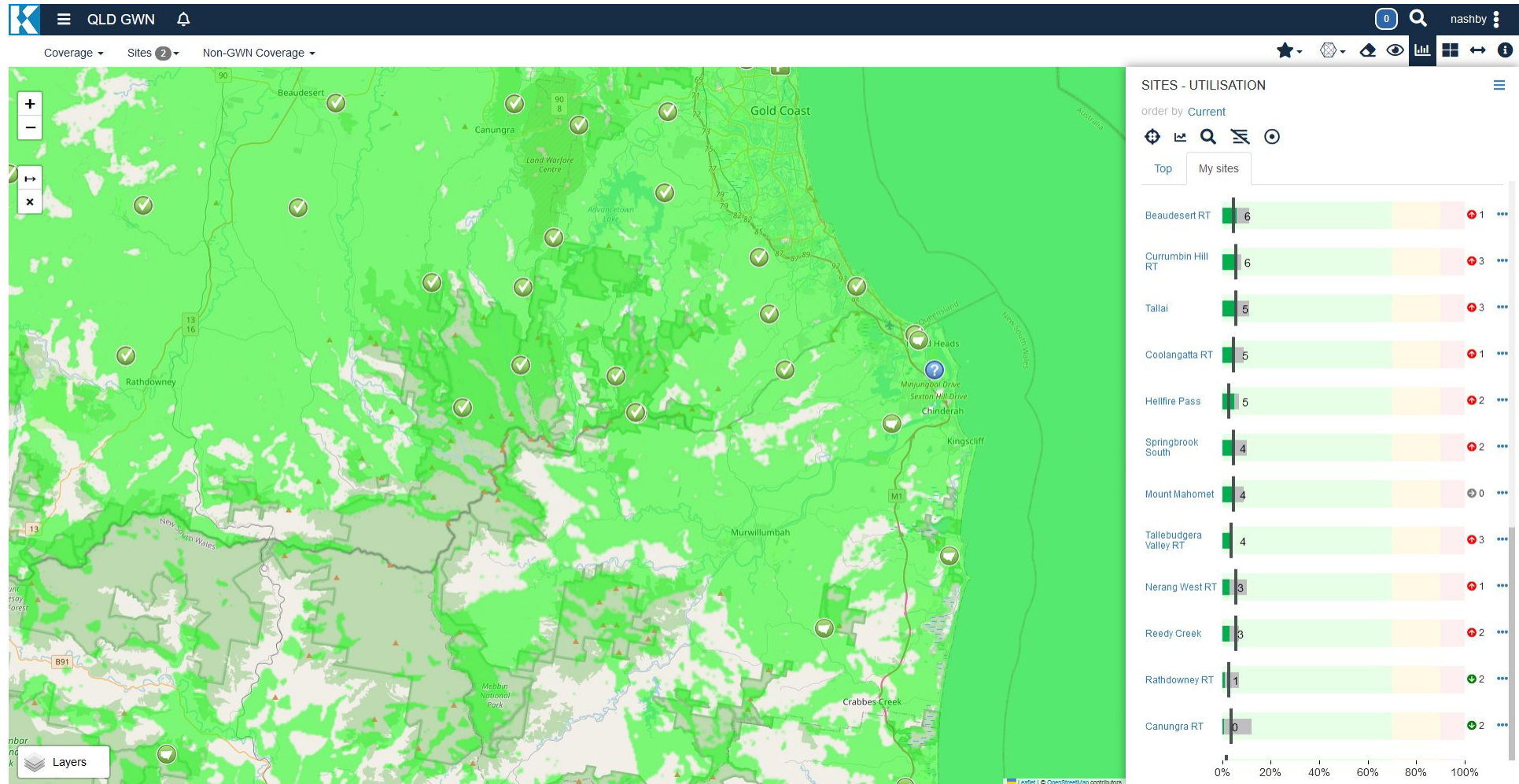
User Acceptance Testing

- Once borders reopened…

- We engaged the Public Safety Agencies to performed User Acceptance Testing (UAT) of the Interstate Roaming Service to determine if it 'meets their business requirements' and is 'fit for purpose'.

- Subsequent to UAT we established Operational Trials. E.g. Coolangatta Police Station.

Legal and Commercial Risks

- Although the States agreed to provide access to the interstate network on a 'quid pro quo' basis, we needed to address any potential legal and commercial risks.

- Each Public Safety Agency was required to execute a Deed Poll in favour of the other State.

- As long as Public Safety Agency personnel followed their training and abided by their State's Acceptable Use Policy, there was no change in risk.

- The GWN actually 'onboarded' the NSW Agencies as 'State Beneficiaries' under our GWN managed service contract to ensure there was no change in risk to our Contractors.

Project Closure Approved

- Yes, but subject to radio reprogramming…

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- Facilitate the network interconnection
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- Facilitate development of operational processes
- Establish the management of the operational service

Project Success Factors

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- While roaming, GWN and PSN users will be able to maintain radiocommunications with their respective communication centres
- Operational MoU will be drafted and agreed upon by GWN Contract Directorate and NSW Telco Authority

Current Status

- While we have a number of Operational Trials underway, no Agency has operationally gone live with the Interstate Roaming Service yet.

- Qld Public Safety Agencies are updating codeplugs.

- Additional workshops are scheduled to assist to operationalise the IRS.

- QAS intend to begin reprogramming radios in the Gold Coast region soon.

Summary

- The lack of interoperability between Public Safety interstate peers has been an ongoing issue and operational risk.

- The Interstate Roaming Service project was established to address this risk.

- When operational the IRS will enable Queensland PSAs to roam interstate, while maintaining radiocommunications with their communication centre, and be able to interoperate with New South Wales (NSW) Agencies.

- This interconnection of the Queensland and NSW radio networks is a first in Australia.

- The introduction of IRS will provide a significant capability uplift to both Queensland and NSW PSAs and addresses a recommendation of the Royal Commission into National Natural Disaster Arrangements (2020).

- This IRS project is of international significance as proven by being shortlisted in two categories at the recent International Critical Communications Awards in Helsinki, Finland in May 2023.

- The IRS project has delivered all the Project Scope and Project Success Factors.

- Once operational, NSW and Queensland PSA personnel will be able to focus on public safety incident response and assisting interstate peers, while having confidence their radio communications will not restrict their operational response.

Questions

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Thank you to the following who were involved in this project:

Philip Conder, John McIntosh, Duncan Alcorn, Amelia Cardell, Tracy Greenlees, James Corkill, Kate Foy, Robert Crawford, Charbel Matta, David Gorton, Tertsea Tor-Anyiin, Khalid Salim, Jamie Vernon, Rekha Evans, Steven Morrison, Denis Patel, Shane Culbert, Mick Jones, Nathan Eberle, Geoff Kerr, Mike Nielsen, Paul McManus, Noel Sutherland, Sonya Jaaniste, Fabian De Clara, Clayton Watts, David Hay, Isaac O'Sullivan, Paul Hurwood, Will Hampton, Danny Hew, Kim Taylor, Emily Cravigan, David Rountree, Isaac Nankavill, Tom Webster, Gary Davis, Jeff Monro, Sean Maskell & apologies to anyone I've missed…

"R" = Roaming

9 INTER-OP
970-INTERSTATE
3:143:Legume
RSSI 60
Zone ChSr Chan