



# Next Generation Critical Communications Concept Brief



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**Contents**

- Introduction** **3**
  - Purpose 3
  - Document Audience 3
- Business Context** **4**
  - The Sector 4
  - International Direction 4
  - The Challenge 4
  - The Vision 5
  - Operational Scenarios 6
  - Needs Comparison 10
- The Capability** **12**
  - Service Delivery 12
  - Service Catalogue 12
  - Service Management 12
  - Communications Services 13
  - Service Availability 13
  - Itinerant Network Services 15
  - Standalone Communications 16
  - Resilience 16
  - Devices 17
  - Integration 17
- Transition** **19**

# Introduction

This Concept Brief outlines the high-level deliverables of the Next Generation Critical Communications (NGCC) Programme. The approaches described in this document are concepts only, aligned with Emergency Sector requirements.

## Purpose

The purpose of this document is to describe the business outcomes being sought from the NGCC Programme and to provide a high-level view of how these outcomes will be met by the proposed services. This document does not prescribe how the NGCC solution will be provided, which will be determined through a formal procurement process, and is intended to be a living document updated over time as the NGCC Programme progresses. A more technical view of the proposed capability is contained in the NGCC Indicative Architecture document.

## Document Audience

The intended audience for this document is business users within the Emergency Services community, and related government and commercial stakeholders.

# Business Context

This section outlines the fundamental need for the NGCC, describing typical operational scenarios requiring communications, providing an overview of the current state of agency communications and describing the desired future state.

## The Sector

The Emergency Services sector agencies included in this programme are New Zealand Police, Fire and Emergency New Zealand (FENZ), Wellington Free Ambulance and St John Ambulance.

Communications capability is critical to the safe and effective provision of emergency services for our communities. The sector agencies have the usual business drivers of using modern communications capability to improve service delivery but also have unique requirements particular to their role. Front line staff must have reliable services in the most severe disaster scenarios and in the most remote places in New Zealand. Communications must function wherever and whenever needed to ensure the safety of staff and the public.



The Emergency Services agencies work individually and together as a sector in different situations. This has an impact on the communications services required, to ensure agencies have the ability to communicate and share information in a timely manner to reduce harm and damage.

In recent years, agencies have put in place mobility strategies to improve effectiveness and service delivery by providing front line staff with timely access to information they need to make the right decisions. Traditionally, critical communications have focussed on the provision of reliable voice services for dispatch and management of resources in the field. The implementation of agency mobility strategies means reliable access to high-speed data services has also become critical to the delivery of services. Existing communications networks do not provide these rich data capabilities and many have reached end of life, presenting a growing risk of service failure.

## International Direction

The shift to commercial cellular services for critical communications is world-wide, with initiatives well advanced in the United Kingdom (ESN), United States of America (FirstNet) and South Korea (SafeNET), and most other developed nations are considering similar programmes. The mobile communications industry (equipment suppliers and network providers) are actively supporting critical communications through the development of standards for critical communications features in networks and devices. User devices designed for emergency services are in development and the global use of common standards will see economies of scale realised. These standards will also see many critical communications features on normal consumer devices which will be suitable for many agency users.

## The Challenge

The NGCC Programme has established, through engagement with Emergency Sector agencies, that agencies face similar challenges to their existing communications capability, which are:

- Unreliable communications that are endangering operations and lives; and

- Inability to utilise modern communications, which is hindering continuous improvements to the delivery of service to the public.

To address these challenges, the following investment objectives have been developed:

- To provide Emergency Services with reliable access to secure communications when needed;
- To meet Health and Safety requirements while delivering our legislative and contractual obligations for New Zealand;
- To provide a sustainable communications capability for Emergency Services; and
- To govern the development of critical communications capability.

By delivering the objectives, the Programme will be deemed successful when the following outcomes are achieved for the participating agencies:

- Our communications capability meets operational needs;
- Our communications services make our people safer;
- Critical communication services are evolving and affordable.

The proposed approach to deliver these outcomes is outlined in the following sections of this document. The solutions discussed are proposals only and may change through the NGCC business case process.

## The Vision

The vision for the Next Generation Communications Capability is:

A nationwide communications capability that delivers critical mobility services which enable productivity and effectiveness for Emergency Services to better serve New Zealanders<sup>1</sup>.

The new capability will meet all current and future communications needs of the Emergency Services agencies. It will be provided under a flexible service contract offering an evolving set of standard and critical communications voice and data services available where and when needed. Services will be provided over enhanced commercial networks, on an outcomes-based agreement recognising the specific requirements of emergency service communications.

Agencies will partner with commercial service provider(s) who will be responsive to their needs and will assist with transition from existing services and ensure the service evolves to meet the changing needs of agencies.

