Rural Emergency Communication

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Agenda

- Introduction and role of ILECs
- Rural emergency service challenges
- Funding support
- Infrastructure resilience
- Policy considerations
- High-capacity transport

Introduction and the role of ILECs

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Introduction and the role of ILECs
What are rural emergency communications?

- Rural emergency communications refers to the systems and processes that support the exchange of critical information during emergencies in sparsely populated and geographically isolated areas
- Key components
  - Public safety communications – police, fire, EMS radio and dispatch systems
  - Warning systems broadcasts
  - Interagency networks – integration with regional and national systems

Introduction and the role of ILECs
Emergency communications services

- 911 – the standard public emergency number in the U.S. Primarily voice
- Enhanced 911 – provides caller location and callback number to the PSAP
- Next Generation 911 – all IP protocol. Allows text, photos and videos, automatic crash data from vehicles and real-time location sharing
- Wireless emergency alerts – government-issued alerts sent to cell phones for imminent threats, Amber alerts and presidential alerts
- Emergency alert systems – alert broadcast over radio and TV
- First Responder Network Authority – nationwide dedicated broadband network for first responders. Operated in partnership with AT&T

Introduction and the role of ILECs
Emergency communications services

- Priority Telecommunications Services – provides prioritized call routing for government and critical infrastructure communications during network congestion
  - Government Emergency Telecommunications Service
  - Wireless Priority Service
- Emerging and future services
  - Drones for situational awareness
  - Internet of Things and wearables
- Satellite backup – provides comms in remote areas or outages

Introduction and the role of ILECs
Why is rural emergency communications important?

- Crucial for evacuations, warnings and disaster management
  - Protects lives and property
    - Enables rapid response to wildfires, floods, accidents and health crises
    - Helps coordinate evacuations and rescue efforts
    - Delivers life-saving information to isolated populations
    - Provides critical care in areas far from hospitals
    - Ensures timely response to accidents, heart attacks, strokes and trauma

Introduction and the role of ILECs
Why is rural emergency communications important?

- Crucial for evacuations, warnings and disaster management (cont.)
  - Supports first responders
    - Keeps law enforcement, EMS and fire crews connected over long distances
    - Allows communication across counties, states and agencies
    - Enhances situational awareness during complex incidents
  - Overcome infrastructure gaps
    - Compensates for lack of reliable cell service or internet
    - Provides alternative methods (radio, satellite) when networks fail
    - Ensures continuity during power outages or disasters

Introduction and the role of ILECs
Why is rural emergency communications important?

- Crucial for evacuations, warnings and disaster management (cont.)
  - Protects critical infrastructure and builds resilient communities
    - Helps rural areas prepare for and recover from emergencies
    - Enables local leaders to stay informed and make decisions quickly
    - Strengthens public trust through timely alerts and updates
    - Provides fast, secure communication to protect infrastructure (e.g., dams, power grids and pipelines) during emergencies
  - Integrates rural areas in national response systems
    - Connects rural agencies to national platforms like FirstNet, FEMA and NOAA

Introduction and the role of ILECs
What is the role of RLECs in emergency rural services?

- 911 network support
  - Maintain infrastructure for enhanced and next generation 911
  - Route emergency calls to public safety answering points
    - A PSAP is a call center responsible for answering 911 emergency calls and dispatching emergency services
  - Ensure redundancy and routing diversity in emergency networks
- Ensure location data is transmitted to the PSAP
- Distribute emergency alert messages through phone and internet systems
- Work with other providers to ensure reliable 911 access

Rural emergency service challenges

- Geographic challenges
  - Sparse population density: Fewer customers are spread over large areas, making it difficult to justify the cost of infrastructure investment
  - Challenging terrain: Mountains, forests or remote locations can complicate the deployment and maintenance of fiber or wireless networks
  - Long distances: Extending connectivity to distant or isolated locations increases installation and maintenance costs
- Aging infrastructure and the cost of upgrades

Source: Image generated by ChatGPT

Rural emergency service challenges (cont.)

