

A close-up photograph of a person's hands holding a smartphone. The phone's screen is red and displays the number '112' in large white font, with 'EMERGENCY CALL' written in smaller white text below it. The background is dark and out of focus.

**112**  
EMERGENCY CALL

# Network Resilience and Emergency Communications

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# What is EENA?

- NGO focused on public safety and emergency communications.
- Promotes the 112 emergency number and supports the improvement of emergency services by addressing topics such as advanced mobile location, eCall, public warning systems, and network resilience.
- Collaborates with its networks of +1500 emergency services representatives, +100 solution providers, and +200 academic researchers to innovate and enhance emergency services.

# EENA's Vision and Beliefs

- Citizens deserve the highest quality of emergency services.
- Citizens should receive timely and effective public warnings before disasters, and societal resilience in disasters should be improved.
- The common European emergency number, 112, should be actively promoted across Europe.
- Network availability and resilience underpins all emergency communications.



# New Challenges in Network Resilience

- Climate change impacts (flooding, storms)
- Geopolitical threats (supply chains, cyberattacks)
- Transition to IP and decline of fixed networks; Shut down of older mobile networks (2G, 3G) can reduce redundancy.

# Examples of Threats to Network Resilience

- Physical threats or shocks: from extreme events to the mundane
- Technology vulnerabilities: hardware and software failures and capacity/overload problems. Providers must consider how new innovations and technologies impact on Network Resilience
- Human error: inadequate training/recruitment, or negligence
- Architecture design failings: single points of failure, technical oversights

# Network Outage Impact - Australia

- 12-hour outage impacted 10 million customers, disrupting emergency services (Optus, November 2023).
- Hospitals and businesses affected; 2,500 emergency calls failed.
- Highlights the need for robust network design and emergency protocols.

<https://www.acma.gov.au/articles/2024-11/optus-pays-12-million-penalty-triple-zero-outage>

# Lessons from the Australia Outage

## Network Wilting and Communication Chain Failures

- Emergency call prioritisation system failed due to 3G towers not shutting down properly.
- Demonstrates the need for end-to-end checks in network systems.
- MNOs should ensure all parts of the network function correctly, including parts of network which are specific to emergency communications.

# UK Network Fault

- 14,000 emergency call attempts failed due to BT's network fault (June 2023)
- Ofcom fined BT £17.5 million for inadequate preparation and response.
- Emphasizes the importance of warning systems and mitigation procedures.

<https://www.ofcom.org.uk/phones-and-broadband/telecoms-infrastructure/bt-fined-17.5m-for-999-call-handling-failures>



# Lessons from the UK Outage

## Robust disaster recovery

- Well-documented response plans enable quick and effective mitigation of disruptions.
- Frequent testing ensures staff are familiar with recovery procedures and can act efficiently under pressure.
- Inform stakeholders promptly during outages to manage expectations and coordinate solutions.

# New Opportunities for Enhancing Resilience

- Improved battery technologies for electricity backups
- Eliminating Single Points of Failure
- Prioritisation Mechanisms
- Technology evolution
- Geographic Distribution and Business Continuity Planning

# Battery Backup and Power Resilience

- As PSAPs are energy intensive, extended power support through on-site batteries or renewable energy sources is crucial to increase resilience.
- For MNOs, the steps needed for emergency communications resilience will differ depending on the stage of the network.
  - For the core network, an independent source of power generation may be necessary.
  - For access domain infrastructure battery resilience and overlapping fields of coverage may suffice.
- Improved battery and renewable power generation technologies makes it easier to modernise battery backup and power resilience.

# Mitigating Network Failures: Eliminating Single Points of Failure

- Redundant network paths and systems ensure that failures in one part of the network do not lead to a complete outage
- Providers must undertake an analysis of their systems to identify single points of failure, including points of failure which may be specific to emergency communications.
- Single points of failure can be mitigated in a variety of ways, including by adding redundancy, or creating failover mechanisms.
- Mitigations must comply with the requirements of emergency communications, such as prioritisation of emergency calls.

# Prioritisation Mechanisms and technology evolution

- Maintain the concept of traffic prioritisation for emergency communications, especially during times of network congestion or disaster.
- Spaced based communications satellites could provide a backup when terrestrial networks fail, particularly for emergency communications and public warning.
- New technologies like 5G & 6G may offer more reliability.



# Geographic Distribution and Business Continuity Planning

- Spread Network Operations Centers to reduce geographic risks, or risks of attacks/failures at an individual PSAP.
- Business continuity plans to maintain service levels during disruptions.
- Ensure business continuity plans prioritise continued availability of emergency communications.

# How to improve network resilience for emergency communications

- **Reliable Networks:** Strengthening network resilience and prioritisation mechanisms is essential to ensure emergency services remain accessible during crises.
- **Proactive Management:** Transparent communication and robust disaster recovery plans are critical for maintaining trust and public safety during disruptions.
- **Future Preparedness:** Continuous investment and collaboration among stakeholders will enhance system reliability and adaptability to future challenges.

# CONTACT

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