CQ CHATTER

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WOOD COUNTY AMATEUR RADIO CLUB

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http://wcarc.bgsu.edu

How's Propagation?

from NCDXF home page

Want to take the pulse of current HF propagation conditions? Here is an easy way to do it. The NCDXF (Northern CA DX Foundation), in cooperation with the IARU, constructed and operates a worldwide network of high-frequency radio beacons on 14.100, 18.110, 21.150, 24.930, and 28.200 MHz. These beacons help both amateur and commercial high-frequency radio users assess the current condition of the ionosphere. The entire system is designed, built and operated by volunteers at no cost except for the actual price of hardware components, shipping costs, and so on.

The first beacon began transmissions from Northern California in 1979 and was so successful that the IARU proposed a world wide network of beacons operating 24 hours a day. Over the next few years the network was expanded slowly. The current system of 18 beacons began operation in 1995 and has been in continuous operation ever since.

The transmitter used has been the Kenwood TS-50s for the past 20 years. The controller was designed by hams and is described in detail on the Beacon Controller page. In 2015, a new controller design was implemented for use with new Icom IC-7200 radios. The new controller and radios will gradually replace the old equipment over the coming months.

Stan Hunting, KW7KW, wrote, "there are at least two possible explanations for an apparently dead band: 1) propagation is poor, or 2) no one is transmitting. The NCDXF/IARU International Beacon Network addresses the second of these possibilities by insuring that reliable signals are always on the air, around the clock, from fixed locations worldwide." With three minutes of listening for the beacons, one can find out either if a particular band is open or which band has the best propagation to a particular part of the world.

In principle, one can simply listen on the beacon frequencies and copy the CW callsigns of the various beacons to figure out where the band is open, but in practice, not every ham operator can

continued---on p. 11

Net Check Ins

Jul 4 Traffic: 0

KD8NJW (NCS)
N8VNT
KD8VWU
KC8EKT
KD8RNO
WB8NQW
KG8FH
WD8JWJ
KE8CVA
WD8ICP (10)

Jul 11 Traffic: 0

NM8W (NCS)
K8BBK
KD8RNO
WD8LEI
KG8FH
WB8NQW
KD8NJW
KC8EKT
KE8CVA
KA8VNG
KD8VWU
KC8NKC
WD8ICP
WD8JWJ (14)

Brain Teasers

1. What is meant by *compandoring*?

a.) compressing speech at the transmitter and expanding it at the receiver

b.) using an audio frequency signal to produce pulse length modulation

c.) combining AM and FM to produce SSB

d.) detecting and demodulating a SSB signal by converting it to a pulse modulated signal

2. What is an L-network?

a.) a network consisting entirely of four inductors

b.) a network consisting of an inductor and a capacitor

c.) a network used to generate a leading phase angle

d.) a network used to generate a lagging phase angle

3. For SSB phone emissions, what would be the bandwidth of a good crystal lattice band-pass filter?

a.) 6 kHz at -6 dB

b.) 2.1 kHz at -6 dB

c.) 500 Hz at -6 dB

d.) 15 kHz at -6 dB

August Contests

The contest lineup for the month of August is given below. Please note that the WARC bands (60, 30, 17 and 12 m) are never open to contesting.

Aug 5-6	*1800 to 0559 Z*	160 m to10 m
North American QSO Party		**CW**
Aug 12-13	*0000 to 2359 Z*	80 m to 10 m
WAE(urope) DX 'test		**CW**
Aug 12-13	*1600 to 2359 Z*	160 m to 10 m
Maryland-DC QSO Party		**all modes**
Aug 19-20	*10800 to 0800 Z*	160 m to 10 m
Russian District Award 'test		**CW Phone**
Aug 19-20	*1800 to 0559 Z*	160 m to 10 m
North American QSO Party		**SSB**
Aug 20	*1800 to 2359 Z*	80 m to 6 m
ARRL Rookie Roundup		**RTTY**
Aug 21	*1400 to 2200 Z*	80 m to 10 m
Solar Eclipse QSO Party		**all modes**
Aug 26-28	*0400 to 0400 Z*	160 m to 10 m
Hawaii QSO Party		**all modes**
Aug 26-27	*1200 to 0300 Z*	160 m to 6 m
W/VE Islands QSO Party		**SSB**
Aug 26-27	*1200 to 1200 Z*	80 m to 10 m
Romania (YO) DX 'test		**CW Phone**
Aug 26-27	*1400 to 2000 Z*	80 m to 6 m
Kansas QSO Party		**all modes**
Aug 26-27	*1600 to 0400 Z*	80 m to 10 m
Ohio QSO Party		**all modes**

