
NEMA2024
ORLANDO
CONFERENCE & EXPO ☼ JUNE 28 - JULY 3

Commercial Carrier & Mobile Networks never fail, do they?

CC:IPS

Critical Communications: International Public Safety

Panel: British APCO (Chris Lucas & Duncan Swan), EENA (Mladen Vratonjic), NENA (Laurie Anderson, Holly Barkwell & Monica Million)

Objectives

- Discuss major network outages that affected Australia, Canada, Europe, the United Kingdom and the United States
  - Panelists will discuss specific impacts outages had on their country
- Explore mitigation strategies and importance of recognizing and addressing system limitations
- Explain the partnership that is CC:IPS and its significant role in the international community.

AUSTRALIA
Optus Outage – 8th November 2023

On 8 November 2023, the Optus network suffered a national outage of all Optus internet, cellular and fixed-line services in Australia. Emergency services were compromised. Hospitals were hampered in their critical work. Businesses lost the ability to trade.

Nearly 2,500 Optus customers were unable to get through to emergency services - sparking widespread frustration with the telco and raising fresh questions about the reliability of Australia's Triple Zero system

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AUSTRALIA
Optus Outage – 8th November 2023

Some 10 million customers had no way to get through to Triple Zero emergency services

"We didn't have a plan in place for that specific scale of outage. I think it was unexpected," Optus MD, Lambo Kangaratnam told the Australian Senate.

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AUSTRALIA
Optus Outage – 8th November 2023

Network Wilting:

- In a situation where there is no service available to Optus customers via the Optus network, user devices' "emergency camp on" feature should operate – this allows access to Triple Zero via another operator's network.
- With no connectivity to the core network, Optus's 4G and 5G base stations automatically wilted (shut down) - *but* the Optus 3G base stations were still radiating signals and did not automatically wilt.
- Some devices detected that 3G radio units were radiating and attempted to make emergency calls via those towers (rather than look to camp on to another network). These calls received an error signal from the Optus network, which signalled the network was not in operation.

AUSTRALIA
Optus Outage – 8th November 2023

- On 9 November 2023, the Federal Government announced a review into the telecommunications industry with a specific focus on emergency calls, customer communications and complaints handling.
- The post-incident review, recommendations, and government response were released in April 2024.
- The report made 18 recommendations aimed at ensuring the telco industry learns from this outage – and identifies opportunities for industry, regulators and government to better mitigate impacts and respond to such events, particularly with respect to the Triple Zero service.

AUSTRALIA
Optus Outage – 8th November 2023

- **Recommendation 2** - Establish a Triple Zero custodian, with oversight of and overarching responsibility for the efficient functioning of the Triple Zero ecosystem, including monitoring the end-to-end performance of the ecosystem.
- **Recommendation 5** - Require carriers, through a standard or determination, to share real time network information detailing outages with relevant emergency services organisations and other appropriate entities, including the Triple Zero custodian.
- **Recommendation 7** - Combine and expand existing disruption protocol instruments to cover all matters relevant to outages in any element of the Triple Zero ecosystem.
- **Recommendation 9** - The Protocol for Notification of Major Service Disruptions should be improved and augmented with clear and detailed requirements for Government communication and collaboration during telecommunications outages through a central coordination point in Government.
- **Recommendation 13** - An industry wide standardised approach to the form of resolutions available to consumers affected by a crisis or large-scale outage should be implemented.

AUSTRALIA
Optus Outage – 8th November 2023

- Australia identified it has not had in place sufficient measures in place to manage an outage of this scale and impact.
- A National Committee has been established to develop the Triple Zero Custodian
- Other considerations are the recognition and inclusion of emergency communications infrastructure in critical communications policy.
- Carriers cannot shy away from their responsibilities to deliver Triple Zero calls

AUSTRALIA
Optus Outage – Another Triple Zero Issue

- The Australian Communications and Media Authority (ACMA) also investigated Optus' compliance with the Emergency Call Service Determination

- On 6 March 2024 the ACMA announced that they found large-scale breaches of public safety rules – Optus had left close to 200,000 mobile customers (supplied under the Coles Mobile and Catch Connect brands) at risk by failing to upload required customer information to the Integrated Public Number Database (IPND) between January 2021 and September 2023

- The IPND is used by critical services like the Emergency Alert service to warn Australians of disasters such as flood and bushfires, and by Triple Zero to provide location information to police, ambulance and fire brigade in an emergency.

