ALE
for International Amateur Radio Emergency / Disaster Relief Communications
Presented by:
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HFLINK Founder
Alan Barrow KM4BA,
HFLINK Network Director

Global Amateur Radio Emergency Communications Conference 2007
HFLINK

is an international resource for:

• Coordination of ALE in the Amateur Radio Service
• Interoperative HF Communications
• Emergency / Disaster Relief HF Communications

HFLINK.COM
Is HF emergency communication really viable?

"For HF emergency communication to be taken seriously, it must be able to make the call or send a message without prior notice, at any time of the day or night."
What is ALE?
ALE is

Automatic Link Establishment...

1. A versatile method of connecting radio operators for voice SSB, text, and internet messaging.
2. The *international standard* for initiating and sustaining HF communications.
3. An active HF propagation optimizer.
4. The foundation for non-proprietary interoperative HF communications.
A force multiplier for the HF operator.

Monitor and manage 5 or 10 HF bands and Nets simultaneously.
What Does ALE Do for Ham Radio Emcomm?

- Maintains *Hot Standby Nets* 24 - 7 - 365 on demand.
- Calls up one or multiple stations as needed... without nets or skeds... on the best band.
- Transmits an HF message or bulletin, without a schedule, even when the other radio operator is not listening.
- Interoperates via SSB voice or Text with other organisations and agencies on HF.
- Sends SMS phone texting or email by HF, without an external modem or computer.
- Tracks positions of mobile stations by HF.
Any station can call, with voice or text message to any other station individually or as a net.
How ALE Works

• Each ham radio ALE station uses the operator's callsign as a digital address in the ALE controller.
• When not actively in a QSO with another station, each ALE transceiver constantly scans through channels on every band, listening for its own callsign.
• Each ALE transceiver also listens for other callsigns... and stores the channel, signal quality, and time each station is heard.
HF propagation is like a wild animal. With ALE, you can ride it.
ALE Hardware and Software

- Most ALE ham operators use PCALE software ALE program with an HF amateur radio SSB transceiver.
- MULTIPSK software has recently added the basic functions of ALE for calling and messaging.
- MARS members use MARS-ALE.
- Hams also use commercial HF radios with ALE built-in... a computer is not needed with these radios.
- Other ham software programs are now in the process of adding ALE.
- External ALE controllers are also available.
PCALE by
Charles Brain G4GUO

- Complete ALE software for amateur radio HF rigs.
- Advanced methods of scanning that enable Ham-Friendly ALE.
- High-speed HF soundcard ARQ built-in.
- Interoperable with ALE Hardware MIL-STD radios.
- Free download for hams at HFLINK.COM

MARS-ALE by
Steve Hajducek N2CKH

- Advanced CAT interface control for ham and commercial HF rigs
- Silent relay scanning for PCALE
- Enables ALE HF Network internet with BBSlink by Alan Barrow KM4BA
[21:48:21] >> [K7EK] SEND 500 GALLONS WATER 1000 MRE TO SHELTER 5

[21:48:46] [FRQ 14109500] [MSG SENT] [K7EK]
[21:47:49] [FRQ 14109500] [LINKED] [K7EK]
[21:17:59] [FRQ 21096000] [TO] [KM4BA]
[21:04:04] [FRQ 14109500] [TO] [W1PID]
[20:12:20] [FRQ 14109500] [SND]
[20:11:17] [FRQ 10145500] [SND]

ADDRESS: K7EK
TEXT: SEND 500 GALLONS WATER 1000 MRE TO SHELTER 5
Example of an Icom 756pro ham transceiver with PCALE

Quiet Relay Scanning and Sounding
MULTIPSK by Patrick F6CTE

SEND 500 GALLONS WATER 1000 MRE TO SHELTER 5

SEND 500 GALLONS WATER 1000 MRE TO SHELTER 5
Mobat Micom ALE Transceivers
Harris ALE Transceivers