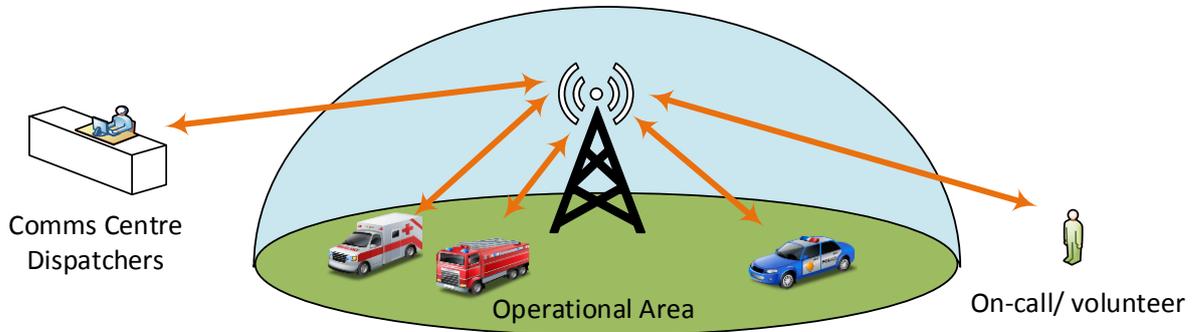
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<sup>1</sup> NG-RN Programme Business Case, November 2017

# Operational Scenarios

The following scenarios are provided to illustrate how Emergency Service agencies rely on mobile communications. Rich data provided by the NGCC will enable Agencies to better serve the public and ensure the safety of their staff, and will create more detailed information about events that will be available for future training purposes or incident reviews.

## 1. Dispatch and manage resources



### Scenario background

The Emergency Services use mobile communications to efficiently manage their resources. Agencies operate Communications Centres in Auckland, Wellington and Christchurch where Dispatchers manage a group of field resources, usually in designated geographic areas. To respond to an incident, the Dispatcher selects a resource and assigns the job to them, providing information as required to ensure the field resource knows where to go, the actions required by them and any known safety related information.

Agency Responders can be career or volunteer, and located at stations, in vehicles or otherwise on the move, or be on-call. Dispatch notifications must reach volunteer, on-call or mobile Responders who are not located at a station, and they must be able to acknowledge the notification and provide their status and ability to respond.

Following the initial dispatch, the Dispatcher will often provide additional relevant information. During the life of an incident, the field resource will respond back to the dispatcher with status information or to request additional information or resources. This two-way communication continues until the incident is over, although the level of communication will typically drop over time. At the conclusion of the incident, field resources need to indicate the outcome of the incident and confirm they are now available for the next job.

What does Dispatch involve?	NGCC Services will enable....
1. Matching the right resources to incidents	Location, status, equipment and skill set of Responders to be known and incorporated with environmental context (e.g. traffic congestion between the Officer and the incident) to ensure the most appropriate resources are dispatched.
2. Dispatching Responders and resources	Dispatch notification received and responded to by Responders, including remote volunteers, on-call and mobile Responders. Stations (FENZ / ambulance) are 'turned out' (doors opened, lights on, sirens started) at the touch of a button.
3. Travel to incident	Responders know the best route and relevant environmental factors (e.g. road crash on route).

<b>What does Dispatch involve?</b>	<b>NGCC Services will enable....</b>
4. Receiving information on-route	Responders can receive and gather relevant rich data on route. Rich data (pictures / video) is available to passengers but drivers will need to receive clear voice communications.
5. Initial situation assessment	Situation Reports (SITREPs) to Comms Centre are enhanced with rich data (video / data) from the scene.

## 2. Officer Safety

### Scenario background

Agency Responders often work alone in remote areas and enter uncertain situations. Having reliable communication services is vital to keeping our people safe. It is vital that our staff can receive help when they are in immediate danger/ peril.

<b>How do we keep our people safe?</b>	<b>NGCC service will enable....</b>
1. Monitor and track Responders	Accurate Responder location (including altitude) and body telemetry to be viewed by local and remote staff. Responders can be tracked as they move which could be in a vehicle.
2. Communication (on-scene and to agency comms centres)	Reliable rich two way communications (streaming video/ audio). Communication sessions could be established remotely e.g. Dispatcher can open a video channel to a Responder's device to confirm that a Responder needs assistance.
3. Responders can raise alerts when they are in danger	Responders must be able to call for help when they need it. Communication services to be available where and when required.
4. Share situational awareness	Agency staff (local and remote) can share rich information to understand the environment before and during the dispatch of Responders. For example, Responders are made aware of environmental hazards e.g. the location of LPG tanks before they arrive on scene.

