

Fremont ARES – Setup for Emergency Packet Radio Communication

Review 20-Oct-2012 AE6YN. - Covers Outpost version 2.6c29

This document describes how to set up and use a packet radio station for use within ARES operations. If you want to read into the theory behind the described setup, please look up the appendix chapters.

Radio setup

- Tune radio to **433.510 MHz simplex** (or **433.530 MHz simplex** – will be announced).
- Select output power as required. Lower is better, save power!
- **Disconnect microphone** – otherwise ambient noise might interfere with packet transmissions.

Computer setup

- Ensure **system date and time** are correctly set.

TNC setup

The TNC has to be set up manually. Remark: although a script would be preferable, Fremont ARES first has to create one – it isn't available at the moment.

Manual TNC setup

- Connect TNC to computer (COM1, 9600 bauds, 8–N–1)
- Open Outpost IPSerial (a program for direct communication with the TNC).
- Switch on TNC. In IPSerial, click “Connect”. A “cmd:” prompt should appear. If it doesn't: try to enter an asterisk “*” to set the baud rate of the device. In this case the TNC will ask you for your legal callsign.
- Enter command “day”. If the displayed date and time are not correct, enter “day YYMMDDhhmm” with YYMMDDhhmm = year, month, day, hour and minute of current time. *Remark: This will be overridden by Outpost with the computer system time, that is why it is important to check the system clock at setup.*
- Enter command “my mycall” with mycall being your **legal** callsign. You may but don't need to use an SSID, e.g. “-15”. *Remark: This will be overridden by Outpost with the legal callsign you enter there during program start.*
- Enter command “mya myalias” with myalias being your **tactical** callsign. You must not use any SSID here!
- **IMPORTANT:** Enter command “myp mymailbox-2” with mymailbox being your **tactical** callsign, with “-2” appended. **Do not forget** the “-2” here! Please refer to the Appendix where the tactical callsigns are defined.
- Enter command “BEA EVERY 0” to disable beacons.
- Logon to your BBS and make sure it is empty: “C mymailbox-2”, then follow the menu presented on screen.
- Close the IPserial program.

Outpost setup

Outpost must be set up as follows.

- Start Outpost PMM. Outpost starts showing the identification dialog (which later can be found and modified by going into the menu, Setup → Identification)
- Enter your own callsign with the correct SSID like “-3”. and your first name.
- Checkmark “Use tactical calls”, enter your tactical call (without any SSID like “-2”!) and a short description (short, because this text is transmitted over and over, taking a lot of air time!). Please look up your tactical callsign in the Appendix sections.

