

Public Safety Network

Appendix 3.1

Fire and Emergency New Zealand Use Cases

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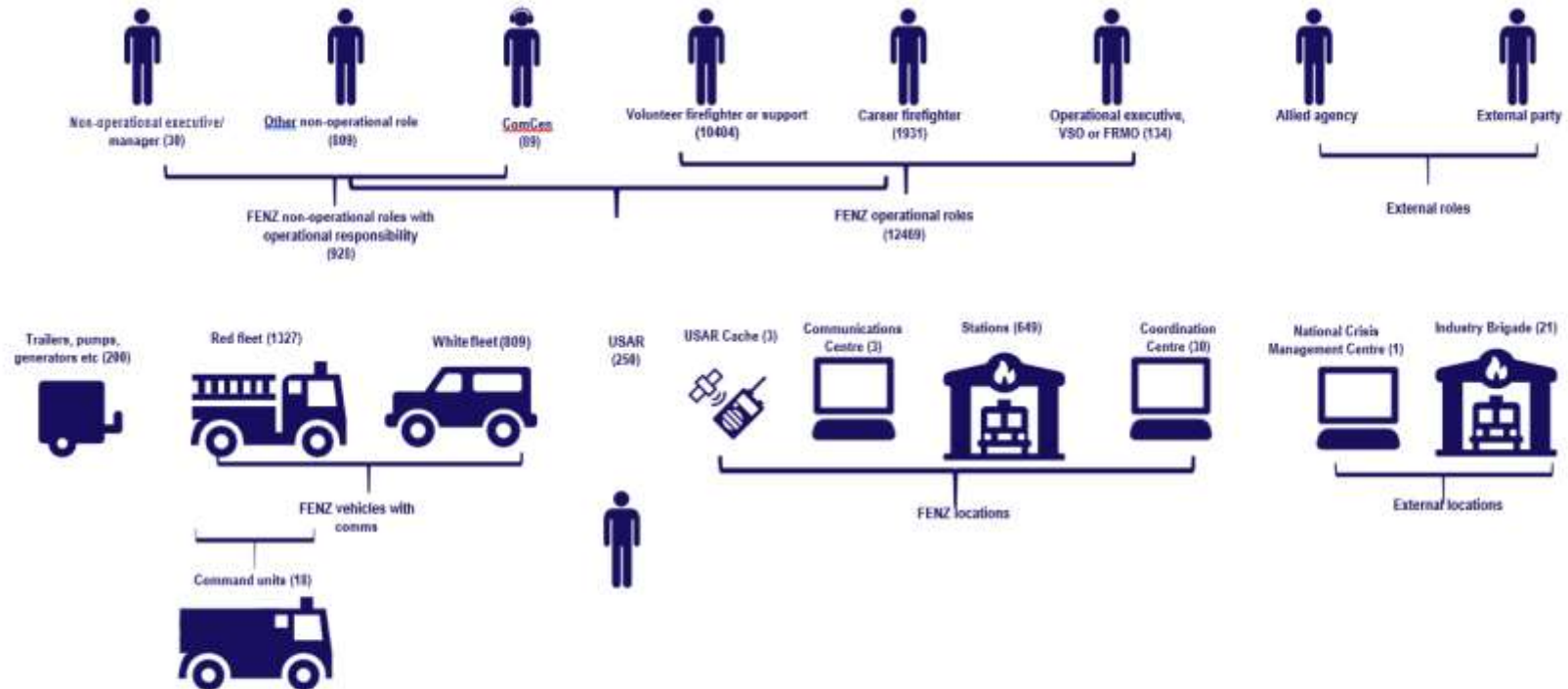
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1. Roles, vehicles, and fixed locations

Figure 1. Summary of roles, vehicles and fixed locations involved in Fire and Emergency operational communications



Numbers as at July 2020

2. Devices

Devices are expected to be allocated as per Table 1.

Note that:

1. Portable devices may be either allocated to individuals or as shared devices to vehicles and fixed locations.
2. Individuals may also have **DP02 Cell phone – BYOD**, their own personal device, which may or may not be furnished with access to a PSN data plan (to be decided, based on detail of the plan).

Table 1: Allocation of devices to individuals, vehicles, and fixed locations

Role, vehicle, or fixed location	PSN ID	Device	Shared	Allocation	Change from current state?
Operational roles					
Volunteer firefighter or support	DP11	Pager-like alerting device	No	One each	No change
Career firefighter	No individually allocated devices – use shared devices only				
Operational executive and specialist officers	DP01	Cell phone - agency-issued	No	One each	No change
	DP11	Pager-like alerting device	No	One each	No change
Non-operational roles with (occasional or ongoing) operational responsibility					
Executives & national managers	DP01	Cell phone - agency-issued	No	One each	No change
	DP10	Satellite phone - portable	No	As needed	No change
Other roles with occasional operational responsibility	DP01	Cell phone - agency-issued	No	One each	No change
	DP11	Pager-like alerting device	No	As needed	No change
Urban Search and Rescue (USAR)					
Any role with additional USAR responsibility	DP01	Cell phone - agency-issued	No	One each if don't already have one on basis of main role	No change

Role, vehicle, or fixed location	PSN ID	Device	Shared	Allocation	Change from current state?
	DP11	Pager-like alerting device	No	As above	No change
Vehicle - Red fleet cab					
All Red fleet	DP01	Cell phone – agency-issued [<i>Rugged, PTTtoC button</i>]	Yes	One per vehicle	Replaces vehicle phone
	DP03	LMR portable [<i>UHF</i>] ¹	Yes	Several (one each for crew)	No change
	DP03	LMR portable [<i>Multi-band</i>] ¹	Yes	One to several (for crew and/or officer)	No change
	DP13	Tablet computer [<i>with vehicle mount</i>]	Yes – linked to Vehicle ID	One per vehicle	New (but replaces current ‘button box’)
	DV03	LMR vehicle terminal [<i>wide-area LMR</i>]	Yes – linked to Vehicle ID	One per vehicle	No change
	DV03	LMR vehicle terminal [<i>support</i>] ¹	Yes – linked to Vehicle ID	As needed for local conditions	No change
	DV12	Vehicle router [<i>with GNSS receiver</i>]	Yes – linked to Vehicle ID	One per vehicle	New (but has GNSS so replaces AVL)
	DV14	Vehicle-based camera [<i>Dashcam</i>] ¹	Yes – linked to Vehicle ID	One per vehicle	New (some only in current state)

¹ Not represented in this document as is used off-network only.

Role, vehicle, or fixed location	NGCC ID	Device	Shared	Allocation	Change from current state?
	DP15	Body-worn camera	Yes – linked to Vehicle ID	One per vehicle	New
	DP10	Satellite phone – portable <i>[with vehicle mount]</i>	Yes	As needed for local conditions	No change
	DV17	Vehicle cellular booster <i>[accessible by portable and fixed vehicle devices]</i>	Yes	One per vehicle	New
	DV10	Mobile satellite narrowband terminal – vehicle mounted	Yes	One per vehicle	New
	SD02	Breathing apparatus telemetry set ¹	Yes	Several (for crew)	No change
	DV13	Local recording device ¹	Yes	One per vehicle	New
Career appliances only	DP11	Pager-like alerting device	Yes	Several (for crew)	No change
Career station pumps & Volunteer station Pump Rescue Tenders only	DP13	Tablet computer <i>[portable]</i>	Yes – linked to Vehicle ID	One per vehicle	New
Vehicle – white fleet cab					
All branded, self-propelled white fleet	DV03	LMR vehicle terminal <i>[wide-area]</i>	Yes – linked to Vehicle ID	One per vehicle	No change
	DV11	Vehicle location device	Yes – linked to Vehicle ID	One per vehicle without router	New
	DV14	Vehicle-based camera <i>[Dashcam]</i> ¹	Yes – linked to Vehicle ID	One per vehicle	New

Role, vehicle, or fixed location	NGCC ID	Device	Shared	Allocation	Change from current state?
	DV17	Vehicle cellular booster <i>[accessible by portable and fixed vehicle devices]</i>	Yes	One per vehicle	New
Operational executive and specialist officers only	DP03	LMR portable <i>[UHF]</i> ¹	Yes	One per vehicle	No change
	DP03	LMR portable <i>[Multi-band]</i> ¹	Yes	One per vehicle	No change
	DP13	Tablet computer <i>[with vehicle mount, can be removed]</i>	Yes – linked to Vehicle ID	One per vehicle	New
	DV12	Vehicle router <i>[includes GNSS receiver]</i>	Yes – linked to Vehicle ID	One per vehicle	New
	DP10	Satellite phone – portable <i>[with vehicle mount]</i>	Yes	As needed for local conditions	No change
	DP26	Personal location device	Yes	As needed for local conditions	No change
Rural operational executive only	DV03	LMR vehicle terminal <i>[support]</i> ¹	Yes – linked to Vehicle ID	One per vehicle	No change
Vehicle – Command unit pod					
All	DP03	LMR portable <i>[UHF]</i> ¹	Yes	Several	No change
	DP03	LMR portable <i>[Multi-band]</i> ¹	Yes	Several	No change
	DV03	LMR vehicle terminal <i>[wide-area]</i>	Yes – linked to Vehicle ID	Several	No change

Role, vehicle, or fixed location	NGCC ID	Device	Shared	Allocation	Change from current state?
	DV03	LMR vehicle terminal [<i>support/incident ground comms</i>] ¹	Yes – linked to Vehicle ID	Several	No change
	DV08	Nomadic satellite broadband terminal – vehicle mounted	Yes	One per vehicle	No change
	DV01	Vehicle cellular hotspot	Yes	One per vehicle	New
	DV02	Vehicle Wi-Fi hotspot [<i>cellular connection</i>]	Yes	One per vehicle	No change
	DV14	Vehicle-based camera [<i>capable of live-streamed video</i>]	Yes	One per vehicle	No change
Trailers etc					
Trailers, pumps, generators etc	DP23	Asset tracking device	Yes	One per item	New
Fixed locations					
Stations Industry Brigades Coordination Centres National Crisis Management Centre	DF01	LMR vehicle terminal [<i>wide-area</i>]	Yes – linked to location ID	One per location	No change
Stations Coordination Centres	DF01	LMR vehicle terminal [<i>support</i>] ¹	Yes – linked to location ID	As needed for local conditions	No change
Stations Industry Brigades	DF04	Station router	Yes – linked to location ID	One per location	New

Role, vehicle, or fixed location	PSN ID	Device	Shared	Allocation	Change from current state?
	SD16	Station dispatch terminal	Yes – linked to location ID	One per location	New (replaces Paging Data Terminals & printers)
	INP06	Station turnout console	Yes – linked to location ID	One per location	No change
All Coordination Centres	DP10	Satellite phone - portable	Yes	One per location	No change
Tier 1 Coordination Centres only	DP03	LMR portable [UHF] ¹	Yes	Several per location	No change
	DP03	LMR portable [Multi-band] ¹	Yes	Several per location	No change
	DV08	Nomadic satellite broadband terminal – fixed	Yes	One per location	No change
	SD03	Deployable telemetry repeater ¹	Yes	At least one per location	No change
USAR cache					
USAR	DN05	Data Communications Hub [<i>portable LAN/hotspot case with cellular & WiFi connectivity</i>]	Yes	Three per location	No change
	DP18	Nomadic satellite broadband terminal – portable [<i>USAR Variant 1: for short to medium term events</i>]	Yes	One per location	No change
	DP18	Nomadic satellite broadband terminal – portable [<i>USAR Variant 2: for squads doing search & rescue</i>]	Yes	Three per location (five northern)	No change

Role, vehicle, or fixed location	PSN ID	Device	Shared	Allocation	Change from current state?
	DN06	Nomadic satellite broadband terminal – deployable [<i>USAR Variant 1: long duration events</i>]	Yes	One per location	No change
	DN06	Nomadic satellite broadband terminal – deployable [<i>USAR Variant 2: lighter weight for long-duration international events</i>]	Yes	One in Northern only	No change
	DP03	LMR portable [<i>Multi-band</i>] ¹	Yes	20 per location	No change
	DP13	Tablet computer [<i>with SIM. Includes tablets used for surveying</i>]	Yes	Nine per location	No change
	DN02	Deployable LMR repeater [<i>long range – up to 100km</i>]	Yes	At least one per location	No change

3. Use Cases

This section describes the expected future state Use Cases for Fire and Emergency networked communications. Detailed discussion of off-network communications is excluded.