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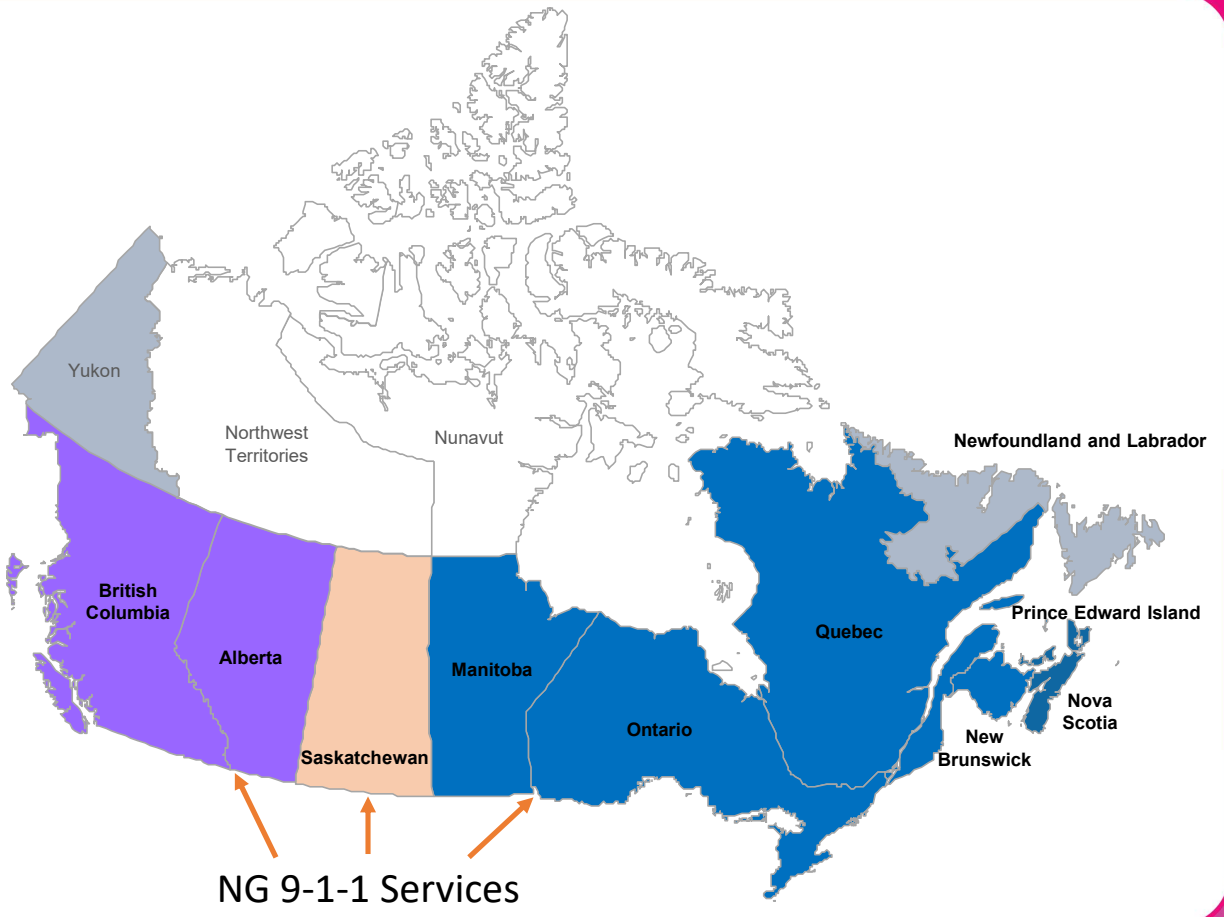
CANADA
Introduction

9-1-1 in Canada

- 243 PSAPs Nationally
- 105 Primary
- 138 Secondary

3 x NextGen 9-1-1 Services Providers

Grey is still Basic 9-1-1 Service



CANADA
Outage Example 1

April 19, 2021, National Canadian Wireless Provider outage affecting ~ 11 million people (~25% of the 40 million population in Canada)

- Wireless and landline internet access affected
- Canada was still dealing with COVID-19 workflow modifications at that time
- Services Affected:
  - Ability to contact 9-1-1,
  - Online school access,
  - Online banking,
  - Medical appointment booking.
- Duration: approximately 18 hours to restore service

Root Cause: *software update*

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CANADA
Outage Example 2

July 8, 2022, same National Canadian Wireless Provider outage affecting almost a 1/3 of the population (14+ million subscribers)

- Wireless and wireline access affected
- Significantly greater impact than previous outage
- Services Affected:
  - Ability to contact 9-1-1,
  - Access to border clearance,
  - Access to license & registration,
  - Canada Revenue Agency,
  - Hospital notification and emergency call-in,
  - Banking and online payment.
- Duration: approximately 18 hours to restore service
- Subscribers were unable to roam on other wireless networks due to the nature of the outage

Root Cause: *software update*

CANADA
Outage Example 2

Financial Impact of the 2022 outage:

- The economic toll to the Canadian economy for the outage period was assessed at $142 million
- Rebates to affected customers are estimated upwards of $70 million
- The network operator split its physical and wireless backhaul networks at an estimated cost of $261 million
- The above costs were rolled into a 3-year strategy for increased resiliency and network surveillance systems to mitigate against future risks of failures at a projected cost of $10 Billion

CANADA
Impact on PSAPs of Outages

Existing Telecom Decision CRTC 2017-389

- Sets out carrier notification requirements for service outages

Outages create havoc for PSAPs

- Carrier notifications were generic and left out important information about services affected, ETA for service restoration, and/or status of response
  - Notifications were not targeted (generic notification to primary PSAPs only)
  - Notifications included some PSAPs that were not affected (Basic 9-1-1 areas)
- PSAPs were left to design and distribute Public Service Announcements and messaging
  - PSAPs didn't know what service was affected, expected duration or cause resulting in many calls from the public on 10-digit lines looking for reassurance and information
  - Some PSAPs did not receive ANY notification and found out through social media, news and other media channels.

CANADA
After Effects

CRTC issued a letter after the 2022 outage requiring all major telecom carriers in Canada to establish a formal agreement to mitigate damage in future outages

- The group was to “consider emergency roaming, mutual assistance during outages, and building out a communication protocol to better inform the public and authorities of any emergencies.” (Industry Minister and CRTC Chair, Francois-Philippe Champagne)

Also triggered

- a CRTC investigation into root cause including a public consultation on reporting
- Public Consultation 2023-39 to collect input for a new regulatory framework for improved network reliability and resiliency – Mandatory notification and reporting (no decision issued yet)

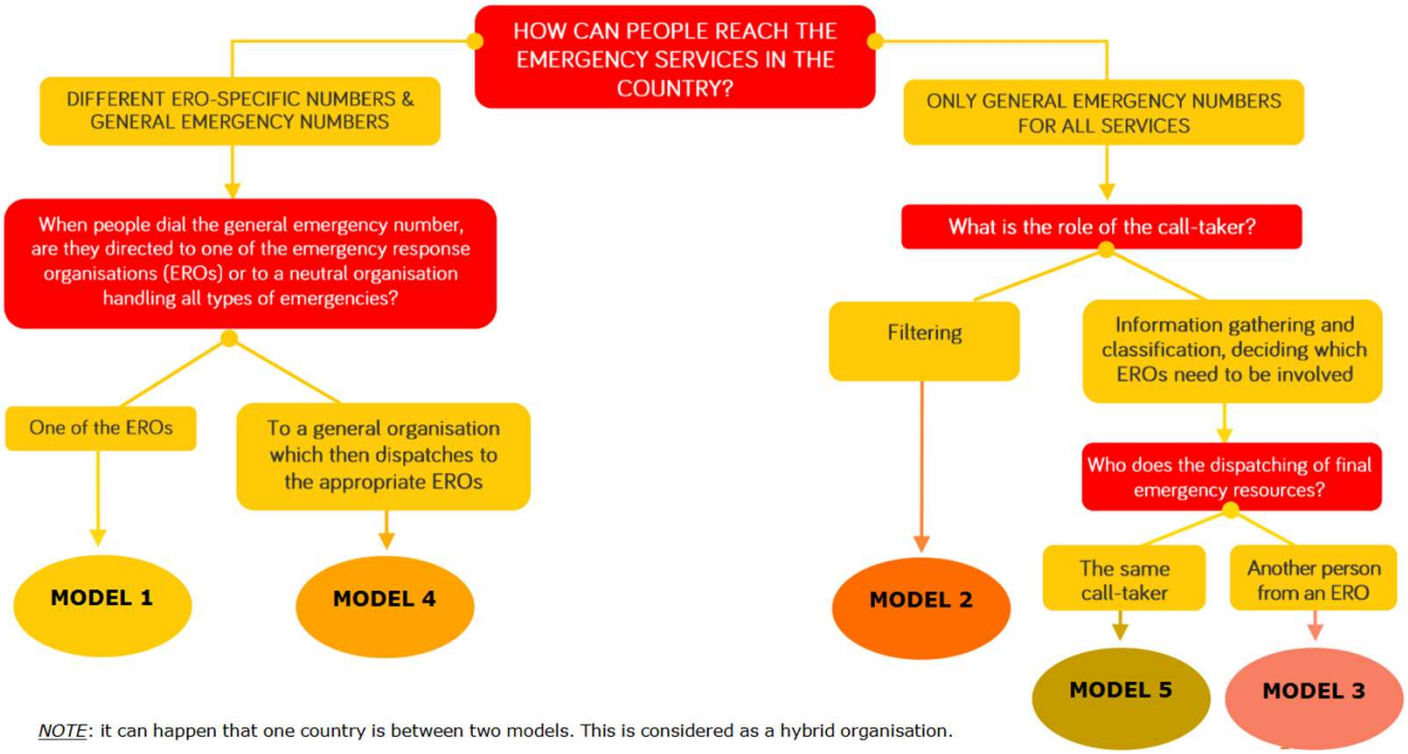
EUROPE
European Emergency Call Handling in Europe

