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# Introduction to NBEMS

Narrow Band Emergency Messaging System

# What is NBEMS?

## Narrow Band Emergency Messaging System

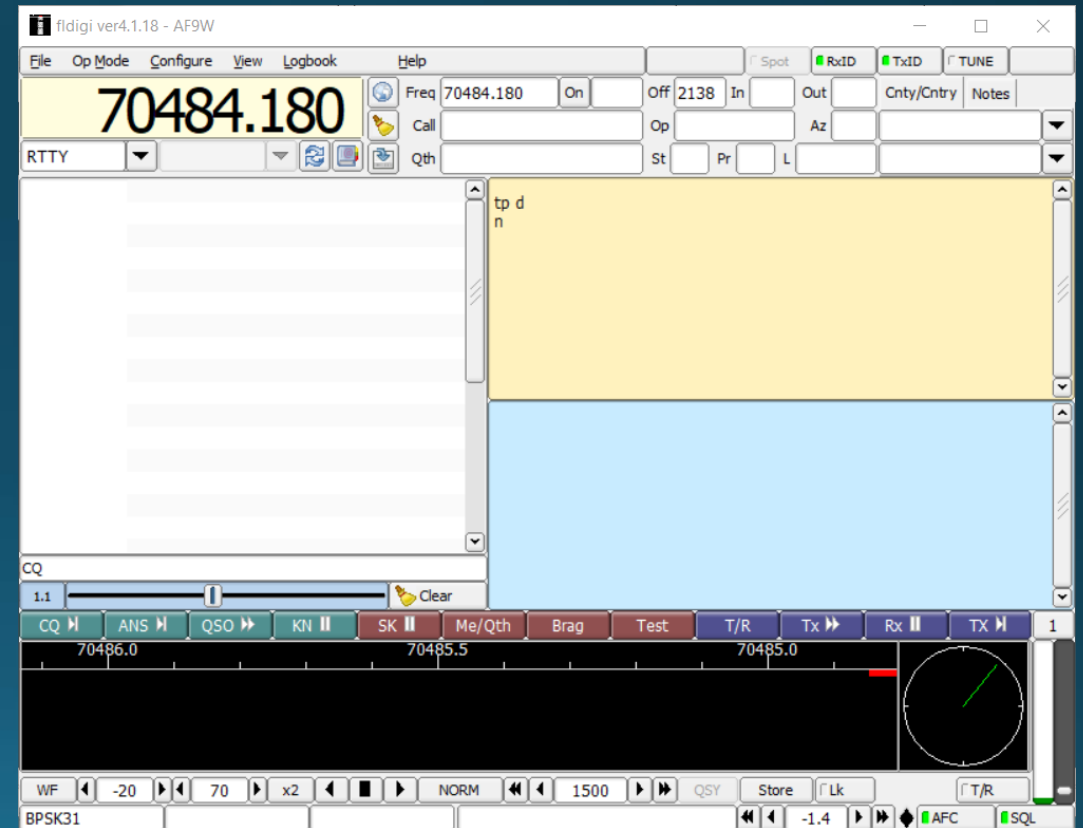
- A system for sending messages digitally over amateur radio
- Extension of fldigi – Fast Light Digital Interface
- Used by many groups for emergency communications
- Faster and more reliable than voice communication for data transfer over amateur radio in many cases

# Why digital instead of voice

- Information sent directly with no interpretation required
- Faster than voice communications
- Can allow communication at lower SNR
- Sending runner information as a spreadsheet vs reading and writing runner numbers and times

# fldigi – Fast Light Digital Interface

- Suite of digital programs
- Open Source
- Runs on virtually all OS's
- Well-supported



# Fast Light Digital Interface Suite

- Suite of digital programs
  - Open Source
  - Runs on virtually all OS's
  - Well-supported
  - Written by W1HKJ and team
  - Supports many digital modes
  - Many extensions written by third-parties
  - FREE!
- fldigi / flarq - modem / arq
  - flamp - Amateur Multicast Protocol - file transfer program
  - flwrap - file encapsulation / compression
  - flmsg - Forms manager
  - flrig - rig control program, cooperates with fldigi
  - flwkey - modem program for the K1EL Winkeyer series
  - fllog - can use same data file as fldigi
  - flnet - voice net controller database / check-in application

