Digital Modes for Emergency Communications

Winlink & FLdigi: Essential Tools for ARES/RACES

Why Digital in Emergencies?

Infrastructure Independent: Operate when cell, internet, and landlines are down.

Accuracy: Digital modes offer error correction, ensuring messages arrive intact.

Efficiency: Transmit more data (text, forms) faster than voice, especially in noisy conditions.

Record Keeping: Digital messages provide a clear, written record of traffic.

Interoperability: Can bridge radio communications to internet-based systems (like email) when available.

Winlink: Radio Email & Forms

Concept: "Radio Email" - a store-and-forward messaging system.

How it Works:

- Client software (e.g., Winlink Express) on your computer.
- Connects to a **Radio Message Server (RMS) Gateway** via HF, VHF, or UHF radio.
- RMS Gateways then connect to the internet (or other RMS stations via radio) to deliver messages.

Emergency Uses:

- Sending and receiving emails with served agencies (e.g., Red Cross, FEMA).
- Transmitting pre-formatted **ICS (Incident Command System) forms** and other critical documents (e.g., damage assessments, resource requests).
- Position reporting (GPS).
- Operates **Peer-to-Peer** (radio-to-radio) if no RMS gateway is accessible.

Key Advantage: Provides a familiar email-like interface and can bridge radio communications to the internet when available, or work completely off-grid.

FLdigi: Real-Time & Robust Messaging

Concept: A suite of open-source software for sound card digital modes.

How it Works:

- Uses your computer's sound card as a modem.
- Connects your radio to your computer via an interface (e.g., SignaLink).
- Supports a wide variety of robust digital modes (e.g., MT63, Olivia, PSK31, MFSK).

Emergency Uses (NBEMS - Narrow Band Emergency Messaging System):

- **Keyboard-to-Keyboard:** Real-time text chat between operators.
- **FLmsg:** Companion program for composing and sending standardized **ICS forms** and plain text messages.
- **FLamp:** Used for reliable file transfers.
- **Broadcast Capability:** Can send messages to multiple stations simultaneously (simplex or via repeater).

Key Advantage: Highly versatile with many robust modes for varying propagation conditions. Excellent for direct, real-time communication between field operators and EOCs (Emergency Operations Centers) without relying on internet-connected gateways.

JS8Call: A Resilient Digital Tool for EMCOMM

What is JS8Call?

- Digital mode for HF/VHF/UHF, built on a robust FT8-like modulation (JS8).
- Designed for **keyboard-to-keyboard free-text messaging** and networking, unlike automated FT8.

Key EMCOMM Strengths:

- **Weak Signal Performance:** Decodes signals well below the noise floor, crucial for poor propagation, QRP, or damaged antennas.
- **Off-Grid Capable:** Does NOT rely on internet infrastructure for core operation.
- **Message Relay/Networking:** Built-in store-and-forward for message relay via other stations, forming ad-hoc networks.
- **Directed Messaging:** Send messages to specific callsigns or groups; query mailboxes remotely.
- **Low Resources:** Runs on basic computers (e.g., Raspberry Pi) with simple sound card interface.

EMCOMM Use Cases:

- Health & Welfare messages.
- Tactical communications between field operators.
- Damage assessment reports (concise text).
- Basic resource tracking via location beacons.
- Backup communications when other modes fail.

Considerations: Slower speed than voice or high-speed data; requires operator presence for active conversations.

Winlink vs. FLdigi vs. JS8Call for EMCOMM

Feature	Winlink	FLdigi (NBEMS)	JS8Call
Primary Function	Radio Email (Store & Forward)	Keyboard-to-Keyboard; File Transfer	Keyboard-to-Keyboard; Weak-Signal Messaging
Reliance on Internet	Can bridge to internet; also P2P radio-only	Primarily radio-only (P2P/Broadcast)	Primarily radio-only (Off-Grid)
Message Type	Standardized forms (ICS), email, attachments	Standardized forms (ICS), plain text, files	Free-text messages, limited auto-reports
Operation	Automatic linking to RMS gateways	Manual tuning & real-time operator presence	Semi-automated; conversational via frames
Weak Signal Performance	Good (with VARA/Pactor)	Good (with robust modes like MT63)	Excellent (designed for extreme weak signals)
Networking/Relay Capability	Yes (RMS gateways, P2P, Hybrid Mesh)	Limited (simplex/repeater broadcast)	Yes (Built-in store-and-forward relaying)
Key Strength for EMCOMM	Familiar email interface; robust forms; internet bridging	Reliable, direct text in noisy conditions; broadcast ability	Gets text through when almost nothing else will; ad-hoc networking

Conclusion: Enhancing Resiliency

Digital modes are essential tools for amateur radio's role in emergency communications.

Winlink provides a powerful radio email system for structured messages and internet bridging.

FLdigi (and NBEMS) offers robust, real-time messaging and file transfer for challenging conditions.

Proficiency in these modes significantly enhances an amateur radio operator's ability to serve their community during a crisis.

Get Involved: Join your local ARES/RACES group to learn more and practice!