30+ sovereign countries (EU/EAA/CH/UK/Balkans/South Caucasus)

5 different call handling models identified by EENA with centralised or decentralised call handling

eena
EUROPEAN EMERGENCY NUMBER ASSOCIATION

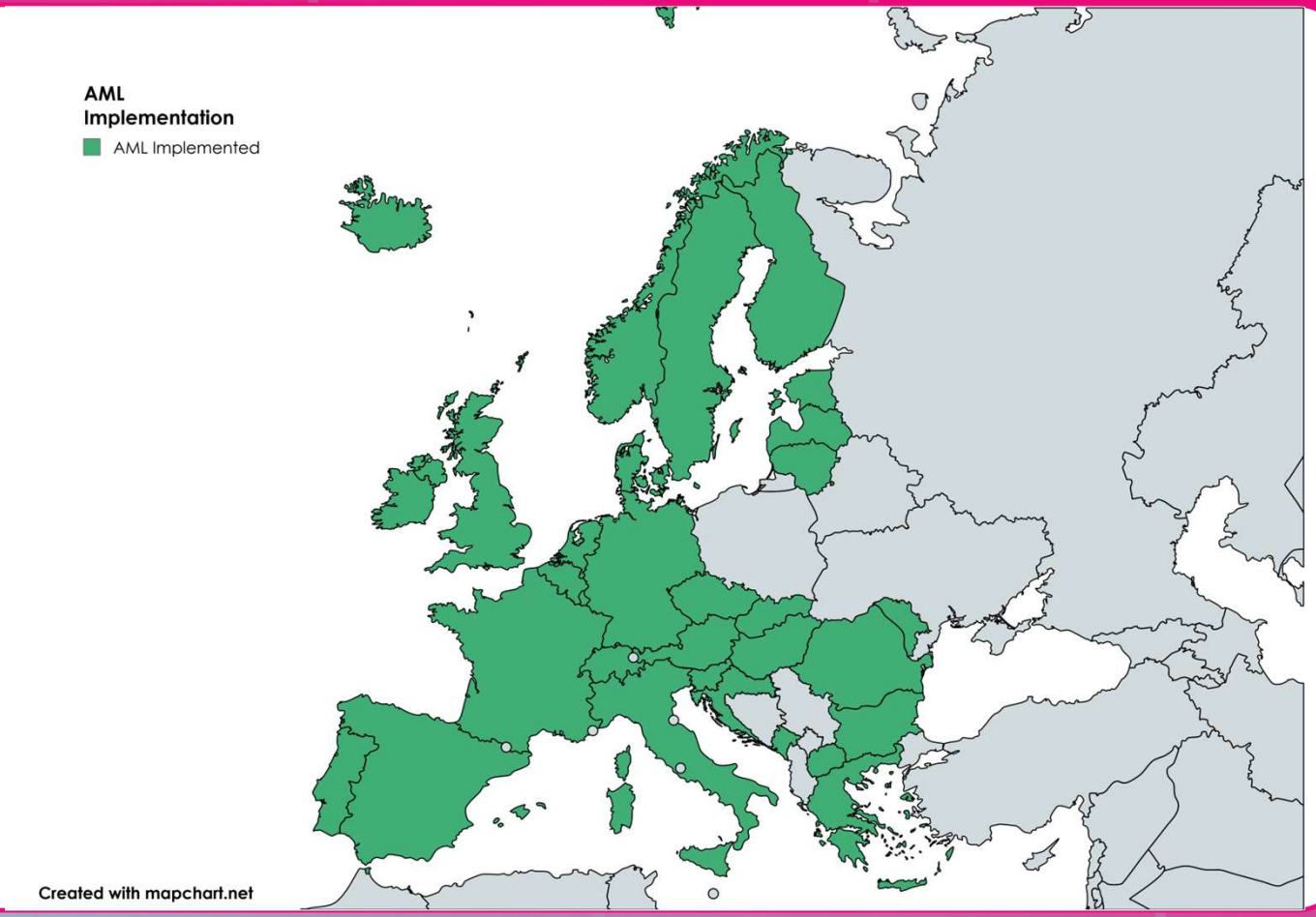
To be able to decide what is the model closest to the organisation in place in one specific country, the following decision tree has been created:



NOTE: it can happen that one country is between two models. This is considered as a hybrid organisation.