# fldigi Modes

- Contestia
- DominoEX
- FSQ
- Hellschreiber
- IKFP
- MFSK
- MT63
- OFDM
- Olivia
- PSK
- QPSK
- 8PSK
- PSKR
- RTTY
- THOR
- Throb
- WEFAX
- Navtex/SITOR

# NBEMS Modules

## **fldigi**

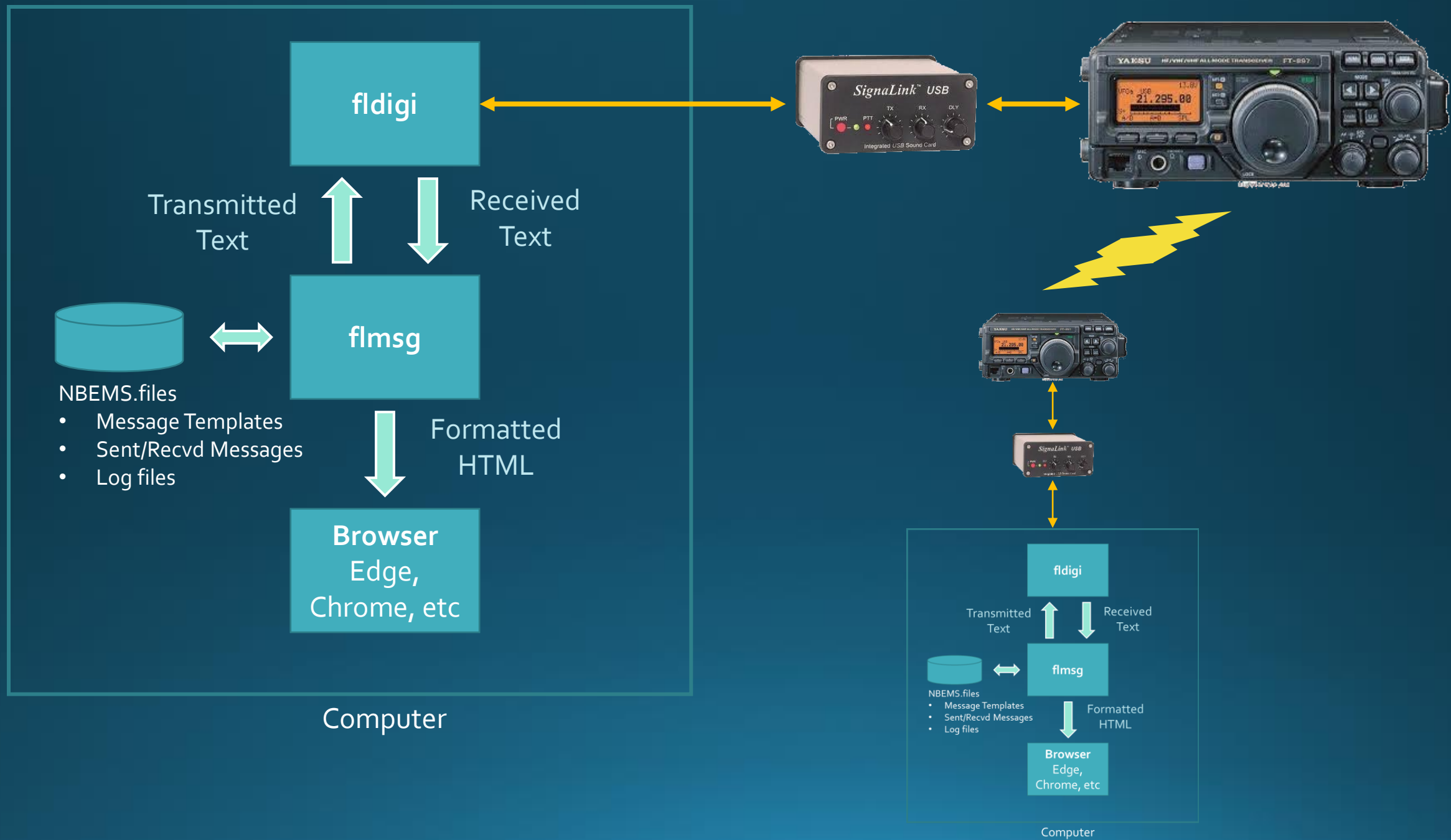
- Modem that translates ascii to digital audio tones
- Provides the transport of digital data between stations