- Financial constraints
  - High costs with low return: Capital investments in network upgrades (e.g., for NG911) are expensive, but the revenue base is small
  - Limited funding: Many rural LECs depend on federal or state support (e.g., USF or RUS loans), which may be inadequate or inconsistent
- Regulatory and compliance hurdles
  - Evolving requirements: Keeping up with new FCC rules, cybersecurity standards and NG911 mandates can strain resources
  - Reporting and coordination: Rural LECs often lack the staff to manage compliance paperwork and coordinate with state and federal emergency systems

Rural emergency service funding support
High-cost programs

- The high-cost program provides financial support to rural LECs to build, operate and maintain telecommunications networks in high-cost areas
  - These funds directly and indirectly support rural emergency communications
- Directly support voice and broadband capable network infrastructure
  - 911 can only function if wireline end users have a working landline or broadband connection
    - Fiber and IP infrastructure is a prerequisite for NG-911

Rural emergency service funding support
High-cost programs

- Directly support voice and broadband capable network infrastructure (cont.)
  - CAF ICC supports switching equipment needed to route 911 calls to public safety answering points
    - PSAPs – funding is provided by state and local sources
    - Most states collect a monthly fee on landline, wireless and VoIP service bills. These fees typically range from $0.25 to $1.50 per line per month. Collected by telecom providers and remitted to the state or local 911 board
    - Counties, municipalities or regional 911 authorities often supplement PSAP funding through general tax revenues (property or sales tax) for public safety or emergency services budgets
  - Power backup for networks ensures 911 is available during storms/disasters

Rural emergency service funding support
Grants and loan programs – direct support

- 911 Grant Program – helps states, territories and tribal governments upgrade their 911 infrastructure
- State Homeland Security Program – helps state and local governments prevent, prepare for, respond to and recover from acts of terrorism and other catastrophic events
- Emergency Management Performance Grant – provides federal funding to help state, local and tribal governments sustain emergency management capabilities
- Community Facilities Direct Loan and Grant Program – supports construction or modernization of essential rural facilities

Rural emergency service funding support
Grant and loan programs – indirect

- Reconnect Program – grants and loans provide support for rural broadband infrastructure, essential for NG911 and PSAP connectivity
- Bead Program – eligible uses include infrastructure that supports public safety, telehealth and emergency services
- Distance Learning and Telemedicine Program – grants up to $1 million for technology linking ambulances and facilities
- Tribal Broadband Connectivity Program – can be used for infrastructure and facility projects that support emergency communication
- Community Development Block Grants – can be used for infrastructure and facility projects that support emergency communication in rural areas

Infrastructure resilience

- To ensure continuity of service, RLECs must take proactive steps to strengthen infrastructure resilience
  - Network hardening
    - Replace aging copper lines
    - Use hardened shelters and weatherproof cabinets for equipment
    - Elevate critical infrastructure above flood risk areas
    - Install backup power systems at key sites
  - Redundancy and failover
    - Create diverse routing paths to avoid single points of failure
    - Partner with nearby LECs for mutual aid routing in emergencies

Infrastructure resilience

- To ensure continuity of service, RLECs must take proactive steps to strengthen infrastructure resilience (cont'd)
  - Cybersecurity enhancements
    - Implement firewalls, intrusion detection and endpoint protection
    - Regularly patch systems and conduct vulnerability assessments
  - Workforce training
    - Train technicians in emergency restoration procedures
    - Train staff to handle outages, cyber incidents and field deployment
  - Community partnerships – collaborate with local utilities, fire/rescue and municipalities for shared response planning

Policy consideration

- RLECs are vital emergency communications in rural America, yet they face persistent regulatory, financial and operational challenges
- Sustain and expand funding mechanisms for rural ILECs
- Participate in public/private partnerships
  - Promote collaboration between ILECs and local public safety agencies to share infrastructure and coordinate deployments
- Encourage inclusion of emergency services in broadband planning
- Support training and workforce development

Policy consideration
FCC's FNPRM

- Facilitating Implementation of Next Generation 911 Services (NG911); Improving 911 Reliability
  - FCC-25-21, WC Dockets 21-479 and 13-75, adopted March 27, 2025, and released March 28, 2025
  - Published in the Federal Register June 4, 2025
- Deadline for filing comments was Aug. 4, 2025
- Reply comments cycle closed on Sept. 4, 2025

Policy consideration
FCC's FNPRM

- Key proposed changes
  - Accessibility
    - Proposed to ensure NG911 systems support interoperability for nonvoice services, including text, video and multimedia, to support accessibility for people with disabilities
  - Reliability
    - Sought to update its 2013 reliability rules for NG911 networks to cover new network elements and critical points where failure could lead to outages, applying them to NG911 providers such as ESInet providers, transport providers and aggregators

Policy consideration
FCC's FNPRM

- Key proposed changes (cont.)
  - Interoperability
    - Proposed establishing interstate interoperability requirements for the reliable exchange of 911 traffic between emergency services IP networks, ensuring calls can cross state borders without needing retranslation or reformatting
  - Oversight
    - Proposed modifying the certification and oversight mechanisms in the current reliability rules to empower state and local 911 authorities with access to annual reliability and interoperability certifications from covered 911 service providers

