Pi-star

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About Pi-star

Pi-star is a system of pre-packaged software and firmware that permits a Hotspot to be implemented on a Raspberry Pi (software) and ARM-based controller of an Analog Devices 7021 RF modem (firmware). Pi-star permits many of the Hotspot functions to be performed via a web interface. The Pi-star group provides the web interfaces, integration, and package distribution services. The radio modem firmware, gateway software, and hardware are provided by others.

Pi-star Main Page

Note that the Pi-star page is 100% useless when it comes to documentation. It’s more or a “Look at us, this stuff is great” page and less about setup and use. Fortunately, KE0FHS has undertaken to provide instructions on how to set up and use Pi-star. I highly recommend those pages and you can find them here:

Playing With Pi-Star

Learning to Live with Pi-star

At some point the playing is over and you want to get Pi-star to actually work. For this discussion, I’m going to assume you are using the ZumSpot available from Ham Radio Outlet. Note that I’m not an expert on all hotspots. I focused on the ZumSpot since many people were purchasing it because of the availability through HRO.

I am responsible for Bridging the MNWis Room to the Hotspot networks. I, and others, started to notice a lot of problems.

Traffic from the Hotspot networks were causing issues with WiRES-X. To track down these problems I ended up purchasing a ZumSpot and started work on reverse engineering the code.

I'll leave the details for later, but here are the things you need to know:

- The AD7021 RF Modem (radio) chip is not a very good radio. It's meant to be cheap, and it is – about $2. It has poor sensitivity, very poor decoding of the digital RF stream, and acts like a giant mixer when connected to an antenna. (Never, never, NEVER EVER connect a hotspot to a real antenna!!)
- The firmware that runs the RF Modem has a number of design errors. It does not enable AFC (Automatic Frequency Control) and it does not properly calibrate the IF section. The bottom line is that the these hotspots will be very, very, VERY sensitive to frequency. You must be within 200 Hz. That's 200 Hz at 440 MHz!!!!! Insane!!!! You must monitor the BER (Bit Error Rate) and fiddle with the frequency until it is acceptable (less than 1%). If you use a different radio YOU WILL NEED TO ADJUST THE FREQUENCY AGAIN!!! Yaesu makes fine radios, but I'll guarantee you that no manufacturer produces UHF radios that can stay within 200 Hz!
- The firmware and software is out of date. The ZumSpot I bought from HRO had firmware and software that was about a year old. Update DOES NOT update the software or firmware. It updates the host and other files related to the web interface. You must go to the EXPERT panel and perform an UPGRADE. However the upgrade process is broken. You must keep performing upgrades until it doesn't upgrade any more. (I had to do it 5 times.) Even with that UPGRADE DOES NOT TOUCH THE FIRMWARE!!!! You have to enter a command line command to update the firmware. Even if

Upgrade and Update tell you you are up-to-date, your firmware may be out of date.

- Due to an error in the firmware, 2 meters will not work. Even if your hardware is designed to work on 2 meters, the firmware does not select a lower frequency VCO (Voltage Controlled Oscillator) when operating on 2 meters. The result is, if it works at all, it will be way off frequency!
- The OpenSpot2 from SharkRF isn't perfect either. The RF range seems to be very limited due to the low-cost PCB/PCB-mount antennas.

There are some very clever things that Pi-star does do. Setting up the WiFi is very clever. There are a lot of really nice features. My complaint is that it is not quite ready for "prime time". If you want plug-and-play, this is not it. There will be problems. And maybe, someday, it will become much better.

For those of you who do not operate a WiRES-X node (I operate three of them), I can say that WiRES-X does work extremely well. Nothing will ever work better on WiRES-X than an official Yaesu WiRES-X node. Fortunately that is becoming easier with the availability of the Mobile Digital operation where an FT2D HT (and eventually the FTM-100 and FTM-400) can be plugged directly into a PC running the WiRES-X software.

Please!!!

One last note. Please don't contact me for help with your Hotspot. I'm working to generally improve the "Hotspot Experience", but I don't have time beyond the information that is presented here.