## 3. Communications at an incident scene

### Scenario background

Emergencies can occur anywhere at any time. Agency specific and inter-agency communications are required for remote support and Incident Ground Communications. On the ground the Incident Controller is responsible for coordinating activities.

The Emergency Services operate in rural areas outside of fixed coverage and away from roads and vehicles so they need to be able to take coverage with them or to communicate off-net with fellow Responders at a scene.

<b>What needs to be communicated at an Incident scene?</b>	<b>NGCC Services will enable....</b>
1. Scene assessment •	Video/ pictures of the scene to be used to gather and share an awareness of the situation. HAZMAT identification signs can be shared and vehicle schematics are available to Fire Fighters to enable safe extraction of people from vehicles.
2. Additional resource requests	Rich data will create a shared situational awareness enabling remote Dispatchers to identify additional resources as they are required. Dispatchers will be able to provide the ETA of additional resources to Responders on scene.
3. Incident briefings	Responders can receive a briefing at their current location, which might be on-route to the incident. Additional information or instruction can be shared throughout the event with Responders at their location.
4. Situational Reporting (SITREPs)	Remote supervisors will not have to solely rely on voice updates from the scene, for example officer-worn cameras, video from drones and biometric sensors will provide a rich picture to Dispatchers and the Incident Controller.
5. Co-ordination of Responders	The Incident Controller knows the identity, status and location of Responders on scene. This information can be used to coordinate the multi-agency response.
6. Identification of hazardous substances	If hazardous substances cannot be identified at the scene video/ pictures/ data can be sent from the scene directly to remote specialists for identification.
7. Extracting people from vehicles	Firefighters could use augmented reality to know where to cut vehicles to safely extract people.
8. Telemedicine	Responders from any agency will be able to share rich data with remote Clinicians to diagnose and treat patients at the scene. Paramedics will be able to download clinical records to mobile devices to enhance clinical decision making. Correct diagnosis will enable patients to be transferred directly to the correct Hospital speciality possibly bypassing the Emergency Department.
9. Patient transfer	If, for example, helicopters are dispatched the Incident Controller can view a map of the scene and taking into account the event and weather identify a suitable landing location, they would be able to guide Responders to clear the landing zone and move the patients to the helicopters.

## 4. Major Incident

### Scenario background

New Zealand experiences major multi day/ week incidents every year. These could be a large forest fire, industrial incident or natural disaster.

The timely availability of information on conditions and hazards is vital to ensure the most effective use of resources for all agencies. Sharing of situational information between agencies (usually at a command level) is essential to resolving major incidents.

To ensure the safety of Responders, all Emergency Services agencies require communications to remain operational and available to all users at all times during these events. A temporary network capability could be required, such as portable cell sites or satellite base stations to deliver communication services for the duration of the Incident, if the incident is located out of general coverage or if regular services are unavailable due to the disaster itself.

<b>What is communicated at a major incident?</b>	<b>NGCC services will enable.....</b>
1. Incident prioritisation	Having accurate, rich information from the scene will enable correct prioritisation and the appropriate response from agencies.
2. Remote management of the overall agency response	Agency command centres have a shared understanding of the incident(s) and the information they need to make the right decisions.
3. Assure communications/ setup communications network	Agencies currently rely on their own communications staff to ensure that communications are available during large incidents. This same level of service will be required for NGCC.
4. On scene and inter-agency briefings	Responders can receive regular accurate updates on the situation to their mobile device. Rich information can flow up and down the command chain and between agencies to ensure that the correct decisions and actions are taken.
5. Responders at incidents request additional resources, which can be from other agencies.	Responders on the ground have the ability to send relevant information to request assistance from other agencies. For example, video and health data from a casualty's wearable sensors can be sent by a Firefighter to the ambulance service to diagnose the patient. Remote supervisors will be able to inform Responders on the ground when additional assistance will arrive.

## 5. Road Policing- Fleeing Driver

### Scenario background

Police are responsible for enforcing transport laws across the road network nationwide. Duties include responses to observed driver behaviour, checking that vehicles are safe to drive and responding to vehicle crashes. Infringement notices are completed at the side of

the road, relying on data services to query and confirm identities and other information. In the example below a car has driven away from a Police traffic stop at speed, the suspect is known to carry firearms, the Eagle Helicopter is dispatched.