3.1 Overview of PSN capabilities used

Tables 2 gives an overview of what PSN capabilities (as described in the PSN Appendix 1. Service Requirements document) are expected to be used by Fire and Emergency, and when (either as soon as is available), or 'later' in a subsequent phase.

Table 2 PSN capabilities planned to be used by Fire and Emergency

PSN ID	Capability	LMR	Cellular	Personal alerting	Satellite	Comment
CC01	Make/Receive PTT Group Call	Yes	Yes	N/A	Later	Separate talkgroups on each network.
CC01	Make/Receive PTT Group Call	Later				Communication over both cellular and LMR on the same dispatch talkgroups.
CC02	Make/Receive One-to-One PTT Call	No	No	N/A	No	
CC03	Make/Receive Phone Call	No	Yes	N/A	Yes	
CC04	Take Part in an Audio Conference	No	No	N/A	No	FENZ needs assumed to be achieved via CC03 Make/Receive phone call.
CC05	Send/Receive SMS message	N/A	Yes	N/A	No	
CC06	Send/Receive MMS message	No	No	N/A	No	FENZ need to send pictures assumed to be achieved via Use Case FENZ10 Access applications.

CC07	Send/Receive Narrowband Data	Yes	N/A	N/A	Later	Key fall-back capability on LMR where cellular broadband data unavailable.
CC08	Send/Receive Turnout/Alert Message					Assumed to be a business outcome achieved by FENZ using PSN capabilities (see FENZ05), rather than a PSN capability itself.
CC09	Send/Receive Predefined Message	Yes	N/A	N/A	N/A	Note that this is assumed to be a business outcome achieved using PSN capabilities (see FENZ06), as well as the specific LMR technical capability indicated.
CC10	Send/Receive Call Request	Yes	Yes	N/A	Later	Routine and priority types.
CC11	Send/Receive Duress Message (wide-area)	No	No	N/A	No	Assumed to be covered by 'Priority' type CC10 Send/Receive call request.
CC12	Send/Receive free-form message (wide-area)	No	Yes	Yes	No	Personal messaging is required via both cellular alerting via data & SMS and (to achieve the required system availability) and via a completely independent personal alerting network.
CC13	Send/Receive vehicle location	Yes	Yes	N/A	Yes	
CC14	Send/Receive portable device location	Yes	Yes	N/A	Yes	
CC15	Send/Receive telemetry (wide-area)					Assumed to be a business outcome achieved by FENZ using PSN capabilities (see FENZ09), rather than a PSN capability itself.

CC16	Send/Receive Broadband data	N/A	Yes	N/A	Yes	Nomadic satellite broadband.
CC17	Send/Receive Live Video	N/A	Yes	N/A	Yes	Live video over nomadic satellite broadband.

3.2 FENZ01 Make/receive wide-area group call

3.2.1 Description

- **Dispatch groups.** ComCen or an Operational role makes/receives an **LMR** Push-to-Talk group voice call ('PTT call') to/from one or more target recipients in a geographic area. Other personnel in the area hear the call. Primary use is for communication between ComCen and operational roles but can be used for communication between operational roles.
- **Cellular talkgroups.** Officers (a rank of Operational role) are expected in the future to make use of **Cellular** Push-to-Talk group calls to communicate amongst themselves at an incident ground because of the potential for better in-building performance than off-network LMR communications. This would also give them a mechanism for portable access to ComCen (i.e. when away from a vehicle, as networked LMR is expected to continue to be accessible to operational roles only via vehicle and station devices). Push-to-Talk calling over cellular would also be a mechanism for communication amongst Operational support (traffic management) personnel for whom off-network LMR has an insufficient range.

See Figure 2 for a graphical overview.

3.2.2 Context

Group voice communication will continue to occur in the future between ComCen and Operational roles over an LMR network as part of the following operational functions. High performance characteristics (call set up time etc) are needed. Where an operational role is initiating a call with ComCen, the protocol is to request a call back from ComCen via **FENZ03 Make/receive call request – inbound**.

- **Dispatch** – for confirmation of turnout details.
- **Response** – for supplying and receiving additional contextual information relevant to turnouts.
- **Resource management** – for providing/requesting status updates not possible via predefined messaging, for requesting additional resources and providing/requesting situation reports.
- **Incident management** – for calls between arriving vehicles or a vehicle at the incident ground and arriving vehicles. As these calls do not involve ComCen, no **FENZ03 Make/receive call request – inbound** needs to be made.

Cellular talkgroups are expected to be used for the following, with a standard level of call performance being sufficient.

- **Incident management** – As an alternative to off-network LMR command talkgroups as described above and also for communications between operational support unit personnel. May be used by operational roles for portable communications with ComCen in which case would be preceded by **FENZ03 Make/receive call request – inbound** via the cellular device.

3.2.3 Preconditions:

1. Personnel have appropriate devices available on the correct talkgroup.
2. ComCen has selected the relevant talkgroup on which to make and receive the call.
3. The relevant network is available to all parties.
4. Where an Operational role wishes to speak with ComCen they have sent though a **FENZ03 Make/receive call request - inbound**.
5. The RedBox voice recording service
6. is available and receiving/recording on the relevant talkgroup.
7. (Except where ComCen is making the call), the talkgroup is not in use.

3.2.4 Postconditions:

1. Call has been made in a secure (encrypted) and timely manner (minimal technical delays or congestion).
2. Call has been received by target recipients, so they are able to act.
3. Call has been received by other personnel in the area, so they have awareness of activity in their area.
4. Call has been recorded.
5. ComCen calls have priority and can pre-empt other calls.

3.2.5 Primary actor:

ComCen or an Operational role.

3.2.6 Secondary actor:

Target recipients, i.e. Operational role or ComCen.

3.2.7 Main flow:

1. Actor initiates the PTT call on
 - a. the **INP01 Desktop Voice Control Software** or **DV03 LMR vehicle terminal** or **DF01 LMR fixed terminal** – where it is an LMR/dispatch talkgroup call; or
 - b. a Push-to-Talk app on **DP01 Cell phone – agency-issued** or **DP02 Cell phone – BYOD**. Ideally, for maximum geographic coverage, the call is established on any cellular network available (roaming).
2. Actor speaks into microphone, addressing the call to the target recipient(s).
3. Call is received by all personnel listening on the talkgroup(s).
4. Actor terminates call (e.g. releases foot pedal or button).
5. Actor receives verbal acknowledgement from target recipient(s) via the target recipient executing Steps 1–4.

A complete call will typically involve repetition of Steps 1–5.

3.2.8 Alternative flow 1: Vehicle going between geographic areas (dispatch talkgroups)

When a vehicle travels from an area covered by one dispatch talkgroup into an area covered by another dispatch talkgroup, the flow is the same as the main flow except the actor needs to switch talkgroups on the **DV03 LMR vehicle terminal** in order to maintain communications with ComCen over the LMR network. In this case the terminal transmits a status update to ComCen indicating what talkgroup the resource is now on.

***Future enhancement:** Talkgroup changes automatically as vehicle goes from one area to another.*

3.2.9 Exception flow 1: Cellular caller travelling out of coverage

Where a caller using a Push-to-Talk app on a cell phone leaves an area covered by the network on which the call was established, the call ideally would transfer the call seamlessly to another network should this be available, but it is acknowledged that this circumstance may be infrequent.

3.2.10 Exception flow 2: Desktop voice control software is unavailable

Where **INP01 Desktop Voice Control Software** is unavailable the flow will be the same as the main flow, except that ComCen makes/receives the call via a fall-back system.

3.2.11 Exception flow 3: LMR network is unavailable.

Where the LMR network is unavailable, a point-to-point voice call may yet be possible as LMR, Cellular, and Satellite network infrastructure are expected to be completely independent – see availability scenarios below.

If a cellular network is available or the actor has a satellite phone, target recipients are instead contacted via **FENZ02 Make/receive phone call**.

3.2.12 Availability

Voice calling is a critical for Fire and Emergency operations and needs to have to have overall Very High (99.999%) availability in the Full Service Zone. It is the primary means for coordinating operations and is the only fit-for-purpose communication method when operational personnel are under duress. Wide-area group calling is the preferred method, but point-to-point phone calling is acceptable in fall-back scenarios.