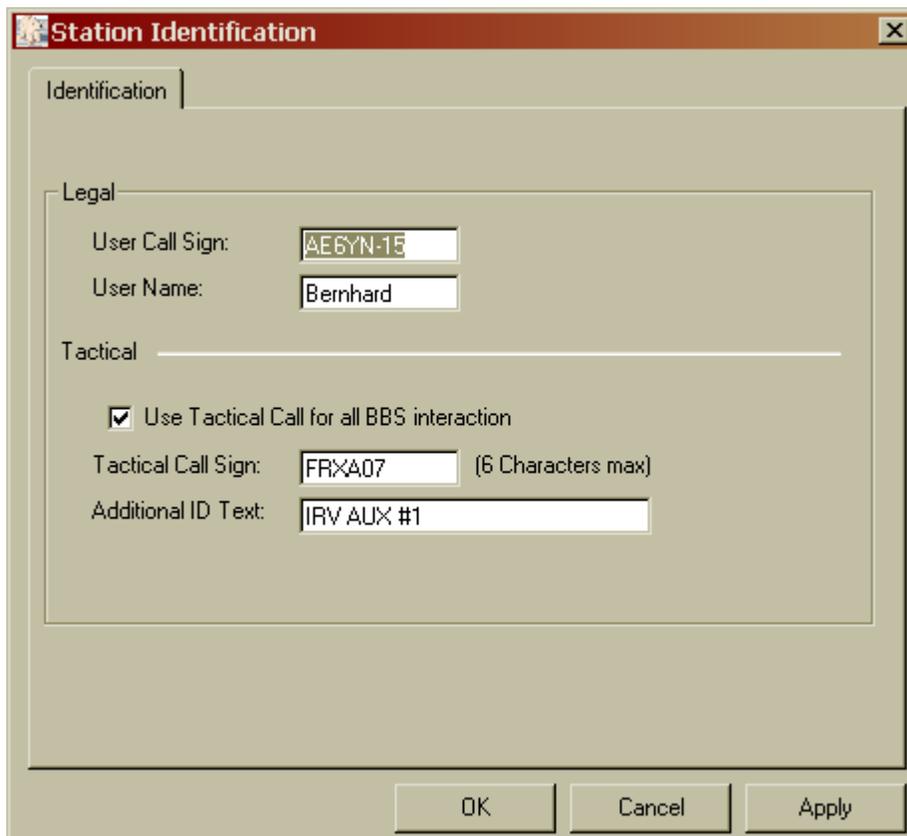


Figure: Station identification dialog at Outpost startup. Fill in your information as shown here. The “Additional ID text” must be as short as possible to save precious air time – this text is sent often. This example shows the identification for an Irvington auxiliary station.

Recommended TNC settings sent by Outpost as recommended in its documentation as follows:

```
Before SENDRETRIEVE
int term
streamev off
streamsw 0
lfadd off
mcon off
(retry 10; beacon every 0, ?)
(my, mya, myp)

after SENDRETRIEVE
(beacon every 30; btext FStn xy, ABC, TACCALL (MYCALL))
(my, mya, myp)
```

Additionally to do:

- Switch off bulletins except when asked for retrieving one.
- Clean out In Tray and Out Tray before starting new session..

Ics213mm setup

If ICS-213 forms are to be used (recommended), it needs to be enabled in Outpost.

These steps need to be done:

- In Outpost, go to the menu and select “Tools”, then “Message settings”.
- Select tab “Adv”.
- Ensure there is a checkmark set at “Automatically start OpDirect Message Capture System”.
- If that checkmark was missing and you had to add it, you need to restart Outpost.
- Along with outpost, another program “Opdirect MCS” is started. Do not close this program!

Create Message (non-ICS213)

You can connect to *Firedoc* by using the following steps:

- Go to menu, Setup → BBS and select FRFD-2.
- On main dialog, click “New” button.
- Write mail as displayed in screenshot below. Critical: “Bbs:” must carry the SSID (“-2”), “To:” must not. Please look up the required tactical callsigns in the Appendix.

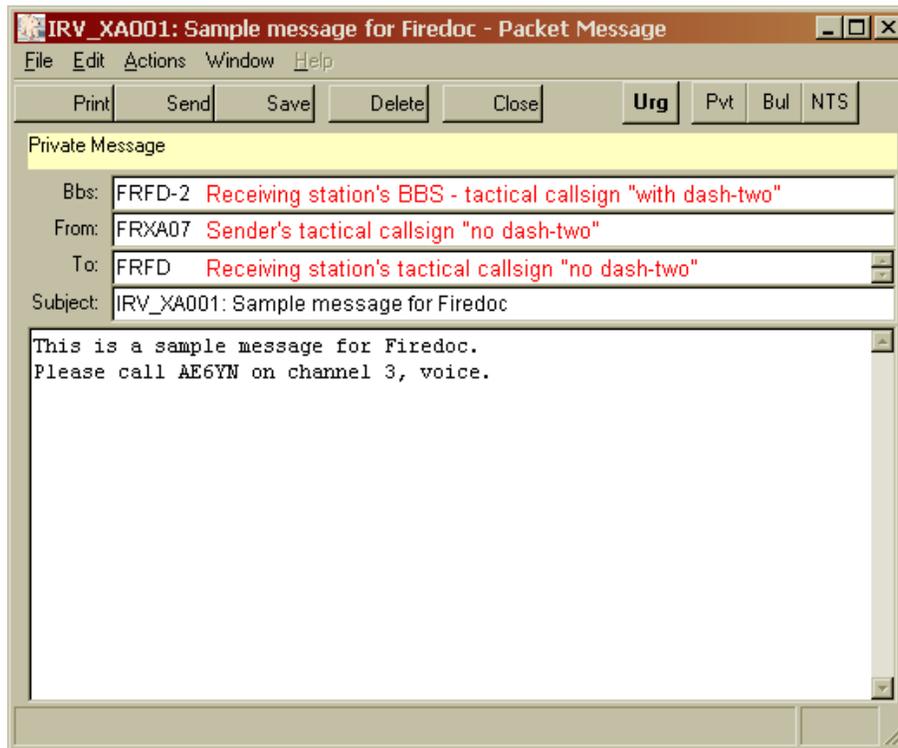


Figure: Outpost message. Fill out header like shown here.

