

Building a Shelter Information Distribution System Independent of Normal Telecommunications Systems



by Gordon Gibby

After action review of the Alachua County response to Hurricane Irma revealed a significant need for methods to get information out to hundreds, or thousands of county shelter residents. With several hundred people to a shelter, and running 13 shelters, it proved difficult to keep information flowing --- and almost impossible if hurricane-force winds were to take out grid power, cell towers, internet and other resources.

Yet these days, almost every person in a temporary shelter has a working cell phone – a SCREEN on which information can be viewed. The problem is how to get information to those screens if normal systems quit.

I concluded that a workable solution would be to use a raspberry-pi-based Web Server, driving a standard home consumer WIFI router. This could be given the SSID of “Shelter-A” etc., operate from storage batteries, and be pre-loaded with all manner of useful background information --- and get storm updates and other essential information via 2-meter packet and/or WINLINK to shelter ham radio volunteers, who would then use either batch-file or graphical FTP techniques to upload new html content.



Alachua County Amateur Radio Emergency Service &
Gainesville Amateur Radio Society
Shelter Web News & Information



[EOC Information](#)

[Amateur Radio Information](#)



*Opening Screen Users might see when accessing
our standalone web system on a cell phone.*



Communications Office - Media Release

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Alachua County has opened five new emergency shelters for people evacuating from Hurricane Irma, including Eastside High School, High Springs Community School, Oak View Middle School, Talbot Elementary, and Westwood Middle School (Special Needs Shelter).

[View a complete list of shelters in Alachua County \(with addresses, shelter type, and an interactive map\).](#)

There is a mandatory evacuation notice for anyone living in mobile homes, manufactured homes, recreational vehicles, or homes, which may not withstand hurricane force winds and those in flood prone areas. Please evacuate as quickly as possible.

These residents must evacuate and stay with friends, family, or in a hotel. Those considering using the emergency shelters, please remember that shelters are a choice of last resort.

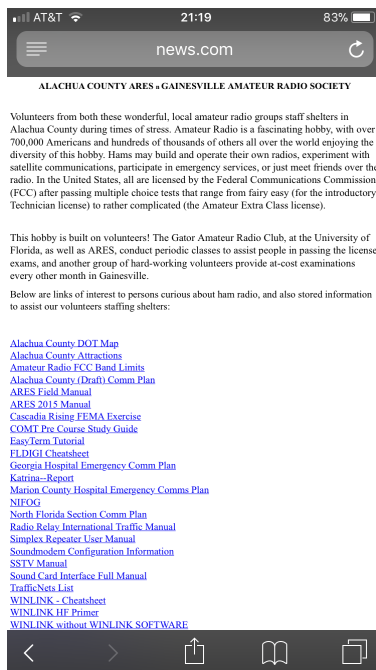
All shelters are on a first come first served basis.

General population shelters do not provide cots or beds. Bring any needed bedding. When packing to go to a shelter, please bring special dietary foods, baby food, diapers (and other child necessities), prescription medications, a small cooler of ice if refrigeration is needed as the shelter cannot be responsible for your medications. Also bring



*Hurricane Update users might find on a standalone shelter
information system driven by ham radio.*

Graphics, maps, normal schedules, ICS forms, instruction sheets, first aid information – almost an encyclopedia – could be preloaded onto the huge micro-SD card of the Raspberry. County EOC headers and other graphics that are customary (and unchanging) in their press releases could be preloaded as well. Then simple text-type .html files could allow them to have an up-to-date current status always available on the shelter backup web server for viewing by residents.



*Ham radio operators might have access to a plethora of stored files
– frequency charts – instruction manuals and other valuable sources.*

Shelter hams could receive error-free updates to the text .html file using any of a number of methods;

- Winlink email attachments
- Easyterm packet YAPP file transfer protocol
- NBEMS

I can easily copy a microSD card for ARES groups who wish to try this out and have lesser familiarity with Linux and Raspberry pi's.

An explanation of how the networking for this system works:

The Raspberry Pi carries out the functions of an Internet Service Provider:

- It establishes its own IP number as 10.0.0.1
- It provides DNS services to downstream devices and associates the names hamradioband.com

and www.hamradioband.com with the same IP number (its own) 10.0.0.1

- When it detects that a wifi router has made an ethernet cable connection to it it provides it a new IP number on its ethernet connection, in the 10.0.0.x network. It also provides DNS services to the router. More than one router can be connected (using a switch) to the Raspberry and all will be treated appropriately.

Each consumer wifi router than fields a WIFI-based network, on a network such as 192.168.1.X, providing network address translation to the IP number that it received from the Raspberry, and thus passings requests from users to the Raspberry pi for pages to be served.

It is suggested that the consumer wifi routers be set up as follows;

1. Provide a password on administrative changes to the router that only you know.
2. Make the router provide a distinctive SSID such as “SHELTER-A” or similar.
3. Make the router allow users to connect without any passphrase or password.

As mentioned earlier, I'll be happy to build you a chip for your Raspberry version 3 if you contact me and send me a blank chip. You can then copy the chip as you need. Or you can build the entire Raspberry Pi system yourself in a matter of an hour. The details of the technical development of this system are as follows:

Start with a standard Raspberry Pi version 3 with Raspbian version of the linux operating system installed. You'll need a few hundred megabytes of free space at a minimum; I recommend a 16Gbyte microSD card.

