

Advanced NBEMS



ARRL Western Pennsylvania Section

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Advanced NBEMS features

- Flmsg – ICS and ARRL Radiogram forms
- Can have incoming messages opened automatically
- Data compression with Flmsg
- Advanced file transfer with flarq
- RSID for auto mode change of unattended system
- New “High Speed” Modes
- Flamp – Amateur Multicast Protocol

Flmsg – send ICS-213 and ARRL Radiogram

- Flmsg is a powerful tool in NBEMS
- Can send ICS, ARRL Radiogram, Red Cross and Hospital forms
- ICS forms include (not complete list):
 - ICS-203 Organization Assignment List
 - ICS-205 Incident Radio Communications Plan
 - ICS-206 Medical Plan
 - ICS-213 General Message (most common)
 - ICS-214 Unit Log
 - ICS-216 Radio Requirements Worksheet
- Can send and receive files very easily with 100% verification

Flmsg ICS-213 screen

The screenshot shows the FLMSG: 1.1.29 application window. The title bar reads "FLMSG: 1.1.29". The menu bar includes "File", "Form", "Template", "Config", "AutoSend", and "Help". The main window contains the following fields and controls:

- File name: "ICS-213 report" (with "file: default.213" to its right)
- Originator: "Originator" (selected) and "Responder" tabs
- To: "Larry Keller AB3ER" (with "Pos. WPA SEC" to its right)
- Fm: "Harry Bloomberg W3YJ" (with "Pos. Assistant SEC" to its right)
- Sub: "Activation Required?"
- Date: "2012-11-22" (with a calendar icon and "Time 2220Z" to its right)
- Message: A text area containing "What is the WPA Sectionwide situation? Do we need to activate?"
- Sig: "Harry Bloomberg W3YJ" (with "Pos. Assistant SEC" to its right)
- Bottom bar: Comp, "base64" dropdown, "MT63-2K" dropdown, "*", and "422 bytes / 21 secs" display.

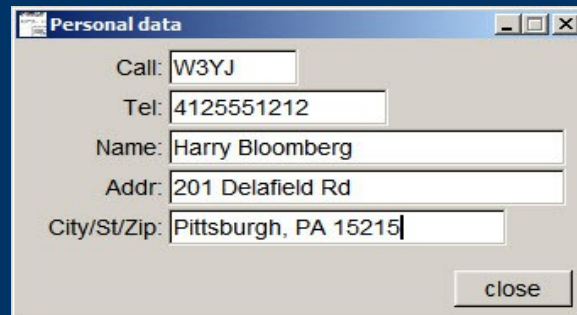
Flmsg ARRL Radiogram screen

The screenshot shows the FLMSG: 1.1.29 application window. The title bar reads "FLMSG: 1.1.29". The menu bar includes "File", "Form", "Template", "Config", "AutoSend", and "Help". The main interface is divided into several sections:

- Header:** "JARU radiogram" and "file: default.i2s".
- Fields:** "NR" (empty), "PREC" (dropdown menu showing "ROUTINE"), "STN OF ORIG" (empty), and "PLACE OF ORIG" (empty).
- Time/Date:** "FILED TIME" (empty), "FILED DATE" (empty), and "CHECK" (checkbox) with a "ck" button.
- TO/FROM:** Two large empty text boxes for "TO" and "FROM".
- MESSAGE:** A large empty text area for the message content.
- Received/Sent:** Fields for "RECEIVED FROM", "DATE", and "TIME" (both empty), and "SENT TO", "DATE", and "TIME" (all empty).
- Footer:** A status bar showing "Comp" (checkbox), "base64" (dropdown), "MT63-2K" (dropdown), a "*" button, and "163 bytes / 8 secs".

Flmsg - configuration

- Click on Config menu.



Personal data

Call: W3YJ

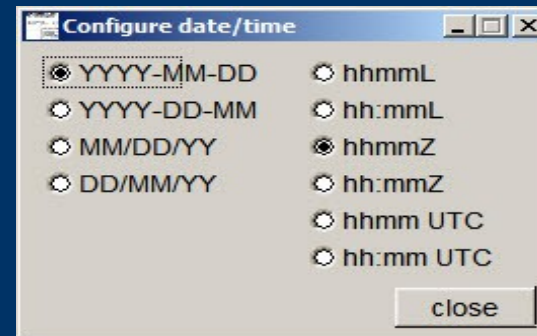
Tel: 4125551212

Name: Harry Bloomberg

Addr: 201 Delafield Rd

City/St/Zip: Pittsburgh, PA 15215

close



Configure date/time

YYYY-MM-DD hhmmL

YYYY-DD-MM hh:mmL

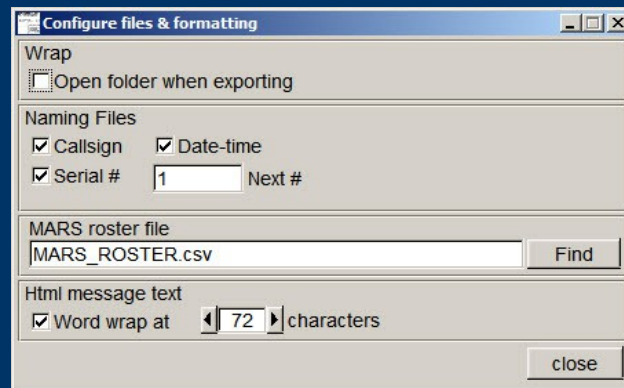
MM/DD/YY hhmmZ

DD/MM/YY hh:mmZ

hhmm UTC

hh:mm UTC

close



Configure files & formatting

Wrap

Open folder when exporting

Naming Files

Callsign Date-time

Serial # 1 Next #

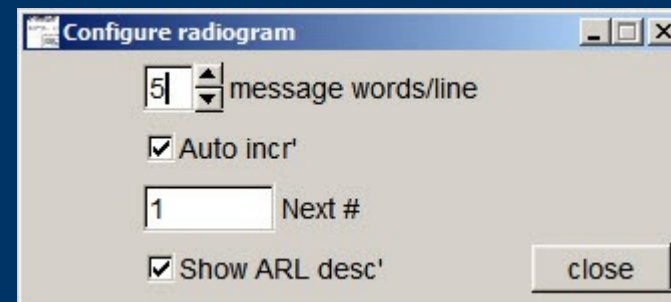
MARS roster file

MARS_ROSTER.csv Find

Html message text

Word wrap at 72 characters

close



Configure radiogram

5 message words/line

Auto incr'

1 Next #

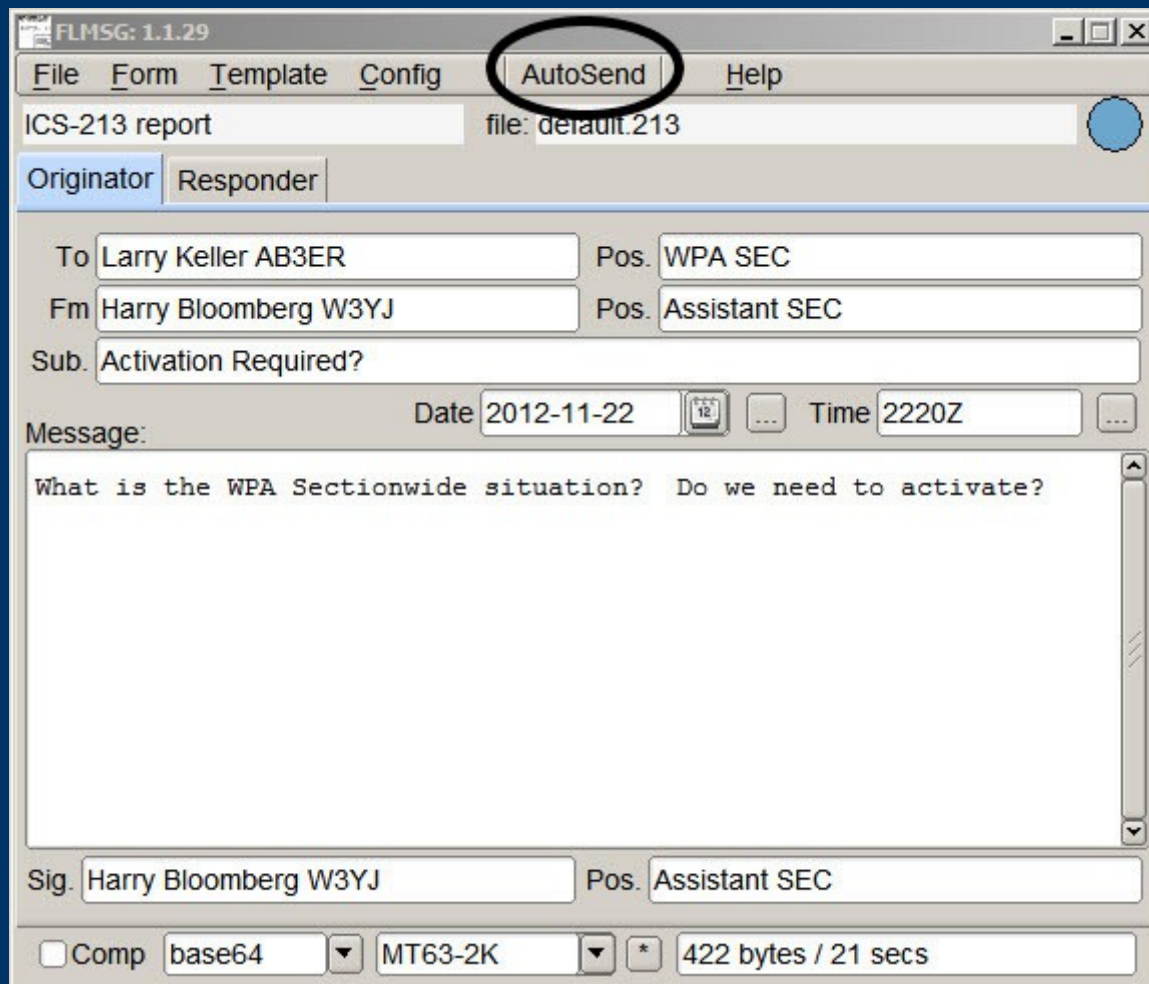
Show ARL desc'

close

Auto sending ICS-213

- Start Flmsg and Fldigi
- Form->ICS->ICS-213 menu in Flmsg
- Fill out ICS-213 form in Flmsg
- In Flmsg:
 - Push AutoSend menu at the top
- Will be asked to save file
- Message is automatically wrapped and transmitted!
- It's really that simple!

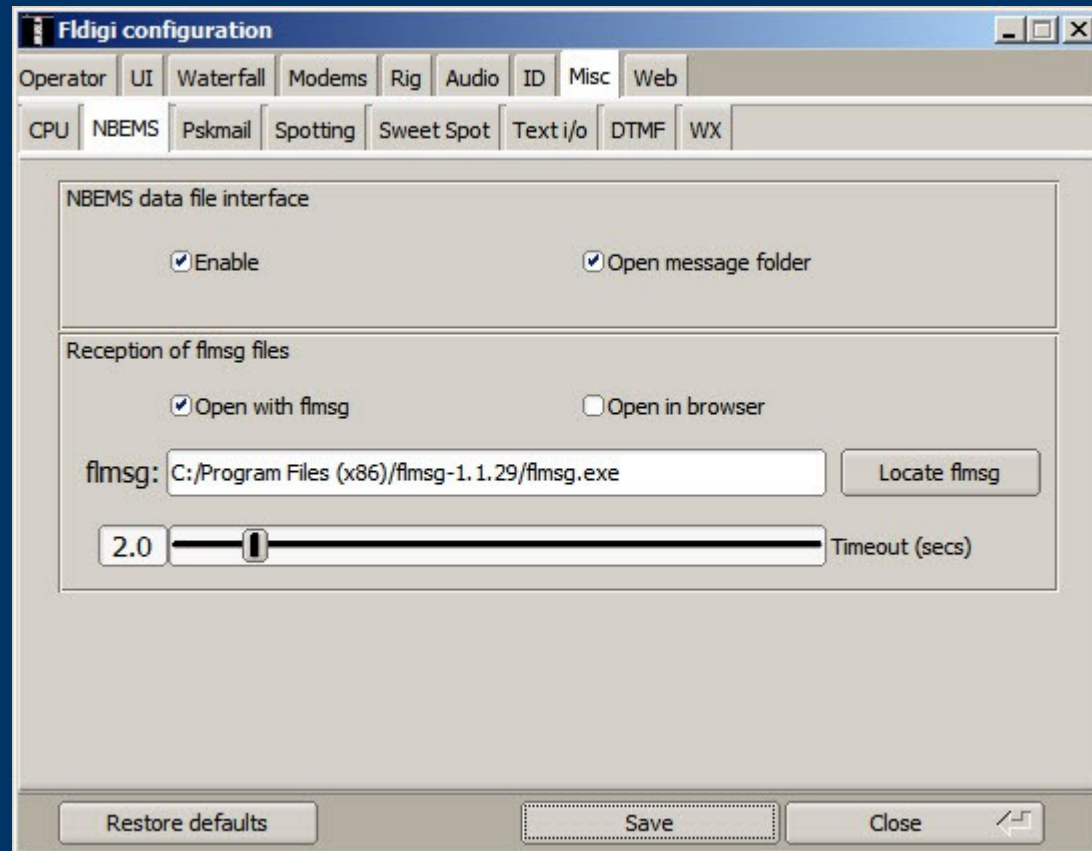
Auto sending ICS-213



Flmsg auto display of messages

- Possible to automatically open messages in Flmsg and/or your default web browser
- Much simpler workflow!
- No searching through lists of extract files
- Can walk away and come back to see messages displayed
- Display in browser great for EOC

