Pepwave Surf OTG Test Report

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The Pepwave Surf OTG (firmware level 1.0.13, OTG stands for "On The Go") is a combination of cellular router and wifi repeater intended for the mobile market. In technical characteristics and form-factor it is closest to the Cradlepoint CTR 35, but actually performs better than the Cradlepoint. The street price hovers around $100. There is a complete review of the feature set on the 3GStore website, so I am not going to cover all the configuration and features here. This will be more a critique and performance report. If you are looking for a mobile router that does a little bit of everything hopefully this report will provide some selection guidance.

For the RVer, or other mobile "road warrior" having constant Internet connection is a challenge. Having a device like the OTG that can handle many different connection types, and is compact and easy to configure is a major benefit – it certainly makes your life simpler. Until the last year or so, to cover all the connection methods (wifi hotspot, hardwire, and cellular modem) required not only multiple devices, but a level of technical understanding to accomplish configuration that many people simply could not cope with. Devices like the Pepwave Surf OTG, the newer generation of Cradlepoint routers, and the WiFiRanger portable router claim to provide "all in one" connectivity with simple configuration. Most of these deliver on their promise technically, but have proven to be challenging for the non-technical user to configure. It is always a tradeoff between making all features available, and creating a configuration interface that is manageable for a networking novice. As more experience is gained by the manufacturers the interfaces have gotten better. Until now, the WiFiRanger has provided the easiest interface for most people – but the OTG is now challenging the WFR in ease of use.

The idea with any of these routers is to present **one** network to all your client devices that never changes – even though the method of connecting to the Internet may change from WiFi to cellular aircard. This has the advantage of not requiring configuration changes in each client device as you move locations and the Internet connection changes. And it also means that with the more powerful radio and antenna that you can get a reliable signal in places your separate devices cannot.

The OTG is relatively small, being 3.5" square and about an inch thick when mounted. It has a 5 dbi omni antenna that can be positioned horizontally or vertically. It has a 100 mW WiFi radio – which is far better than most laptop radios, but not as powerful as some other dedicated WiFi devices. Note: the OTG also has a 50 mW 5Ghz band capability. I'm not going to discuss that here, since this review is of "conventional" WiFi capabilities. Most parks do not have APs broadcasting on 5Ghz, but it might be something to consider if you are building your own network at 5Ghz. The only other device like this that I know has this capability is the Cradlepoint 1400.

 In the mobile environment the OTG it is often mounted on a window. Why mount on a window, instead of putting it in a cabinet? Because one of the major benefits of the device is its ability to pick up a WiFi hotspot and repeat it on a local wireless network that you control. To do that it needs the best LOS (line

of sight) to the hotspot (Access Point) that it can get – so mounting it with the provided suction cups to the inside of a window in the RV is a typical setup. Of course, you will move it to the window with the best "view" of the AP as your location changes. If you use it in a car or smaller vehicle than an RV, you might find it satisfactory to just set it up in one location permanently, but in a typical RV park environment with weak WiFi signals you will move it to enhance the signal acquisition. This is an indoor device – you cannot mount it outside without very good weather protection. If you need an outside device there are far better solutions than the OTG.

So, what can it really do?

- Pick up a WiFi hotspot signal from fairly far away and use that to connect your local network to the Internet.
- Use your 3G or 4G cellular modem to connect to the Internet.
- Use a hardwired line (like a DSL modem) to connect to the Internet.
- "Fail –over" between connections. If one goes down, it will automatically connect to the next.
- Establish your own local wireless network that you always connect all your wireless devices to, no matter how the OTG is connected to the Internet.

The OTG only has one LAN/WAN port – just like the Cradlepoint CTR 35 – so if you want to connect multiple hardwired devices to it you need to plug a switch into the single Ethernet port. Some may find this an inconvenience, but the device is really intended for the wireless mobile environment.

