

Bob Stephens AF9W
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Introduction to NBEMS

Narrow Band Emergency Messaging System

What is NBEMS?

Narrow Band Emergency Messaging System

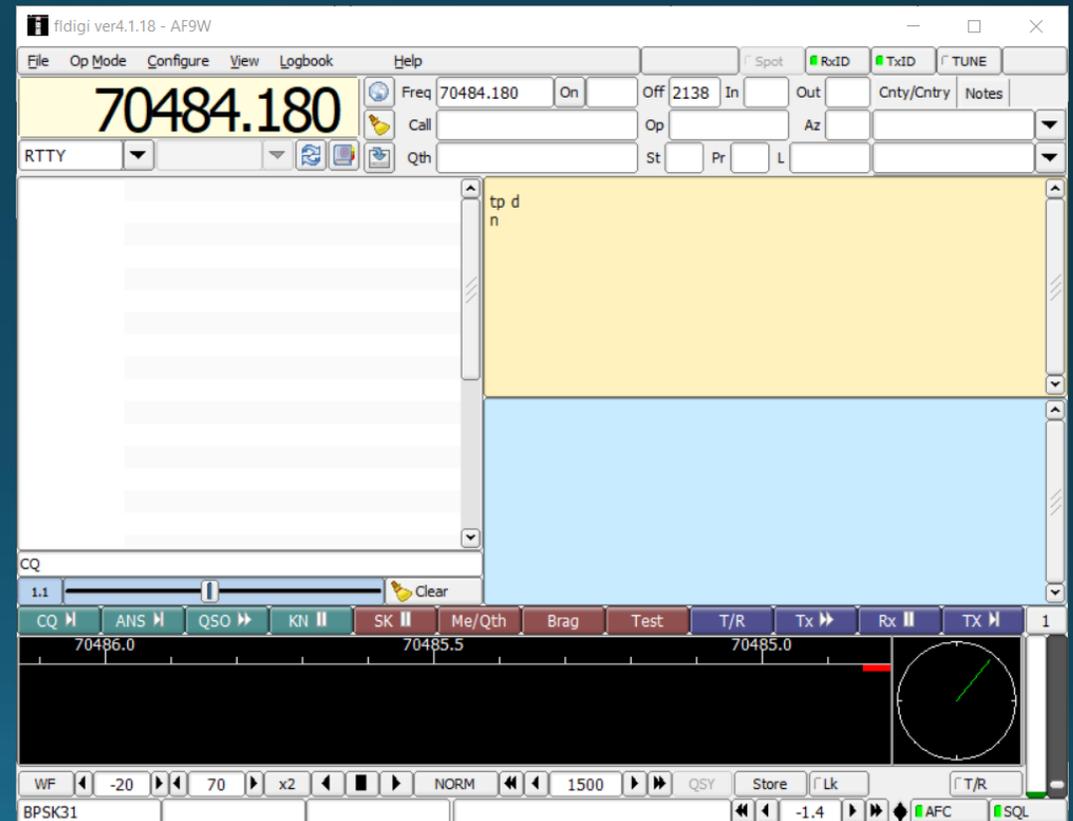
- A system for sending messages digitally over amateur radio
- Extension of fldigi – Fast Light Digital Interface
- Used by many groups for emergency communications
- Faster and more reliable than voice communication for data transfer over amateur radio in many cases