What is communicated during a fleeing driver incident?	NGCC services will...
1. Pursuit initiation.	Communication services are used to alert the relevant Dispatcher and Supervisor that a pursuit has been initiated. Could be voice from driver or an alert created from car sensors.
2. Supervisor authorises or denies the continued pursuit based on the risks to public safety; this is reviewed constantly.	The Dispatcher and Supervisor have sufficient information (streaming dash cam, map, traffic, weather, car speed, video from helicopter) to decide to authorise or deny the continuation of the pursuit. Communication is possible with vehicles (cars and helicopter) moving at speed potentially across districts.
3. The Dispatcher provides the Police driver with guidance.	In a vehicle, clear hands-free voice is vital for communications as the driver will need to keep their eyes on the road. Group communications allows everyone involved in the pursuit to be informed, and the relevant people to communicate directly with the driver if needed.
4. Two-way communications between Comms and Emergency Services Responders.	The dispatcher can see the location of the Police resources on a map and organises other units to assist as appropriate. Fire and Ambulance Responders on route to local incidents are alerted that there is a pursuit and diversions are suggested via their Mobile Data Terminals.
5. Other appropriate information is available to the Dispatcher from Police systems.	Relevant information from agency systems can be provided to Responders to ensure they are aware of the situations they are going into e.g. the fleeing driver is suspected to carry firearms.
6. Conclusion of pursuit	By having all the information they need and clear communications with Responders the Dispatcher(s) can co-ordinate the response to safely apprehend the suspect.

## Needs Comparison

The following table outlines the desired future state for critical communications and provides a summary of the current state as a comparison.

Current State	Future State
Basic dispatch and in-field communications.	Rich dispatch and in-field communications including voice, video and data.
Mixture of delivery models for radio and cellular communication services, including own/operate and commercial services.	Common approach to delivering critical communications across the sector under a service model that delivers fit-for-purpose, highly available services.

<b>Current State</b>	<b>Future State</b>
Secure communications available in Auckland, Wellington and Canterbury only on the NZ Police digital network.	Secure communications wherever and whenever required.
Staff safety managed through voice communications and “Emergency Button” alerting system when in coverage.	Staff safety managed through location-based services that automatically report their location combined with voice and emergency button services.
Front line business application access and standard voice and data services restricted to current commercial cellular coverage areas (<50% of New Zealand).	Front line business application access, voice and data services available wherever and whenever required.
Aged infrastructure in radio networks and end user equipment has stagnated and has a growing risk of failure, including obsolete components that are increasingly expensive and difficult to repair.	Modern communications service that is managed and maintained, aligned to international standards, and has a continuous investment cycle to maintain currency.
One-off large capital investments to replace networks and devices.	Sustainable ongoing operational costs.
Disparate governance.	Common, centrally-governed service.

# The Capability

This section describes how the NGCC services will enable the investment objectives to be met and describes the features which will be available and where there are constraints to delivering these services.

## Service Delivery

The new services will be provided as a fully managed service, where agencies buy services from a Service Catalogue on either a flexible consumption or fixed term basis.

Key features of the contract will be:

- A collaborative approach between agencies and suppliers, enabling a productive long term relationship (possibly 10+ years);
- Service levels suitable for emergency services critical communications;
- A 'per user' or 'per service' structure that does not restrict the amount of calls/data usage ('all you can eat' usage);
- Flexibility for increasing/decreasing numbers and/or service features without penalty;
- Transition assistance to ensure agencies successfully migrate to the new service;
- Agreed roadmap for new services and retirement of obsolete services.

Agencies will not need to invest in capital purchases of services or devices, they will purchase them as an operational monthly service charge.

## Service Catalogue

The Service Catalogue will list all available services and devices and allow agencies to select the appropriate mix of NGCC services for their business. The catalogue will include standard and specialist devices, critical communications services and standard voice and data services.

The catalogue will evolve over time to meet the changing needs of agencies, and will be updated as new technologies become available. This evolution will be guided by a central body representing the emergency services sector, ensuring critical communications services and devices remain current and available and essential services remain supported over their operational lifespan.

## Service Management

Agencies and Service Providers will have a long term partnership, working together to provide the best outcome for agencies, with Service Providers actively seeking innovative solutions to improve agency productivity and effectiveness and service delivery.

Service Providers will need to develop their traditional support and operational activities to ensure they can provide a service offering that matches the needs of agencies, particularly around the responsiveness expectations for critical communications services.

It is expected agencies will want some ability to self-manage their services, particularly around access and authorisation, managing applications on devices and having flexibility to manage group communications. Emergency Services need to respond quickly to changing circumstances and self-service ability will be critical to this responsiveness.

## Communications Services

The NGCC will provide a full suite of mobile communication services to replace all legacy radio and cellular services. The new services will meet Emergency Services agency requirements for availability, reliability and performance.

The following table lists the intended services. All services will be available across the country with a guaranteed level of performance and availability however there will be cases where a reduced level of performance will be available due to the capability of the delivery technology being used (see the following 'Service Availability' section).