*It is essential to use exclusively tactical callsigns, with the “-2” SSID only in the **Bbs line!***

IMPORTANT: use only tactical call signs! **Never use legal callsigns** here! (Outpost takes care automatically that your legal callsign is part of your transmissions – it is just transparent to the user.)

Reply to a Message

When replying to a message, cut the quoted text to the absolutely needed minimum to save air time. Also ensure that the message header is correct: when you reply to a message, the BBS is likely to be wrong – correct this before sending.

Send Message

Sending a message requires you to select a BBS first.

- Go into Outpost’s menu and select “Setup” → ”BBS...”.
- In the dialog which opens now, select the BBS you want to exchange messages with.
- If the BBS is too far away to be reached directly, ensure you have set a BBS Path (see corresponding tab).
- Close dialog and click the button “Send / Receive”. Your outbox will be flushed, and you will see any new message for you in the “InTray”.

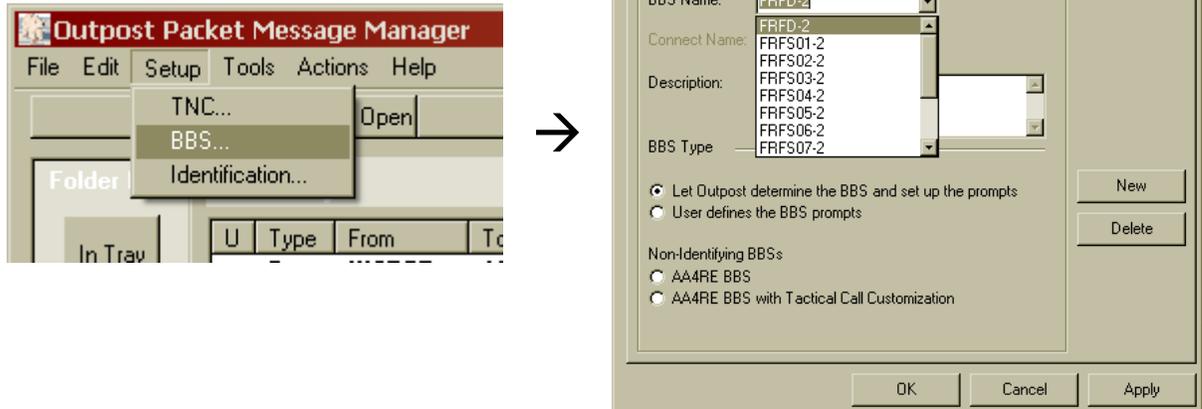


Figure: select a BBS and click OK. Here we select the Firedoc's BBS.

If the desired BBS address does not yet exist, create the BBS address as described below. Please look up the required tactical callsigns in the Appendix.

Use Digipeaters

Digipeaters are stations between you and the target BBS. If you cannot reach the addressee directly, you need to set up a link through one or more digipeating stations, which will relay your transmissions.

Select a BBS as described above, then select tab "BBS Path". There enter the list of stations in between you want to use.