## **flmsg**

- A simple forms management editor for emergency management
- Has built-in templates for common forms, i.e., ICS, Red Cross, Radiogram, etc.

## **flwrap**

An application that encapsulates a text file, an image file, or a binary file within a set of identifier blocks to insure delivery





# Message Encapsulation - Outgoing

FLMSG: 4.0.19

File Form Template Config AutoSend Utilities Help

ICS-213 report file: AF9W-20210807-153855L-4.213

Originator Responder

Inc: Island County RACES

To: KI7WND Pos: EOC

Fm: AF9W Pos: EC/RO

Sub: Testing flmsg

Message: Date: 2021-08-07 Time: 1537L

This is a test of the NBEMS System.

App'd: Bob Stephens AF9W Pos: EC/RO

☐ Comp OLIVIA-8/500 376 bytes / 2 m 11 s

ARQ Send NOT CONNECTED

```
... start
[WRAP:begin][WRAP:if][WRAP:fn AF9W-20210807-153855L-4.213]<flm
sg>4.0.19
:hdr_fm:20
AF9W 20210708223902
:hdr_ed:20
AF9W 20210708223902
<ics213>
:inc:19 Island County RACES
:to:6 KI7WND
:p1:3 EOC
:fm:4 AF9W
:p2:5 EC/RO
:d1:10 2021-08-07
:t1:5 1537L
:sb:13 Testing flmsg
:s1:17 Bob Stephens AF9W
:p3:5 EC/RO
:mg:35 This is a test of the NBEMS System.
[WRAP:checksum 84E6][WRAP:end]
... end
```

# Message Encapsulation - Incoming

```
... start
[WRAP:begin][WRAP:if][WRAP:fn AF9W-20210807-153855L-4.213]<flmsg>4.0.19
:hdr_fm:20
AF9W 20210708223902
:hdr_ed:20
AF9W 20210708223902
<ics213>
:inc:19 Island County RACES
:to:6 KI7WND
:p1:3 EOC
:fm:4 AF9W
:p2:5 EC/RO
:d1:10 2021-08-07
:t1:5 1537L
:sb:13 Testing flmsg
:s1:17 Bob Stephens AF9W
:p3:5 EC/RO
:mg:35 This is a test of the NBEMS System.
[WRAP:checksum 84E6][WRAP:end]
... end
```

AF9W-20210807-153855L-4

File | C:/Users/af9w/NBEMS.files/ICS/AF9W-20210807-153855L-4.html

### GENERAL MESSAGE (ICS-213)

1. Incident Name (optional): Island County RACES		
2. To (Name and Position): KI7WND	EOC	
3. From (Name and Position): AF9W	EC/RO	
4. Subject : Testing flmsg	5. Date : 2021-08-07	6. Time 1537L
7. Message : This is a test of the NBEMS System.		
8. Approved by: Name : Bob Stephens AF9W      Signature : _____      Position/Title : EC/RO		
9. Reply :		
10. Replied by: Name : _____      Position/Title : _____      Signature: _____ ICS-213      Date/Time :		

# Digital Modes for NBEMS

- Olivia
  - Primarily HF
  - 8-500 mode most common
  - Excellent copy with low SNR
- MT63
  - 1000L on HF
  - 2000L on FM
  - 2000L works with acoustic coupling
- All modes will work but some are better suited
  - DominEX – fast mode for good HF connections
  - OFDM – new mode being tested
  - PSK-250 Multiple Carriers – fast but only on good circuits