Fmsg auto display of messages

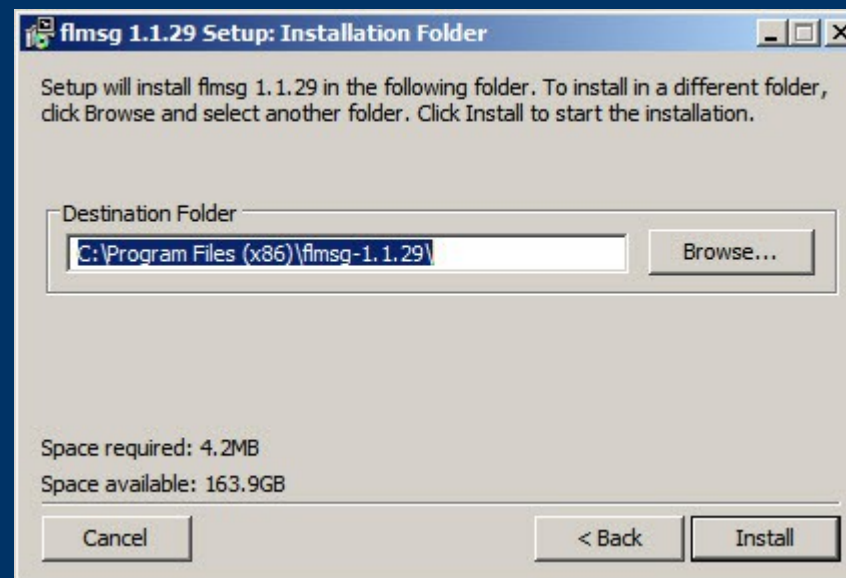


Go to Configure->Misc->NBEMS menu in Fldigi

Fldigi auto display controls

- Enable checkbox – allows capture of message (MUST HAVE CHECKED!)
- Open message folder – automatically open folder holding messages
- Can open automatically with Flmsg or browser, or both!
- Must provide path to Flmsg program
- Be sure to enter path including name of executable, not just folder name
- Easy to print form when opened in browser

Easy way to find Flmsg

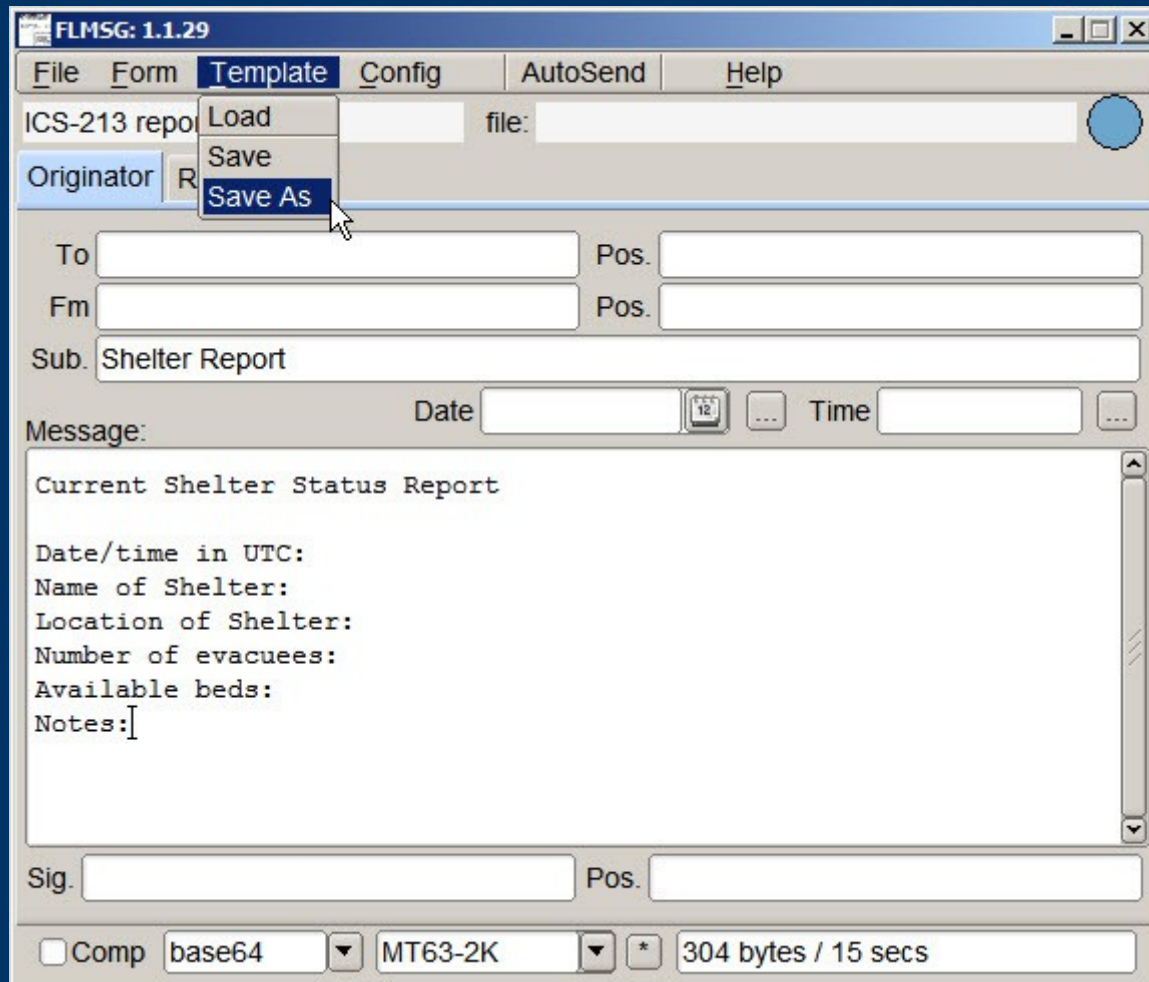


Note location of flmsg program during installation

Flmsg templates

- Say you need a standard report for...
- Hospital situation report
- Shelter info
- Any standard format for situation update
- Flmsg supports templates
- Distribute before event, or even over the air
- Import template into Flmsg, fill it out and transmit
- Use Template menu to save and load

Flmsg templates



Outputting ICS-213

- Want to print message?
- Or maybe email as an attachment?
- Can output message in HTML
File->View
- Very polished, professional looking output!
- Will impress your EMA director with an authentic-looking output

ICS-213 in HTML

GENERAL MESSAGE <small>(ics-213)</small>		
TO: Larry Keller AB3ER	POSITION: Western PA SEC	
FROM: Harry Bloomberg W3YJ	POSITION: Assistant SEC	
SUBJ: Situation report	DATE: 2012-04-24	TIME: 2339Z
MESSAGE:		
<p>What is the current situation? Does WPA ARES need to activate?</p>		
SIGNATURE: Harry Bloomberg W3YJ	POSITION: Assistant SEC	
REPLY:		
DATE:	TIME:	SIGNATURE/POSITION:
		/

Flmsg and ARRL Radiogram

- Excellent tool for ARRL Radiogram
- Autosend works here also
- Import received files just like with ICS forms
- Automatically computes CK (word count check)
- Reminds you when CK needs to be recomputed!
- Dictionary of ARL messages
- All HX handling instructions
- Output in HTML and plain text
- Plain text great for reading or sending to station
not using Flmsg

Flmsg – CK reminder

The screenshot shows the FLMSG: 1.1.29 application window. The title bar reads "FLMSG: 1.1.29". The menu bar includes "File", "Form", "Template", "Config", "AutoSend", and "Help". The main window contains a "Message" tab and a "Records" tab. The "Message" tab is active, showing a form for creating a message. The form fields are as follows:

- SVC**: 1
- *NR**: 1
- *PREC**: ROUTINE
- HX**: HXG
- *STN ORIG**: W3YJ
- CK**: ARL 10

The "ck" button is circled in red. Below the form fields, there are sections for "PLACE OF ORIG" (PITTSBURGH PA), "TIME FILED" (2314Z), and "*MON DY" (NOV 22). The "*TO" field contains "LARRY KELLER AB3ER". The "TEL:" field contains "4125551212". The "OP NOTE:" field is empty. There is a checkbox for "Standard Format" which is checked, and a button labeled "ARL MSG". The "TXT:" field contains the text: "ARL ONE DO YOU NEED ASSISTANCE QUERY PLEASE ADVISE THIS CAUSES CK TO GO RED". At the bottom, there are fields for "SIG:" and "OP NOTE:". The status bar at the bottom shows "Comp base64 MT63-2K * 406 bytes / 20 secs".

Flmsg – Handling Instructions Tool

The screenshot shows the FLMSG 1.1.29 application window. The main form contains the following fields:

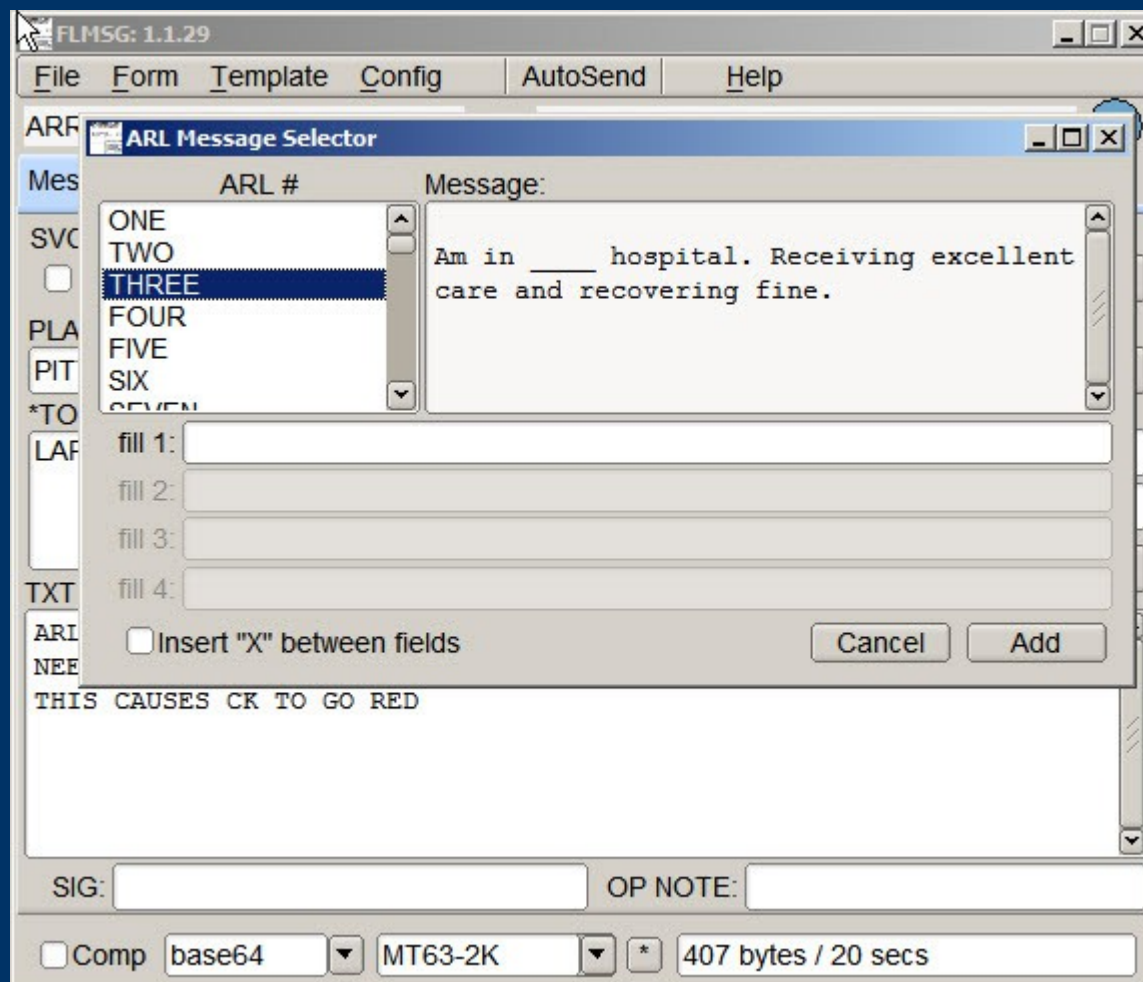
- SVC**: 1
- *NR**: ROUTINE
- *PREC**: G
- HX**: hx
- *STN ORIG**: W3YJ
- CK**: ARL 10 ck
- PLACE OF ORIG**: PITTSBURGH PA
- TIME FILED**: 2314Z
- *MON DY**: NOV 22
- *TO**: LARRY KELLER AB3ER

A dropdown menu is open over the HX field, listing options: HXA, HXB, HXC, HXD, HXE, HXF, and HXG. The HXG option is selected. A dialog box titled "Handling" is open, showing the text for HXG:

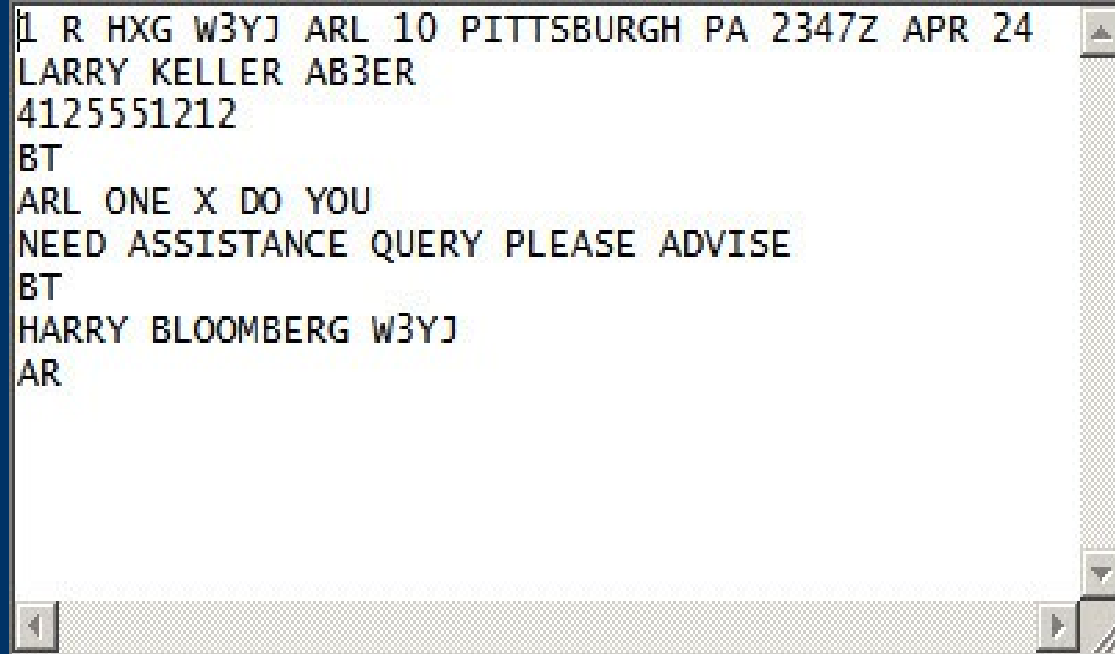
Delivery by mail or landline toll call not required
If toll call or other expenses involved, cancel
message and send service message back to
originating station.