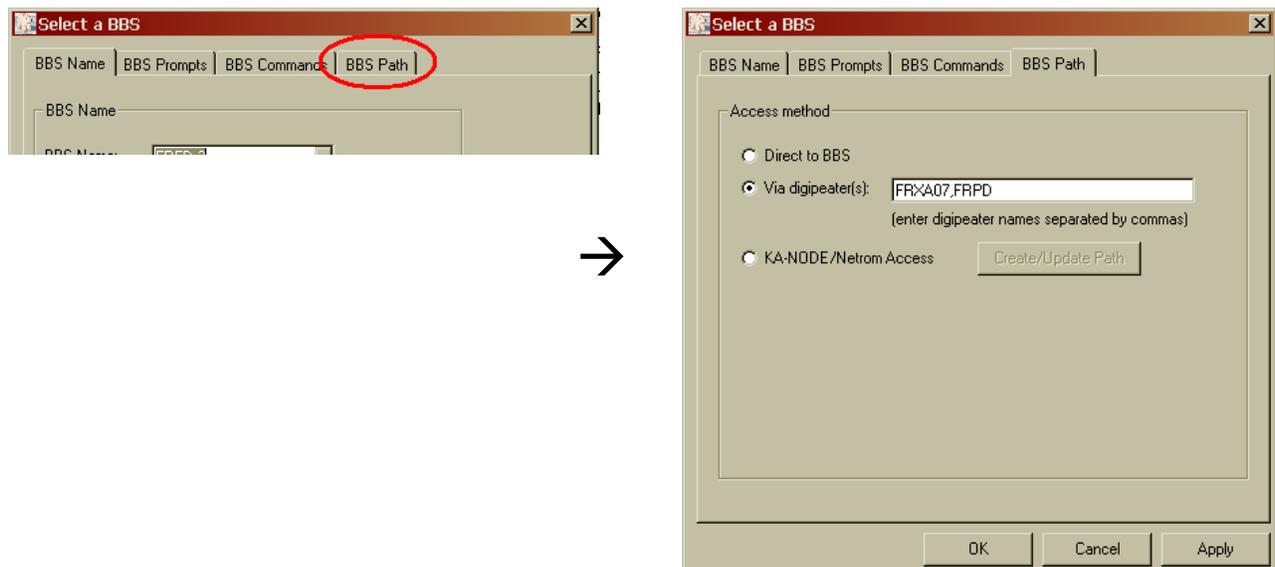


Figure: if you need a digipeater or more between you and the addressee, set the BBS Path accordingly. Enter the first station you can reach, then, separated by commas, the next one and so on. **Do not add the target BBS here.**

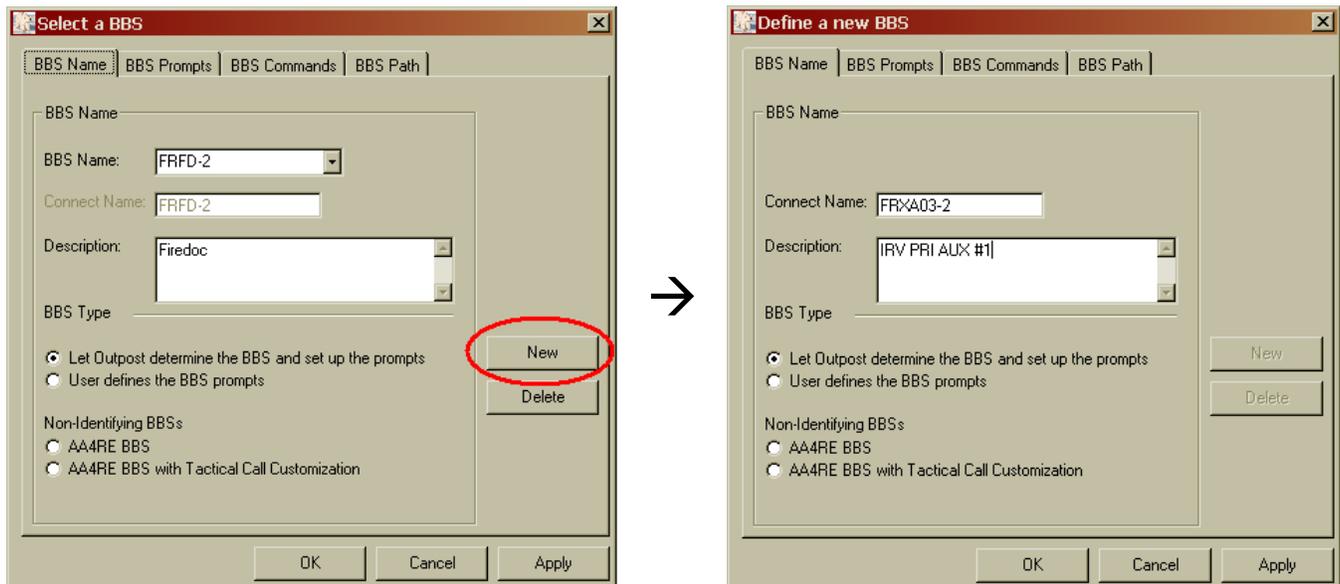
Look Into Own Mailbox

Looking into your own mailbox works exactly as described above – just use your own tactical BBS address. **Do not forget the SSID “-2”.**

Create New BBS Address

This step should be done before any drill or emergency takes place. Although it is very easy to set up a new destination BBS, it saves you time if that information is already available. – Please look up tactical call signs in the Appendix of this document.