Policy consideration
FCC's FNPRM

- Primary goals
  - Enhance accessibility
    - Ensure individuals with disabilities can access 911 services through accessible technologies, including sign language communication and enhanced text and video capabilities
  - Promote reliability
    - Improve overall reliability of NG911 networks and ensure consistent delivery of emergency traffic

Policy consideration
FCC's FNPRM

- Primary goals (cont.)
  - Improve interoperability
    - Establish requirements for the seamless, interstate transfer of 911 traffic between different networks
  - Increase transparency and accountability
    - Modify oversight mechanisms to provide state and local 911 authorities with better information and tools to manage reliability and interoperability within their jurisdictions

High-capacity support
The role of ETS and OWS

- Ethernet transport service and optical wavelength services play a crucial backbone and transport role in the provisioning of rural emergency services
  - These services form the backbone of rural emergency infrastructure, enabling PSAPs, hospitals, first responders and command centers to share real-time data
  - Emergency response in today's digital landscape is data-intensive
    - NG911 relies on IP-based broadband to handle multimedia emergency calls (voice, text, video, pictures, medical records). ETS and OWS underpin this system
  - Support secure, high-speed IP transport between NG911 elements
  - Allow for redundant network paths in case of fiber cuts, storms or equipment failures
  - Support state NG911 backbone and rural hospital networks

High-capacity support
What is OWS?

- Optical wavelength service – a dedicated, high-speed communication service using fiber optic networks to transmit data over long distances with minimal signal loss
  - OWS offers high-speed transmission, strong reliability and low latency
- OWS provides the underlying physical transport that supports various types of services, including those with extremely high bandwidth requirements
  - OWS is protocol flexible and can support SONET, ethernet transport service, Internet Protocol, time division multiplexing and asynchronous transfer mode
    - Transmits voice, video and data

High-capacity support
What are the OWS components?

- Fiber optic cable – uses light pulses to carry binary digits (1 and 0)
- Optical transceivers – converts electrical signals into optical signals (and vice versa) for transmission over a fiber optic cable
- Optical amplifiers – boosts signal strength in fiber optic networks, compensating for signal loss over long distances
- Wavelength division multiplexer – allows multiple data signals to be transmitted simultaneously over a single optical fiber by using different light wavelengths
- Customer premises equipment – bridges the customer's internal network with the OWS service

High-capacity support
ETS versus OWS

Feature	ETS	OWS
Technology	Uses ethernet protocol over various mediums (fiber, copper, wireless)	Uses fiber optic networks
Speed	Typically ranges from 10 Mbps to 400 Gbps	Capable of extremely high speeds (up to terabits per second)
Latency	Low	Very low
Reliability	Reliable, but can be affected by network congestion	Highly reliable
Scalability	Easily scalable for businesses and small enterprises	Scales well for large enterprises and ISPs
Security	Can be secure, but depends on encryption and network configuration	High security due to dedicated optical links

High-capacity support
Uses of OWS

- ISP middle mile facilities
- Data centers
- Cloud computing connectivity
- State rings
- Large corporations and financial institutions
- Government and defense networks
- Smart cities
- Hospitals, telemedicine and emergency services

Summary

- There are many things to consider for ILECs in rural emergency communications, including a myriad of challenges
- Funding support exists, both directly and indirectly, to help in making your network resilient in the midst of emergencies
- There are various policies to consider, including the FCC's own FNPRM, in improving emergency services
- ETS and OWS are high-capacity transport services to help bolster your network to add further resiliency and quality of service
- We are here to help you!

thank you!

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Acronyms

CAF ICC	Connect America Fund Intercarrier Compensation
EMS	Emergency Medical Services
ESInet	Emergency Services IP Network
ETS	Ethernet Transport Service
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FNPRM	Further Notice of Proposed Rulemaking
ILEC	Incumbent Local Exchange Carrier
IOT	Internet of Things
IP	Internet Protocol
LEC	Local Exchange Carrier
NG911	Next Generation 911
NOAA	National Oceanic and Atmospheric Administration
OWS	Optical Wavelength Service

Acronyms

- PSAP — Public Safety Answering Point
- RLEC — Rural Local Exchange Carrier
- RUS — Rural Utilities Service
- SONET — Synchronous Optical Networking
- USF — Universal Service Fund