At the bottom of the form, there are fields for **SIG:** and **OP NOTE:**. Below these are checkboxes for **Comp** (base64), **MT63-2K**, and a field for **407 bytes / 20 secs**.

Flmsg – ARL Message tool



Flmsg – Radiogram plain text

A screenshot of a radiogram message window. The window has a white background and a grey border. The text is in a monospaced font. The message content is as follows:

[L R HXG W3YJ ARL 10 PITTSBURGH PA 2347Z APR 24
LARRY KELLER AB3ER
4125551212
BT
ARL ONE X DO YOU
NEED ASSISTANCE QUERY PLEASE ADVISE
BT
HARRY BLOOMBERG W3YJ
AR

The window includes standard scroll bars on the right and bottom edges.

Flmsg – Radiogram HTML format

THE AMERICAN RADIO RELAY LEAGUE

RADIOGRAM

VIA AMATEUR RADIO

NUMBER	PRECEDENCE	HX	STATION OF ORIGIN	CHECK	PLACE OF ORIGIN	TIME FILED	DATE
1	ROUTINE	HXG	W3YJ	ARL 10	PITTSBURGH PA	2347Z	APR 24

TO
LARRY KELLER AB3ER

THIS RADIO MESSAGE WAS RECEIVED AT

W3YJ 4125551212
Harry Bloomberg
201 Delafield Rd
Pittsburgh, PA 15215

PHONE NUMBER
4125551212

ARL ONE X DO YOU
NEED ASSISTANCE QUERY PLEASE ADVISE

HARRY BLOOMBERG W3YJ

ARL ONE: Everyone safe here. Please don't worry.

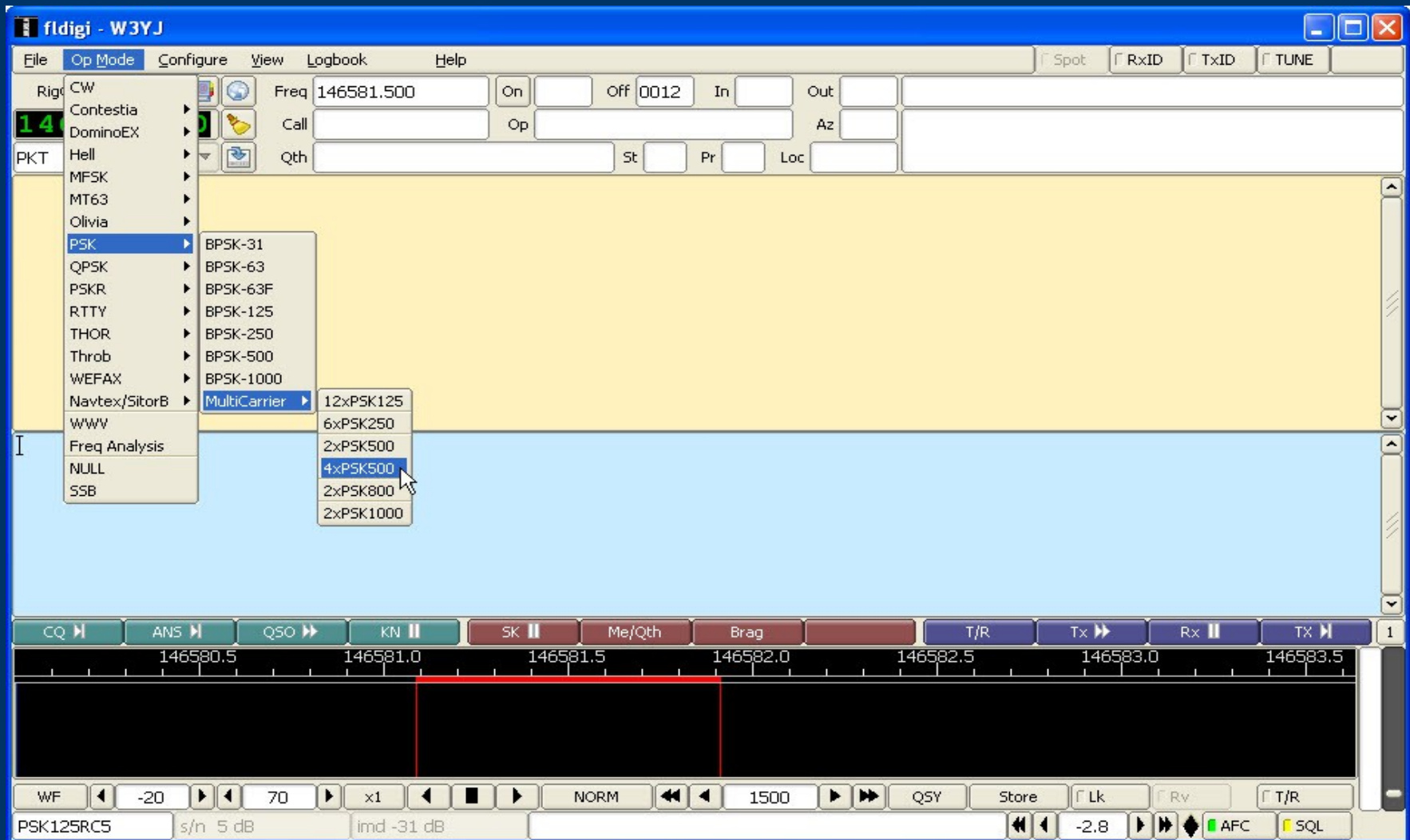
High-speed modes

- Fast modes now available in fldigi:
PSK-500R
PSK-250R
PSK-125R
- “R” signifies Robust
- Contains Forward Error Correction (FEC)
- PSK-500R is approx twice as fast as MT63-2000

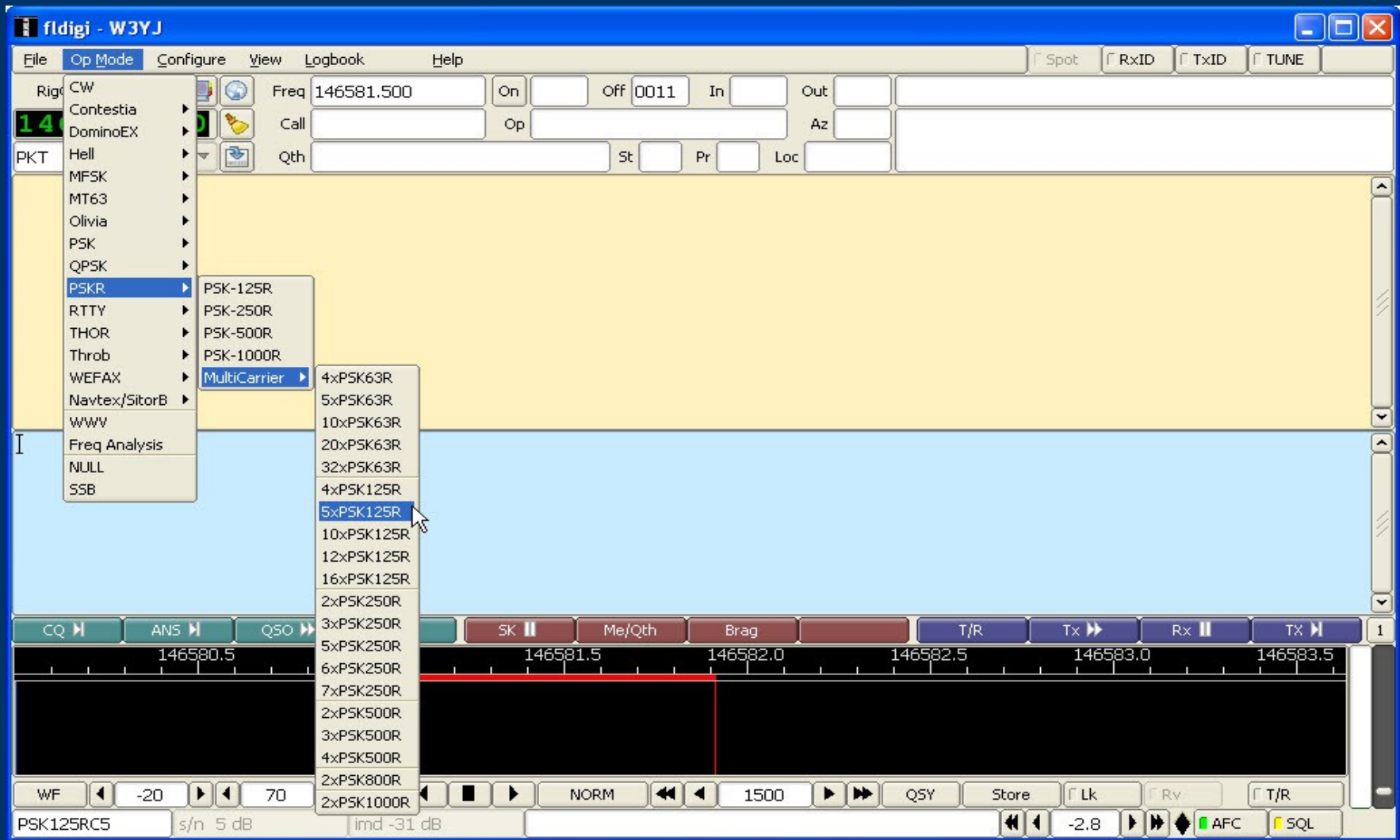
High-speed multi-carrier modes

- Multi-psk modes now available in fldigi.
- PSK signals sent in parallel.
- As many as 12 carriers sent as a time.
- Can have parallel PSK and PSKR modes.
- Blazingly fast.
- Must trade off speed vs robustness.
- Good compromise mode...PSK125R x 5
- Modes of multi 500 Hz wide carriers not legal on HF.
- FCC rules are antiquated...let's hope they're changed

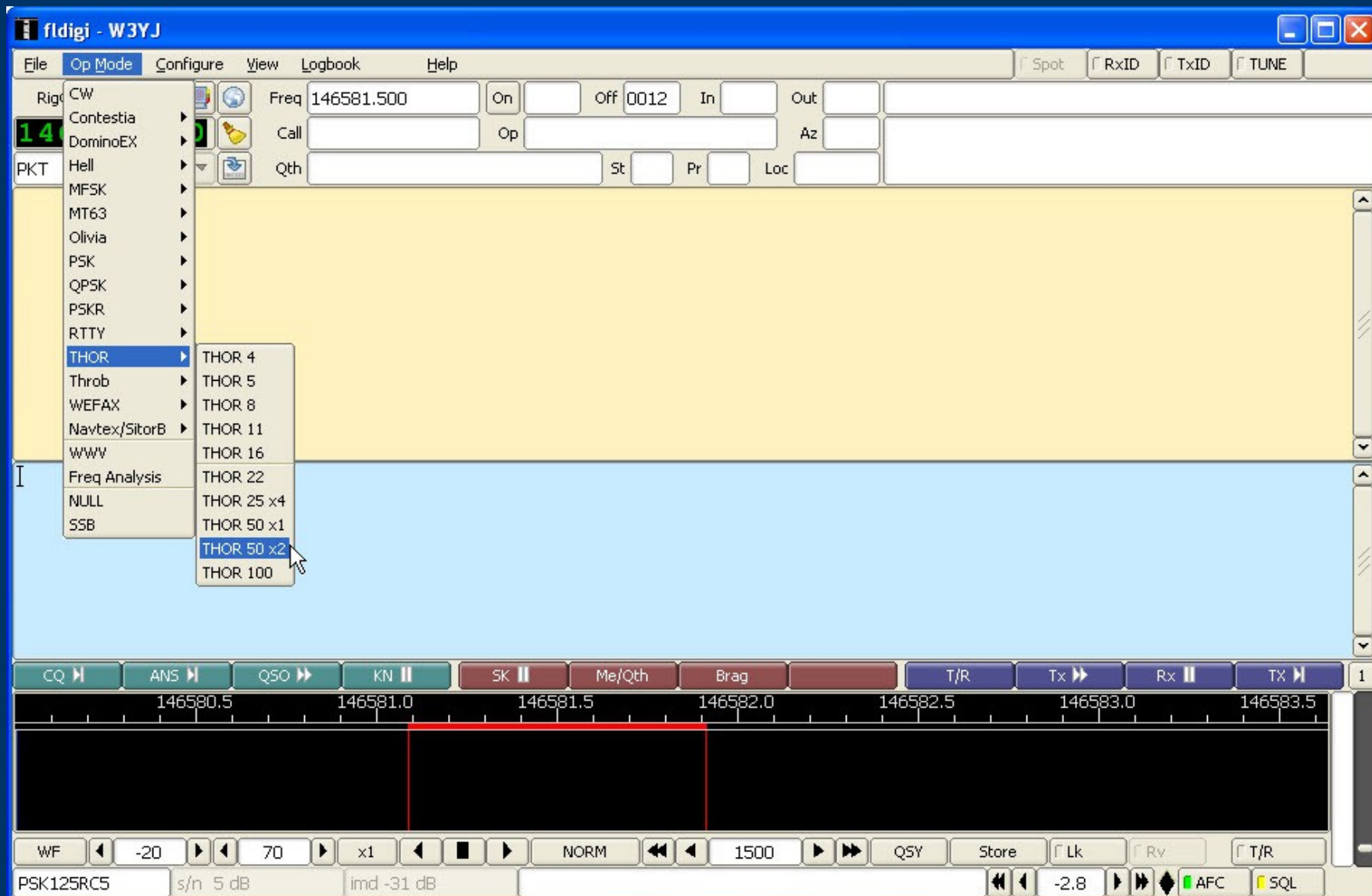
High-speed multi PSK modes



High-speed multi PSKR modes



High-speed Thor modes



PSK tips

- Fldigi has checkbox for AFC
 - Automatic Frequency Control
- Can be used to track PSK signals
- But...can lead to wandering off freq
- Could lead into QRM
- So, for PSK, try either one of the following:
 - Disable PSK (uncheck AFC checkbox) or
 - Enable PSK, but lock transmit (click Lk button)
 - AFC at lower right corner
 - Lk button on lower right below waterfall

PSK R modes vs MT63

- PSK-500R is faster than MT63, PSK-250R as fast
- Why do we continue to use MT63?
 - MT63 tolerates tuning errors
 - MT63 audio levels can vary widely
 - MT63 works well with acoustical coupling
 - MT63-2000 audio offset fixed at 1500 Hz, not possible to change by accident
- MT63 is much more robust and forgiving
- We think best use of PSK R modes is on HF or on VHF/UHF FM with flarq

Data compression with Flmsg

- Flmsg can compute a file checksum and encapsulate file with [wrap] identifiers.
- Can also compress files!