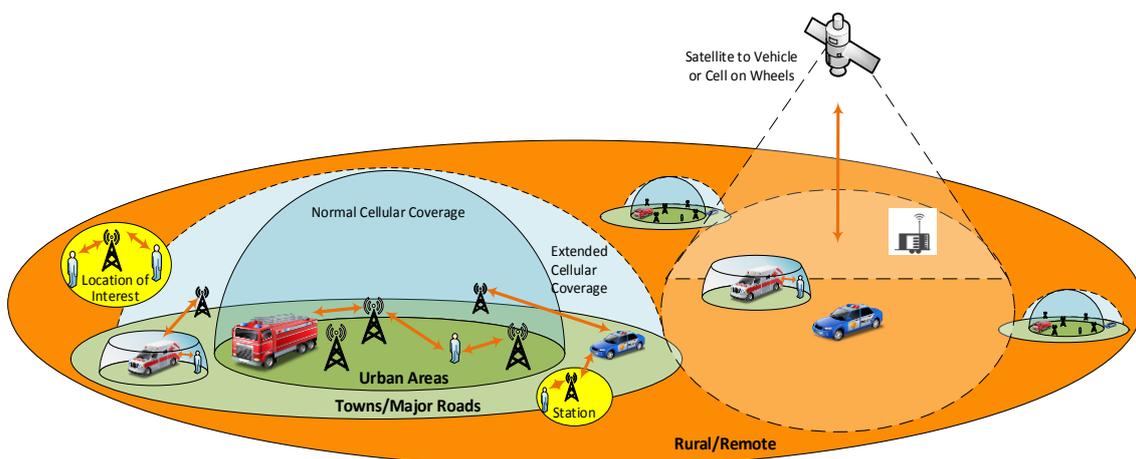
The NGCC services are:

- Critical communications (priority access)
- Push to Talk (PTT) group calling
- PTT video calling
- Data services
- Secure communications (privacy, encryption)
- Messaging Services (signalling, paging, text)
- Location services (GPS, etc.)
- Vehicle relay connectivity
- Standard telephone voice services (including audio conferencing)
- Communications Centre connectivity
- Gateways to other communication networks (e.g. radio, maritime)
- Off-network, device-to-device/group operation
- Video conferencing
- Streaming video

Agencies will be able to purchase devices for use where network-enabled services are not available, or are not needed. Typical uses include direct-mode (simplex, and stand-alone relay) use at incident scenes, search and rescue use in remote locations, and specialist group use in close proximity, such as VIP protection. These services may be supplemented with portable coverage solutions where network services are occasionally needed but permanent services are not justified (see the 'Itinerant Network Services' section of this document).

## Service Availability

To enable access to a common set of communication services and agency-specific operational applications in all locations where Emergency Services operate, the NGCC capability will be delivered using multiple network access technologies including cellular and satellite. This concept is shown in the following diagram.



Ideally the full complement of services could be delivered to all users across 100% of New Zealand through investing in expansion of commercial cellular. The NGCC Programme will invest in expanding existing commercial cellular networks to commercially non-viable areas and to improve service quality in many areas, however there is a practical limit where investment in permanent coverage is not justifiable or even possible. Currently cellular networks cover around 50% of the land area of New Zealand, and recent Government investments in the Rural Broadband and Mobile Black Spots<sup>2</sup> initiatives will extend this to most urban and rural areas (~70%) by 2022.

Emergency Services response may be required in any part of New Zealand including the remaining ~30%. Therefore, the more remote parts of the country will have services provided on an 'as-needed' basis primarily utilising commercial satellite services, connected into a seamless service. Vehicles fitted with satellite equipment will allow critical communications services to be maintained seamlessly as they move in and out of primary coverage. The vehicles can then act as relays, extending a 'bubble' of coverage for people to use.

The inherent capability of commercial satellite services, and the more costly pricing structure, means there may be some performance restrictions on some services when using satellite communications but mission critical services will always be available. Full performance will automatically become available again when the vehicle moves back into cellular coverage.

Where a response situation in an area with no permanent cellular coverage requires higher performance services, deployable cellular solutions such as vehicle-based cellular repeaters or mobile cell sites can be brought in quickly to augment the services available to the first responder. In areas of special interest, 'hotspots' of permanent coverage can be created providing normal cellular services. In remote places, communications will usually be limited to person-to-person radio services, although network connectivity can be provided with deployable cellular solutions or satellite services when required.

To determine where investments in permanent coverage are made and the types of services which will be available in different locations, a 'zone' model has been developed, as below.