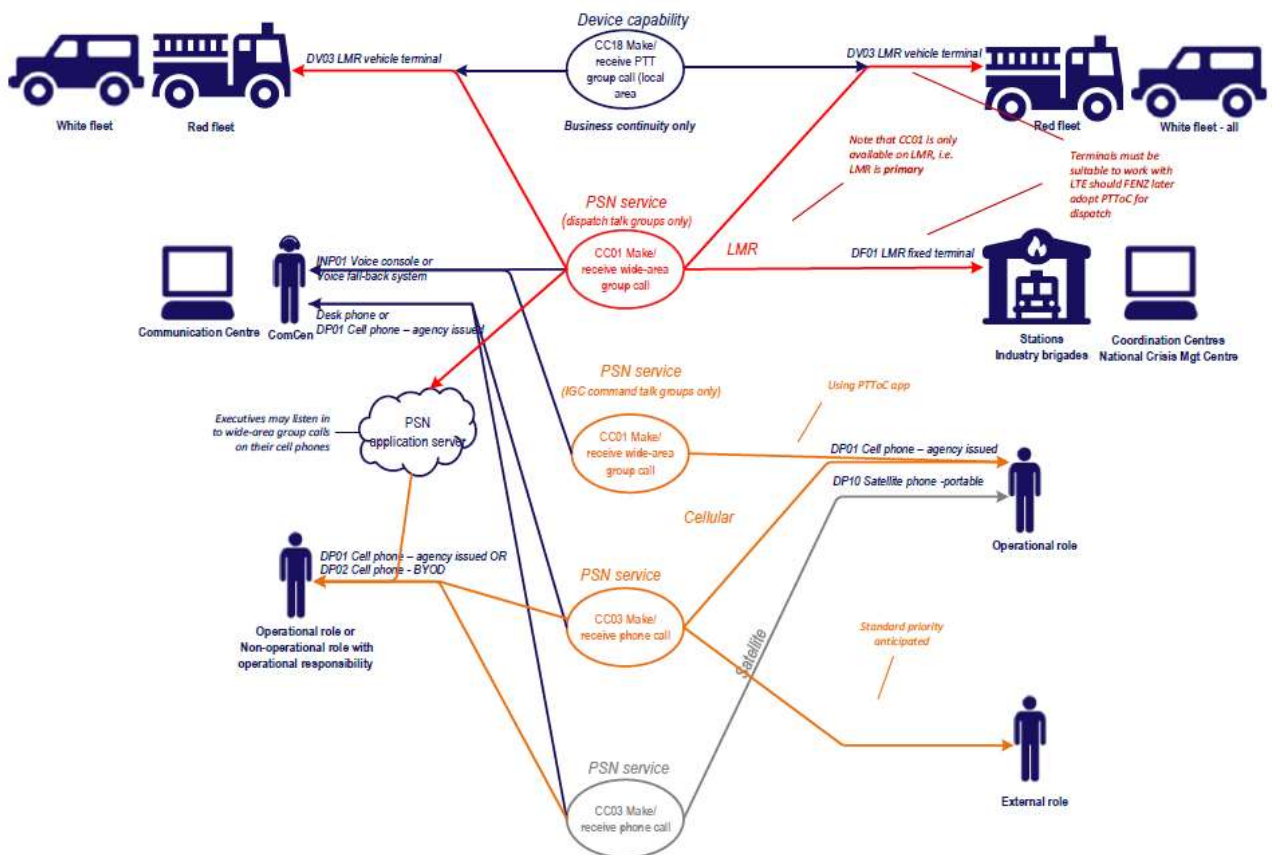


Figure 2: FENZ Make/receive voice call, incorporating FENZ01 Make/receive wide-area group call and FENZ02 Make/receive phone call

3.3 FENZ02 Make/receive phone call

3.3.1 Description

An Operational role or ComCen makes/receives a point-to-point phone call to/from an Operational role or ComCen or an External party.

See Figure 2 for a graphical overview.

3.3.2 Context

The capability supports the following operational functions:

Dispatch – for non-response follow-up by ComCen, mustering of remote resources and notifying external parties of Incidents.

Incident management – used widely for all supporting activities.

All operational functions – as business continuity in the case of LMR failure.

3.3.3 Preconditions:

1. Both parties have a suitable user device (Desktop phone or **DP01 Cell phone – agency-issued** or **DP01 Cell phone – BYOD** or **DP10 Satellite phone - portable**).
2. All relevant parts of the PSTN are available.

3.3.4 Postconditions:

1. Call has been made in a timely manner (minimal technical delays).
2. Call has been received by target recipient(s), so they are able to act.

3.3.5 Actors:

Operational role (any location); ComCen; External parties

3.3.6 Main flow:

1. Actor initiates call and recipient answers call.
2. Ideally any cellular part of the call is established on any cellular network available (roaming).
3. Actors have a conversation.
4. When conversation is over, one actor terminates the call.

3.3.7 Alternative flow 1: Audioconferencing

Where the actor wishes to speak via phone to more than one person, the call proceeds as per the main flow, except the 'target recipient' is an audioconference bridge service which other participating actors also phone in to.

3.3.8 Exception flow 3: Network unavailable

Where the cellular network is unavailable, calling may yet be available to roles with a **DP10 Satellite phone – portable** as Cellular, and Satellite network infrastructure are expected to be completely independent.

3.3.9 Exception flow 1: Caller travelling out of coverage

Where a person on a phone call leaves an area covered by the network on which the call was established, the call ideally would transfer seamlessly to another network, should this be available. However, this not strictly necessary given the expected low incidence of this case.

3.4 FENZ03 Make/receive call request - inbound

3.4.1 Description

An Operational role at a Station or Vehicle needing to speak with ComCen requests a call from ComCen (via **FENZ01 Make/receive wide-area group call**). See Figure 3 for a graphical overview.

3.4.2 Context

Call requests are made by Operational personnel who wish to speak with ComCen. The protocol is to make a request rather than just going ahead with a voice call so that ComCen can:

- Make sure they are listening on the relevant talkgroup; and
- Address matters in priority order.

The capability is used by operational personnel when initiating a communication with ComCen as part of the following functions:

- **Dispatch** – Volunteer roles arriving at a Station confirming attendance and requesting details of a turnout (SouthCom activity only, which is being reduced/phased out).
- **Response** – Operational roles requesting additional contextual information relevant to turnouts.
- **Resource management** – Operational roles providing a status update not possible to send via predefined messaging, or providing situation reports or requesting assistance.

3.4.3 Preconditions:

1. Relevant networks and devices are available.

3.4.4 Postconditions:

1. Request has been successfully received by **INP02 Computer Aided Dispatch System** and ComCen alerted.
2. The sending of the request has not impacted the availability of other capabilities or been affected by other capabilities (e.g. where made over LMR has not impacted the availability of **FENZ01 Make wide-area group voice call** (LMR) or been affected by any wide-area group call that is in progress).

3.4.5 Actors:

Operational role at station or vehicle.

3.4.6 Main flow:

1. Actor indicates the urgency of the request by either :
 - a. pressing a hardware Routine (R) or Priority (P) button on the **DV03 LMR vehicle terminal** or **DF01 LMR fixed terminal** – where an LMR call is being requested; or
 - b. by choosing equivalent routine or priority alerting options in the Push-to-Talk app on **DP01 Cell phone – agency-issued**.
2. The message is sent over the relevant network.
3. The request and the identity of the requestor is received into **INP02 Computer Aided Dispatch System** and the ComCen dispatcher is alerted.
4. Acknowledgement of receipt of the message is sent back over the relevant network.
5. Actor receives acknowledgement on the device that the message has been received successfully.

3.4.7 Alternative flow 1: No acknowledgement of message receipt

Where no acknowledgement is received in Step 4, this is indicated to the user by the device.

The actor needs to repeat the main flow or may choose to go ahead with the call anyway (**FENZ01 Make/receive wide-area group call**).

3.4.8 Availability

As inbound call requests are required as part of the **FENZ01 Make/receive wide-area group call** protocol, the availability of call requests needs to match the availability of group calling.

3.5 FENZ04 Make/receive call request - outbound

3.5.1 Description

Operational roles receive an alert from ComCen that they wish contact to be made with them. See Figure 3 for a graphical overview.

3.5.2 Context:

Capability is used to support the following operational function:

- **Incident management** — (e.g. getting the attention of Operational roles on the incident ground so that someone can provide a situation report).

3.5.3 Preconditions:

1. Relevant networks and devices are available.

3.5.4 Postconditions:

1. Alert has been sounded.
2. The sending of the alert has not impacted the availability of other capabilities or been affected by other capabilities (e.g. has not impacted the availability of **FENZ01 Make wide area group voice call** (LMR) or been affected by any wide-area group call (LMR) that is in progress).

3.5.5 Actor:

ComCen.

3.5.6 Main flow:

1. Actor selects target resource in **INP02 Computer Aided Dispatch System** (and for Red fleet vehicle, whether alert is to be sounded on the LMR terminal inside the vehicle or on external speakers) and initiates the alert.
2. System sends the message over the relevant network (LMR for targets on dispatch talkgroups or cellular for targets using PTTtoC).
3. Target resource receives the message and an audible/visible alert is triggered :
 - a. inside a White fleet vehicle via the **DV03 LMR vehicle terminal**; or
 - b. inside/outside a Red fleet vehicle via the **DV03 LMR vehicle terminal**; or
 - c. on **DP01 cell phone – agency-issued** or **DP02 Cell phone – BYOD**.
4. Device sends confirmation message back to the **INP02 Computer Aided Dispatch System** that the sending of the message was successful.

3.5.7 Exception flow 1: CAD system or network unavailable

Where the **INP02 Computer Aided Dispatch System** or LMR network is unavailable, the use case fails.

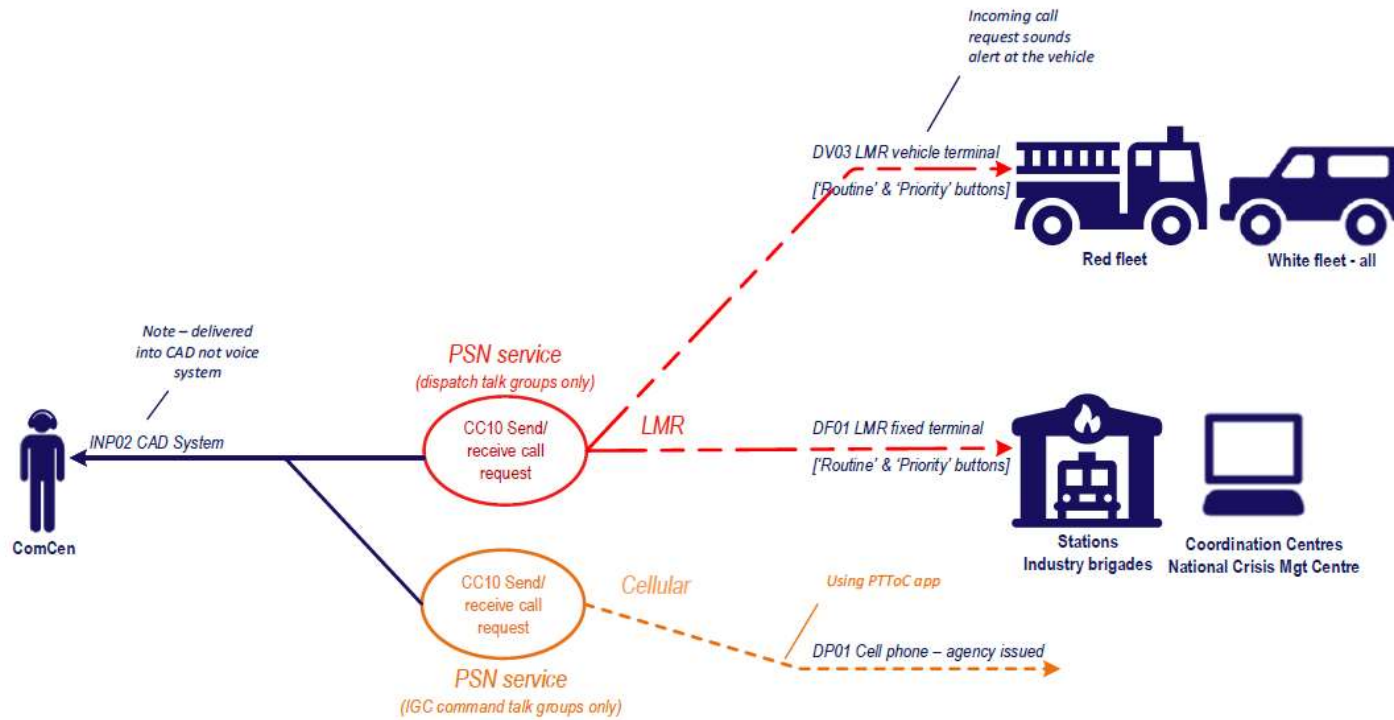


Figure 3 Call requests, incorporating FENZ03 Make/receive call request – inbound, and FENZ04 Make/receive call request – outbound.