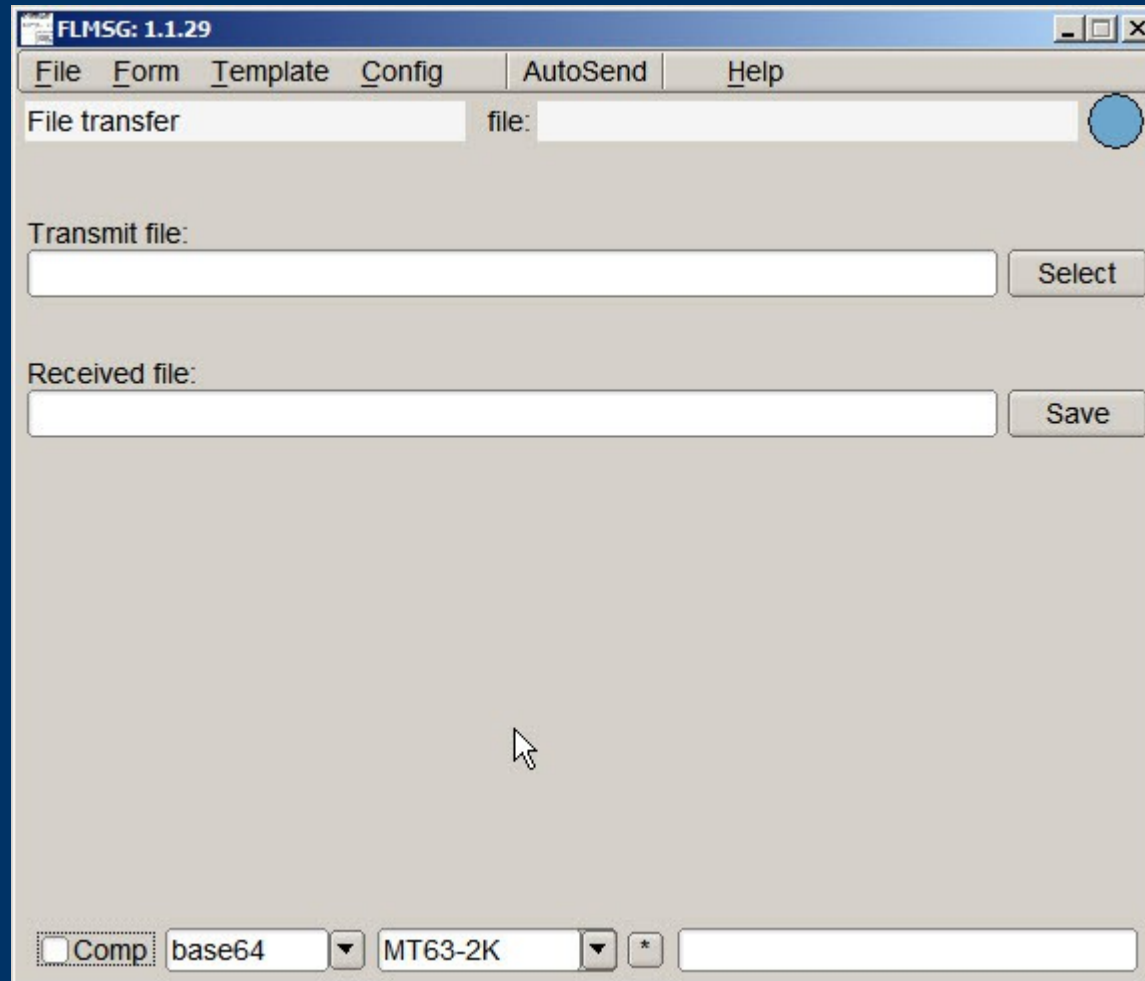
Compressing files with Flmsg

The screenshot shows the FLMSG 1.1.29 application window. The title bar reads 'FLMSG: 1.1.29'. The menu bar includes 'File', 'Form', 'Template', 'Config', 'AutoSend', and 'Help'. The 'AutoSend' menu item is circled in black. Below the menu bar, the message title is 'ICS-213 report' and the file path is 'file: W3YJ-20120714-003516Z-16.213'. There are two tabs: 'Originator' (selected) and 'Responder'. The message fields are: 'To: Larry Keller AB3ER', 'Pos: WPA SEC', 'Fm: Harry Bloomberg W3YJ', 'Pos: Assistant SEC', and 'Sub: Activation Required?'. The 'Date' is '2012-11-22' and 'Time' is '2337Z'. The message body contains the text: 'This is an example of data compression. Note that unless the file is fairly large, compression will not actually occur even if the Comp box is checked.' At the bottom, there is a 'Sig.' field and a 'Pos.' field. The 'Comp' checkbox is checked and circled in black. The compression settings are 'base64', 'MT63-2K', and '*'. The estimated size is '480 bytes / 24 secs'.

Sending Spreadsheets

- Two choices in sending spreadsheets.
- Native format, usually Excel format or...
- Exported as Comma Separated Value (CSV).
- Try to send as CSV...it's much more efficient.
- Transmit in Excel format only when
 - Served Agency insists upon it.
 - Spreadsheet contains formula
- When sending Excel, be careful of file size and transmission time.

Transfer Form in Flmsg



Transferring Binary Files

- Use fastest mode that will work for conditions
- Don't time out the repeater!
- Can be used to transfer any kind of file but...
- Due to size, sending a useful image is still impractical, even with very fast modes.
- Use only when necessary.

Advanced file transfer with Flarq

- Fast Light Automatic ReQuest (Flarq)
- Allows reliable file transfer with handshaking
- Two stations connect
- Data is sent in blocks
- An ack is sent after each block to indicate successful receipt of block
- Continues until file transfer is complete

Using Flarq

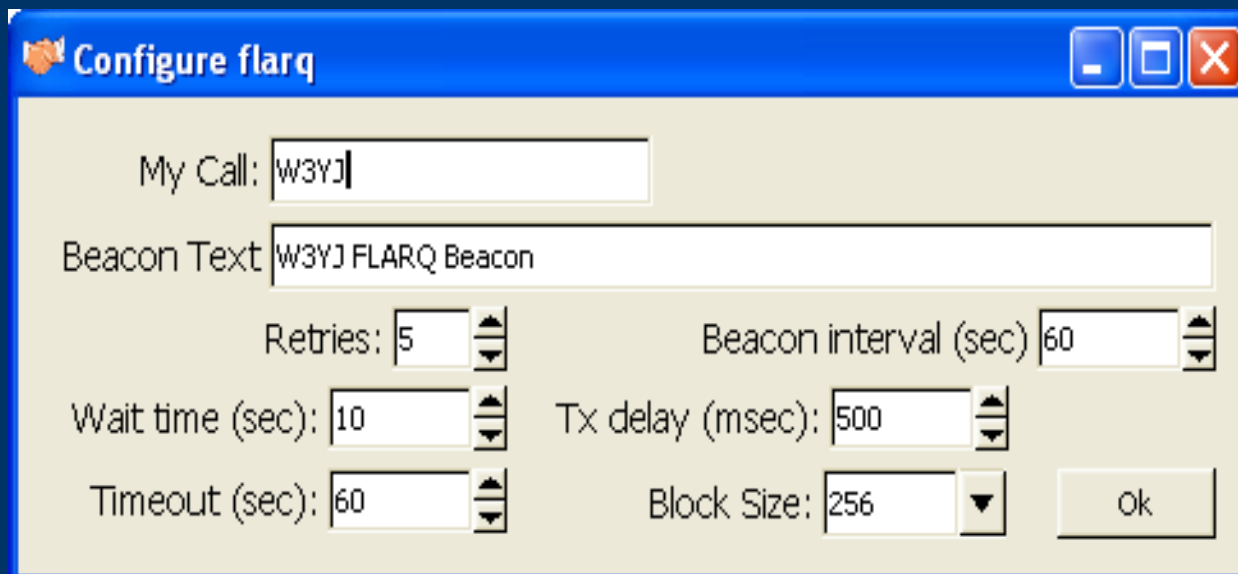
- Two stations establish a connection
- Station A transmits a beacon
- Station B responds to the beacon
- A and B establish a connection
- Either station starts a file transfer
- File transfer either continues successfully to completion or fails
- Another file can then be transferred, or connection broken

Important parameter: Block Size

- Flarq breaks up files into blocks
- One block sent at a time between acks
- You can configure the size of a block
- Bigger blocksize allows faster file transfer but...
- If there's a retry, entire large block must be retransmitted
- Use large block size with good conditions
- Small block size with poor conditions
- In general, use largest possible block size, small block size is a performance killer

Configuring Flarq

- Go to Configure menu
- Fill in My Call, Beacon Text
- Change Block Size as needed



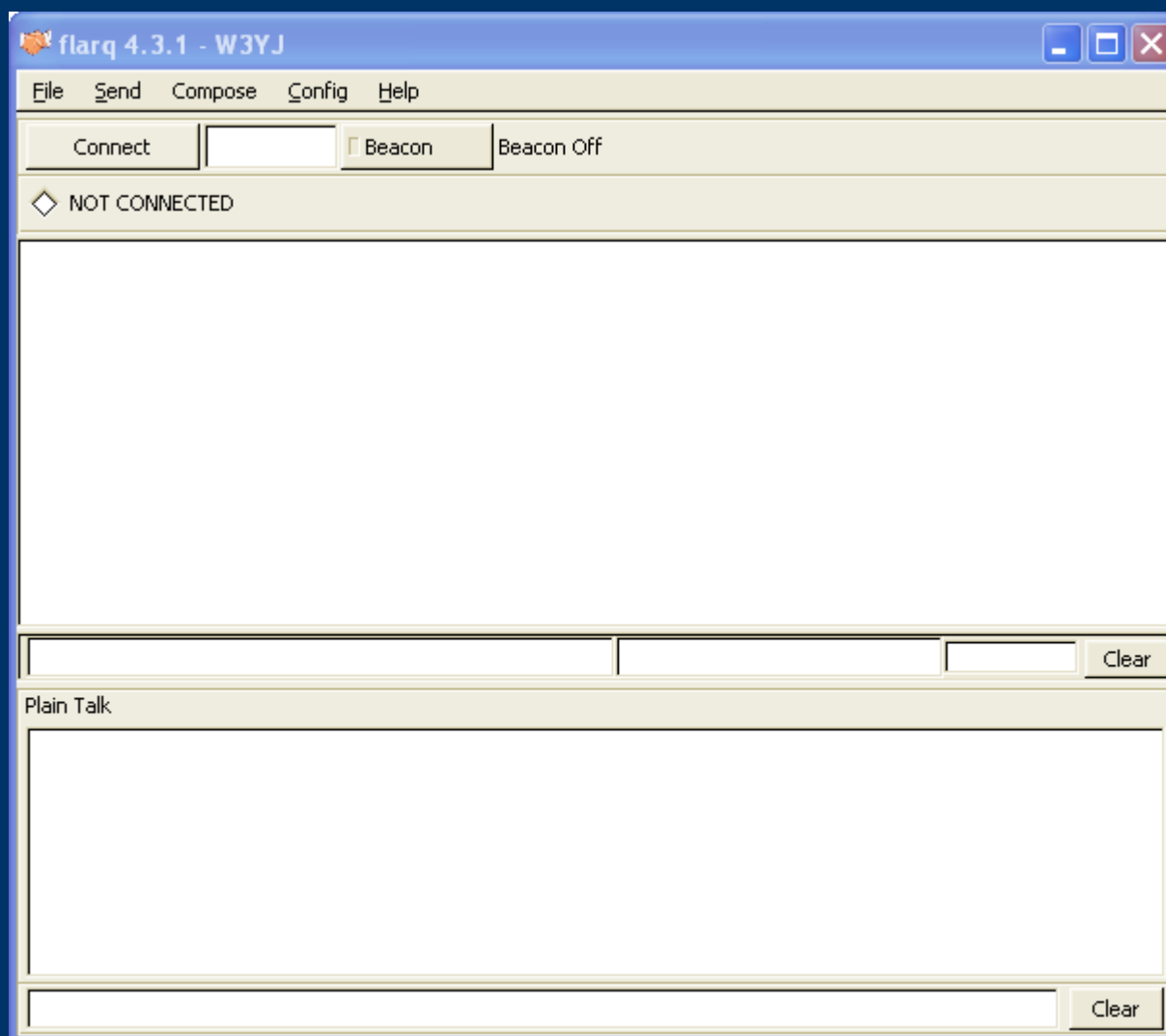
The screenshot shows a Windows-style dialog box titled "Configure flarq". It contains several input fields and a button:

- My Call:** A text box containing "W3YJ".
- Beacon Text:** A text box containing "W3YJ FLARQ Beacon".
- Retries:** A spin box set to "5".
- Beacon interval (sec):** A spin box set to "60".
- Wait time (sec):** A spin box set to "10".
- TX delay (msec):** A spin box set to "500".
- Timeout (sec):** A spin box set to "60".
- Block Size:** A dropdown menu set to "256".
- Ok:** A button to confirm the configuration.