Testing
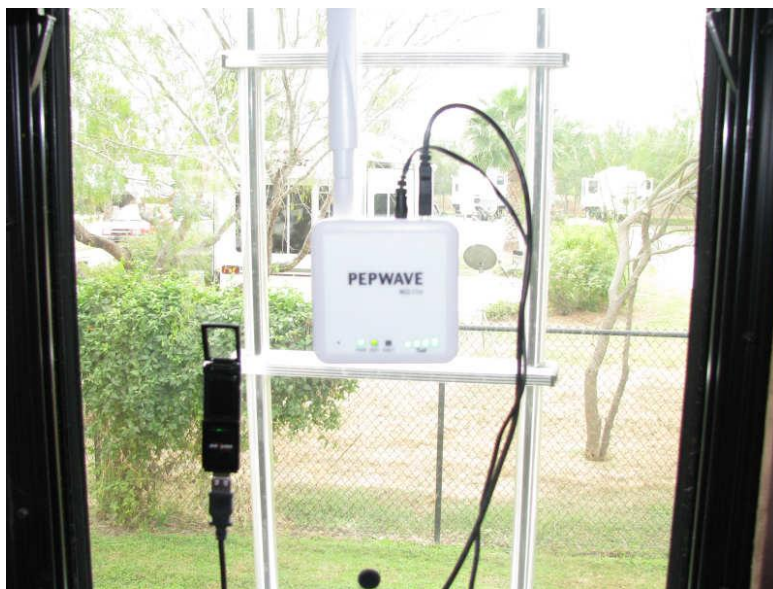
 I tested the Pepwave Surf OTG in the back window of my RV, at about six feet off the floor. It did not have direct line of sight to the AP, but was on the side of the trailer where the access points from the RV park next door were located. In this test environment I got a weak but usable signal from my laptop, but the speed suffered and the signal sometimes dropped.

I also placed the WiFiRanger (without the WFRBoost Mobile connected) on the coffee table below the Pepwave as well as two versions of Cradlepoint routers that support **WiFi as WAN**. I did not mount the WFR or the Cradlepoints in the window, because this is not the intended mounting position

of them. There were no other electronics near the units, and only one unit was powered up at a time. These units are all mounted in a fashion that would be typical of their use.

The Pepwave is easy to configure, and does have pretty good help text built into its firmware for the WiFi configuration screens. The Cellular screen has no help, but realistically, you don't really need to do anything except plug the modem in and it self-configures. You cannot access the cellular screen unless the modem is inserted. As is typical, this device only supports USB modems – either 3G or 4G. You can find a list of supported modems on the manufacturer's site. I used an older USB727 on the Verizon network. I did not test 4G. The only thing I had to do to get the cellular working was insert it.

When configuring or managing the device you connect wirelessly through a web interface – this is typical. The first time you need to plug in the supplied Ethernet cable and configure that way. Once you establish the local wireless network you can re-connect with a wireless session. You can see the state of your currently active connection via the "Dashboard" - shown with wifi active in the screen shot below.
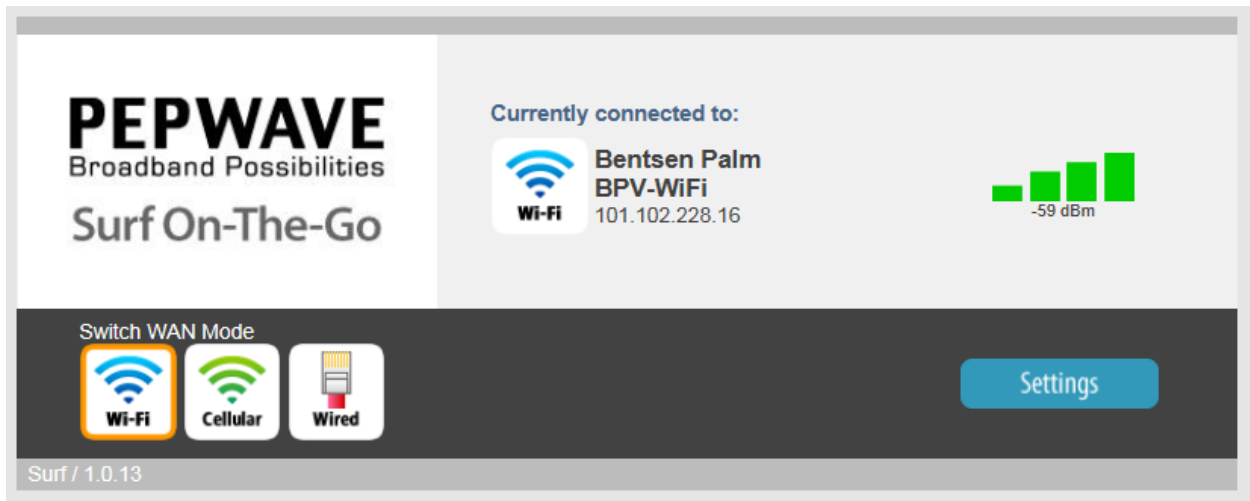
In this screenshot I have configured the Pepwave to use the Bentsen Palm access point, and it is connected with a very good signal quality and shows 4 bars. The -59dBm rssi is excellent. You can also see that Cellular has been configured, since the "Switch WAN Mode" icons on the left do not have Cellular dimmed out.