Use keypad to send text similar to cell mobile phone

LCD display shows messages and calls

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Icom IC-F7000 ALE mobile

Fly-Away 125 Watt Portable ALE HF Station Package in Waterproof Case

Pelican Flip Top Case 1430

Power Supply  Control Head

Transceiver
### International Amateur Radio Emergency / Disaster Relief

**ALE Channels**

<table>
<thead>
<tr>
<th>Frequency (kHz)</th>
<th>Description</th>
<th>Global Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1845.0</td>
<td>Global</td>
<td>14346.0</td>
</tr>
<tr>
<td>3791.0</td>
<td>Global</td>
<td>18117.5</td>
</tr>
<tr>
<td>5403.5</td>
<td>Regional</td>
<td>21437.5</td>
</tr>
<tr>
<td>7065.0</td>
<td>Regional</td>
<td>24932.0</td>
</tr>
<tr>
<td>7185.5</td>
<td>Global</td>
<td>28312.5</td>
</tr>
<tr>
<td>10145.5</td>
<td>Global</td>
<td>kHz</td>
</tr>
</tbody>
</table>

All ALE Channels are **Upper Sideband standard**.

Channels are frequency-coordinated with all IARU Regions (R1, R2, R3) for Global use.

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Why Upper Sideband?

- All ALE for Amateur Radio is USB, including channels below 10MHz.
- USB conforms to International Standards for ALE.
- USB enables interoperability with other services.
## ALE Pilot Channels

### HF Network, Text Messaging, and Sounding

<table>
<thead>
<tr>
<th>Frequency kHz USB</th>
<th>IARU Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>1806.0</td>
<td>2,3</td>
</tr>
<tr>
<td>1840.5</td>
<td>1</td>
</tr>
<tr>
<td>3596.0</td>
<td>2,3</td>
</tr>
<tr>
<td>3617.0</td>
<td>1</td>
</tr>
<tr>
<td>3626.0</td>
<td>3</td>
</tr>
<tr>
<td>7040.5</td>
<td>1,3</td>
</tr>
<tr>
<td>7102.0</td>
<td>2</td>
</tr>
<tr>
<td>7185.5</td>
<td>3</td>
</tr>
<tr>
<td>10145.5</td>
<td>1,2,3</td>
</tr>
</tbody>
</table>

- **IARU Region**: Numbers 1, 2, 3 refer to IARU Regions 1, 2, and 3 respectively.

<table>
<thead>
<tr>
<th>Frequency kHz USB</th>
<th>IARU Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>14109.0</td>
<td>1,2,3</td>
</tr>
<tr>
<td>18106.0</td>
<td>2,3</td>
</tr>
<tr>
<td>18117.5</td>
<td>1</td>
</tr>
<tr>
<td>21096.0</td>
<td>2</td>
</tr>
<tr>
<td>21116.0</td>
<td>1</td>
</tr>
<tr>
<td>24926.0</td>
<td>1,2,3</td>
</tr>
<tr>
<td>28146.0</td>
<td>2,3</td>
</tr>
<tr>
<td>28312.5</td>
<td>1</td>
</tr>
</tbody>
</table>

- **IARU Region**: Numbers 1, 2, 3 refer to IARU Regions 1, 2, and 3 respectively.

Coordinated with IARU Regions' Automatic Data Sub-Bands.
Info About the ALE Channels

- ALE channels are frequency coordinated with IARU Region bandplans, and comply with rules for the various countries of operation.
- At least one ALE voice SSB channel on each HF band is available in every IARU Region throughout the world.
- An ALE data channel on each HF band is used for Sounding Station Identification transmissions and HF Network text/data.
- The HF spectrum is a shared resource, so there is no guarantee of a clear channel... if one ALE channel is busy, an alternate QSY channel is selected by ALE.
- Ham-Friendly ALE techniques for sounding and channel scanning were specially developed by hams to avoid interference, and make ALE compatible with ham radio.
## ALE Signal