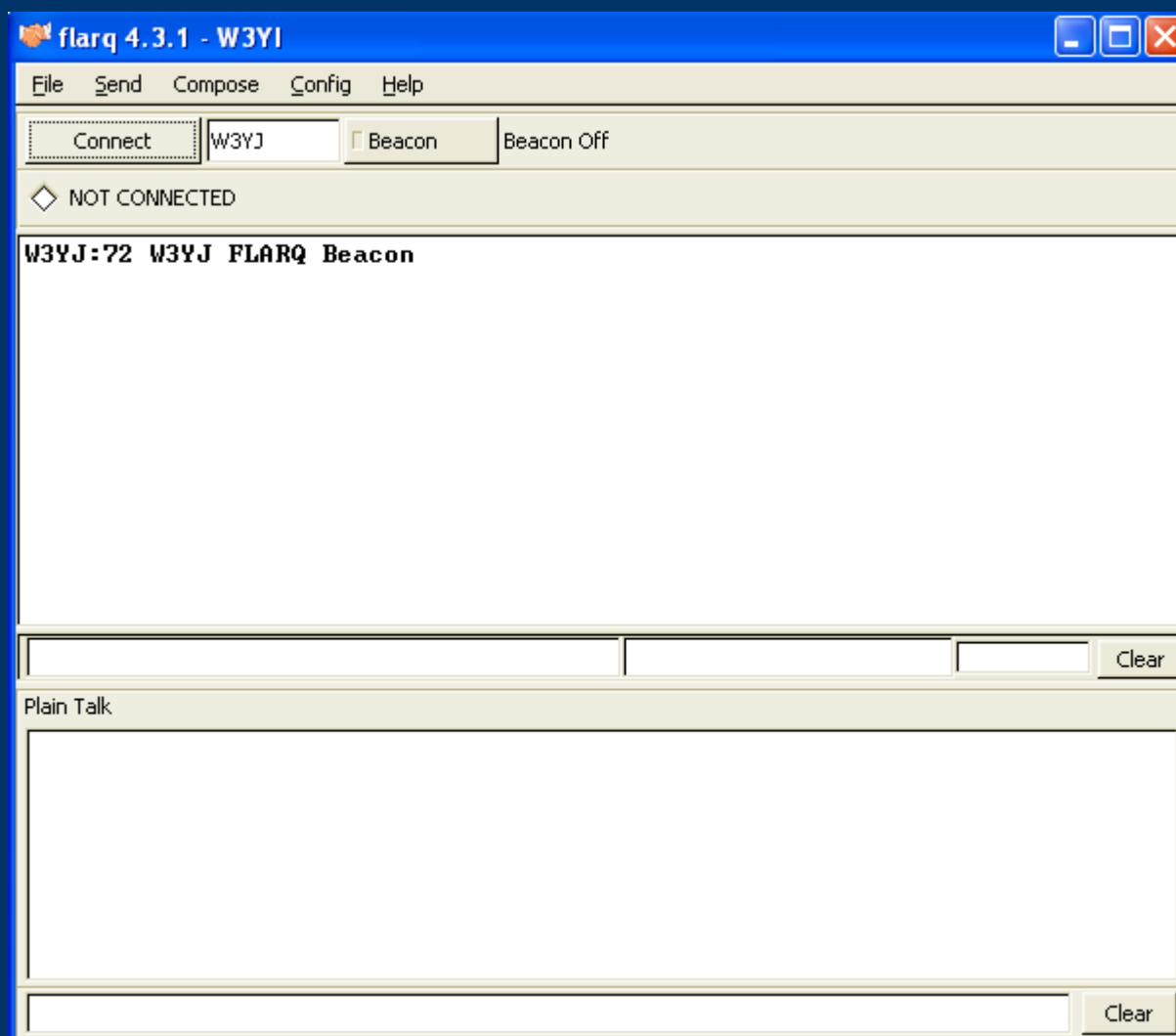
Example of Flarq in use

- W3YJ initiates a beacon
- W3YI responds to beacon
- Stations establish connection
- W3YJ send a file to W3YI
- Two stations handshake until transfer is completed