If I want to, I can create profiles of connections. This allows me to more easily switch between various available connections that I commonly see without manually re-entering the configuration selections or the log-in information (if that is required). You would use this if you went back to an area frequently, or if you have several available wifi connections in one location that you might switch between. The profile screen is shown below, set up for Bentsen Palm.

When initially setting up the Pepwave you have to tell it what to connect to. You do this with the basic settings screen.

In the **WiFi WAN Settings** if you click the orange **Refresh** button you will see the available Access Points that you can connect to.
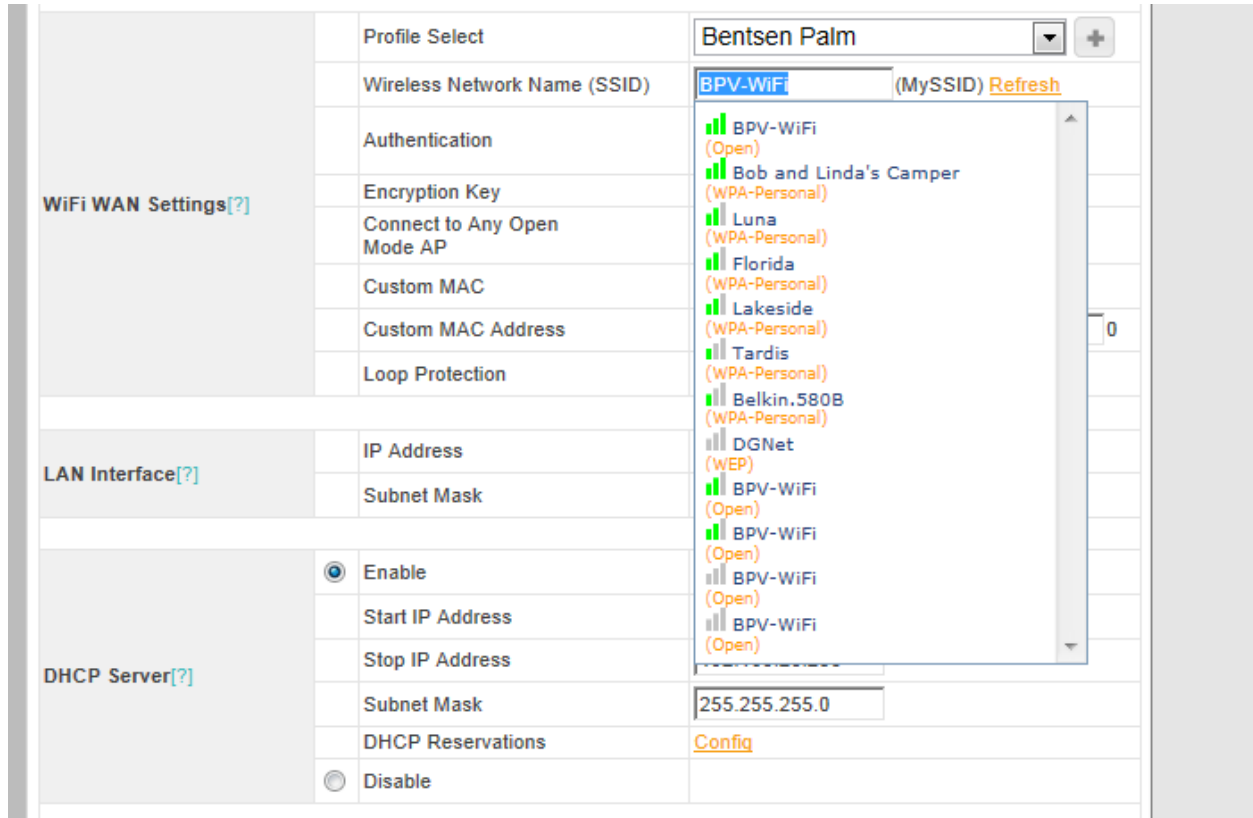