- Go into Outpost’s menu and select “Setup” → ”BBS...”.
- Click onto the button “New” to create a new BBS entry.
- Enter the tactical callsign of your desired destination – **do not forget the SSID “-2”.**
- Add a **short** meaningful description, e.g. “IRV SEC” for FRFS07-2.
- If you cannot reach the destination BBS directly because the signal is too weak or not audible at all, you can use other stations in between you and the destination station as digipeaters. Just open the tab “BBS Path” add these stations comma-separated into the “Path” field. – See section “Use Digipeaters” above!



Figures: Create a new BBS entry. Do not forget the “-2” SSID! Click OK.

ICS-213 forms with the Ics213mm program

This chapter is quite short at the moment and will require some review. Here is just a quick introduction.

- Make sure the “OpDirect MCS” program is running. If it is not, please review the “Ics213mm setup” instructions listed at the beginning of this and restart the software.
- “OpDirect MCS” will run in the background, just leave the dialog minimized.
- Doubleclick onto the “Ics213mm” icon on the Windows desktop. A dialog opens, asking you for your identifier. You must accept the default “**LOCAL**”, or your setup won't work.

Important rule: this dialog does not accept any input before you clicked the “**New**” button on it. If you want to type a reply to a received ICS-213, you must click onto “**Reply**” first.

- Fill out the form as you would for a paper ICS-213. Make sure you fill out all fields.
- Click “Send”.
- The interface program will recognize within a short time that there's an ICS-213 waiting. It will transfer it to Outpost and open a new message for you. The ICS-213 contents have been converted into text format.
- Ensure that the three header lines in this Outpost message are correct and apply changes as needed.
- In Outpost, as usual select the mailbox you would like to send the ICS-213 form to (Setup/BBS).
- Click Send/Receive.

If an ICS-213 message for you arrived in your mailbox, OpDirect MCS will transfer it to the Ics213mm program and fill out an ICS-213 form. You can reply to it. There is only one reply to any ICS-213 form possible.

Appendix: Some specific background on Packet Radio

This chapter will not explain too much about what Packet Radio is, there's plenty to read about it in the Internet. Also have a look into the manual of your TNC. The questions and answers listed here were taken from a presentation held for the Tri-City ARES groups in 2012.

What is Packet Radio?

Method to send text or files over radio

Not very fast, commonly 1200 or (more complicated) 9600 baud, on HF only 300 baud

System of bulletin boards available

Network with addresses available

Packet repeaters (“**digipeaters**”) available

Why Packet Radio in Emergency Communications?

Packet Radio adds an important variant to emergency communications:

Packet Radio is superior if messages ...

... must be precise (e.g. list of names or medications etc.)

... need to stay more private

Packet Radio was used in the 1989 Bay Area quake primarily for H&W messages, after repeaters quickly got overloaded. That might happen again!

What's needed to do Packet radio?

A radio. Fremont currently uses 433 MHz for Packet, but is planning on moving to 222 MHz.

A computer, in our case laptops with Windows on it

As glue: one out of two possibilities

A terminal node controller (TNC). Requires that the computer has a serial port (a USB/Serial adapter can be used, preferably with FTDI chip which proved to be more reliable).

“AGWPE”, a software to let the computer soundcard do the packet encoding and decoding. Requires a more complicated software setup and a soundcard.

Some additional parts, e.g. USB/Serial adapter with FTDI chip

What is an “SSID”?

To be able to use multiple stations with one call sign, the callsign of it carries a **S**econdary **S**tation **I**dentifier, the “SSID”.

Examples:

KI6EGL-15 - Mikes 16th PR channel

NWFS28-2 - Newark firestation #28, 3rd channel (*that's a tactical call!*)

KI6SEJ - Scotts 1st channel (no SSID)

Either use no SSID or any SSID between 1 and 15.

The Terminal Node Controller (TNC)

Fremont ARES uses TNCs, reducing complications with software setups.