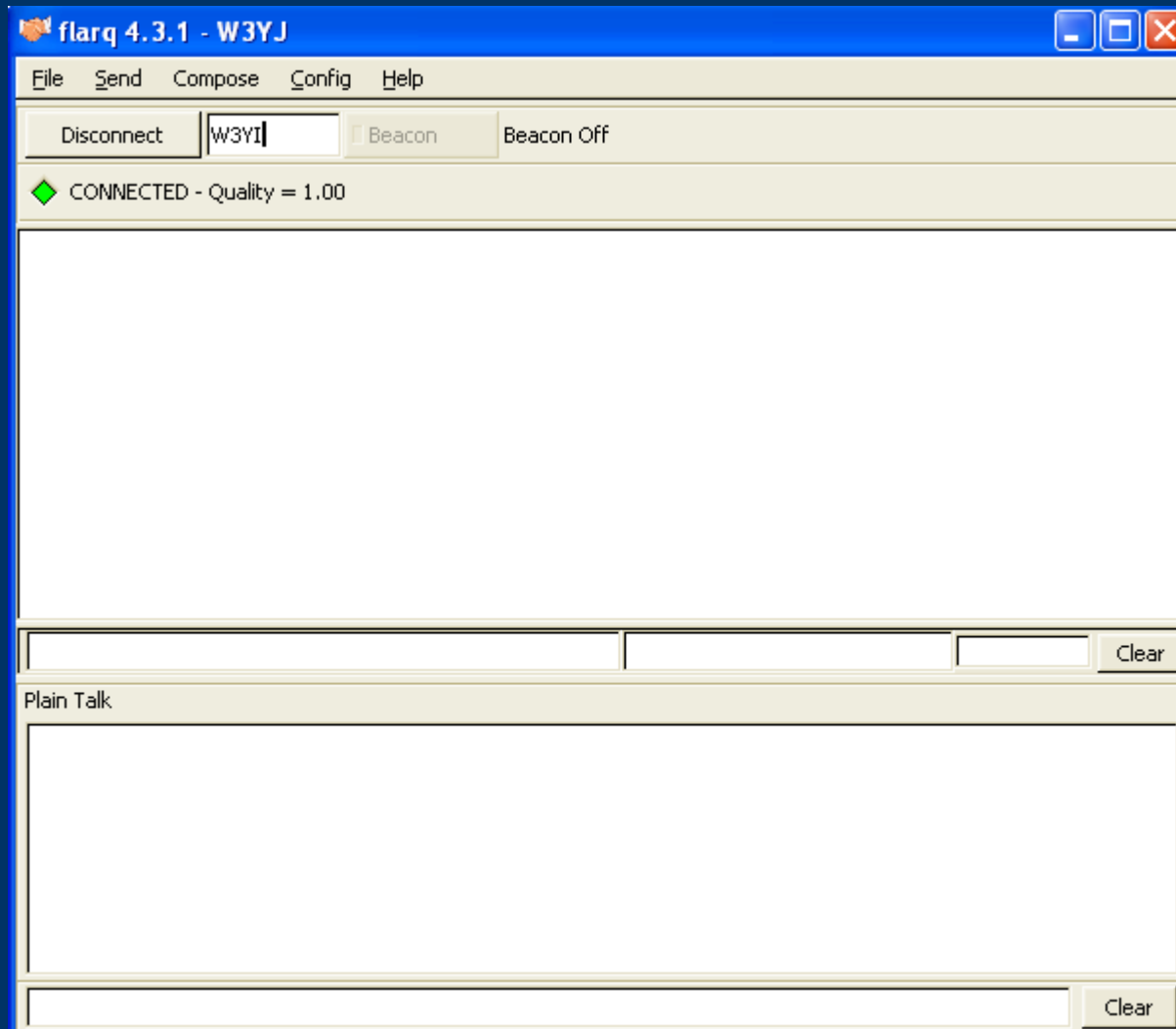
Start Beacon - W3YJ



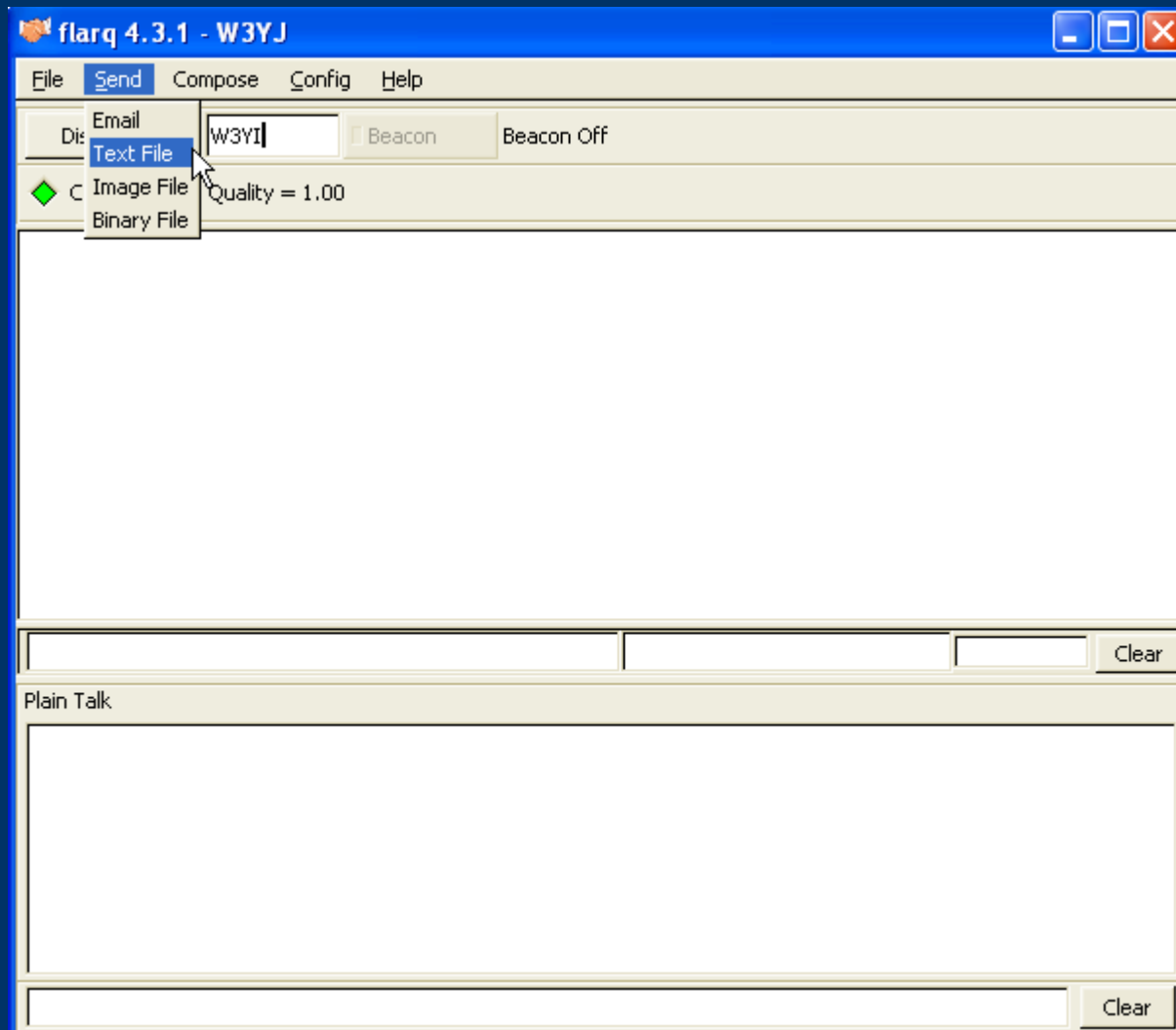
Respond to beacon - W3YI



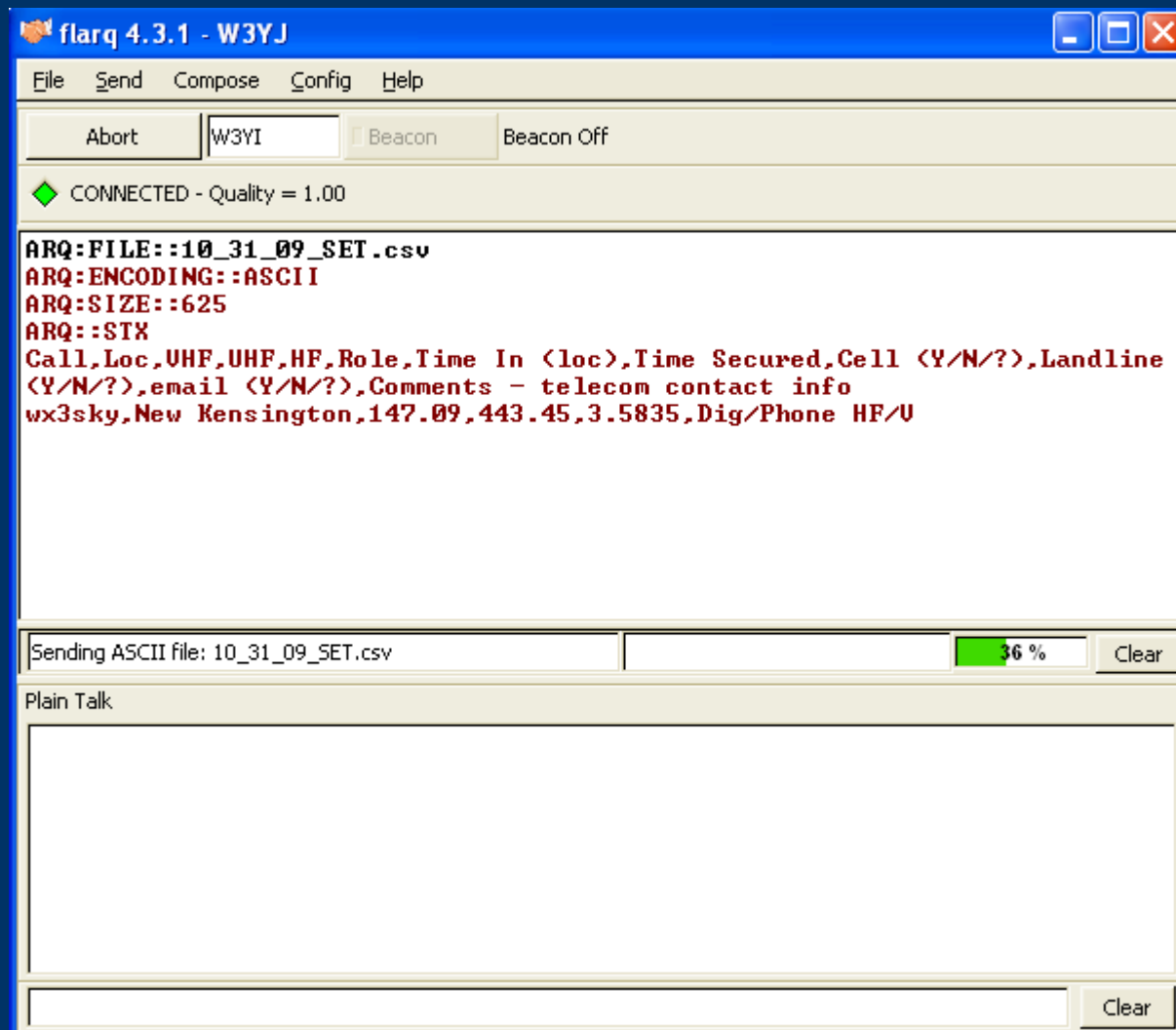
Wait for connection



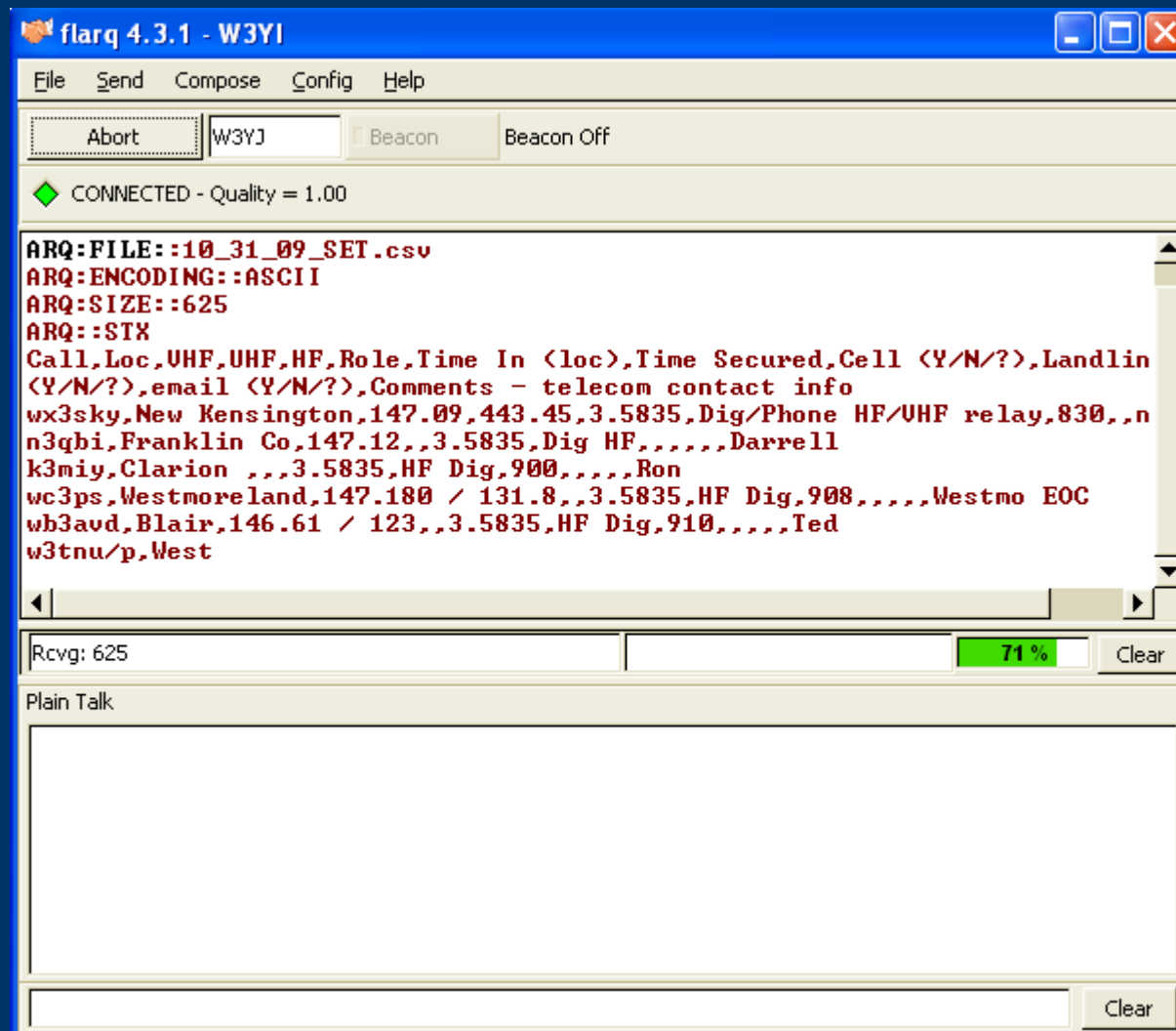
Initiate file transfer – W3YJ sender



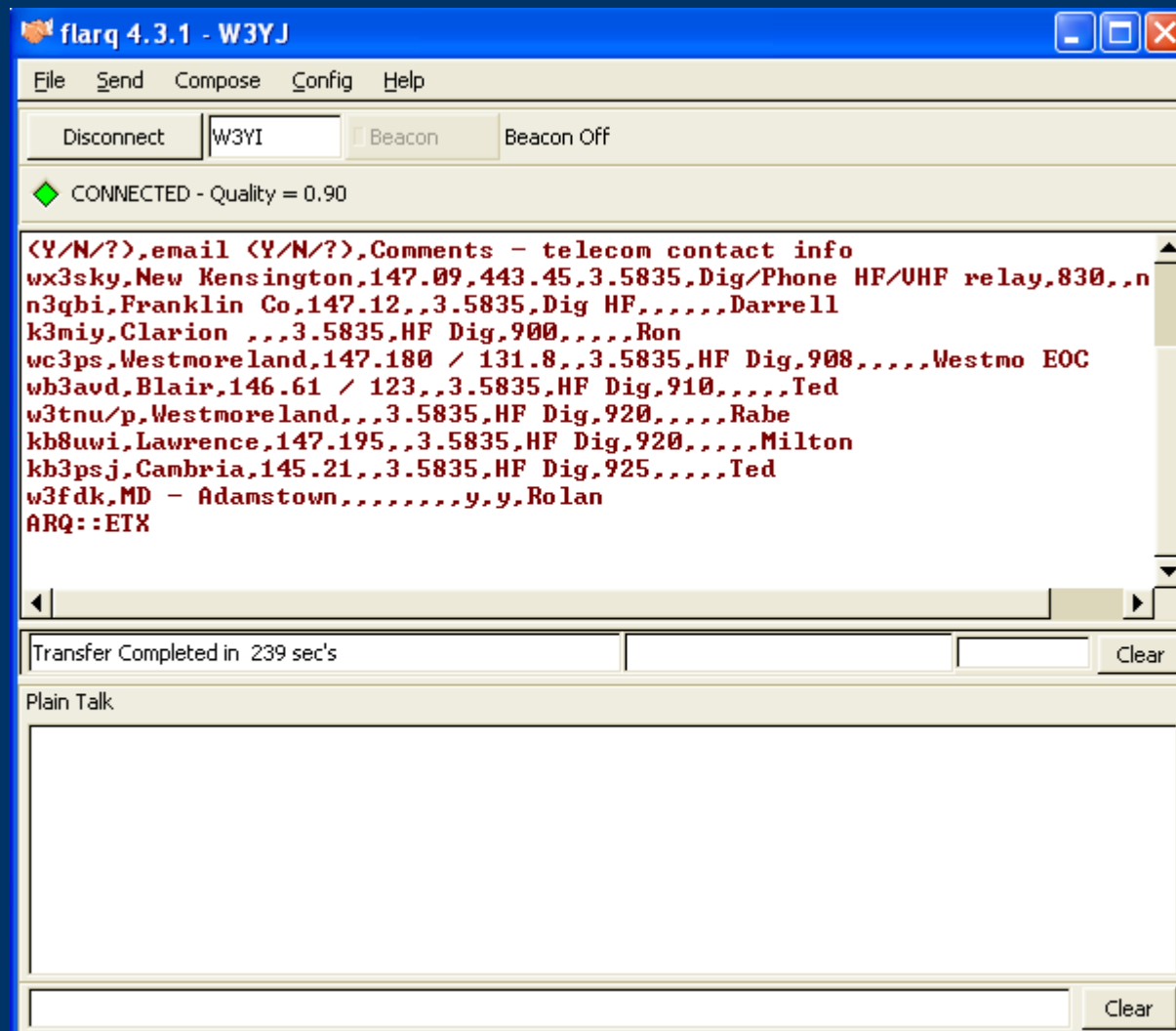
File Transfer – sender viewpoint



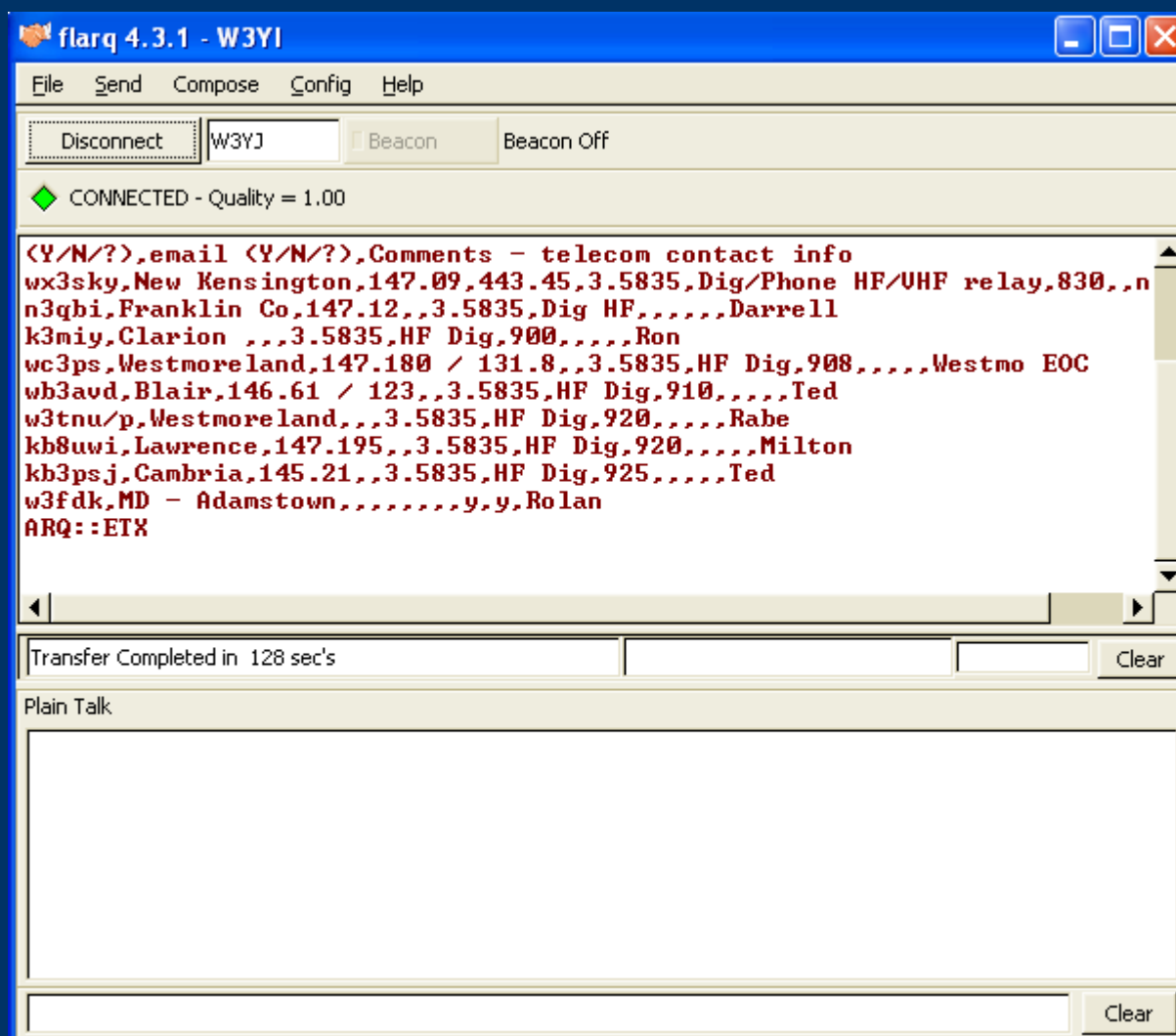
File Transfer – receiver viewpoint



File Transfer complete - sender



File Transfer complete - receiver



Flarq guidelines - pros

- Can transfer very long files
- Possible to change transmit delay to allow courtesy beeps on repeaters
- Great for one-to-one file transfers
- Lots of flexibility with block sizes and different modes

Flarq tradeoffs - cons

- Must have hard-wired interface
- Cannot do broadcasts to many, can only do one-to-one transmissions
- At least 30% performance penalty with largest possible block size
- With small block size, very long transmission times
- Much more complex than flwrap
- MT63 and Olivia do not work with flarq
- ARQ works poorly under noisy conditions

Flarq recommendations

- We think Flarq should be reserved for large file transfers or binary files
- Should be very rare for us to send a binary file
- Use PSK-125R, PSK-250R, and PSK-500R to overcome performance issues
- Train extensively...more difficult to learn than Flwrap
- Be prepared to change modes and block sizes

Benchmarks

- How long to send 2kb and 6kb text bulletin?
- Effect of compression?
- Differences between modes?
- Effect of Flarq block size
- Benchmark files are bulletins with plain text
- Look closely...big surprise is lurking!