Digital Communications in Amateur Radio V

by Jeff Kopcak, K8JTK

Jeff is a long-time member of WCARC, dating back to his days at BGSU. He has always had an interest in computers and computing, and is currently employed as an IT specialist in Cleveland. Jeff also serves as the webmaster of the WCARC web page (see masthead for URL). Jeff also serves the ARRL Ohio Section as Section Technical Coordinator---ed.

Have you ever been involved with an EmComm/ARES drill and heard digital tones as forms were being passed over a repeater? You may have wondered what application are they using, what mode, or how do they know what form is being sent? Chances are they utilized an established standard called NBEMS. The *Narrow-Band Emergency Messaging System* was created to pass text-based messages and forms used by hams and other served agencies over Amateur Radio. Technicians, listen up! NBEMS includes standard modes for HF SSB and is very popular on VHF/UHF FM.

NBEMS was established in collaboration between David Freese, Jr. – W1HKJ who created and maintains the Fldigi suite of applications and Skip Teller – KH6TY who created DigiPan, a popular PSK application. The philosophy specifies utilizing radios, software, and hardware readily available and widely used in ham radio. Older equipment and older computers can be used, meaning it would be relatively inexpensive. There would be no steep learning curve but flexibility in an emergency situation. Finally, it must be independent of infrastructure. No need for Internet, nodes, or existing communications systems. Power on the computer, radio, interface, and you're off-and-running. Interfaces between the computer and radio used for other digital modes work best. In accordance with the flexible and inexpensive philosophy, another option is available: no interface at all. That's right, you don't need any interface between a computer and radio in order to communicate. To receive data, the radio speaker is held to the computer microphone. To transmit, the radio microphone is held to the computer speaker. This method is called an "acoustic interface." It's a game saver in a pinch, doesn't require any additional hardware, and allows anyone with a radio and PC to participate. The digital protocols used are robust enough to deal with ambient noise, casual conversations, too much audio, too little audio, and still be able to decode 100%.

Though operating without an interface sounds like the best of all possible options, there are serious drawbacks. Transmitting (PTT) is done manually. Longer messages mean the operator has to hold PTT in longer. If their finger accidentally slips off the button, the message needs to be retransmitted. The operator needs to be more attentive to the station where it's possible they may become distracted and miss messages. In a conference or war room, transmitting and receiving messages acoustically adds a layer of disruption to the setting. A connected

continued---on p. 6

WCARC Weekly Net

Tuesdays at 2100 all year

147.18 MHz 67 Hz PL

Net Control Roster

Aug 8	*KD8VWU*
Aug 15	*KD8NJW*
Aug 22	*NM8W*
Aug 29	*K8OVO*
Sep 5	*WB8NQW*
Sep 12	*N1RB*
Sep 19	*KD8VWU*

NEXT MEETING

Business Meeting

Monday, Aug. 14th

TIME:

7:30pm/7:00EB

PLACE:

Sheriff's Training Rm

E. Gypsy Lane

& S. Dunbridge Rd.

August Hamfests

Aug 12 Land of Lakes ARC. Annual Hamfest. Gateway Church, Angola, IN.
web: http://llarc.org

Sep 10 Findlay RC. Annual Hamfest. Hancock County Fairgrounds, Findlay, OH.
web: http://www.findlayradioclub.org

DON'T FORGET!