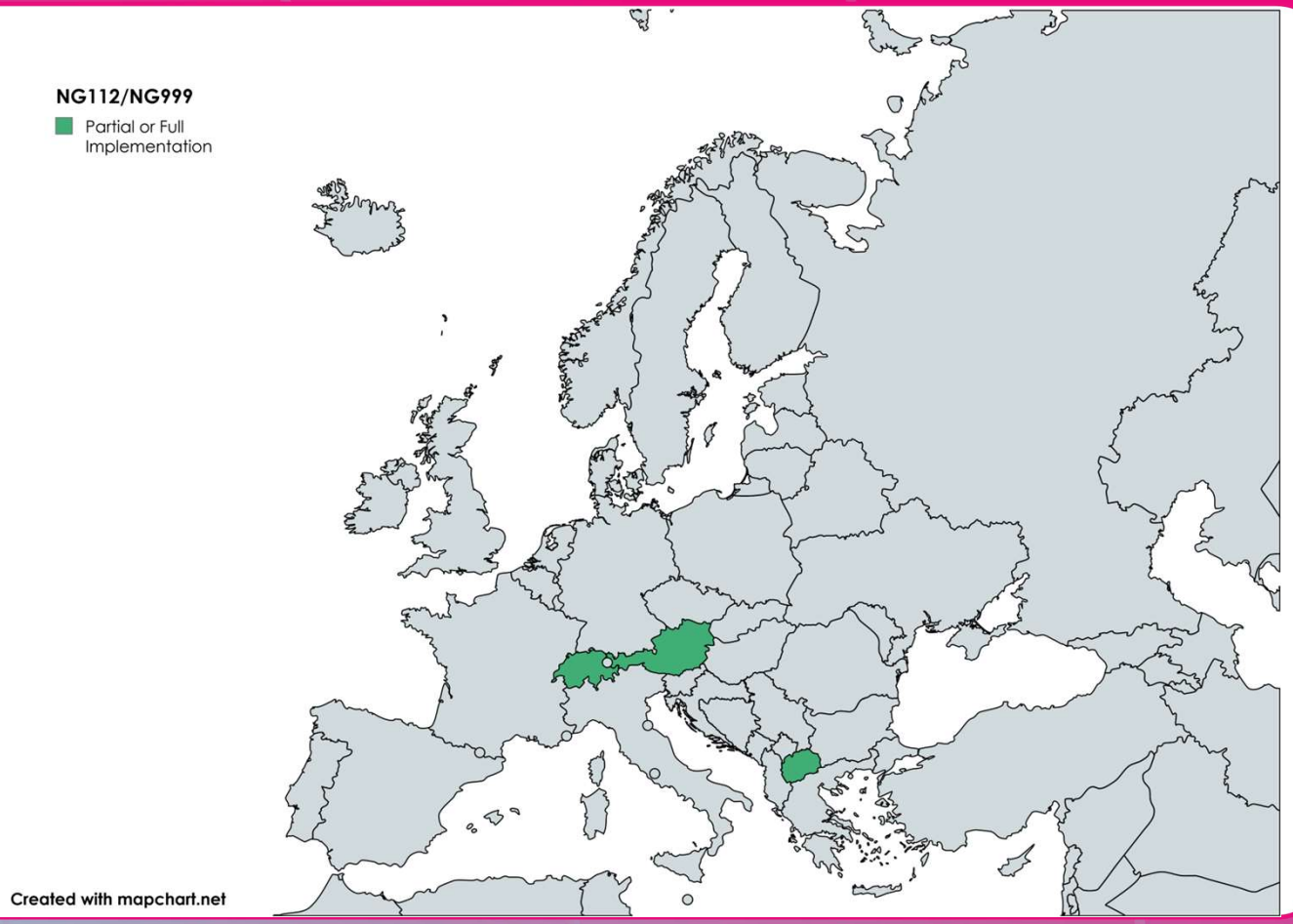
EUROPE
Advanced Mobile Location Implementation (ETSI TS 103 625)

- 24 EU Countries
- Norway
- Iceland
- Liechtenstein
- Switzerland
- UK
- North Macedonia
- Montenegro
- Moldova