3.6 FENZ05 Turnout resources

3.6.1 Description

Relevant stations, vehicles, and operational personnel are alerted to a job. Automation (e.g. sirens, ovens off, doors open) is triggered at stations. See Figure 4 for a graphical overview.

3.6.2 Context:

This capability is critical to operational function:

- **Dispatch** – as primary mechanism for alerting crews to turnouts.

3.6.3 Preconditions:

1. **INP02 Computer Aided Dispatch System** is available to initiate the turnout.
2. Relevant networks and receiving devices are available.

3.6.4 Postconditions:

1. Alerts have been received by target resources.
2. Automation has been triggered.
3. ComCen has confirmation that the turnout alert has been received by all resources.
4. Alert has not been affected by or impacted the availability of other capabilities (e.g. where delivered via LMR has not significantly impacted the availability of **FENZ01 Make wide-area group voice call** over LMR or been affected by an LMR call in progress).

3.6.5 Trigger:

1. ComCen has confirmed Red fleet vehicles to turn out.

3.6.6 Main flow:

1. The **INP02 Computer Aided Dispatch System** sends a turnout/alert message containing a short summary of the job (nature, address etc) to relevant stations, vehicles, and operational personnel as follows:
 - a. **Stations** (via LMR and/or cellular networks by way of **DF04 Station router**). To the **INP06 Station turnout console** triggering automation (siren on, kitchen appliances off, doors open, temporary broadcast of wide-area group voice calls over the station PA system etc, depending on the station in question) and a display of a summary of the turnout on a large screen on the **SD16 Station dispatch terminal**; and/ or
 - b. **Vehicles** (via LMR and/or cellular and/or satellite networks by way of **DV12 Vehicle router**). To the Fire and Emergency application 'MRA' on a fixed **DP13 Tablet computer**, triggering an alert message on the tablet and possibly an alerting tone played through the cab interior and exterior speakers;
 - c. **Vehicle (via LMR)** also delivered directly to the **DV03 LMR vehicle terminal**, triggering an alerting tone played through the cab interior and exterior speakers.
 - d. **Operational personnel** :
 - i. **DP11 Pager-like alerting devices** carried by personnel at large (Personal Alerting network), triggering an audible and/or haptic alert and display of the job details; and

- ii. A smartphone application and/or via SMS message on **DP01 Cell phone - agency-issued** or **DP02 Cell phone – BYOD** (via cellular network), triggering an audible and/or haptic alert and display of the job details.

Note that each resource is/can be alerted via more than one network, to ensure very high availability/reliability of alerting.

2. The endpoint sends a confirmation message back to the **INP02 Computer Aided Dispatch System** which displays a receipt confirmation message.

3.6.7 Exception flow 1: ICAD is unavailable

Where the **INP02 Computer Aided Dispatch System** is unavailable, instead of using the CAD, ComCen would use a an alternative (fall-back) interface of some sort.

3.6.8 Exception flow 2: Isolated operations

Where (e.g. because of a disaster scenario) the Communications Centre is unavailable or cannot communicate with the area where turnout is needed, instead of the main flow, a role at a local Coordination Centre would use the alternative (fall-back) interface to turn out local resources.

3.6.9 Exception flow 3: Network unavailable, or message not received

Where a single network is unavailable or a message is not received, the sending of the message may yet be successful via another network, as the different networks are expected to be completely independent infrastructure.

A ComCen role could use a network availability and coverage tools to assist with diagnosis as necessary in order to plan remedial action (e.g. turn out an alternative resource).

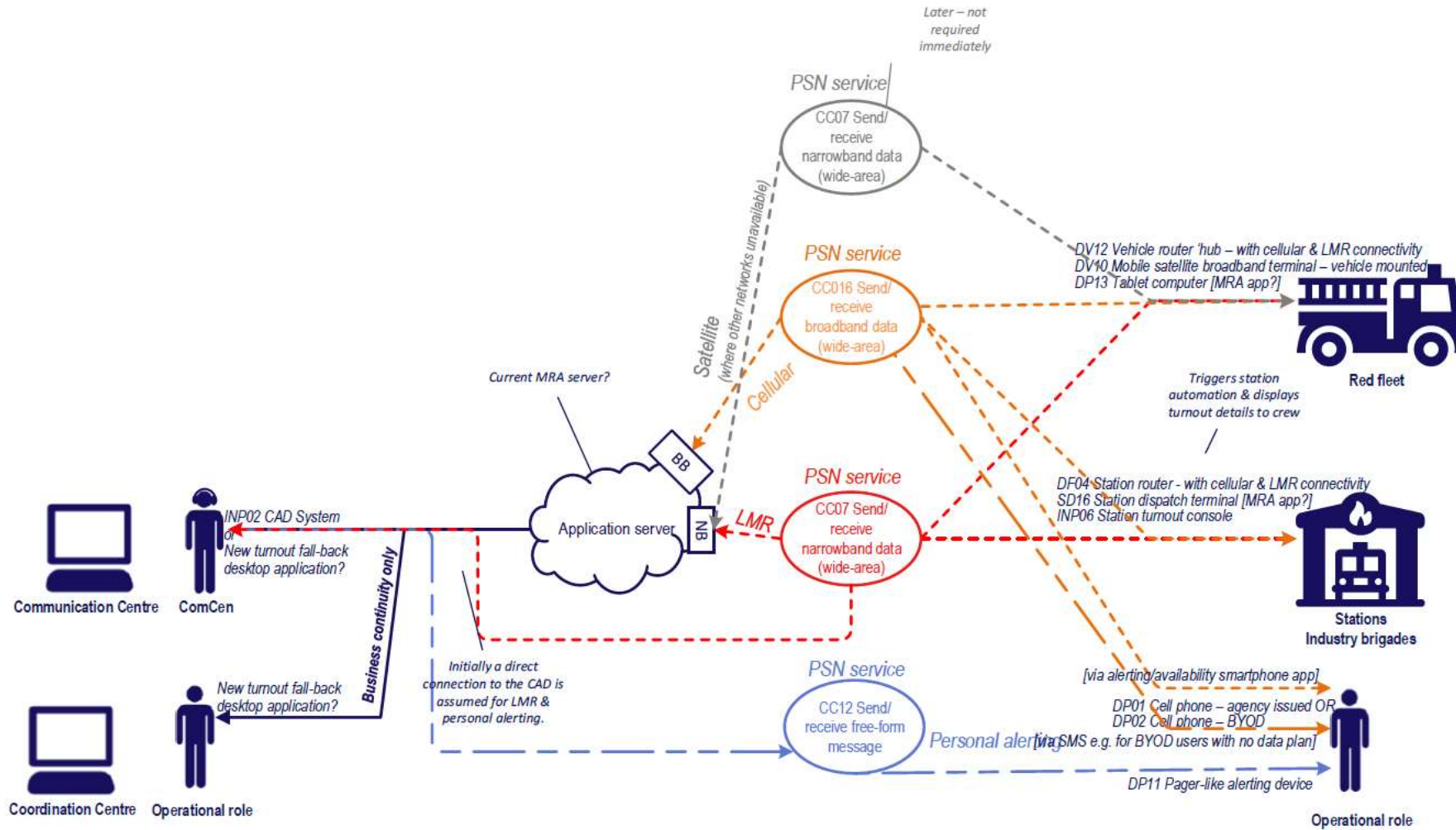


Figure 4 FENZ05 turn out resources

3.7 FENZ06 Send/receive predefined status message

3.7.1 Description

An operational role at a vehicle transmits a predefined (i.e. pre-set or requiring minimal input) status message to ComCen. See Figure 5 for a graphical overview.

3.7.2 Context

The sending of status updates to the **INP02 Computer Aided Dispatch System** via a few keypresses, rather than via a voice call to ComCen which assists operational efficiency by eliminating the need for human input by ComCen.

Resource management – for maintaining up-to-date information on resource availability and arrival status.

3.7.3 Preconditions:

1. **INP02 Computer Aided Dispatch System** is available to receive the message.
2. **DP13 Tablet computer** (and possibly **DP01 Cell phone – agency issued**) is available to send the message.
3. Relevant networks are available.

3.7.4 Postconditions:

1. Message has been successfully received by **INP02 Computer Aided Dispatch System** and status of the resource updated.
2. Sender has received confirmation of successful delivery of the message.
3. The sending of the message has not been affected by or impacted the availability of other capabilities (e.g. where delivered via LMR has not significantly impacted the availability of **FENZ01 Make wide-area group voice call** over LMR or been affected by a LMR call in progress).

3.7.5 Actors:

Operational role in/at vehicle.

3.7.6 Main flow:

1. Actor submits code using an application on the vehicle's fixed **DP13 Tablet computer** (possible alternative for Operational executives, VSOs, and FRMOs is using an app on their **DP01 Cell phone – agency issued**).
2. The message is sent over cellular broadband if available, else over the LMR network.
Later a third option could be to submit the message over a narrowband satellite connection.
3. The message and the identity of the requestor is received into **INP02 Computer Aided Dispatch System** and ComCen is alerted.
4. Acknowledgement of receipt of the message is sent back from the **INP02 Computer Aided Dispatch System** via the same network.
5. Actor receives acknowledgement on the device that the message has been sent successfully.

3.7.7 Exception flow 1: No acknowledgement of message receipt

Where no acknowledgement is received in Step 4, this would be indicated on the device. However, it is expected that messages would queue and be sent when systems are available again. Any urgent updates can be made via voice (**FENZ01 Make/receive wide-area group call**).

3.7.8 Exception flow 2: Network unavailable

Where a network is unavailable, the sending of the message may yet be successful via the alternative network. LMR, Cellular, and Satellite network infrastructure are expected to be completely independent.

3.7.9 Exception flow 3: Server, tablet, or router unavailable

Where the application server, router, tablet, or tablet application is unavailable, instead of the main flow, the actor sends the message via the LMR control head.