10 meter Net meets

Sunday@ 2030

on 28.335 MHz

Fusion (C4FM) Net

meets Thursday

@1930

on 442.125+

Net Check Ins

Jul 18 Traffic: 0

N1RB (NCS)
K8JU
KD8NJW
W8PSK
KG8FH
KA8VNG
WD8JWJ
KD8RNO
WD8LEI
WB8NQW
KE8CVA
KB8QEW
KD8VWU
NM8W
KC8NKC
KE8CUZ (16)

Jul 25 Traffic: 0

WB8NQW (NCS)
WD8LEI
KD8RNO
KA8VNG
KD8NJW
W8PSK
KE8CVA
KG8FH
N1RB
NM8W
KD8VWU
WD8JWJ
K8JU
KC8NKC (14)

Brain Teaser answers: (E) 1-a, 2-b, 3-b

digital---from p. 4

interface would handle the keying, always providing audio to the computer for decoding messages – even while away from the station, and would not generate any additional noise, effectively allowing the station to be completely quiet. As a whole, digital modes are not designed to work through an acoustic interface because most are sensitive to noise. Noise introduces errors, making all or part of the transmission unrecoverable. An acoustic interface is a good way to practice or start, though the efficiency of a connected interface is soon realized.

NBEMS utilizes two different modes: VHF/UHF uses MT63-2000L, HF uses Olivia 8/500. Both were developed by Pawel – SP9VRC. It is surmised that 25% of the characters in an MT63 transmission can be lost and the receiving station will still have a perfect copy. This is achieved by encoding characters over the time and frequency domains for robustness. In addition, the "L" versions have additional (long) interleaves providing even more error correction. MT63 is very forgiving of poor audio levels and tuning errors, making it a great choice for EmComm. The suffix indicates bandwidth used, 2000/2K means 2 KHz. Transfer rate is about 1 KB/minute.

Olivia 8/500 is used on HF because signals can be decoded below the noise. Low power and QRP stations can communicate nearly as effectively as a higher power station. A channelized approach is used because signals below the noise can be decoded but not heard or seen on the waterfall. The 8/500 indicates 8 tones utilizing 500 Hz of bandwidth. The Fldigi suite reverses these designation as, 500-8. Transfer rate is about 170 bytes/minute.

A common question brings up the issue of popularity. PSK31 and JT65 are two popular modes on HF. Neither is used in NBEMS because there is no error correction for weak or fading signals in PSK. A faster, multi-carrier PSK-R (for Robust) mode is occasionally used in NBEMS but I have not seen many groups use it as an established standard. JT65 is limited to 48 second timed transmissions of 13

continued---on p.7

digital---from p.6

characters, which is not efficient for data transfer.

Two applications are synonymous with NBEMS: Fldigi and Flmsg. In the last article, I talked about Fldigi being one of the more popular multimode applications. Flmsg is another application in the Fldigi suite that manages forms. It can be used to send standardized agency forms like ICS, Red Cross, or MARS. Forms developed by local agencies can be coded as a "custom form." Plain text (.txt) and comma-separated (.csv) files can be transferred. Sticking to the inexpensive and flexible philosophy, the entire Fldigi suite of applications are free, open source, and cross platform available on Windows, Mac, and Linux, including Raspberry Pi. Custom forms are a popular use of Flmsg. However, these forms need to be disseminated or available online ahead of time.

Other applications like DM780 and MultiPSK can send and receive both MT63 and Olivia. These don't have provisions for managing forms or validating transmissions. Fldigi and Flmsg are integrated seamlessly to pass data between the form manager and modem application.

A very important behind-the-scenes, but not often discussed feature in NBEMS is the checksum. In computing, a checksum is used to detect errors in transmission or in storage. Flmsg automatically generates and includes a checksum as part of the message with each transmission. Receiving stations calculate a checksum value based on the data received and compare it against the value included in the message. This is an ease-of-use feature letting receiving stations know if they received a perfect copy of the message. If the checksum matches, Flmsg will open, displaying the form or message. If the checksum fails, this means an error was introduced in transmission. As a result, the message will not open or a "Checksum failed" prompt will be seen.