- CHANGE the default password of user pi, to be something unique and write it down so you don't lose it.
- CHANGE the default password of user root some be something unique and fairly secure, and write it down so you don't lose it!!!! If you lose that password...the entire system is basically junk.

Now open a terminal window as user pi, and execute the following to update your system's package list.

```
sudo apt-get update
```

You will want to have secure shell access so that you can remotely control the Raspberry pi using a secure connection (“secure shell”) sshd The explanation of how to do this can be read here: <https://www.raspberrypi.org/documentation/remote-access/ssh/>

I would strongly suggest that you move the sshd access port from its well-known port of 22, to a

different port, such as 9512. Otherwise, your system, if ever left connected to the internet for any length of time, will be attacked by “bots” who will try passwords forever in an attempt to enter your system. You change the port in this file:

```
/etc/ssh/sshd_config
```

(Look for the line Port 22) When you install your firewall (ufw, see later in this document), be certain that you provide sshd access through the proper port number – has to be the same one you put in sshd_config!

The following URL give information on installing the Apache web server:

<https://maker.pro/projects/raspberry-pi/raspberry-pi-web-server> My instructions are close to theirs.

```
sudo apt-get install apache2 apache2-doc apache2-utils
```

```
sudo apt-get install libapache2-mod-php5 php5 php-pear php5-xcache
```

Your web files will go in the subdirectory /var/www/html --- and you can add additional subdirectories below that to better organize your files. Be certain that you edit and provide index.html

Your raspberry pi must provide DNS and DHCP services to the standard home wifi router that connects to it, and expects it to “act like an Internet Service Provider.”

```
sudo apt-get install dnsmasq
```

Become root (sudo root, and provide the proper password) – then

edit /etc/network/interfaces so it shows:

```
auto eth0
iface eth0 inet static
address 10.0.0.1
netmask 255.255.255.0
```

Then add the following lines to /etc/dhcpd.conf (note carefully that file's spelling!)

```
interface eth0
static ip_address=10.0.0.1/24
static domain_name_servers=10.0.0.1
```

Edit file /etc/hosts.dnsmasq to have a couple lines like this:

```
10.0.0.1 hamradioband.com
10.0.0.1 www.hamradioband.com
```

NOTE: to guarantee that I wouldn't cause problems if anyone accidentally connected this system to the real internet....I purchased the domain name hamradioband.com for 2018 and 2019. Any ARES group is welcome to use that domain name in this system....it isn't mapped anywhere else...

Now your system will come up, respond to the name www.hamradioband.com and the ip number 10.0.0.1, provide an IP number in the 10.0.0.x net to router(s) that connect to it (you can power more than one router from this!) and provide web pages.

Now we need a way for you to upload new pages over FTP. In this case I wish to have a user named ARESHAM have access to the base directory of the server, password bossham ; and I wish to have a user upload have access to a subdirectory /EOC of the web server, with password EOC

The URL <https://www.raspberrypi.org/documentation/remote-access/ftp.md> will help you install pureftp

```
sudo apt-get install pure-ftpd
sudo groupadd ftpgroup
sudo useradd ftpuser -g ftpgroup -s /sbin/nologin -d /dev/null
```

Set up a user upload whose files will go to /home/pi/FTP but show up under <http://hamradioband.com/EOC>

```
sudo mkdir /home/pi/FTP
sudo chown -R ftpuser:ftpgroup /home/pi/FTP
sudo pure-pw useradd upload -u ftpuser -g ftpgroup -d /home/pi/FTP -m
sudo pure-pw mkdb
```

Set up a user ARESHAM whose files will go to /home/pi/FTP but show up under <http://hamradioband.com/EOC>

```
sudo mkdir /home/pi/ARESHAM
sudo chown -R ftpuser:ftpgroup /home/pi/ARESHAM
sudo pure-pw useradd ARESHAM -u ftpuser -g ftpgroup -d /home/pi/ARESHAM
```

```
sudo pure-pw mkdb
```

As root, create symbolic links that will put material uploaded into these two directories onto the Apache web server's files.

```
ln -s /home/pi/ARESHAM /var/www/html
ln -s /home/pi/FTP /var/www/html/EOC
```

User	purpose	password	home directory for ftp uploads	where their material shows up on the web server
ARESHAM	ham ownership of the server	bossham	/home/pi/ARESHAM	http://hamradioband.com/
upload	EOC pages to be uploaded	EOC	/home/pi/FTP	http://hamradioband.com

Material can be easily uploaded using a free ftp graphical program such as CoffeeCupFTP, or even with Windows 10 command-line ftp commands. If you use batch files (.bat) to upload files, you'll need two files, as the first will merely start the ftp process and refer to the 2nd for username/password entry and further details. As an example:

As root, edit the file **/etc/hosts.allow** so that only certain types of access are allowed into your system:

```
ALL: 192.168.
ALL: 10.0.0.
sshd: ALL
```

This allows your or others connected via your WIFI routers to have relatively unlimited access to your system, but if it is connected to the real internet.....ONLY the ssh access is allowed.

Now add a firewall to the system

```
sudo apt-get install ufw
sudo ufw allow 9512/tcp
sudo ufw allow 8080/tcp
```

```
sudo ufw allow 80/tcp
sudo ufw allow ftp
sudo ufw allow dns

sudo ufw enable
```

Note earlier in this document, we moved sshd to operate on port 9512 .

In order to check the status of the firewall,

```
sudo ufw status
```

That should do it! Your system should function properly!