3.7.10 Availability

Status messaging is an important part of Fire and Emergency operations and ideally needs High availability in the Full Service Zone, noting that delivery of status updates via voice is always a possibility as fall-back.

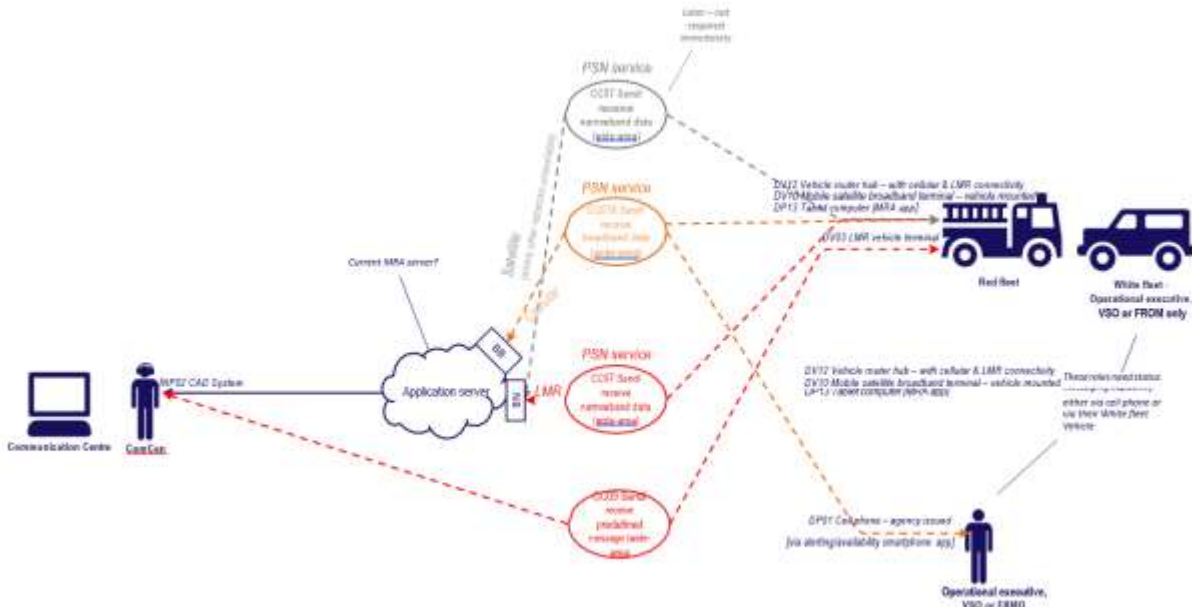


Figure 5 FENZ06 Send/receive predefined status message

3.8 FENZ07 Send/receive ad hoc personal message

3.8.1 Description

1. ComCen sends a short message to one or more operational roles; or
2. Operational roles send messages amongst themselves.

See Figure 6 for graphical overview.

3.8.2 Context:

Capability is used for ongoing administration of operational resources, also to support the following operational functions:

- **Dispatch** — sending summary details of a turnout to vehicles, Stations, and personnel, and alerting White fleet personnel to an incident they need to attend.
- **Response** — sending additional information to Volunteers who might not yet have arrived at the Station.

3.8.3 Preconditions:

1. Systems are available to send the message, either **INP02 Computer Aided Dispatch System** or the fall-back personal messaging web application or smartphone app.
2. All target recipients have at least one device available to them to receive the message (**DP01 Cell phone – agency issued or DP02 Cell phone BYOD, and DP11 Pager-like alerting device**), but typically two (one cell phone plus **DP11 Pager-like alerting device**).
3. Cell phones have the relevant messaging app, if the holder wishes to be receive alerts via the app, or wishes to send messages, not just receive them.

3.8.4 Postconditions:

1. Message has been successfully received by target recipient(s) in a timely manner, so they can act.

3.8.5 Primary actor:

ComCen or Operational role.

3.8.6 Trigger:

1. ComCen has confirmed a vehicle to turnout (Dispatch) and the dispatch system has determined what individual or group of individuals and/or Station/vehicle to send the message to, and has determined the content (turnout summary) of the message; or
2. ComCen has chosen a target recipient or recipient group for an ad hoc message in the dispatch system and has composed the message content; or
3. An operational role has composed a short human-readable message via the fall-back personal messaging web interface or smartphone app.

3.8.7 Main flow:

1. The system sends a message with text content to relevant:
 - a. **DP01 Cell phones – agency issued , DP02 Cell phone BYOD**, via SMS (cellular) and/or app alert (broadband data e.g. cellular or Wi-Fi).
 - b. and **DP11 Pager-like alerting devices** (via Personal alerting network).
2. Target recipients receive the message on these devices.
3. The devices (where possible – may not be possible with paging technology) send an acknowledgement back to the system to confirm that the message has been received.
4. Where possible (e.g. via cell phone app or SMS), the message recipient sends a message back to the to reply, especially to say whether they are responding or not to a turnout.
5. The system displays to the initiator (e.g. via the **INP02 Computer Aided Dispatch System** or personal messaging web interface or app) the receipt status of the message and any reply.

3.8.8 Exception flow 1: CAD system unavailable

Where **INP02 Computer Aided Dispatch System** is unavailable, the flow is the same as the main flow except ComCen uses the personal messaging fall-back web interface or smartphone app to send the message, according to user privilege.

3.8.9 Exception flow 2: Network unavailable

Where a network is unavailable or a message is not received, the sending of the message may yet be successful via the alternative network. Personal Alerting network infrastructure is expected to be completely independent of the Cellular network infrastructure.

3.8.10 Exception flow 3: Target recipient outside network coverage

Where a target recipient is out of coverage (cellular, Wi-Fi, Personal Alerting network) they receive the relevant message as soon as they are back in coverage relevant to their device(s).

3.8.11 Availability

FENZ07 Send/receive ad hoc personal message is a critical use case for Fire and Emergency operations and needs to have Very High (99.999%) availability. It is the only way of alerting operational personnel to an incident when they are not already at a Station or vehicle. At any one time this is typically thousands of personnel — all volunteer personnel, and all career roles on-call or on-duty.

Figure 7 shows how Fire and Emergency calculates the availability of a communications capability, based on the devices available to a role, the networks available at their location, and assumed availability of those networks.

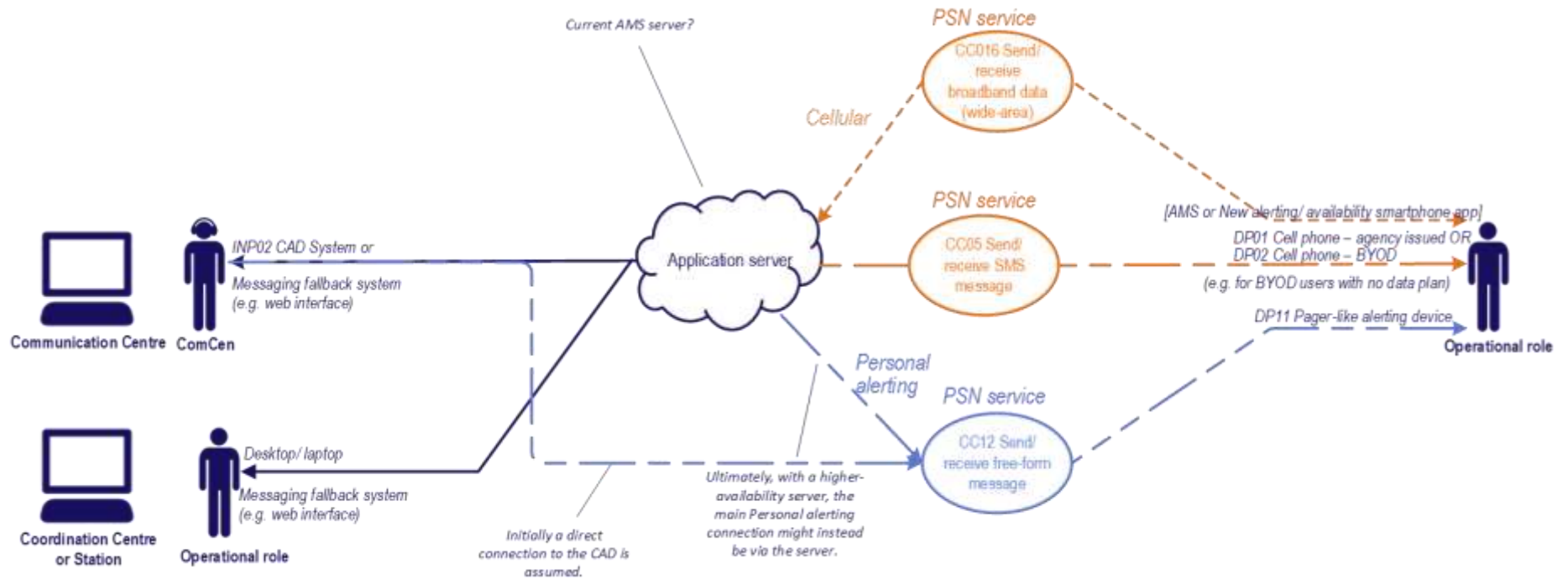
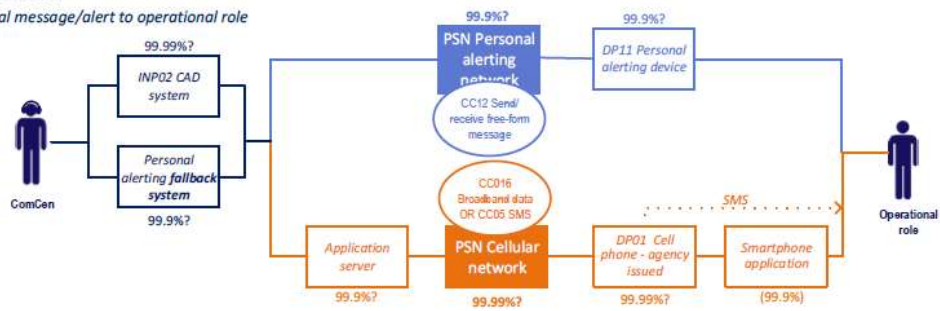


Figure 6 : FENZ09 Send/receive ad hoc personal message

Full service zone: 99.999%

ComCen sends personal message/alert to operational role



$$\text{Availability} = (1 - (1 - 0.9999) \times (1 - 0.999)) \times (1 - (1 - (0.999 \times 0.999)) \times (1 - (0.999 \times 0.9999 \times 0.9999 \times 0.999))) = 99.999\%$$

Figure 7 How Fire and Emergency estimates the availability of communication capabilities (example shown is for personal alerting).

3.9 FENZ08 Send/receive resource location

3.9.1 Description

1. The **INP02 Computer Aided Dispatch System** maintains up-to-date information on the location of certain resources, to inform ComCen and to calculate the best recommendation of resources to turnout; and
2. ComCen and operational roles can query the location of any connected resource, to inform operations, manage safety etc, also limited vehicle information (e.g. whether lights and sirens are on).