Example message:

... start
[WRAP:beg][WRAP:lf][WRAP:fn K8JTK_Digital_Communications_in_Amateur_Radio-_NBEMS.p2s]<flmsg>4.0.2
:hdr_fm:21
K8JTK 20171807024326
:hdr_ed:21
K8JTK 20171807024320
<plaintext>
:tt:46 Digital Communications in Amateur Radio: NBEMS
:to:6 Reader
:fm:5 K8JTK
:dt:10 2017-07-17
:tm:5 2233L
:sb:12 Demo message
:mg:44 This is an example message in an NBEMS form.
[WRAP:chksum 2CBF][WRAP:end]
... end

A checksum value is included in the "WRAP" tags and is 2CBF for this message. Upon receipt of this message, Fldigi automatically calculates a checksum for verification. If it arrives at the value of 2CBF, the message was received perfectly.

There are limitations of NBEMS that users and served agencies need to be aware of. To meet FCC requirements, all data must be transmitted within 3 minutes on a repeater with a standard

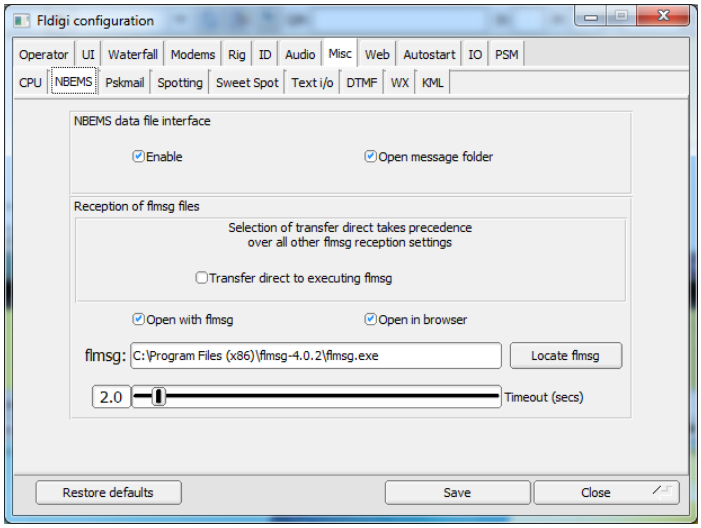
continued---on p.8

digital---from p.7

time-out-timer or 10 minutes on simplex. This means a maximum file size for MT63-2KL on a repeater is 3,000 bytes and 1,700 bytes for Olivia 8/500 on simplex. These properties severely limit the content that can be transferred to text. Word documents need to be converted to TXT and Excel spreadsheets to CSV files in order to save bandwidth. There are not many useful images, Word documents, Excel spreadsheets, and executable programs under 3K. This makes high-resolution images and large data transfers impractical using NBEMS. Remember, it is a **Narrow-Band** Emergency Messaging System.

Reminder: review the first two articles in the series for information that will be omitted here, including that some modes operate your transceiver at 100% duty cycle, use upper sideband (USB), and using too much audio will overdrive the transmitter and the signal will be wider than intended. Operating data mode over FM is the same as operating voice and does not change the duty cycle of the radio. However, operating FM at high power for prolonged periods of time is considered extreme for most radios and will likely shorten the life of the transceiver. In addition, review the fourth article on "Conversational Modes" where Fldigi was covered.

With Fldigi setup and working, download and install Flmsg from http://www.w1hkj.com/.To prepare Fldigi for VHF/UHF NBEMS, click **Op Mode**, select **MT63**, and click **MT63-2000L**. MT63-2000L is also abbreviated as MT63-2KL in other places within the Fldigi suite. With MT63-2KL selected as the active mode, center the receive window on the waterfall at **1500**. 1500 Hz is the standard center frequency. For HF NBEMS, replace MT63-2000L references with Olivia 8-500. Fldigi passes data to Flmsg for decoding and displaying. Fldigi needs to know where to find the Flmsg installation. In Fldigi, click **Configure**, select **Miscellaneous**, then click **Misc** to enter the Miscellaneous program options. Finally, click the **NBEMS** tab.