Benchmark Results

Mode/Method	2kb Bulletin (sec)	6kb Bulletin (sec)
MT63-2000	115	320
MT63-2000 compressed data	95	215
8/500 Olivia	715	N/A
16/500 Olivia	1070	N/A
PSK 125R	190	615
PSK 125R compressed data	215	520
PSK 250R	95	310
PSK 250R compressed data	110	265
PSK 500R	45	155
PSK 500R compressed data	55	130
PSK 500	25	85
PSK 500 compressed data	30	80
PSK 125R Flarq 256 block	235	710
PSK 125R Flarq 64 block	315	980
PSK 125R Flarq 16 block	652	1970
PSK 500 Flarq 256 block	40	115
PSK 500 Flarq 64 block	60	175
PSK 500 Flarq 16 block	145	440

Benchmarks Discussion

- Compression and PSK don't play well together!
- For 2K file, compressed file takes longer to transfer with PSK modes
- 6K file transfer is not appreciably faster with PSK
- Reason is varicode
- Varicode is optimized for “normal” text
- Example – “e” = 11, “q” = 11011111
- Compressed data no longer has normal distribution of characters

Benchmarks Discussion

- Compression is effective only on large files
- Our 2kb benchmark => 1.68 kb, 16% compressed
- Our 6kb benchmark => 4.09 kb, 31% compressed
- Most of our files will be small because of limited bandwidth
- Big problem: dropping a single bit in a compressed file, everything is lost!
- With plain text, can usually recover something
- May be important depending upon circumstances

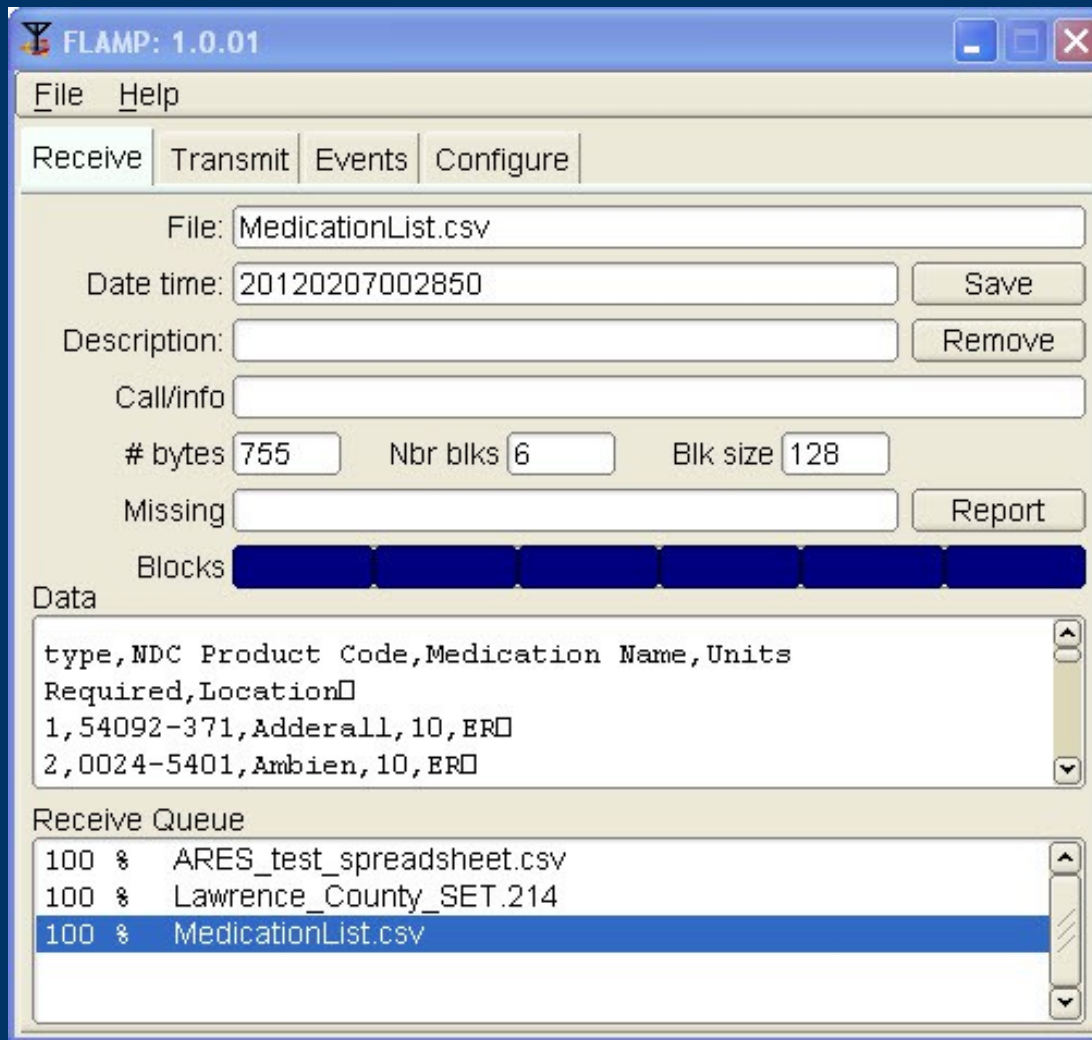
Compression Conclusions

- At first glance, compression sounded like a good idea but...
- Doesn't work well with PSK
- Can't compress a small file very much
- Potential to lose entire transmission if single bit is dropped
- Conclusion: Compression not worth the trouble most of the time

Compression use guidelines

- Three simple and easy to remember rules:
 - 1) Never compress any plain text file
 - 2) Never compress any file less than 2kb in size
 - 3) Compress CSV file only if compression is by 50% or more
- CSV files should compress better because they may be largely numbers
- Cannot tolerate any error in CSV file, so compression is no drawback.

Flamp – Amateur Multicast Protocol



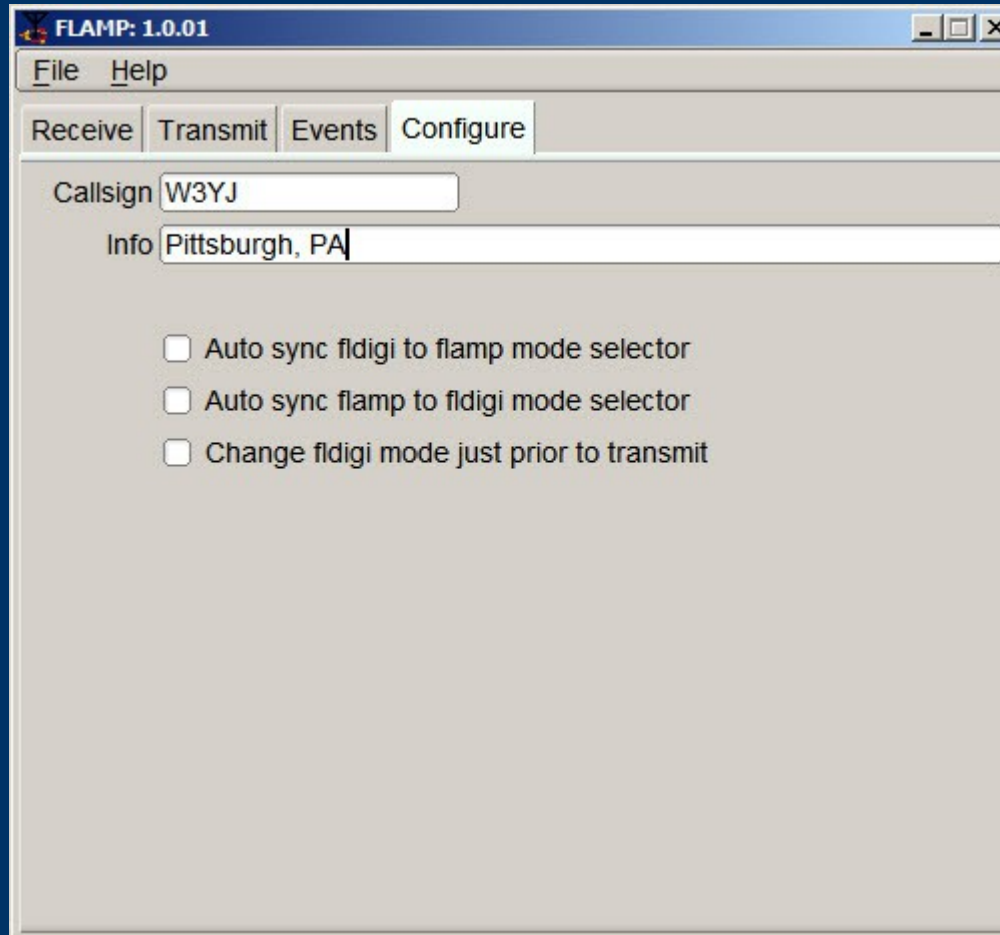
Flamp

- Send large amount of data to multiple stations.
- Can send any kind of file...Flmsg files, text, CSV, Excel, other binary formats.
- Uses Fldigi to send and receive data.
- Multiple files can be sent at a time.
- Files sent in blocks...each block has a checksum.
- Transmitting station can auto repeat transmission.

Flamp

- Blocks missed in 1st transmission are filled in.
- Receiving stations report which blocks were missed after retransmission...
- Or missing blocks auto filled on subsequent transmissions.
- Only necessary for missed blocks to be retransmitted.
- Help at <http://www.w1hkj.com/flamp-help/index.html>

Flamp – initial configuration



Flamp – initial configuration

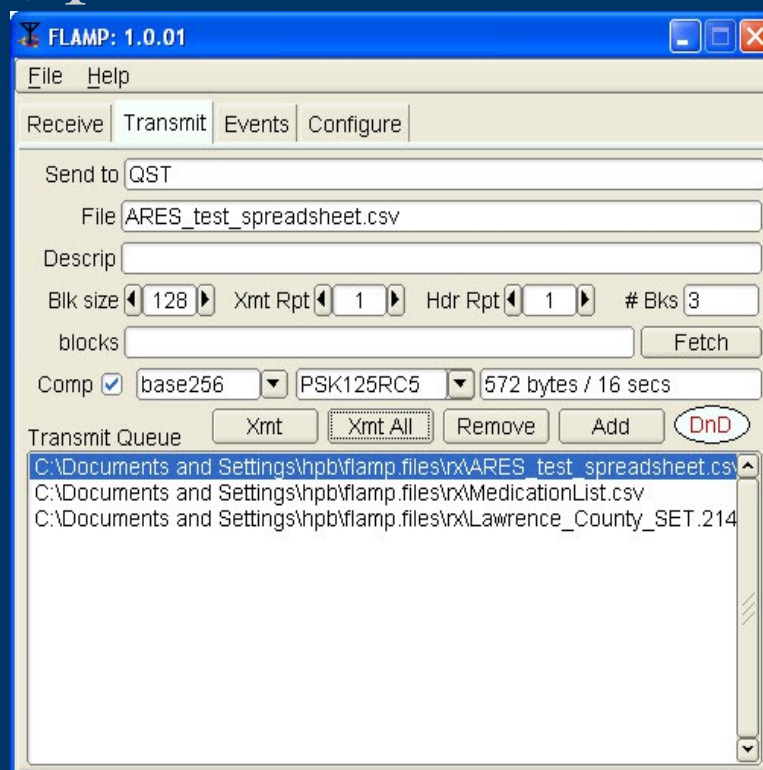
- Fill in callsign and text info.
- Info shows up at bottom of receiving station's Flamp window.
- Can configure Fldigi and Flamp to control each other transmission modes
- Can also configure so that Fldigi is set to slow keyboard-friendly mode and Flamp set to high-speed mode.
- May be useful for net operation.
- Consult with Net Control on preferred configuration.

Flamp – Transmit Configuration

- Use small block size under poor conditions...
- Use large block size under good conditions.
- Smaller block size, more overhead, but missed blocks will be smaller.
- Use compression on large files.
- Receiving station does not need to configure block size or compression.

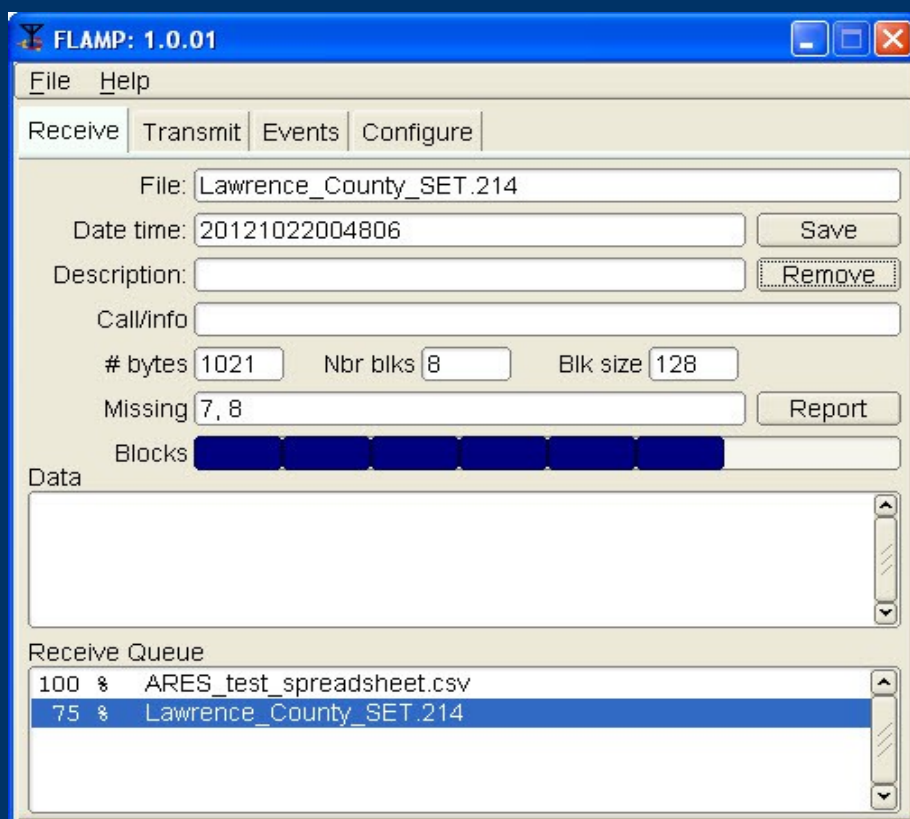
Flamp – transmitting workflow

- Build list of files to transmit.
- Can use Add button...
- Or can use DnD oval...just drag-and-drop.
- When done, push Xmt or Xmt All.