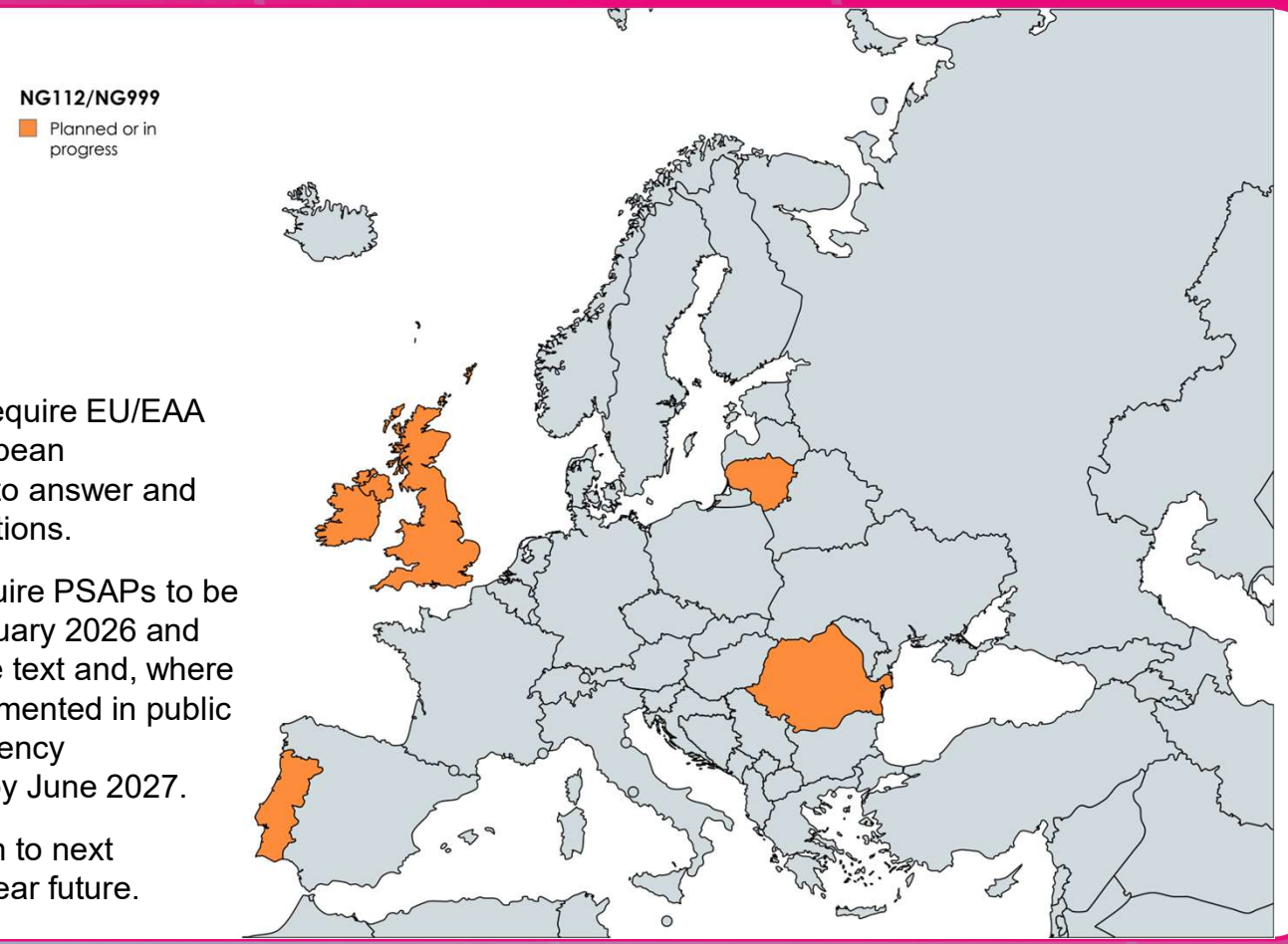
EUROPE
Next Generation 112/999 implementation