<b>Zone</b>	<b>Typical Area</b>	<b>Type of coverage</b>
<b>A1</b>	Cities	<ul style="list-style-type: none"> <li>• Full cellular coverage outdoor and in-building</li> <li>• Permanent infrastructure</li> <li>• Resilient services</li> </ul>
<b>A2</b>	Large Towns	<ul style="list-style-type: none"> <li>• Full cellular coverage outdoor and in-building</li> <li>• Permanent infrastructure</li> <li>• Some resilience</li> </ul>
<b>A3</b>	Locations of Interest	<ul style="list-style-type: none"> <li>• Specified locations, e.g. tourist locations, industrial sites, etc.</li> <li>• Full cellular coverage outdoor and in-building</li> <li>• Permanent infrastructure</li> </ul>
<b>A4</b>	Stations	<ul style="list-style-type: none"> <li>• Fire, ambulance, police stations</li> <li>• Full cellular coverage in-building and immediate vicinity</li> </ul>

<sup>2</sup> More information on these initiative, can be found on the Crown Infrastructure Partners website - <https://www.crowninfrastructure.govt.nz/ufb-initiative/rbi2-mobile-black-spot-fund/>

Zone	Typical Area	Type of coverage
		<ul style="list-style-type: none"> <li>• Permanent infrastructure</li> </ul>
<b>B1</b>	Small Towns	<ul style="list-style-type: none"> <li>• Significant cellular coverage</li> <li>• In-building cellular coverage through vehicle relay</li> </ul>
<b>B2</b>	Major Roads	<ul style="list-style-type: none"> <li>• Significant cellular coverage</li> <li>• Vehicle relay cellular</li> <li>• Some satellite*</li> </ul>
<b>C1</b>	Rural Areas Minor roads	<ul style="list-style-type: none"> <li>• Satellite*</li> <li>• Deployable cellular</li> <li>• Cellular where available</li> </ul>
<b>C2</b>	Remote Areas	<ul style="list-style-type: none"> <li>• Satellite*</li> <li>• Radio*</li> <li>• Deployable cellular</li> </ul>
<b>C3</b>	Coastal & near-shore	<ul style="list-style-type: none"> <li>• Satellite*</li> <li>• Cellular where available</li> <li>• Maritime radio*</li> <li>• Deployable cellular</li> </ul>
<b>C4</b>	International Deployment (disaster relief, protection services)	<ul style="list-style-type: none"> <li>• Standards compliant devices that can be taken overseas</li> <li>• Satellite*</li> <li>• Deployable services*</li> </ul>

\* Reduced performance for some services, when not using cellular

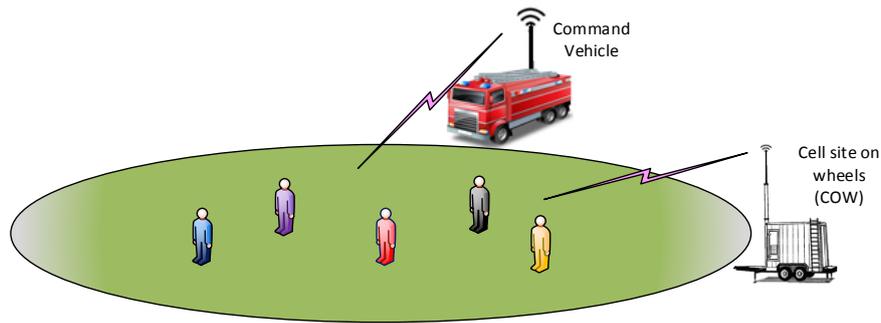
For each zone, an agreed set of services with agreed performance levels will be available (permanently or on an as-required basis). This will enable agencies to plan their service delivery in each area with certainty.

For international deployments (zone C4), the NGCC satellite service will be available worldwide, however it is likely the majority of communications would be with the local agencies on their services. The availability of devices which comply with international standards will enable users to take their usual device with them overseas, simplifying deployment. Similarly, visitors from other jurisdictions will be able to use NGCC services with their own devices.

Imperative to the success of this hybrid approach is for the access technology to be transparent to front line staff whenever possible, i.e. they use the same device and the services do not appear to change when the access method changes. If a different operating process is required due to restrictions imposed by the access method, then it must be obvious to the user this has happened and the new process must be fast and simple to adopt.

## Itinerant Network Services

Where network communications are required for a limited time in an area with no permanent network coverage, portable communications can be brought in for the duration of the event.