See Figure 8 for a graphical overview.

3.9.2 Context

This capability supports the following operational function:

- **Dispatch** (allows ComCen to validate **INP02 Computer Aided Dispatch System** turnout recommendation).
- **Resource management** (allows ComCen and others to manage operations, safety, etc.).

3.9.3 Preconditions:

1. Desktop systems are available to send queries and receive location information.
2. Relevant resources have GNSS-capable devices and are connected to relevant networks.

3.9.4 Postconditions:

1. Location and ID of the resource (and other information as relevant e.g. from vehicle CANbus) has been successfully received by relevant systems
2. The sending of location information has not impacted the availability of other capabilities or been affected by other capabilities (e.g. has not impacted the availability of **FENZ01 Make wide-area group voice call** or been affected by any wide-area group call that is in progress).

3.9.5 Main flow:

1. At a configured intervals, the **CC13/14 Send/receive vehicle/portable device location** system sends the location, ID (and other limited information e.g. from vehicle CANbus) of selected resources that have been received over either cellular (where available), LMR, or (last resort)

satellite networks. Location is received via API into the **INP02 Computer Aided Dispatch System**.

2. Alternatively an actor or system can query the location of resources via a **CC13/14 Send/receive vehicle/portable device location** system API or web interface capable of displaying location.

3.9.6 Alternative flow 1: Location of external party resources

Where Allied Agency resources have been contracted for an Incident, in some cases (e.g. helicopters) they provide ComCen with a third-party application so that ComCen can track the contracted resources.

*Ideally the **CC13/14 Send/receive vehicle/portable device location** system would be able to accept a feed from third-parties, enabling ComCen to track all resources in the same system.*

3.9.7 Exception flow 1: CAD system unavailable

Where the **INP02 Computer Aided Dispatch System** is unavailable, actors use the **CC13/14 Send/receive vehicle/portable device location** web interface as fall-back.

3.9.8 Exception flow 2: Network unavailable

Where a network is unavailable, the sending of the location information may yet be successful for vehicles on an alternative network, as LMR, Cellular, and Satellite network infrastructure are expected to be completely independent. For devices where only one network is used, if that network fails, the use case will fail.

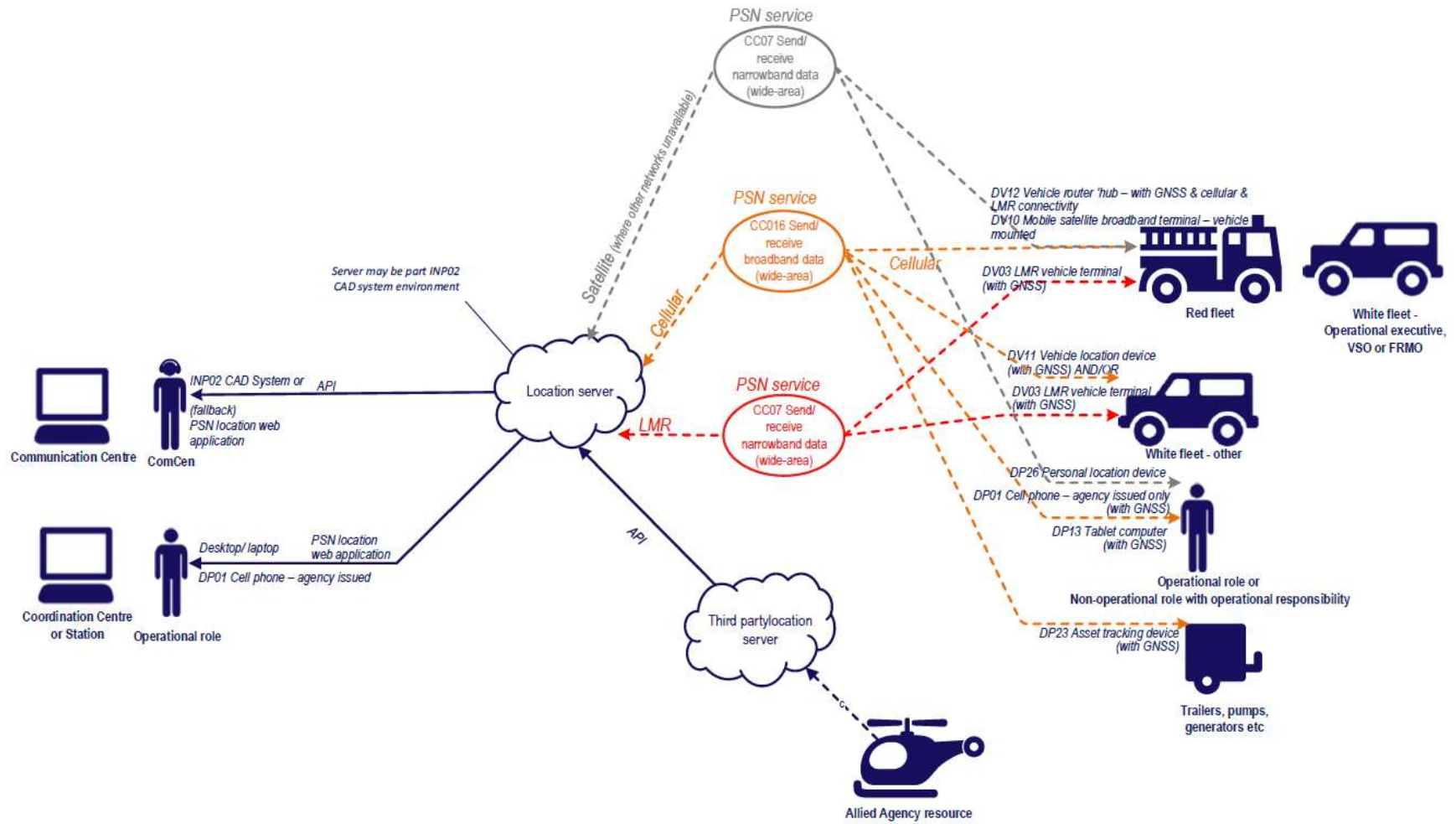


Figure 8 FENZ08 Send/receive resource location

3.10 FENZ09 Monitor stations

3.10.1 Description

Comcen receives an alert when a sensor at a Station is triggered.

See Figure 9 for a graphical overview.

3.10.2 Context

The capability specifically supports the following operational function:

1. Resource management.

3.10.3 Trigger

- Station sensor detects :
 - Security, power supply, or battery level alarm; or
 - Activation of a manual call-point (public access point outside station) switch.

3.10.4 Preconditions:

1. Relevant devices are available in the Station (**INP06 – Station Turnout Console, DF04 Station router**).
2. LMR or cellular networks are available.

3.10.5 Postconditions:

1. Message has been successfully received by **INP02 Computer Aided Dispatch System** and ComCen has been alerted.
2. Station monitoring has not impacted the availability of other capabilities or been affected by other capabilities (e.g. where made over the LMR network has not impacted the availability of **FENZ01 Make wide-area group voice call** or been affected by any wide-area group call that is in progress).

3.10.6 Main flow:

1. Station alarm message is generated and sent to ComCen via the Wide-area LMR.
2. The message and the identity of the Station is received into **INP02 Computer Aided Dispatch System** and ComCen is alerted.

3.10.7 Exception flow 2: Network unavailable

Where a network is unavailable, the sending of the message may yet be successful via the alternative network. LMR network infrastructure is expected to be completely independent of the Cellular network infrastructure.

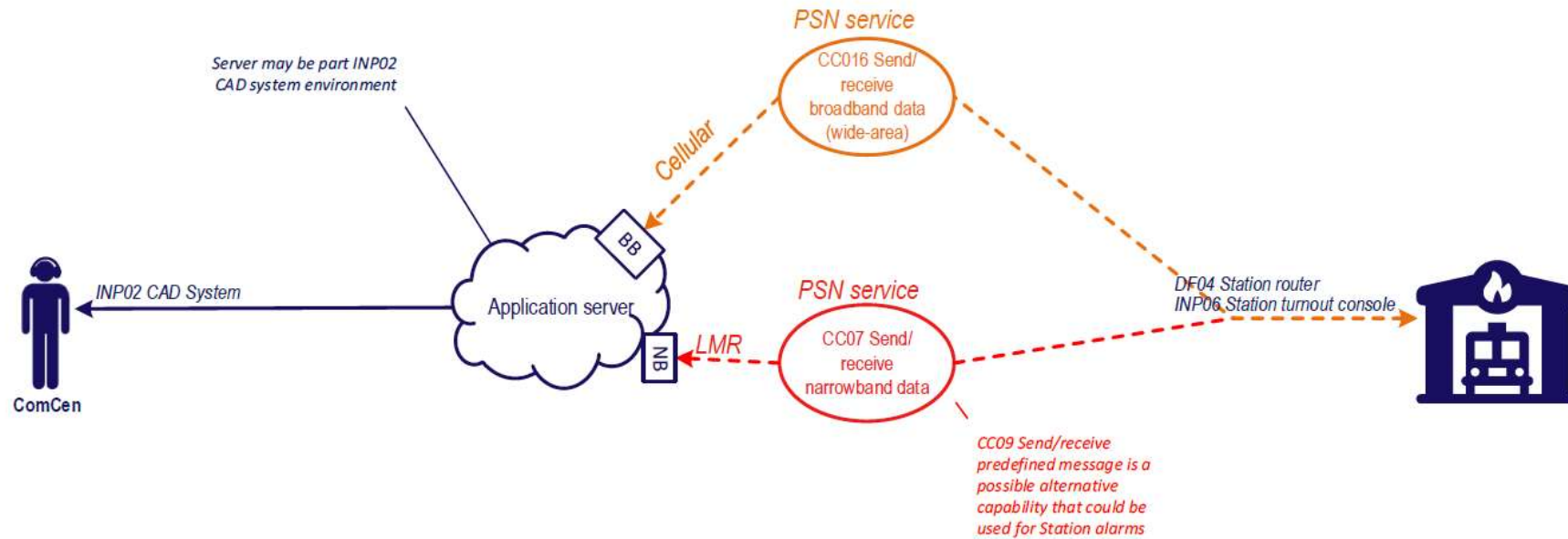


Figure 9 FENZ09 Monitor stations

3.11 FENZ10 Access applications

3.11.1 Description

An operational or non-operational role accesses:

- enterprise or third-party applications that rely on a broadband connection;
- enterprise applications that are able to send small amounts of critical information via a narrowband connection.

See Figure 10 for a graphical overview.

3.11.2 Context:

The capability is used to support the following operational functions:

- **Dispatch** (being alerted of an incident)
- **Response** (getting incident, route, traffic, site, weather, hazard, hydrant and corporate information)
- **Incident management** (getting weather reports, corporate or public reference material, and creating and sharing photos, video and telemetry information with parties on or off the incident ground)
- **Resource management** (command and control including overseeing the location of contracted resources)
- **Reduction & Readiness** (updating site information, capturing, uploading, and sharing photos and video).