- Switzerland
- Austria
- North Macedonia



EUROPE
Next Generation 112/999 implementation

- Romania
- Portugal
- Lithuania
- UK
- Ireland



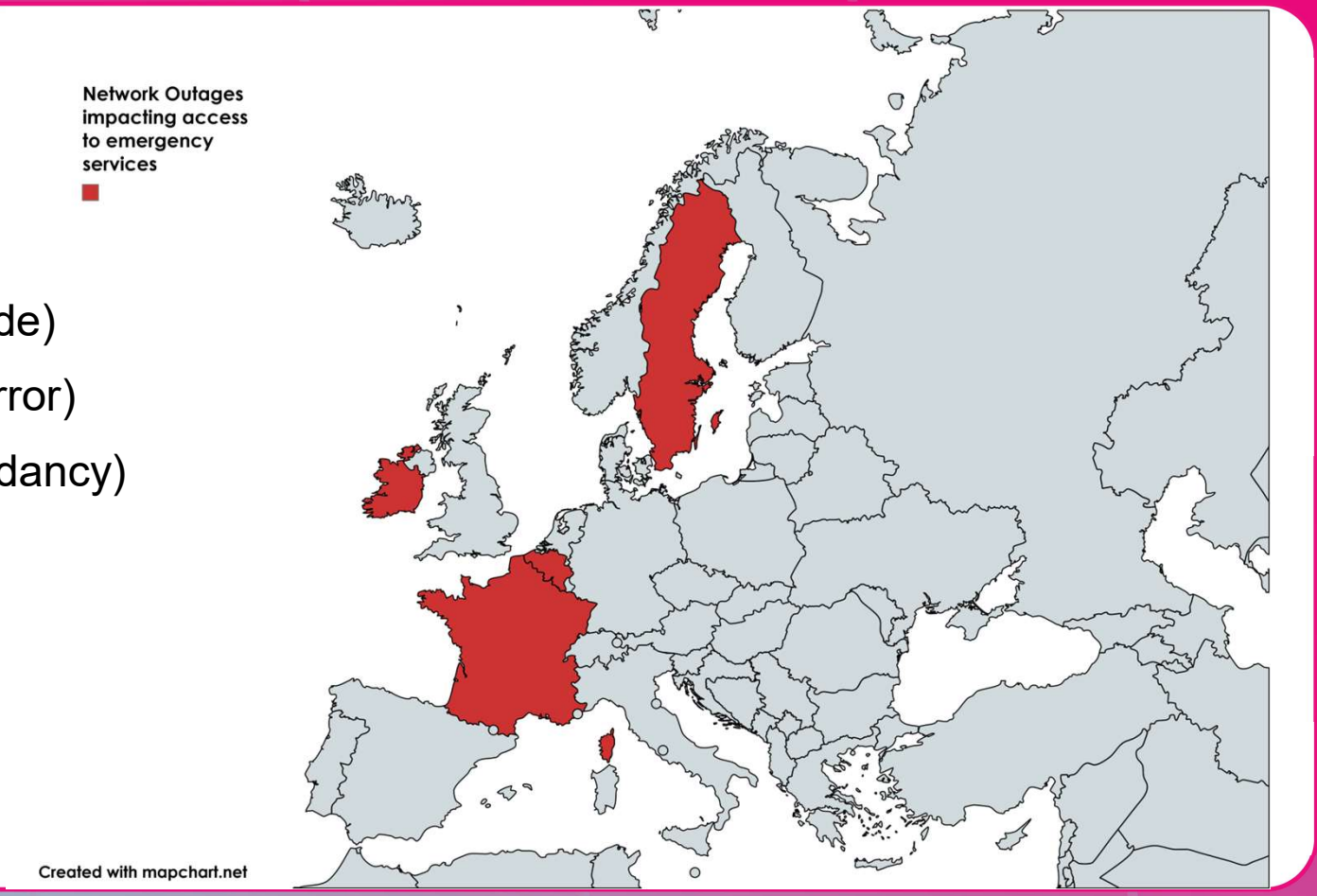
Requirements set out in European Legislation require EU/EAA Member States to submit roadmaps to the European Commission on upgrading their PSAP systems to answer and handle packet-switched emergency communications.

In addition, changes to the eCall framework require PSAPs to be able to handle Next Generation eCall by 01 January 2026 and the European Accessibility Act requires real time text and, where video is provided, total conversation to be implemented in public networks by June 2025 and, for handling emergency communications originating on these services, by June 2027.

These requirements will accelerate the transition to next generation emergency communications in the near future.

EUROPE
Network Outages Impacting Emergency Communications

- Sweden (Cyber Attack)
- Ireland (Software Upgrade)
- France (Configuration Error)
- Belgium (Lack of Redundancy)
- France (Power Outage)



UNITED KINGDOM
BT 999 System Outage 25 June 2023

The statistics - 2023

41.9 million
999/112 calls a year, of which:

79%
from mobile

15%
from landline

134,000
eCalls (included in mobile %)

Service	Percentage of calls
Police	57%
Ambulance	40%
Fire	3%
Coastguard	<1%

7 BT call centres.

142 local emergency services control rooms.

- The Public Emergency Call Service (PECS) is run by BT as the primary PSAP – answering 999 & 112 calls.
- On Sunday, 25 June 2023, BT experienced a technical fault affecting its ability to transfer 999 calls to the emergency authorities. First, calls to 999 were unintentionally disconnected, and then failed to connect, until BT's back-up system was successfully activated which then caused delays in transferring 999 calls before the issue was resolved later the same day
- The PECS has proven itself to be extremely resilient - the incident on 25 June marked the first nationwide loss of 999 in over 86 years since the inception of the PECS in 1937.
- The collective response to the incident was not as efficient as it could have been due to three key issues - notification, coordination, and communication.

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UNITED KINGDOM
BT 999 System Outage 25 June 2023

As the incident progressed so too did the potential impacts on the UK population in terms of severity and scale, which can be broadly categorised into three phases:

Disruption. Between 06:24 and 07:31 (1 hour, 7 minutes). The initial fault resulted in a significant proportion of 999 calls disconnecting. Some citizens attempting to make emergency calls during this period were disconnected as they were being transferred from the BT call handler to the relevant EA control room.