Select the desired connection and if you want to, establish a profile for it.

Next you need to set up your local wireless network that all your client devices will connect to. It is best to change the defaults and set up a secured network. Use the **AP Settings** screen to do this. The **Configure Manually** button allows you to enter the appropriate name for your personal network, and set up the security type. The **Configure Automatically** button is for putting the OTG into repeater mode. This causes it to automatically take on the name of the AP that it is connected to, and repeat that as its SSID. You would only use this feature if you are using the Pepwave to extend your already existing wireless LAN – an example would be to cover an area of a house that had dead spots in it from your existing wireless network. An RV user would typically not do this. In the screen below my local wireless network is *jmayer Pepwave OTG*, I set security to *WPA* and entered a passphrase.

That is all you need to do to get things going. After saving the info the device will connect to the access point you selected, and you are in business. Pretty simple.

One thing you see on the screens above that is disabled by default is failover. Failover allows your connection to the Internet to switch between the primary connection, which is always wifi, and a secondary connection, which in the RV environment is typically a cellular aircard. You can always force the cellular connection by selecting it specifically from the **Dashboard**. Below you see the **Dashboard** with failover configured to cellular.
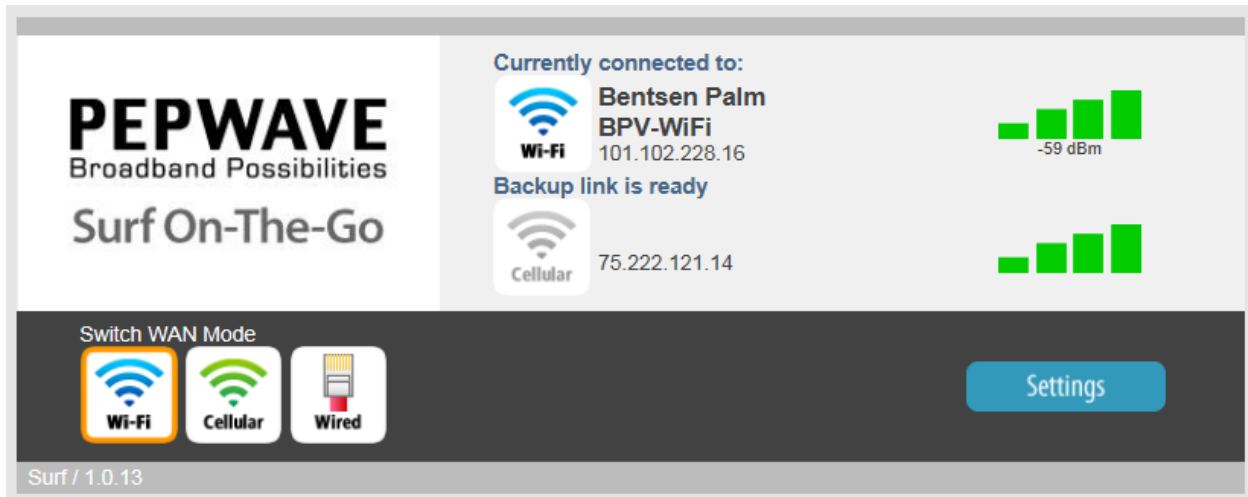
Failover works with a concept called a *Health Check*. The primary connection is checked every interval you set. If there is no response within a certain period of time then the health check is considered to be a failure. You can specify how many failures in a row are required before the secondary connection is switched to. Once you are running on the secondary connection the health check is applied to the failed connection, and if it comes back you can specify how many times it has to test "healthy" before the system puts you back on the primary connection.