3.11.3 Preconditions:

- Relevant networks are available, either directly or via intermediate equipment (e.g. routers or boosters);
- Relevant user devices area available (e.g. **DP01 Cell phone – agency issued, DP02 Cell phone– BYOD, DP13 Tablet computer, DP15 Body-worn camera, or DV14 Vehicle-base camera**).

3.11.4 Postconditions:

- Actor has accessed or shared relevant information.
- The accessing of applications has not been affected by or impacted the availability of other capabilities or been affected by other capabilities (e.g. where access via narrowband LMR has not impacted the availability of **FENZ01 Make wide-area group voice call** or been affected by any wide-area group call that is in progress).

3.11.5 Actor:

Operational or non-operational role.

3.11.6 Main flow:

1. Actor uses device to access information or share information via:
 - a. Direct connection to a cellular broadband network or via a **DV17 Vehicle cellular booster** or **DV01 Vehicle cellular hotspot**; or
 - b. Wi-Fi or wired connection to **DV12 Vehicle router** or Wi-Fi connection to **DV02 Vehicle Wi-Fi hotspot**.

3.11.7 Alternative flow 1: No cellular broadband available on way to or during first hours of an incident

Where fixed/permanent cellular broadband is not available for a vehicle tablet to access applications, limited functions on core enterprise applications may still be able to operate via LMR or satellite narrowband connections to the **DV12 Vehicle router**. For examples see **FENZ05 Turnout resources** and **FENZ06 Send/receive predefined status message**.

This capability is critical to maintaining a vehicle's non-voice communications with Comcen in all circumstances on the way to an incident and at an incident before deployable capability can be provided.

3.11.8 Alternative flow 2: No cellular broadband available at incident of extended duration

Where no fixed/cellular broadband is available at the site of an incident lasting more than a couple of hours, deployable broadband may be provided at a Command Unit deployed to the scene via **DV08 Nomadic satellite broadband terminal – vehicle mounted** or to an extended area of the incident ground via **DN01 Deployable cell site** supplied as a service (via service request, rather than owned by Fire and Emergency – see Use Case **FENZ12 Fix fault or get service request fulfilled**).

Where broadband coverage is required for resources spaced kilometres apart across a very extended incident ground, a **DN03 Deployable Broadband Relay** mesh-type system may be used.

3.11.9 Alternative flow 3: No cellular broadband available - USAR

Where no fixed/cellular broadband is available, USAR personnel use a **DP18 Nomadic satellite broadband terminal – portable** or **DN06 Nomadic satellite broadband terminal – deployable** to access applications via **DP01 Cell phone – agency-issued** and portable **DP13 Tablet computer** or via a local-area network established using a **DN05 Data communications**.

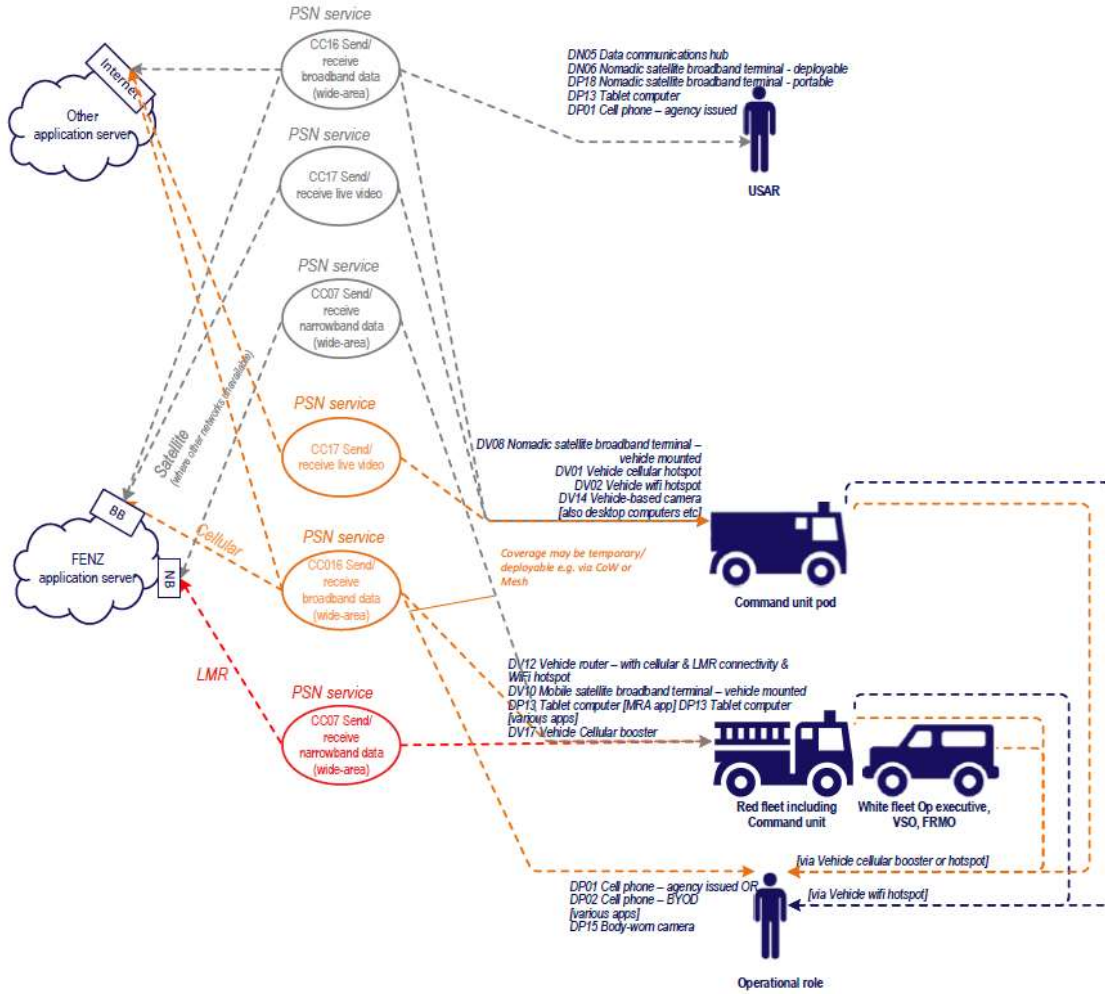


Figure 10 FENZ10 Access applications

3.12 FENZ11 Link/unlink dispatch talkgroups

3.12.1 Description

The country is expected to be divided as it is currently into about 50 LMR dispatch talkgroup areas that in business-as-usual configuration are used combined together into 'virtual talkgroups' or, further still into 'super virtual talkgroups'. However, individual talkgroup areas may from time-to-time (e.g. when there is a high incident load in an area due to a storm etc) be unlinked from the higher grouping and used alone.

3.12.2 Context:

The capability is used to support the following:

- **FENZ01 Make/receive wide-area group call (on LMR).**

3.12.3 Preconditions:

- **INP01 Voice Console** is available.

3.12.4 Postconditions:

The dispatch talkgroup configuration has been changed so that there is one talkgroup, virtual talkgroup or super virtual talkgroup covering the desired geographical area for each available ComCen role.

3.12.5 Actor:

Comcen.

3.12.6 Main flow:

1. Actor uses the Voice Console to
 - a. link dispatch talkgroup areas or virtual talkgroups into a new virtual talkgroup or super virtual talkgroup; or
 - b. unlink one or more talkgroup area from a virtual or super virtual talkgroup.
2. Resulting talkgroup configurations are available to all ComCen roles and may be saved for later access.

Future enhancement: *Dynamic talkgroup capability would allow the creation of a talkgroup for an arbitrary area. The ability to remotely change talkgroups would allow ComCen to assign personnel to the new group.*

3.13 FENZ12 Fix fault or get service request fulfilled

3.13.1 Description

A fault in a communications capability is logged and fixed or a request fulfilled.

3.13.2 Context:

Any user of the communication capabilities described in this document experiences a fault or needs a standard predefined service (e.g. a new device for a location, vehicle, or person).

3.13.3 Preconditions:

- A method of communicating with ComCen is available.

3.13.4 Postconditions:

- The fault has been rectified or service request actioned.

3.13.5 Actor:

Any user of the Communications Capabilities described in this document.

3.13.6 Main flow:

1. Actor experiences fault and an uses an alternative flow to continue operations.
2. When they can, the actor contacts ComCen (who act as first-level support for critical operational communications) and describes the matter.
3. ComCen performs simple vendor-supplied checks to validate the fault.
4. ComCen logs the fault (if they weren't able to validate it, they go to step 7).
5. The fault is workflowed to the appropriate vendor to resolve as per Service Level Agreements. Where any cost may be incurred over and above work covered by contract, the workflow needs to include sign-off by an appropriate Fire and Emergency authority.
6. Where resolution requires on-site diagnosis, installation, or removal of equipment, the matter shall be workflowed to (and performed by) Fire and Emergency support roles or contractors.
7. Any resolved fault shall be workflowed for closure to the person who reported it.

3.13.7 Alternative flow: service request

Where the actor is requesting a standard service, then instead of the main flow, the actor logs the request in the self-service system and the workflow proceeds from step 5.

4. Operational context

This section shows how the Use Cases FENZ01-FENZ10 in the previous section will be used to support Fire and Emergency’s operational functions.

4.1 Overview

Fire and Emergency operations can be broken up into five broad functions as shown in Table 3 — Dispatch, Response, Incident management, Resource management, and Risk reduction & readiness.