Mode	Symbol Rate	Typing Speed	Bandwidth
Olivia 8-250	31.25 baud	1.46 cps (14.6 wpm)	250 Hz
Olivia 8-500	62.5 baud	2.92 cps (29.2 wpm)	500 Hz
Olivia 16-500	31.25 baud	1.95 cps (19.5 wpm)	500 Hz
Olivia 32-1000	31.25 baud	2.44 cps (24.4 wpm)	1000 Hz

Olivia 8/500

Mode	Symbol Rate	Typing Speed	Bandwidth
MT63-500	5.0 baud	5.0 cps (50 wpm)	500 Hz
MT63-1000	10.0 baud	10.0 cps (100 wpm)	1000 Hz
MT63-2000	20 baud	20.0 cps (200 wpm)	2000 Hz

MT-6<sub>3</sub>

# flwrap

- Encapsulates large files into blocks
- Each block has 16 bit checksum
- Fldigi recognizes wrapping and recreates file at the RX end
- Blocks with incorrect checksum are retransmitted



# AndFlmsg Android Application

- Compose, send and receive flmsg forms from your Android phone
- Supports all PSK/PSKR modes, including multi-carrier modes, some of the 8PSK modes, THOR, MFSK, OLIVIA, MT-63 and Domino-Ex modes
- Can use audio coupling to send and receive with an HT
- Currently well supported and actively developed

# Demonstration



# NBEMS and Winlink

## NBEMS

- one to one or one to many transmission
  - Except for ARQ anyone hearing transmission can copy
  - can be used to broadcast messages
- No prior infrastructure required
- flmsg forms can be transmitted by any mode and recreated on RX end with flmsg
- requires TX and RX on same frequency
- runs on all OS including RPi
- chat can occur between messages

## Winlink

- email over radio
- one to one mode – connect required
- Winlink messages only transmitted over Winlink infrastructure
  - except for P2P connections
- TX and RX can occur on different frequencies at different times
  - except for P2P connections
- No chat capability

# NBEMS and Winlink

## NBEMS

- one to one or one to many
  - Except for AFS, all messages are transmitted over the network
  - can be used for voice and data
- No prior infrastructure required
- flmsg forms can be used for mode and recording flmsg
- requires TX and RX capability
- runs on all OS including RPi
- chat can occur between messages

Not mutually exclusive  
both have features  
important to EMCOMM

- no need to connect required
- messages only transmitted over the network structure
- P connections
- can occur on different times
- P connections
- NO chat capability

# NBEMS Possible Uses



## Broadcast messages

FEMA Region 10 monthly COMMEX exercise includes a broadcast of a message on 60M sent using BPSK<sub>31</sub> and MT6<sub>3-2</sub>KL  
EOC to local EMCOMM sites



## Passing data at events with VHF line of site or HF NVIS

All stations get same data

# Opportunities to Copy NBEMS Traffic

- VOA Radiogram
  - Weekly Shortwave Transmissions on HF
  - <https://voaradiogram.net/>
- East Coast NBEMS Nets
  - paNBEMS
  - NY NBEMS
  - NJ NBEMS
- Whatcom Emergency Communications Group
  - Sunday Net on VHF Simplex
- OrcaNet
  - Tuesdays @ 1930 Pacific Time
  - 3.581Mhz 1500Hz Center Frequency
  - MFSK<sub>32</sub>
- Western Digital Net
  - Thursday @ 1930 Pacific
  - 3.581Mhz 1500Hz Center Frequency
  - MFSK<sub>32</sub>

# Want to Try It?

- [NBEMS-FLDIGI Training Series – YouTube](#)
- Works well on VHF/UHF Simplex FM with MT63 modes
- VHF/UHF SSB works as well as HF with good signals
- Even works through repeater

Questions?