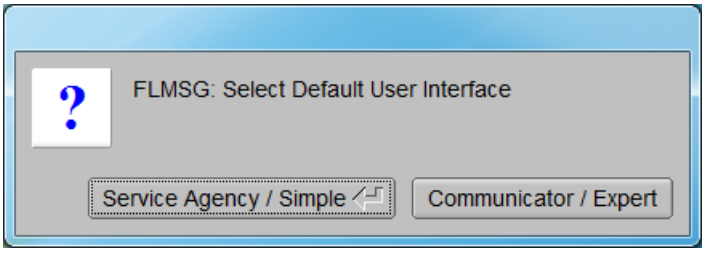
In newer versions of Fldigi (later than 3.23.0), uncheck the **Transfer direct to executing flmsg**. **Open with flmsg** and **Open in browser** should be checked if they are not already. Now click **Locate flmsg**. Depending on the version of Windows, the default installation location for Flmsg will be **C:\Program Files (x86)\flmsg-x.x.x** or **C:\Program Files\flmsg-x.x.x**. In that directory, select the **flmsg** application, click **Open**. Click **Save**, then **Close**. "x86" is a Windows designation to differentiate 32

continued---on p.9

digital---from p.8

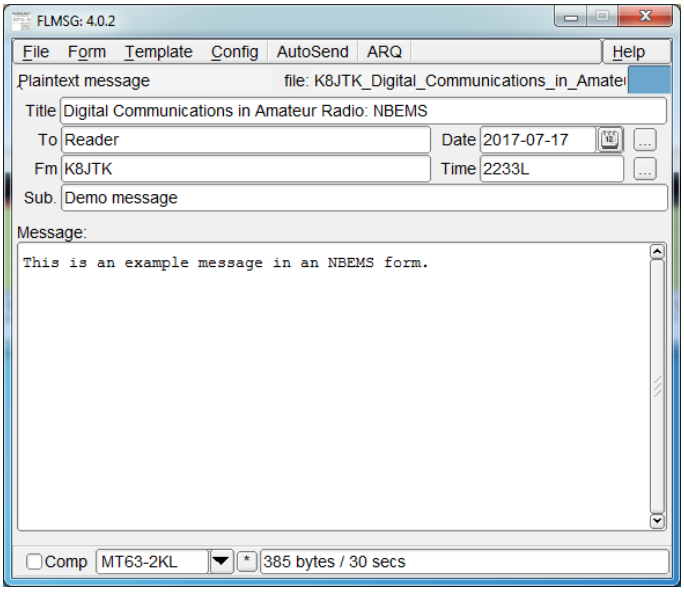
bit from 64 bit applications on a Windows 64 bit installation. "x.x.x" is the version of Flmsg. Each time a new version of Fldigi, Flmsg, or any other Fldigi application is installed, it is kept in a separate directory with the version appended. A lot of versions can accumulate on a system if frequently updated. Anytime uninstalling or using a new version of Flmsg, the steps above for "locating flmsg" need to be repeated.

***Start Flmsg*:** A dialog prompting for the selection of a "Default User Interface" will be seen on a new installation, click **Communicator/Expert**.



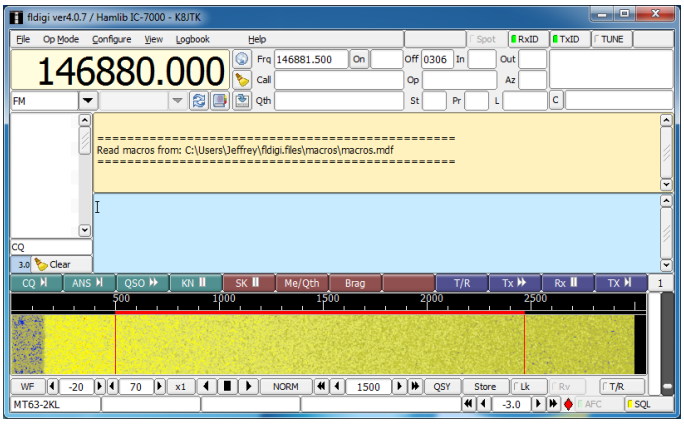
Station information will be requested. These are used as inputs for some forms. Call sign should be filled in as a minimum. Click the red "**X**" when done filling in station information. At the bottom of the main Flmsg window is the mode selector. Click the **down arrow** and select **MT63-2KL**. Configuration is done! To use Flmsg, a blank Radiogram will open initially.