Table 3 Fire and Emergency operational functions

Operational function	Description	Communication goal
Dispatch	<p>Having received notice of an incident, staff at one of Fire and Emergency’s three Communications Centres (ComCen) ‘turn out’ appliances and their crews.</p> <p>Executives, support resources, and external parties (e.g. gas or power companies) may subsequently be alerted, as more information about the incident becomes apparent or different trigger points are met.</p>	<p>ComCen personnel can quickly alert Operational personnel, External parties, and Allied Agencies to Incidents they need to attend.</p>
Response	<p>Crews make their way to the incident ground in response vehicles (with lights and sirens on), all the while obtaining/seeking information to allow them to prepare.</p>	<p>Operational personnel attached to an incident can communicate with each other and get all the available contextual information to support situational awareness, so that they can respond to an incident quickly, safely and effectively.</p> <p>ComCen personnel pass relevant additional information to responding crews</p>
Incident management	<p>On arriving at the incident ground, crews attend to incident, (i.e. perform the rescue, extinguish the fire, etc.). This may involve requesting ComCen to send further resources.</p> <p>For larger Incidents which take a longer time to resolve, a specialist management team operates out of the Command Unit at the scene and/or a Coordination Centre. There also may be increased involvement with Allied Agencies (partners sharing responsibility for incident resolution (e.g. helicopter operators).</p>	<p>Operational personnel on an incident ground can monitor safety and communicate with each other, Allied Agencies, and External Parties so they can co-ordinate operations, tactics, and/or command.</p> <p>For larger incidents, also co-ordinate supporting activity, including activity with Allied Agencies, both on and off the incident ground.</p>

Operational function	Description	Communication goal
Resource management	Whether attending an incident or not, operational personnel keep ComCen up to date by delivering status updates and reports via voice or message. ComCen also has oversight of the security status of Stations, being messaged if a security condition has been triggered, and location of vehicles.	<p>ComCen personnel can get accurate and timely information on:</p> <ul style="list-style-type: none"> • Operational personnel, and contracted resource availability, location, and attendance at Incidents; • The situation of current Incidents; and • Station power supply and security status.
Risk reduction & readiness	Between incidents, there is an ongoing process of developing and maintaining preparedness information. Operational personnel prepare for future Incidents by familiarising themselves with their area, documenting sites and hazards, and assessing risk.	<p>Site and risk information can be captured and distributed as needed to support operations, audit, investigation, and reduction of risks in the community.</p> <p>Weekly Comcen checks ensuring back-up radio systems and turnout equipment are operational and functioning correctly.</p>

4.2 Dispatch

4.2.1 Context

1. An Incident has been lodged in the ComCen **INP02 Computer Aided Dispatch System** (e.g. by a ComCen Dispatcher entering details of an incident notified via 111 emergency phone, or by a Private Fire Alarm being triggered and the incident automatically created in the **INP02 Computer Aided Dispatch System**).
2. The alarm level of an Incident has been increased and ComCen is sending additional resources; or
3. An Incident is consuming many resources in an area and ComCen is calling on resources from other places to relocate to provide cover for local Stations.

4.2.2 What happens

1. The **INP02 Computer Aided Dispatch System** recommends to a ComCen Dispatcher what resources (stations, vehicles, and/or operational personnel) to turn out, then the ComCen Dispatcher confirms the resources actually turned out.
2. Resources are 'turned out' via **FENZ05 Turnout resources**.
3. Where the turnout relates to one or more career-crewed vehicles/stations, ComCen announces details of the turnout by voice via **FENZ01 Make/receive wide-area group call** to vehicles, stations and other locations tuned to the relevant dispatch talkgroup. This involves not only the resources being turned out, but also personnel listening on the talkgroup that have not been turned out, which assists in maintaining situational awareness of activity in the area.

Future enhancement: Manual voice announcements replaced by automated announcements by an application on **SD16 Station dispatch terminal** and by an application on **DP13 Tablet computer – vehicle fixed**.

4. Where ComCen receives additional information regarding the Incident, then if:
 - a. White fleet personnel need to attend, they are alerted via **FENZ07 Send/receive ad hoc personal message** using the **INP02 Computer Aided Dispatch System** (see Figure 6);
 - b. Police or Ambulance (if not already responding) need to attend, and these are alerted via the CAD system or InterCAD (system for communicating with Ambulance), or by phone via **FENZ02 Make/receive phone call** for urgent/vital information; and
 - c. Assistance is required from other Allied Agencies (e.g. power authority to turn power off, or helicopter contractors) or an External party (e.g. building owner), and these are contacted via **FENZ02 Make/receive phone call**; then
5. ComCen checks that the resources have received the turnout alert and are responding, via the **INP02 Computer Aided Dispatch System** and/or the web interface to **CC12 Send/receive free-form message** (see Figure 6).

4.2.3 Alternative scenario 1: Alert not received or not responding

Where the sending of an alert is unsuccessful or there is no response from a resource within a set time, ComCen may choose to turn out an alternative resource, or contact a relevant role via phone (**FENZ02 Make/receive phone call**). That person may in turn contact other relevant personnel via a 'phone tree' (each called person calls others according to a pre-arranged plan).

4.3 Response

4.3.1 Context

Having been turned out to an Incident, Operational personnel may seek or be given information on:

- the route and traffic, so they can get to the incident ground as quickly and safely as possible;
- the Incident – extra information that was not in the turnout summary, including information that can suggest a greater or lesser urgency of response; and
- the building or site, and other relevant supporting information (e.g. weather, hydrants, hazards) so they can prepare for an effective and safe response.

They may also coordinate their response directly with other arriving resources or resources already at the incident ground.

4.3.2 What happens

1. Receiving information direct from an electronic source:
 - a. Crews may get information directly from applications (**FENZ10 Access applications**) on the vehicle **DP13 Tablet computer** or on **DP01 Cell phone - agency issued**, or **DP02 Cell phone – BYOD**. Example apps include Fire and Emergency's Mobile Response Application, and third-party applications such as Emergency Response Guidebook, Google Maps, or hydrant information in Active911.
2. Receiving information via voice from ComCen:
 - a. Crews may request information from ComCen by voice, starting by requesting a call via **FENZ03 Make/receive call request - inbound**.

- b. Either unsolicited or in response to a request, ComCen may contact responding vehicles with information via the Wide-area LMR (**FENZ01 Make/receive wide-area group call**).
3. Receiving information via short message from ComCen:
 - a. Where a Volunteer crew has been turned out and they have yet to reach the Station, ComCen may provide additional information via **FENZ07 Send/receive ad hoc personal message** (on **DP02 Cell phone – BYOD** or **DP11 Pager-like alerting device**), potentially requesting the crew to phone them back (**FENZ02 Make/receive phone call**).
4. Coordinating response with other arriving resources:
 - a. Crews may communicate directly with other arriving personnel via **FENZ01 Make/receive wide-area group call** or, where in range via local area group calling on **DP03 LMR portable** (off-network, therefore out of the scope of this document).
 - b. In remote areas, crews may speak directly with Allied Agencies, (e.g. Forestry companies), via local area group calling on **DP03 LMR portable** or **DV03 LMR vehicle terminal** ('support' variant distinct from the terminal used for wide-area LMR communications, which needs to be on the appropriate talkgroup at all times). Crews may also co-ordinate arrival with Ambulance or Police resources via **FENZ01 Make/receive wide-area group call** on an interagency liaison talkgroup.
 - c. Crews may pass information via voice to ComCen which is in turn relayed to other crews as per 1. above.

4.4 Incident management

4.4.1 Context

On an incident ground, resolution of an incident (extinguishing a fire, effecting a rescue, performing resuscitation etc.) is coordinated according to standard operating procedures for command and control, which scale according to the size of the incident (number of resources attending). Co-ordination is effected principally via voice communication, and safety is supported by the monitoring of breathing apparatus to ensure that wearers always have an air supply and are conscious, and occasional use of satellite tracking in rural scenarios.

In larger or more extended incidents, operations may:

- Be 'sectorised', meaning that voice communications for command, operations, or support may occur on several talkgroups simultaneously. Any one role however communicates on at most two talkgroups at any one time (two devices).
- Be led by an Incident Management Team established at the Incident Control Point and/or off-site Co-ordination Centre.
- Involve co-ordinating/communicating with Allied Agencies involved in the response.
- Involve co-ordination of support roles including for logistics, traffic management.
- Involve obtaining information from off-site parties.
- Involve reporting information from the site including video.
- Involve the sharing of information amongst Operational roles on the incident ground.

4.4.2 What happens

1. Operational roles coordinate operations by calling each other (off-network) via local-area group calling on **DP03 LMR portable** (used off-network only therefore out of the scope of this document).
2. Contact may need to be made with external parties (e.g. a building representative) by either **FENZ02 Make/receive phone call**, or by requesting Comcen make the call.
3. Where used, Operational roles monitor breathing apparatus via Eco board (off-network therefore out of the scope of this document). Local area duress alerts (PASS alarms) are sent and received in the same way .
4. Communications with Ambulance and Police are usually initially face-to-face between senior roles, but arrangements may be made for ongoing voice communications via local area group calling on local area liaison talkgroups (off-network therefore out of the scope of this document).
5. Off-network calls with other Allied Agencies (e.g. forestry companies, helicopter operators) are may either be on Fire and Emergency local-area talkgroups or Liaison or Allied Agency local-area talkgroups.
6. Communications between Operational Support personnel managing traffic occurs via **FENZ01 Make/receive wide-area group call** (cellular variant) on **DP02 Cell phone - BYOD**.
7. Getting or providing information at an Operations Centre or Command Unit or sharing information on the incident ground is done via a personal computer or **DP01 Cell phone – agency issued** or **DP13 Tablet computer** via **FENZ10 Access applications**.
8. USAR roles may capture assessment data and images on tablets via **FENZ10 Access applications**. A principle for USAR is not to rely on terrestrial infrastructure (which may be disrupted) so for this scenario they may rely on internet access via **DP18 Nomadic satellite broadband terminal - portable**.
9. Information may be captured, streamed or live-streamed from a Command Unit **DV14 Vehicle-based camera** or **DP15 Body-worn camera** via **FENZ10 Access applications**.
10. Personnel track may each other on incident grounds via **FENZ08 Send/receive resource location**, with the monitoring person using **DP01 Cell phone – agency-issued** or **DP13 Tablet computer** and the person being monitored using **DP26 personal location device** and/or **DP01 Cell phone – agency-issued**.

Future enhancements:

- a. *Tracking of personnel on an incident ground by means of GNSS capability in **DP03 LMR portable** devices, with location information transmitted by via off-network LMR either directly to a collecting device (**DP13 Tablet computer**) on the incident ground or via a relay to the networked **FENZ08 Send/receive resource location** networked capability.*
- b. *Recording of off-network communications.*

4.5 Resource management

4.5.1 Context

Information on resource and incident status must always be up to date in the **INP02 Computer Aided Dispatch System** so that ComCen personnel can appropriately manage the allocation, security, and safety of resources.

4.5.2 What happens

1. Updates are provided to ComCen from Stations and Red fleet vehicles automatically as follows:
 - a. Location of resources via **FENZ08 Send/receive resource location**.
 - b. Station power supply and security status is supplied to automatically to ComCen via **FENZ09 Monitor stations**.

Other status updates are given as follows:

- a. Operational personnel send vehicle availability, broad location attendance status to the **INP02 Computer Aided Dispatch System** via **FENZ06 Send/receive predefined status message**.
- b. All other status updates, including Situation Reports, are given verbally and ComCen must manually enter details of the update in the **INP02 Computer Aided Dispatch System**. Normally verbal updates are via **FENZ01 Make/receive wide-area group call** (LMR or Cellular variants), possibly in response to **FENZ04 make/receive call request - outbound**, or else requesting the call via **FENZ03 Make/receive call request - inbound**.

4.6 Reduction & Readiness

4.6.1 Context

Between Incidents, Operational personnel prepare by familiarising themselves with their area and documenting sites and hazards, while remaining available to be turned out to incidents. This information is captured and used in Response to improve situational awareness.

4.6.2 What happens

1. Personnel on vehicles use **FENZ10 Access applications** on the **DP13 Tablet computer** to update or enter site information. The information is immediately uploaded to corporate network when an appropriate WAN connection is available.