A state-of-the-art TNC understands a list of commands, has a **mailbox** where other users can leave messages, and contains all the electronics to feed the radio with signals generated from digital data.

The two most important basic commands to a TNC are:

c (**connect**): connect to another station. Examples:

c wy6p connects to Greg's PR station

c frpd connects to the station at the Fremont Police Department (*that's a tactical call!*)

d (**disconnect**): disconnect from current station (just enter “d”)

The TNC and its mailbox

A TNC like the Kantronics KPC-3(+) can serve two addresses:

One for direct communications (“keyboard-to-keyboard” or repeating for other stations - “digipeating”)

One for its mailbox (also known as “BBS”, “bulletin board system”)

Fremont ARES established this **standard rule**:

No SSID (“FRFS03”) for direct / digipeating

SSID “-2” (“NWFS28-2”) for mailboxes

Digipeaters

Any packet station can serve as repeater connecting stations which can't hear each other directly. This is called “**digipeating**”, the stations connect “**via**” the digipeater(s). Example:

```
c n3ckf-2 via ae6yn,frpd
```

connects to Joes mailbox, going through the stations at Bernhards place and Fremont PD (in that order, you connect to ae6yn, ae6yn connects to frpd, frpd connects to n3ckf-2)

You can use tactical calls in Packet, as long as it is ensured that the legal call accompanies it

Tactical calls can be up to six alphanumeric characters

Fremont adopted this system for its tactical calls:

1st 2 characters: city (FR, NW, UC)

2nd 2 characters: location (FS, PD, EC, XA, ...)

3rd 2 characters: number (e.g. FS number)

Appendix: Tactical callsign format

Our tactical callsigns are up to six characters long, the first two letters indicating the city, the second two letters naming the purpose and the last two digits are an optional ID.

Cities:

FR	Fremont
NW	Newark
UC	Union City
AC	Alameda County

Purpose:

EC	Firedoc
PD	Police Department
RV	Rover
FS	Firestation (followed by a two digit ID)
Xn	with “n” being A...Z for Auxiliary stations (followed by a two digit ID)

Identification number (optional)

For FS the number is the firestation’s number.

For XA, XB, ..., the number indicates the closest firestation.

Appendix: Considerations

Packet radio is a very useful tool, adding to the communication requirements during a disaster. However there are a few things which must always be taken into account.

- Packet radio is slow. Avoid long or unnecessary messages.
- Packet radio is slow. Avoid bulletin messages (i.e. messages going to everybody).
- Packet radio is slow. Avoid using digipeaters if you can – it blocks the digipeating stations and the frequency.
- Packet radio is slow. Avoid unreliable links.

If you have to choose between an unstable link and a digipeater, choose the digipeater.

Practice using the described setup whenever you have the chance: that keeps you from forgetting the important rules.

Appendix: List of tactical calls

It is essential that both the TNC and Outpost are configured correctly. Misconfigured stations may not work or create confusion. (*) Legal calls: status 27-Oct-2009. **You should program all tactical BBS calls listed here into Outpost before first usage:** this makes it easier to use in crunch times. See section “System Usage”.

Main Stations – Radios set up at firestations, EOC station, PD station, Rover station

Tactical call	BBS	ID	Legal call (*)	Location	Up 24/7
FRPD	FRPD-2	PD	KD6LMQ (Steve)	Fremont police department	Yes
FREC	FREC-2	FDOC	WA6AWI (Mike)	Fremont Fire Doc (EOC)	No
FRFS01	FRFS01-2	CEN	N3CKF (Joe)	Centerville, primary	Yes
FRFS02	FRFS02-2	NIL	K6VUG (Umesh)	Niles, primary	Tu, Sa, Su 1700-2100
FRFS03	FRFS03-2	IRV	AE6YN (Bernhard)	Irvington, primary	No
FRFS04	FRFS04-2	MSJ	KI6QWB (William)	Mission San Jose, primary	No
FRFS05	FRFS05-2	WSP		Warm Springs, primary	No
FRFS06	FRFS06-2	CEN	KG6IOB (Dan)	Centerville, secondary	Yes
FRFS07	FRFS07-2	IRV		Irvington, secondary	No
FRFS08	FRFS08-2	ARD	W1BMS (Bruce)	Ardenwood, secondary	No
FRFS09	FRFS09-2	MSJ	K6VUG (Umesh)	Mission San Jose	No
FRFS10	FRFS10-2	ARD	KG6QKZ (Roger)	Ardenwood, primary	No
FRRV01	FRRV01-2	EC	WO6U (Jeff)	Fremont EC Roving Setup	No
NWxxxx	NWxxxx-2	Newark			
UCxxxx	UCxxxx-2	Union City			
ACxxxx	ACxxxx	Alameda County			