<table>
<thead>
<tr>
<th><strong>Based on standard</strong></th>
<th>FED-1045 or MIL-STD 188-141</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Occupied Bandwidth</strong></td>
<td>2kHz</td>
</tr>
<tr>
<td><strong>Emission Type</strong></td>
<td>8FSK - single tone shifted between 8 frequencies</td>
</tr>
<tr>
<td><strong>Audio Shift Frequencies</strong></td>
<td>750Hz to 2500Hz at 250Hz spacing</td>
</tr>
<tr>
<td><strong>Symbol Rate (baud)</strong></td>
<td>125 Symbols Per Second</td>
</tr>
<tr>
<td><strong>Speed (raw bit rate)</strong></td>
<td>Basic 375 Bits Per Second. (Up to 4800 BPS with the 8PSK fast ARQ data formats associated with ALE)</td>
</tr>
<tr>
<td><strong>Decode sensitivity</strong></td>
<td>- 4dB SNR</td>
</tr>
<tr>
<td><strong>Compatible with</strong></td>
<td>Amateur SSB Transceivers with no special ALC requirements</td>
</tr>
</tbody>
</table>
ALE Signal RF Spectrum

8 Frequency Peaks

@ -23dBc

Similar bandwidth compared to SSB Voice, Slow Scan TV, PACTORIII, or Digital Voice.

2 kHz Occupied Bandwidth Measured on Spectrum Analyser

10dB/DIV

500Hz/DIV
ALE Signal on a Computer Waterfall Audio Display
Starting an ALE QSO

1. The radio operator enters the desired callsign into the ALE controller, just like dialing a phone number.
2. The ALE controller starts calling on the bands the desired station was heard previously with good quality.
3. The ALE controller transmits a short *selective calling* burst containing the callsigns.
4. When the desired station responds, a Link is thus Established and the QSO can begin using any mode, such as SSB Voice or Text Messaging.
Receiving an ALE Call

1. When your scanning transceiver's ALE controller detects the first few characters of its callsign, it stops scanning and stays on that channel.
2. If it decodes your callsign, it responds to the caller with a *handshake* to confirm the link is established.
3. Your transceiver, muted up until now, turns on its speaker, or the controller beeps to alert you.
4. Your ALE controller display indicates the callsign of the station calling you.
5. You may start a regular QSO in any mode you like.
6. At the conclusion of the QSO, you clear the link, and each operator returns their transceiver to scanning.
ALE Link in Action

- Both stations are scanning the channels, listening for calls.
- Station A calls Station B.
- Station B decodes the call and stops scanning.
- Station B responds.
- Station A acknowledges the response.
- The stations are linked.

LINKING WITH ALE

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Global ALE HF Network (HFN)

- 24-7 Network of ALE stations with HF internet connectivity
- ALE-SMS phone texting and HF email text messaging
- Sounding every hour on the Pilot Channels 3.5MHz - 28MHz
- Phase 1: Covers North America with a 7 station constellation
- Phase 2: Expand Network worldwide with *soundcard* HF text email
ALE - SMS

What is ALE - SMS?

A short phone-text or email message sent through an ALE HF Network Station.
SENDING AN SMS MESSAGE BY FRONT PANEL KEYPAD OF AN ALE HF TRANSCEIVER
**ALE - SMS TEXT MESSAGE**

- Message is received via internet or cell phone system by any Mobile Cell Phone, Blackberry or PDA
**ALE – SMS TEXT MESSAGE**

- Message received via internet on any computer's Email

Subject: **SEND 500 GALLONS WATER 1000 MRE TO SHEL**
From: KQ6XA@hfalink.net
Reply-To: KQ6XA@winlink.org
Date: 24-May

SEND 500 GALLONS WATER 1000 MRE TO SHELTER 5
[SENT VIA HF RADIO ALE SMS BY KQ6XA]
ALE in the Katrina disaster relief
Mobile tracking
Station status
In route messaging
The International Amateur Radio ALE HF Network is an Open Network

- All organizations and individual operators are invited to use the ALE network and ALE channels at any time.
- Use it as an interoperative, common *Net of Nets*.
- Share the ALE common channels for calling each other, or calling up your own net with your net's unique ALE netcall.
- Make your contact on frequency as needed, or QSY to your normal net frequency.
Proposed ALE Net Calls
ALE netcalls are 3 Letters

HAM = Ham radio emergency stations
RED = Red Cross
SAT = SATERN
ARR = ARRL
ARE = ARES
RAY = Raynet
RAC = Radio Amateurs of Canada
IAR = IARU
RCS = RACES
SBD = SBDR
SAL = Salvation Army

Other examples:
CAA = California ARES
ALA = Alabama ARES
MCA = Monroe County ARES
Questions

Answers
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More information:
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