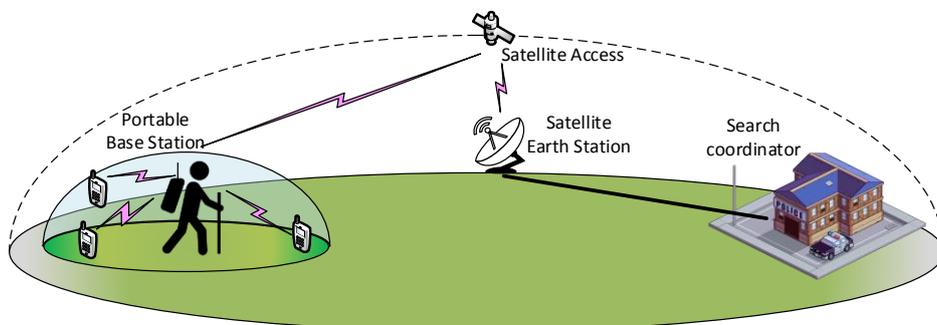


Examples of this use could be a sporting event in a remote place, a long-term rescue or following a storm where permanent services are lost for a few days. Network services would be provided from a portable cell site in an agency vehicle, or a 'Cell site on wheels' (COW) brought in by a service provider. These services can be linked back to the core network through satellite or microwave to provide full services for as long as required.

## Standalone Communications

Emergency Services have many communication scenarios where a centralised 'command and control' process delivered from a remote point over a network are not required, including the 'Communications at a fire' and 'Search and Rescue' scenarios described earlier in this document. The NGCC will support direct-mode communications with a range of devices and accessories, employing the most suitable technology to meet the service need.

In some scenarios, the ability to relay local communications back to a remote coordination point may be useful. This is illustrated in the following diagram.



A typical scenario would be a search and rescue operation where the local searchers have a common direct-mode channel to communicate with each other but a remotely located coordinator is monitoring the progress of the search and the wellbeing of the searchers. In this scenario, remote monitoring could be enabled through the use of a deployable base station with network connectivity through a satellite connection or, in less remote locations, a connection could be established through a local cellular base station. Linking back into the network would enable the GPS location information for each user device to be relayed back to the coordination point, improving situation knowledge and enhancing the safety of searchers.

Itinerant, deployable and standalone service options will be available in the NGCC Service Catalogue.

## Resilience

Emergency Services communications are characterised by the requirement that they must be available during disaster scenarios such as earthquakes and adverse events such as storms. Destructive storms are frequent events in New Zealand, with high wind speeds causing

damage to infrastructure and flooding impacting services and preventing access to restore them. Common causes of network failures from natural events are the loss of power to sites for extended periods of time and the collapse of poles and masts from high winds. Dedicated emergency services networks are designed to be resilient to common failures by incorporating features such as backup generators and large battery installations to maintain power, seismic and wind bracing at sites, built in redundancy against equipment failures and avoiding single points of failure in network designs.

Commercial networks are traditionally designed with lower levels of resilience than dedicated Emergency Services networks as providing resilience features across a network is a costly exercise. To ensure the NGCC provides reliable services in adverse situations, there will be agreed resilience requirements with service providers and investment in additional resilience features where required.

Improving physical resilience of a cellular network will be a major cost driver for the NGCC initiative and therefore alternative means of providing service resilience will also be considered, such as having multiple network access options including roaming onto other commercial cellular networks and deployable cellular and satellite solutions. The NGCC will feature a combination of these approaches to deliver Emergency Services grade communications.

## Devices

A wide range of user devices will be available to meet the diverse communication needs of emergency services agencies, from standard cellular phones for corporate use through to equipment designed to be used under the extreme conditions experienced when fighting fires. The availability of devices to meet Emergency Services needs will be critical to the success of the NGCC initiative. This has been recognised internationally, leading to significant development work from device manufacturers. The NGCC will be delivered to international standards to ensure the widest possible range of equipment and accessories can be sourced, at competitive prices.

Examples of the types of devices required include:

- Front line multi-mode communication devices;
- Vehicle communication hubs;
- Specialist group equipment;
- Corporate cellular phones and tablets;
- Satellite devices;
- Voice-centric radio devices (simplex, Incident Ground Control, Search and Rescue).

Devices will be selected from a Service Catalogue and supplied as part of the NGCC service, meaning agencies can avoid capital purchases of equipment, although it is likely options will exist for agencies to separately purchase highly specialised hardware if necessary. Adherence to international standards means NGCC devices can be taken to other countries if necessary (e.g. protection services, disaster relief) and visitors from other jurisdictions will be able to use NGCC services with their own devices.

## Integration

The NGCC will be integrated into agency communications systems and applications. It will have standards-compliant interfaces to enable integration with a wide range of legacy and future communications services. In particular, integration to the following systems will be provided:

- Computer Aided Dispatch (CAD) systems used in Communications Centres;

- Existing agency analogue and digital land mobile radio systems<sup>3</sup>;
- Agency and public telephone systems;
- Secure access to core agency information systems (for mobility applications);
- External radio networks (maritime, aeronautical).

A key service for Emergency Services is the centralised dispatch and management of resources, as described in the 'Communications scenarios' section of this document. Integration points with Communications Centres will need redundancy and high-availability features to reflect the critical nature of these communications.