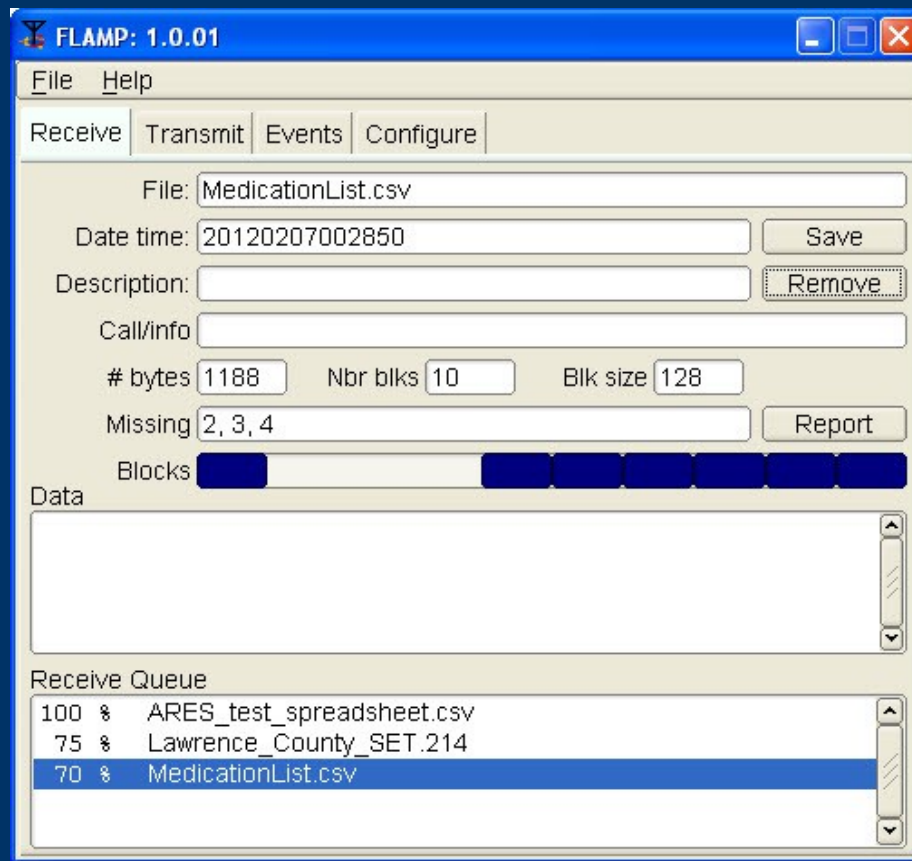
Flamp – receiving workflow

- Will see graphic showing each block as it arrives.
- When all files received, select file and press Save.



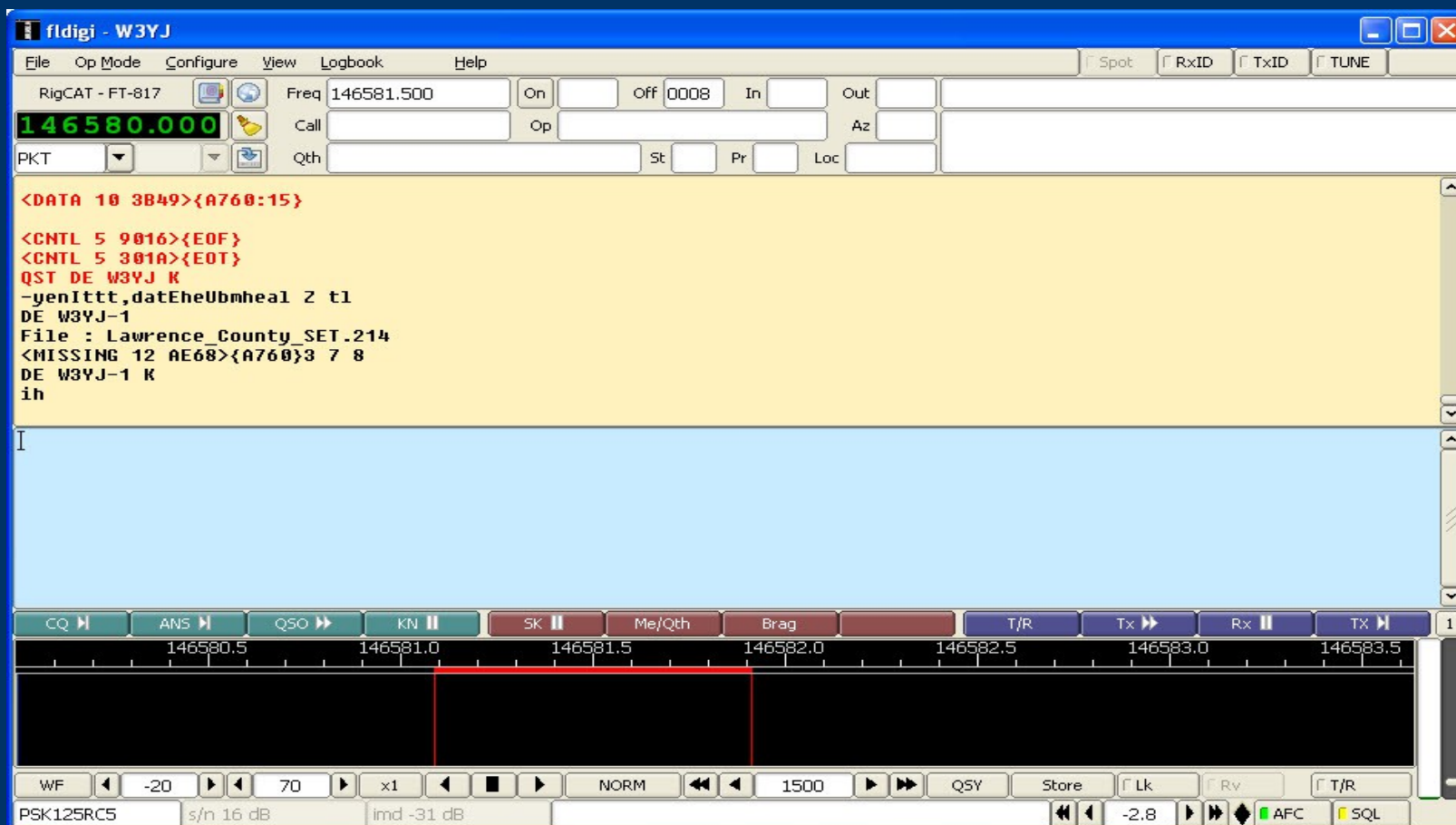
Flamp – missing block workflow

- Flamp will show missing received block(s).
- Push Report button...



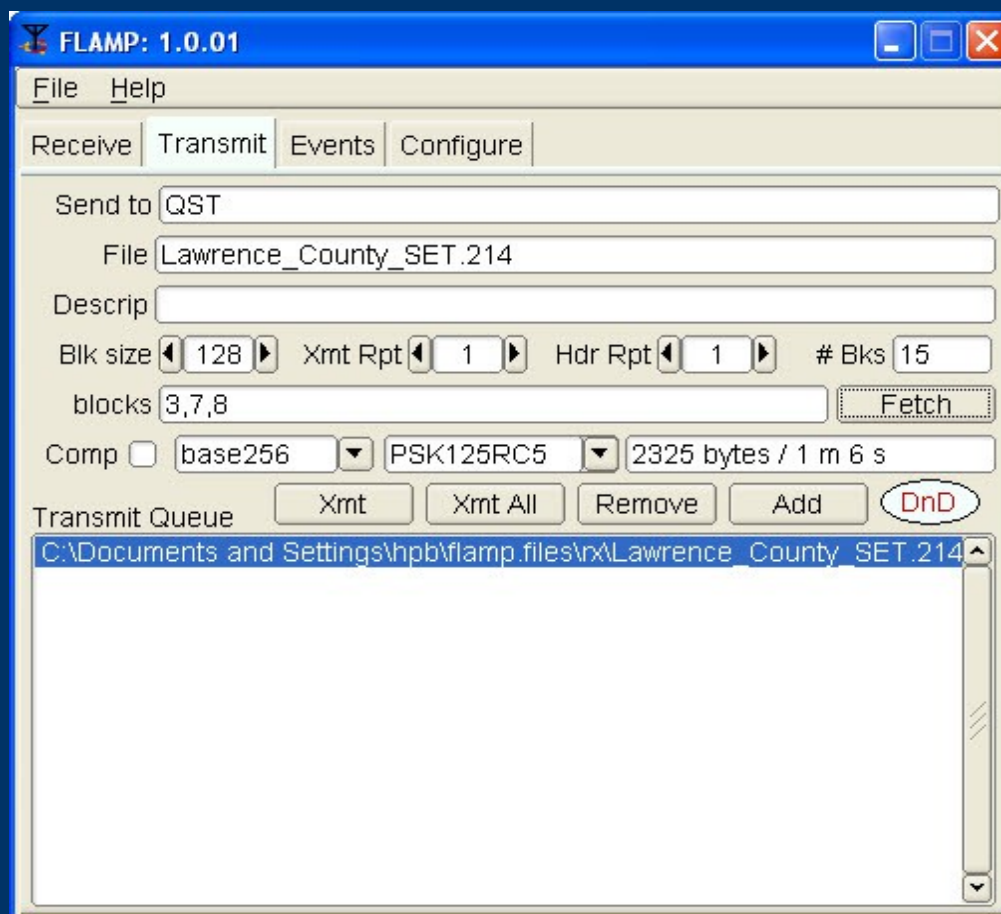
Flamp – report missing blocks

- Transmit report in Fldigi.



Flamp – transmit missing blocks

- Push Fetch button to load missing blocks.
- Push Xmt to send missing blocks.



File Transfer Recommendations

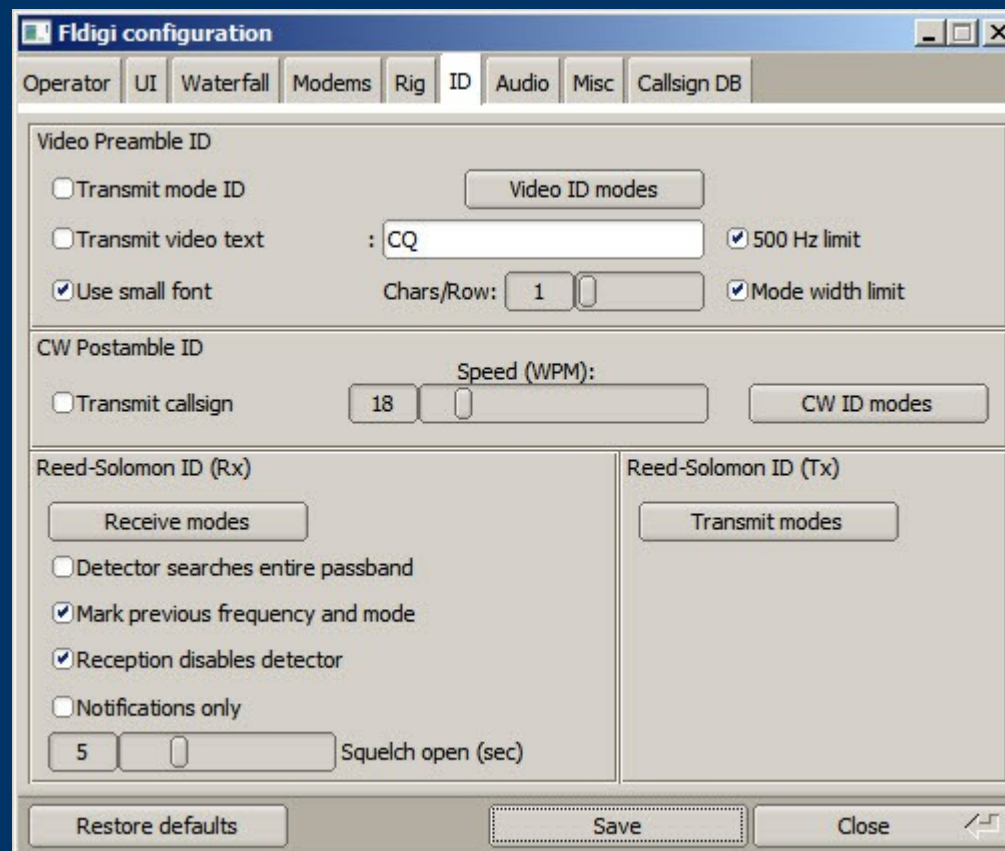
- Rules of thumb for file transfer method for VHF/UHF FM based upon file size...
- Up to 2KB, use MT63
- Consider breaking file into smaller parts if $> 2\text{KB}$
- Consider PSK and multi-carrier modes:
 - Large file
 - Hardwired interface but...
- Some multi-carrier modes will work without i/f.
- Decision is more complex on HF because of band conditions...fading, noise, static, interference.
- New Flamp shows promise for large files.
- That's why we have so many tools available!

RSID

- Reed Solomon id (RSID)
- Tones at begin and end of transmission to help identify mode
- Each mode has a unique RSID
- Fldigi can be configured to automatically change mode upon receiving RSID in passband
- Useful in unattended station for monitoring bulletins
- Set up a scanner, connect to machine with Fldigi, and capture everything!

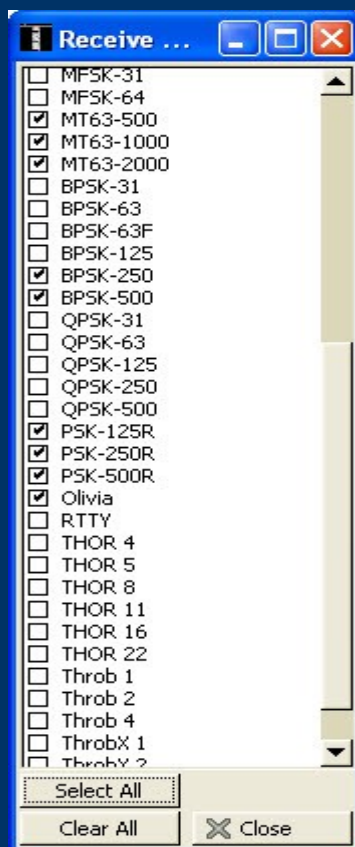
Configuration for RSID

- Go to Configure->IDs menu
- In RSID section, select checkboxes as below



Select RSID modes

- Press Receive Modes button and select modes



Enable use of RSID

- On fldigi screen, push RSID control
- Fldigi will automatically change mode when RSID tone is recognized!

What's next?

- Get on the air and make some noise!
- Join ARES...<http://wpaares.org>
- NBEMS is not hard to master, but does require practice
- So...start organizing practice nets on HF and VHF/UHF

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