To select a different form, click **Form**. Different types of available forms are categorized: ICS, MARS, Radiogram, Red Cross, weather, and custom forms loaded will be available from this menu. Choose any form for practice. Standard practice is to note somewhere in the form that this is a "test," "practice," or "drill."



As with voice, someone may mistake the transmission for a real message.

Once the form is filled out, **set your radio** to the appropriate frequency and **open Fldigi** if it is not already. Set it to **MT63-2KL** centered at **1500**. Verify the mode selected **in Flmsg is MT63-2KL**. Click **AutoSend**.



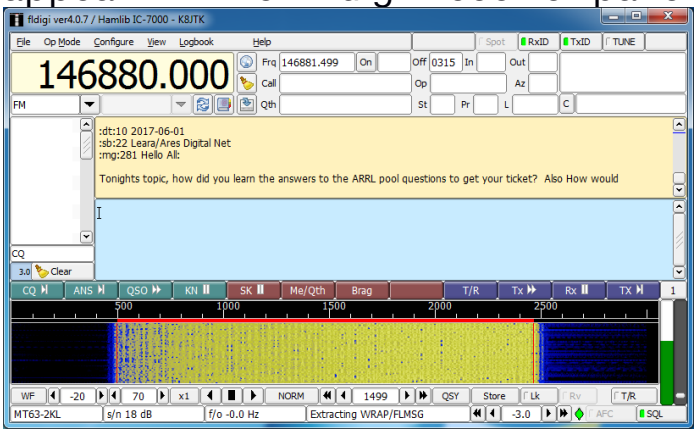
The file must be saved before it will transmit. Once the file is saved, transmission will begin automatically. Get into this habit of checking transmit frequency, Fldigi configuration and Flmsg configuration before clicking AutoSend. Otherwise you will

continued---on p.10

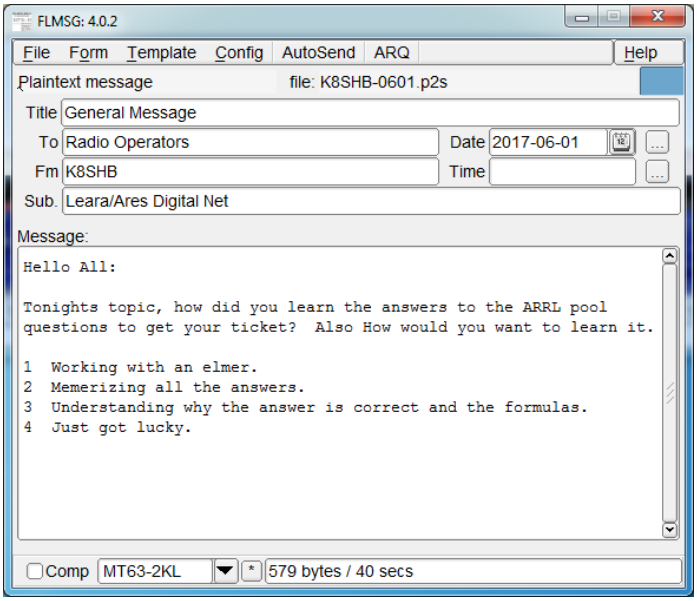
digital---from p.9

inadvertently transmit on a different frequency or in a different mode. It happens to everyone eventually.

Receiving stations only need to open Fldigi. They will first see the message appear in the Fldigi receive pane.

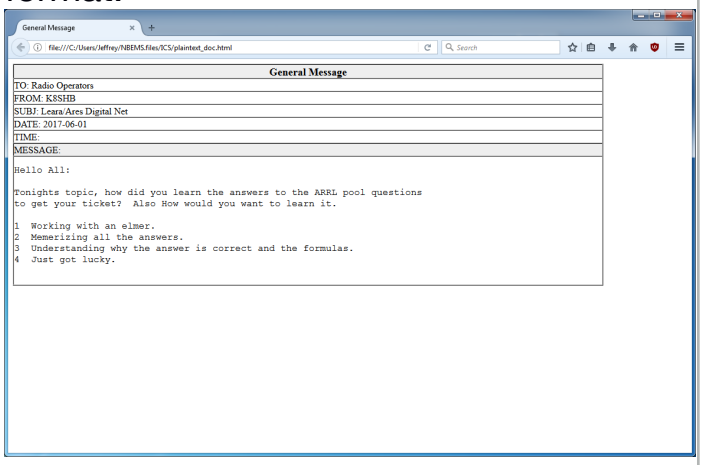


The form type is transmitted as part of the message. In the example message, <plaintext>.