Failover works well between wifi and cellular. In my testing it never failed to switch me correctly. You have limited ability to "tweek" these setting, but the choices they give you are reasonable.

I did not have the ability to test a hardwired connection, like DSL or cable. Most RVers use cellular and/or WiFi connections. But some places do have hardwired connections available.

Test Results

OK, so the device is easy to set up, but how well does it actually work? Well, as I expected, surprisingly well. Pepwave has been building CPE equipment for wifi capture (only) for a long time. I've used their devices extensively in the past. The addition of the cellular capability makes the OTG even more useful for the mobile market.

I used the OTG exclusively for two weeks with absolutely zero issues. I routinely forced a failure on the wifi connection, watched the failover, and then allowed it to return to the wifi. I also manually switched between the wifi and cellular connections. Never an issue with the USB727 modem I am using.

The Access Point I am connecting to is marginal without the OTG. With the OTG I have a solid connection. I also have a solid connection with the WiFiRanger, but the OTG has more gain – as you would expect with its antenna and position in the window. I averaged 100 signal captures (each) over two weeks time and the average is in the table below:

Laptop alone	-89 rssi
WiFiRanger	-80 rssi
Cradlepoint CTR 35	-86 rssi
Cradlepoint MBR 95	-88 rssi
PepWave Surf OTG	-58 rssi

This is about what I would expect. The PepWave outperforms the WFR and Cradlepoints because it likely has a better antenna, more power on transmit, and most importantly it is up higher and in a window. The WFR is sitting horizontally four feet below it – the Cradlepoints were in the same place. It is important to note that the WFR was without the Boost feature. With the Boost feature the WFR blows any competition away – nothing can remotely approach its performance. But I was testing indoor single-radio devices.

I tested with the provided OTG antenna. There have been reports of issues when using some other antennas – some work and some do not. I'm not sure what the issue might be, but if you plan on swapping antennas then it is "buyer beware". But the included antenna **is** removable and you could use a different antenna in its place – even putting it outside if you use good enough cable.

I also hooked my wireless printer to the OTG without issue.

Conclusions

The Pepwave Surf OTG is a great device for WiFi capture. But you have to be realistic in its abilities. For use within an RV park that has reasonable placement of Access Points (or other situations where the APs are relatively close) the Pepwave OTG should certainly be considered when choosing capture devices. But if you have very challenging signal situations even the Pepwave OTG may not be enough. The issue is one of getting high enough to avoid obstructions – and that is sometimes impossible with an indoor device. You also have to consider the number of modems supported, the other router features required, and responsiveness of the manufacturer to firmware issues. If you just want a simple wifi capture device and don't have need of extra LAN ports or other more exotic router features then the Pepwave OTG is well suited. Just make sure it supports your modem.

Also, if you want to permanently mount a router, or use it with the aircard while driving, the OTG may not be the best choice. For it to be useful in capturing WiFi you need to be able to move its location. For it to be useful while in motion with the aircard you likely want it plugged into 12-volt power with an adaptor. In most rigs the location of 12-volt power is limited and permanent mounting at the 12-volt power source is counter to moving the device around for WiFi capture. This limitation may be acceptable to some, but you need to take your usage requirements into account when selecting a device.

 If you have a challenging wifi capture environment then the WiFiRanger with its Mobile Boost feature cannot be beat – and it supports LAN ports as well as most required router features. If you want the ultimate in router features then look at the Cradlepoint routers (all the new ones have **WiFi as WAN**) –

but you will sacrifice wifi capture ability unless you build your own CPE for use with the Cradlepoint. There are lots of tradeoffs to consider, but the OTG will likely handle many people's needs at a relatively modest cost.