A High-Speed Go-Kit for Mesh Networking

This plug-and-play kit allows for increased portable capabilities.

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A mesh networking system works off several nodes wirelessly connected to one another. The infrastructure nodes, such as bridges and switches, are connected to as many other nodes as possible, cooperating with one another to route data. Because the nodes are connected in a non-linear pattern, if one module can't relay information to another, it'll try another route. Some benefits of mesh networks include better coverage, the minimization of dead zones, easy configuration, and less connection failure.

I've created a high-speed go-kit for mesh networking. The whole system has been fabricated in the typical go-kit packaging of a plastic ammo box. Considerable thought has been given to equipment selection, with a focus on a plug-and-play approach to both the construction and the actual use when deployed.

Figure 1 — External ports must be included in your mesh network go-kit for use in the field.

Gathering Equipment

After selecting your mesh radio and updating to the current Amateur Radio Emergency Data Network (AREDN) code, you'll need to consider a support system of power supply, Ethernet hardware, power over Ethernet (POE) injectors, analog telephone adapter, and cabling it all together for an operational node.

The kit should have specific features, such as portability; on-board ac and external dc power; ruggedness for field use; easy set-up and take-down; and support for a Voice over Internet Protocol (VoIP) phone, internet protocol (IP) camera, and an access point. The power supply must be capable of supplying the needed current. All the dc connections on the Ethernet switch, phone adapter, and POE injectors must be the same 2.1-millimeter coaxial connectors. Additionally, the kit must have all ports available on the outside for use in the field (see Figure 1).

Figure 2 — For a secure base, install the power supply through a hole on the bottom of the box with a hose clamp. Notice that the data jack plate is installed.

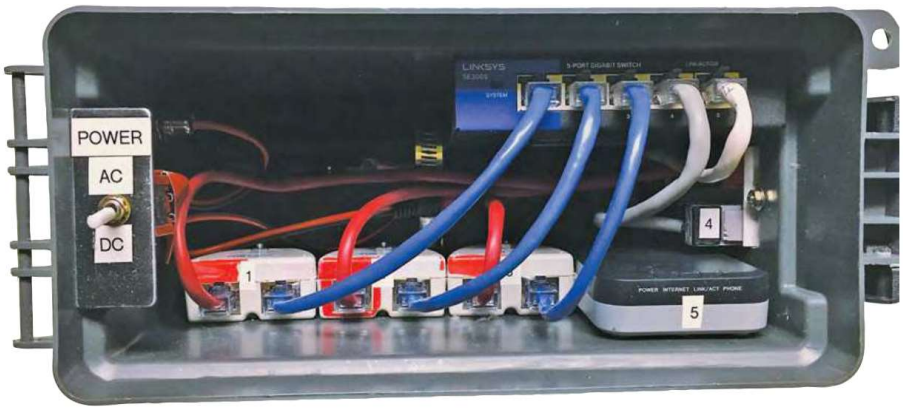

Figure 3 — The red cables are for the POE injectors and the blue cables are for the data connections. Note that there are port numbers on the hardware.

Power Supply System

A small security system provides a nice power supply designed to support a digital video recorder (DVR) and cameras. This supply comes with a spider box (portable power distribution system) that, depending on the model, has a number of 2.1-millimeter coaxial connectors.

This power supply has an integrated ac supply jack and a single connector feeding the spider distribution harness, making the addition of a single-pole double-throw (SPDT) switch a simple fix for an external dc source. You will also want to add an external dc connector. I used a 2.1-millimeter connector, but Molex Electronic Solutions or Power-Pole connectors would also work. There may be some unused power connectors.

Installing the power supply through a hole in the side on the bottom of the box with a hose clamp creates a secure base. Note that the openings will be sealed with clear silicone once construction is complete (see Figure 2).

Ethernet Switch and Telephone Adapter

Many versions of an unmanaged five-port switch are available. Be sure to select one that's 12 V and has a 2.1-millimeter dc connector. I prefer one that has the lights on the front and the connectors on the back, but any configuration will work.

The analog telephone adapter comes in many versions as well. Any that physically fit and have the 2.1-millimeter dc jack will be fine. Be sure to note that even though the output jack on the telephone adapter is a six-pin jack, only the middle two pins are used for the tip and ring.

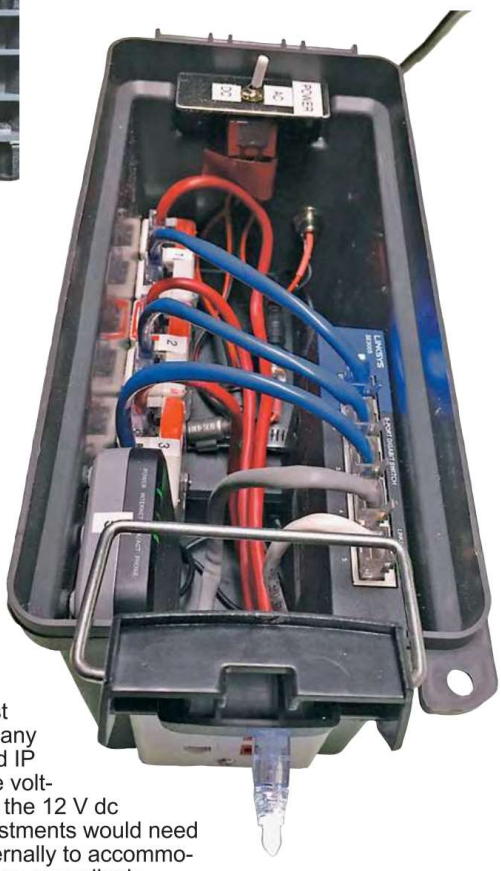

Figure 4 — A bright LED light was installed on a connector to test the red jacks. Many mesh radios and IP cameras require voltages other than the 12 V dc used here. Adjustments would need to be made externally to accommodate the hardware accordingly.