The lines begin with the form field name and check of the number of characters in that field. ":fm:5 K8JTK" is the "**from**" field with a check of 5 characters, "**K8JTK**". When completed, an Flmsg window will open.

The form will also be rendered in the default web browser. Receiving stations don't have to do a thing except wait for the transmission to complete. If the next message received is a Radiogram, Flmsg will automatically open a window and browser page displaying the Radiogram format.



That's it for using NBEMS! I have a more detailed setup and walk-through of installing and configuring Fldigi and Flmsg. My instructions include another Fldigi suite application called Flwrap. Flwrap allows files of any type to be transferred. It sounded, at one point, like it was going to be part of the standard set of NBEMS applications but never made it due to the file size constraints. Additionally, Flmsg performs similar functionality to Flwrap in its ability to send TXT & CSV files. The Flwrap parts can be skipped unless they are found useful.

Typically, you'll need to setup a sked or hold a net to pass messages around. Operators don't sit around watering holes sending Flmsg messages, though I have seen it! Use news on QRZ.com or ARRL Ohio Section updates as text to fill out the forms as practice. Participating

continued---on p.11

digital---from p.10

in a couple of different nets, there seem to be fewer problems when everyone is using the same versions of the applications.

An Android smart phone app is available at the same site as Fldigi called AndFlmsg. There is a INSTALL.txt file with install instructions. The app is not available through any of the Android app stores and must be installed by temporarily enabling the option to allow applications from "Unknown sources." A user guide is available in the same directory as the download. This will be helpful as the interface is not entirely intuitive.

The Ohio Digital Emergency Net (OHDEN) is a weekly HF practice net that uses the Olivia standard. Checkins and coordination is accomplished using the text input box in Fldigi. There is no voice coordination. Formal messages don't happen every week but are passed using Flmsg. OHDEN meets Tuesdays at 7:45 PM eastern on 3.585 USB using Olivia 8-500 centered on 1000 Hz.

To find out more information:

NBEMS mission statement, considerations, and features: http://uspacket.org/network/index.php?topic=44.0

ARRL NBEMS: http://www.arrl.org/nbems

K8JTK Getting started with Fldigi–including Flmsg and Flwrap: http://www.k8jtk.org/2015/04/16/getting-started-with-fldigi-including-flmsg-and-flwrap/

K8JTK VHF/UHF NBEMS – An Introduction using Fldigi and Flwrap: http://www.k8jtk.org/2015/11/10/vhfuhf-nbems-an-introduction-using-fldigi-and-flmsg-presentations/

Ohio Digital Emergency Net: http://www.ohden.org/ ■

propagation---from p.1

copy calls at twenty-two words per minute and some beacons may be heard at too low a signal strength to catch the call. Because the beacons transmit at known times, it is easy to know which beacon one is hearing without actually copying the CW callsign. Since the beacons are running one hundred watts to a vertical, even a weak beacon signal may indicate a path with excellent propagation for stations using higher power and directive antennas.

In order to know which beacon is transmitting at any particular time, one can either refer to the Beacon Transmission Schedule, which shows the currently transmitting beacons by frequency, or use your computer and one of the Programs to Help Beacon Listeners. If you want to know where to point your antenna or decide which beacons are the most interesting to you, you can refer to the Beacon Locations. If you have a computer and a computer-compatible radio and would like a record of when various beacons can be heard at your QTH, you will want to learn about Automated Beacon Monitoring using the FAROS program or Skimmer which posts information to the Reverse Beacon Network.

Along with the JT-modes (JT9 and JT65) and WSPR the NCDXF Beacon network is a great help to DX'ers who might want to know if a band is open to a particular area. ■

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