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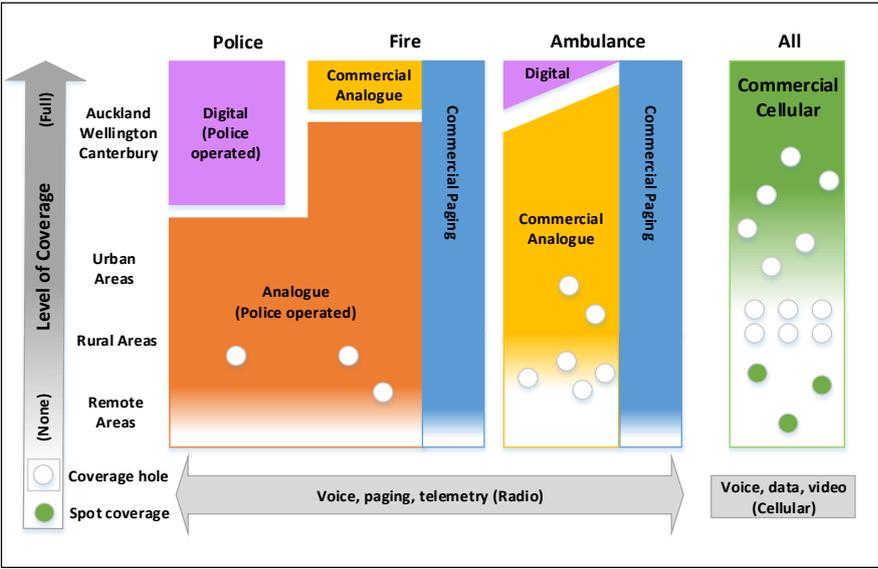
<sup>3</sup> Includes voice communications and turnout systems

# Transition

Service establishment will be progressive with the new services made available with connections to existing services to ensure critical communications capability is maintained during transition. Existing communications services will be the subject of assurance activities to ensure they operate reliably until they are no longer required. All services and the hybrid network (including agreed coverage) will be established in time to complete transition for all emergency services agencies by the end of 2023. Following successful transition, existing networks will be decommissioned.

Agencies will have many early transition opportunities, as mobility applications which do not require specialist critical communication features will be able to use existing cellular networks under the new commercial arrangements. Wider rollout of these applications will then be enabled by the increased coverage and critical communications services being deployed from early 2020.

The NGCC Programme acknowledges there will be challenges for agencies to fully transition their operating and service models to the new capability. Emergency Services agencies currently use a combination of commercial and owned/operated radio and paging networks to provide their critical communications, supplemented with commercial cellular services for high speed data services, as shown below.



The radio and paging networks deliver critical voice and data services for dispatching and managing front line staff from centralised Communications Centres. These networks are up to 30 years old and present a growing risk of failure. In addition to these network services, agencies extensively use radios in a device-to-device mode (simplex use) for direct communications at incidents or where network services are not available.

Agency critical communications requirements have expanded with the implementation of mobility strategies. Access to core agency systems from the front line is now critical to effective service delivery as front line staff require information to make informed decisions. These services are delivered over commercial cellular networks however the success of these initiatives are constrained by the limited coverage of cellular networks outside urban areas.

The scale of communications usage within Emergency Services agencies is shown below:

	<b>Police</b>	<b>Ambulance</b>	<b>FENZ</b>	<b>Total</b>
No. of front line staff	10,000	12,500 <sup>1</sup>	12,500 <sup>2</sup>	35,000
No. of vehicle/fixed radios	6,000	1,400	2,700	10,100
No. of portable radios	6,000	2,500	5,500 <sup>3</sup>	14,000
No. of mobile data terminals <sup>4</sup>	-	1,000	1,500	2,500
No. of pagers	-	8,500	13,500	22,000
No. of existing radio sites <sup>5</sup>	330	150	250	730 <sup>6</sup>
No. of mobility devices <sup>7</sup>	9,000	2,700	700	12,400

Table Notes:

1. Includes full-time staff and volunteers, for St John Ambulance and Wellington Free Ambulance
2. Includes career, volunteer and rural firefighters
3. Not used on the network, direct-mode only (a.k.a. device-to-device)
4. Used in vehicles for updating job status and accessing central information systems
5. Sites are owned/operated by Police or TeamTalk
6. Approximately 500 discrete sites, as FENZ share most sites with Police
7. Consumer devices, including cellular phones, tablets, etc.

The NGCC will provide a full set of services to replace current communications, with a managed transition to ensure agencies have a seamless migration to the new capability. Service Providers will provide assistance during the transition and will have a key role in ensuring agencies can fully realise the benefits enabled by the new capability.