When installing the units, be sure to connect the dc cables as you install the hardware. I found hook-and-loop fastener with adhesive backing to be the ideal mounting solution for the switch and adapter.

Power over Ethernet Injectors

Again, many versions are available for this aspect of the build. The only consideration here is the 2.1-millimeter dc jack. On the injectors used here, I found that removing the screw holding the two case halves together allowed me to drill a ⅛-inch hole, which made mounting to the side of the case much easier. The white and gray cables should be in place at this point.

The external jacks are mounted on a standard data jack face plate, which allows you to choose a color code for the function of the jacks. I used red for POE, gray for the PC, and white for the phone. I used the normal punch down jacks and built my own cables,

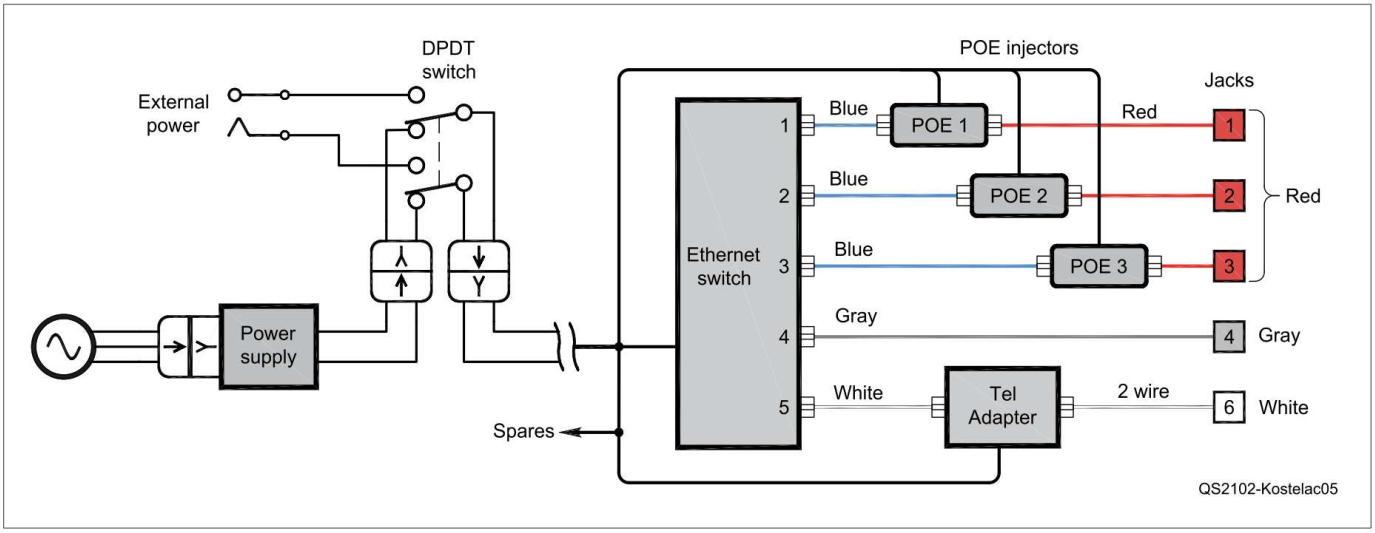

Figure 5 — The schematic for the go-kit.

but you may want to use couplers in the holes on the plate and purchase short cables. I don't recommend building your own cables unless you have a tester available.

To complete construction, I used a red cable for the POE injectors and a blue cable for the data connections (see Figure 3).

Testing Your Work

Now that the build is complete, you'll want to turn on your go-kit and check for the presence of lights and absence of smoke. When testing the POE injectors, I took a bright LED light and installed it on a connector for testing the red jacks (see Figure 4).

Frank Kostelac, N7ZEV, earned his license in 1992, and is active in amateur television (ATV), Automatic Packet Reporting Systems (APRS), and HF and satellite communications. He enjoys creating things related to any form of RF communications and operating in the outback whenever possible. Frank serves as Nevada Section Technical Coordinator and is the COML for Clark County, Nevada, ARES Races. He can be reached at **frank@kostelac.com**.

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New Products

SSB-Electronic Germany SP 400 Low-Noise 70 MHz Preamplifier

SSB-Electronic in Germany has announced their new SP 400 mast preamplifier for the 4-meter band. When using sequence control, the maximum transmission power is 750 W PEP and 400 W CW/FM/WSJT. The preamplifier can be powered remotely via the coax cable through its output and supply voltage. The preamplifier is low-noise and has a coax relay for transmit/receive switching. For more details or to purchase, contact **sales@ssb-electronic.com** or visit **www.ssb.de**.

TurboLog 4.17 Update Now Available

TurboLog Communications has released TurboLog 4.17, the latest update of this station management program, which is immediately available on the TurboLog website. Some of the new features include real-time logging directly into Club Log; automatic feeding of contact information into the online QSL request system, OQRS; a progressive logbook search feature; WebHelp and Manual upgrades to the context-sensitive online help; new transceiver models have been included, and specific new features have been implemented in the code. For example, Power ON/OFF from within TurboLog 4 can now be commanded via the CAT interface, the Packet facility has been enhanced by specific alarm functions and displays, and the embedded *WSJT-X* and *JTDX* plug-ins have been improved. The full range of new features is presented at **http://www.turbolog.de**.