Denial. Between 07:31 and 08:50 (1 hour, 19 minutes). The most serious period, when ALL 999 callers were unable to connect to 999 due to a procedural failure by BT in activating their backup system. During this period, all citizens dialling 999 would have failed to connect to BT's 999 platform, resulting in a failed call and denial of access to the PECS.

Delay. Between 08:50 and 16:56 (8 hours, 6 minutes). The service was operational, with a portion handled using the backup system which had reduced functionality. All citizens during this phase would have been able to get through to the emergency services, but it took longer than usual as call handlers needed to process some information manually (such as location).

During the incident, a total of 9,641 unique callers were unable to access the emergency services via 999/112 and many more were delayed or disrupted. A very small number of customers relying on alternative PECS services (such as Video Relay, SMS and eCalling) may have also been impacted by the incident

UNITED KINGDOM
BT 999 System Outage 25 June 2023

The outage had considerable knock-on impacts across the operations of the Emergency Agencies (EAs), specifically the 144 control rooms at the other end of the 999 system.

The **Disruption** phase placed an additional burden on control room staff as they phoned each caller back, adding to call delay queues that increased as the incident progressed.

In the **Denial** phase, the EAs experienced a significant drop in call volumes - causing considerable concern and is widely assumed to have contributed to the delays throughout the remainder of Sunday as callers repeatedly attempted to access the service.

In the final **Delay** phase, the limited functionality of BT's backup system meant that control room operators needed to ask the caller several questions to determine their precise location, which had a considerable impact on the time it takes to handle a call as callers waited to be transferred to an available operator in the relevant control room.

UNITED KINGDOM
BT 999 System Outage 25 June 2023

- It was clear that there was no existing central communications plan to ensure that advice to the public remained accurate and consistent across all 999 partners.
- There was no authoritative and consistent national message until15:45 when HMG released a statement to the media
- As a result, the messaging to the public on how they should seek emergency support during an outage of 999 services differed slightly across some regions and emergency organisations, including advice to call alternative numbers such as 101 (police non-emergency) and 111 (Health Service).
- Both emergency services and central government should have clear and consistent lines of advice prepared in advance, to be able to tailor and issue to the circumstances of any individual incident as quickly as possible, and this could include publicly accessible information, so callers are able to quickly find alternative means of contacting the emergency services in future
- In future, Cabinet Office will coordinate developing appropriate public advice that can be used for several scenarios involving disruption to 999, and ensure any advice is applicable across the UK. Plans will include an appropriate list of channels and key stakeholders to amplify the advice, so that this advice can quickly be tailored to the circumstances of any future incident and issued by the relevant authority
- On this occasion, it was decided that the criteria to send an emergency alert was not met, given the incident was UK-wide and not consigned to a specific region to which an alert could be sent and because it was agreed in cross-Government discussions that there was not an urgent need for all members of the public to take an immediate action.
- However, there remain clear processes in place to consider using an emergency alert if it was quickly discovered that a local area experienced a 999 outage, and a specific and distinct action for a smaller group of the UK population was required.

UNITED STATES
Recent Carrier Outages

February 22, 2024 AT&T nationwide outage – millions impacted by service disruption which included the FirstNet network.

- FirstNet service was restored within 3 hours
- All others restored beginning 2 hours after that, but many states couldn't access services for several hours past what was reported by service provider
- Outage was caused by "an incorrect process while expanding its network" (software)
- FCC, FirstNet and DHS conducting ongoing investigation.

June 3, 2024 Lumen has statewide outage in Iowa that impacted internet and landline phones. Lumen currently stating they are unsure if they will be able to prevent it from occurring again as it happened "upstream, above all of us".

- Caused by an internal water pipe break at a Lumen/CenturyLink facility.
- "They took down the whole state all because everything is housed in one building."

Carrier Outages – Planning for the PSAP

- CC:IPS Best Practice Guide – watch this space !
- Recognize that the PSAP rarely is notified in a timely manner
- Have preplans in place that help to communicate to the public how they should/can contact Emergency Services
- An Incident Action Plan is a key component to successfully mitigating the circumstances
  - Know who your service providers are
  - PSAP staff need to know the plan and practice it
  - Identify messaging up front with key public information officers
  - Identify and have contact information for all carrier representatives and other relevant stakeholders.

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Carrier Outages – Planning for the PSAP

- Preplan alternate methods for the public to reach Emergency Services
- Implement alternate routing of three-digit emergency calls
- Relay emergency call information or direct dispatch
- Actively monitor tactical mapping solutions to provide location information of callers attempting to reach three-digit emergency service numbers
- Reach out to providers as needed for information and updates
- Provide initial outage notification to public with subsequent updates as appropriate
- Notify 9-1-1 authorities and stakeholders of disruption
- Initiate incident tracking for extended outages
- Implement the after-action review/plan.

THANK YOU !

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