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

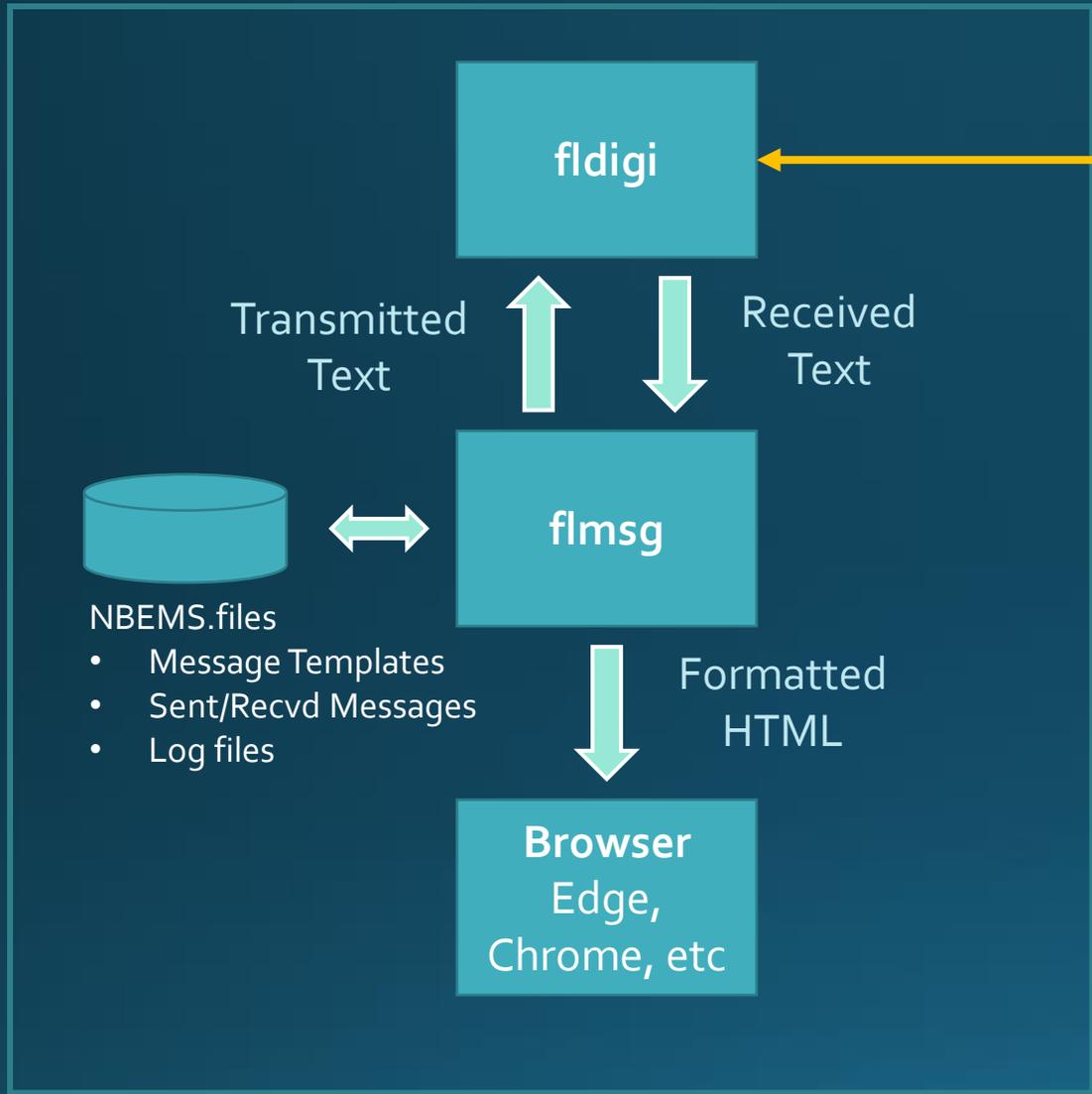
- Modem that translates ascii to digital audio tones
- Provides the transport of digital data between stations

flmsg

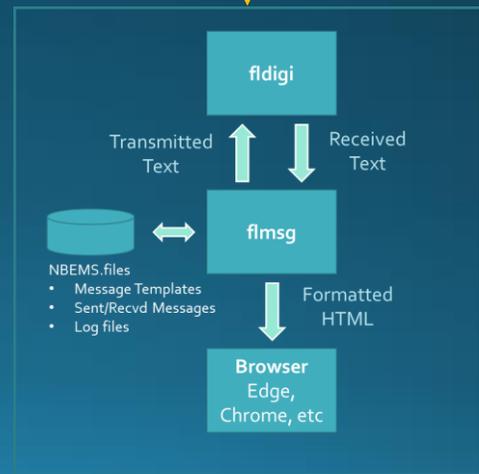
- A simple forms management editor for emergency management
- Has built-in templates for common forms, i.e., ICS, Red Cross, Radiogram, etc.

flwrap

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



Computer



Computer

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:beg][WRAP:lf][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:chksum 84E6][WRAP:end]
... end
```

Message Encapsulation - Incoming

```
... start
[WRAP:begin][WRAP:if][WRAP:fn AF9W-20210807-153855L-4.213]<fmsg
g>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 fmsg
: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 fmsg	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-63

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



AndFmsg 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 A... transmission
 - can be used
- No prior infras...
- flmsg forms ca... mode and recr... flmsg
- requires TX an...
- runs on all OS including RPi
- chat can occur between messages

Not mutually exclusive
both have features
important to EMCOMM

- ...
- ... de – connect required
- ... ges only transmitted over structure
- ... P connections
- ... occur on different 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 BPSK₃₁ and MT6₃₋₂KL
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
 - MFSK₃₂
- Western Digital Net
 - Thursday @ 1930 Pacific
 - 3.581Mhz 1500Hz Center Frequency
 - MFSK₃₂

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?