Auxiliary Stations – private stations. Last two digits indicate closest firestation

Tactical call	BBS	Legal call (*)	Location	Up 24/7
FRXA01	FRXA01-2	KI6SEJ (Scott)	Close to firestation 01	No
FRXB01	FRXB01-2	KI6TCE (Jim)	Close to firestation 01	No
FRXA05	FRXA05-2	KD6LMQ (Steve)	Close to firestation 05	No
FRXA03	FRXA03-2	AE6YN-15 (Bernhard)	Close to firestation 03	Planned
FRXA10	FRXA10-2	KG6SJM (Steve)	Close to firestation 10	No

Unassigned yet

		Legal call (*)	Location	Up 24/7
		K6QDS (Bill)	CEN	No
		KA6S (Steve)		No
		KB8UYR (Brad)	WSP	No
		KI6SFC (Ron)	WSP	No
		KG6IOB (Dan)	CEN	No
		KI6KGN (Trevor)		No

Appendix: Setup Theory

It is important that both TNC and Outpost are set up correctly in order to prevent malfunction and confusion. This section explains what happens behind the user interface and tells you why we are using the setup specified in this document.

Rules:

- We are using exclusively **tactical** call signs. This has the advantage that callsigns will not change when the operator changes.
- The **legal** callsign is entered only one time, when you start Outpost. Outpost takes care that your legal callsign is transmitted along with your messages – this is completely transparent to you, the Outpost operator.

Nomenclature:

- **Station:** the TNC address. It will receive the operators legal callsign (TNC command: MYCALL) and a tactical callsign (TNC command MYALIAS) when the Outpost program is started.
- **BBS:** the station’s mailbox. The BBS must receive a different tactical call than the station, otherwise the TNC gets confused: it does not know whether it is supposed to drop packets in the mailbox or whether it needs to relay them to other stations.

For this reason, three call signs are required to run Tri-City Emergency Packet stations:

- The **legal callsign** (e.g. AE6YN, K6VUG-9, etc.). This callsign may have a so-called SSID attached, allowing an operator to run more than one packet station at one time (AE6YN, AE6YN-1, AE6YN-2, etc.)
- **The Station tactical callsign.** This callsign **must not** have any SSID attached.
- The **BBS tactical callsign.** This is the call sign of the mailbox assigned to the station. It uses the same tactical callsign like the station, but **must use the SSID “-2”**, e.g. FRFS03-2, FREC-2, FRRV-2.

See the appendix about the format for tactical callsigns below.

As a result you need to keep two things in mind:

- **If you want to send a message to a station**, you need to address it to the station’s tactical callsign (To: FREC), but you need to drop it in the station’s mailbox (BBS: FREC-2). Use your tactical station callsign for the “From:” line.

<i>A) Correct</i>	<i>B) Will fail</i>	<i>C) Will fail</i>	<i>D) Bad style</i>
Bbs: FREC-2 From: FRFS10 To: FREC	Bbs: FREC-2 From: FRFS05 To: WA6AWI	Bbs: N3CKF-2 From: FRFS03 To: FREC	Bbs: FREC-2 From: AE6YN To: FRFD

A): Correct way of filling out message header: **always use tactical callsigns.**

B) Never send messages to the legal callsign of a station – the message cannot be opened at the destination!

C) The message cannot be delivered, the destination station does not know any mailbox N3CKF-2 and will not accept the message.

D) The message will arrive and can be read, but a reply will fail: it would be sent to AE6YN and not the tactical callsign FRFS03.

- **If you want to use another station as digipeater** (repeater between you and the destination), you must use the stations tactical call sign, not the BBS tactical call sign.

Appendix: Links

Download of the Outpost package:

<http://www.outpostpm.org>

Role of Packet Radio during the Loma Prieta earthquake: <http://www.wolfswords.com/packet/>, “Emergencies” texts