

FreeWave Introduces the Next Generation

April 1, 2002



The Signal

FreeWave Technologies has announced the release of a new generation of 900 MHz spread spectrum radio products. The new products, designated as the FGR series modems and the FGRO series OEM boards, expand the capabilities of the existing DGR and DGRO series which they will eventually replace.

The new products retain all of the features of earlier FreeWave products and can be installed and used with existing networks of FreeWave radios. New features available include 6 to 30 volt DC operation, sleep current of less than 5 mA at 12 volts dc , and forward error correction plus 32-bit CRC with ARQ. Other standard features of the new models are a separate diagnostics port, full CTS/RTS flow control and improved front-end sensitivity and noise rejection.

Expanded, on-board processing allows over-the-air firmware upgrades and improved local diagnostics including RSSI and VSWR measurements.

The new FGR-115RE provides reliable, point-to-point and point-to-

multipoint Ethernet connectivity at data rates up to 100 Kbps and at operating ranges of 20 miles or more. An Ethernet model to be introduced later this year will increase the bandwidth to 230 Kbps at 20 miles.

A user-programmable RS232/RS-485/RS-422 interface is available on the new FGR09CSU OEM board. This board will also be available later this month as a UL Class 1 Division 2 recognized component.

The first public showing of the new products will be at the Entelec Conference in Houston Texas on April 8-9, 2002. Customer shipments will begin the week of April 1, 2002. Introduction of a full line of corresponding 2.4 GHz models will occur by the end of June 2002.



New Diagnostics Program from FreeWave

Our new multipoint diagnostics software gives the end user a great new tool to maintain and monitor the radio network. This great new feature allows the end user to change any setting on any remote radio, as well as monitor all key parameters of your network from the master radio. The diagnostics can be used with our 900 MHz and 2.4 GHz radio modems programmed to operate in a point-to-multipoint network.

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Diagnostics will not function in a point to point operation.

Features of the diagnostics program:

- Allows you to see what path the data is taking to get back to the master
- See the actual distance of every link in the network in either miles or kilometers Continued on page 3

Fun Facts

- 900 MHz and 2.4 GHz products are license free in US and Canada
- Maximum data throughput is 115.2 kbaud
- Latest firmware version for 900 MHz is 5.82
- Only one radio needed as a repeater
- Line of sight range 60 miles or greater possible

Wind River Oilfield Service By Jerry Morrel

Wind River Oilfield Service operates several gas fields in Pinedale Wyoming. One particular field, owned by Ultra Petroleum, had used licensed channel radios for more than 3 years with mixed success to say the least.

At any given time the radio system would fail to download data from 20-30% of the sites. 10% of the sites would fail consistently and the other 10-20% would fail to deliver data in a random manner - in either event those sites that failed to deliver data would need to be visited by a tech in a truck. The problem was not solved despite a visit from a factory expert.

In conversations with Totalflow

it was suggested that FreeWave might provide a solution for us, their product had worked in many installations where licensed radios did not. FreeWave did the path studies and told us that it would work. We decided to give FreeWave a shot.

The installation did not go smoothly. A spring storm blew in requiring snowmobiles to get up to Hogsback, the main repeater site. Once the radio was installed



there it would not link. Another repeater site was linking intermittently. After 2 days we still were not getting any data. However, FreeWave sent factory representatives out who were able to diagnose the problems. With a filter the

> Hogsback link came up (40 miles into Pinedale), and the second repeater site came up once it was realized that it had a defective cable. With the 2 main repeaters operational, the entire network started lighting up.

> With FreeWave's slave/ repeater capability we are now able to easily cover the entire field,

without adding radios or building towers. The system is robust and is downloading data reliably at 9600 baud. The guys at FreeWave tell me that we can run a lot faster, but compared to the 1200 baud we were running with the licensed radios now the system is screaming. I wish I had known about FreeWave 3 years ago when we installed the system in the first place – it would have saved me tons of time, money and aggravation.

Duke completes successful tests of FreeWave radios By Paul Holman

Ruston Louisiana 3-26-02

As measurement supervisor for Duke Energy Field Services, I am responsible for gathering accurate gas supply and gas sales data for a large gas field in the North Louisiana area. We had never been able to establish communications by radio with all our remote gas flow measurement sites. This meant that we had to "hand collect" some of our sites every week, it also meant that we were "blind" to any problems or shut downs until a pumper physically went to the location. DEFS had tried both licensed radios (900 Megahertz range) and Spread Spectrum with limited success. Last year we were introduced to FreeWave Spread Spectrum radios by our Flow computer manufacturer Totalflow. We agreed to try FreeWave in a limited test. The test was a success and has allowed us to gather data from sites where we had never before had communication.

At DEFS, we created a hybrid system using a licensed radio remote to communicate with the FreeWave master. The function of the licensed remote is a slave on the licensed system, as well as a repeater for the Free-Wave system. We are able to poll the FreeWave spread spectrum slaves at their remote sites through our licensed system. To date DEFS has had 100% success with this system. DEFS is utilizing the FreeWave low power mode to minimize power consumption at the remote sites. With the exception of the master, all the sites are operating on solar power.

We are still installing FreeWave radios and our install base grows monthly. The next phase of the project will create a link to our repeater site using an all FreeWave system. This will

increase our throughput and allow us to speed up the polling process. We will be able to bring real time alarms into our SCADA system through another port on the host. This shortens the poll cycle on the existing SCADA port, allowing for more data in a shorter time period.



Kaiser-Francis Combines CDPD and FreeWave Technologies

Pampa Texas

Technicians from Kaiser Francis and Thurmand McGlothlin successfully linked an existing CDPD (Air Link Raven) to a FreeWave spread spectrum radio. By combining the two technologies Kaiser-Francis created a blended technology repeater. The blending of the two technologies allows the user to make a long hop of hundreds of miles from the office to the CDPD site and then use the FreeWave radio as a Master to poll multiple sites. By linking the RS-232 ports between the CDPD and the FreeWave data passes seamlessly between the devices. A wiring diagram for this hook up is available on the FreeWave web site at www. freewave.com/concemtocdpd.pdf.

Since this application was first implemented several other customers have applied this blended technology with great success.

Congratulations to all the ingenious and talented people involved with this new innovative blended communications technology.

Diagnostics continued

- Ability to monitor key parameters such as Signal Level, Noise Level, Radio Voltage and many others
- Shows a visual trend analysis of Receive Rate, Signal Level and Noise Levels
- Shows a visual trend analysis of Frequency PPM, Radio Voltage Levels, and Radio Temperature



Elk Hills California

ABB Totalflow installed hardware and software to do tank monitoring for a major gas producer in Bakersfield, CA. The system provided excellent data on propane volumes, but the communications (originally based on a licensed radio system) were intermittent and the project's future was in jeopardy. Of particular concern was the fact that the radio network would go down for days at a time and neither the local radio company or factory experts could solve the problem. When this occurred technicians would have to go out to collect the data by hand at 4 in the morning.

ABB convinced their customer to try a 900 MHz spread spectrum solution from FreeWave.

FreeWave Developments

- The FGR series radios offer the best power consumption available – <6mA sleep at 6 volts.
- The FGR series radios offer a switchable RS232 / RS485 interface
- You can now have up to 4 repeaters in a point to point link, there is no limit in multipoint systems.
- FreeWave offers military radios at 138-144 MHz, 225-400 MHz, and 1428-1453 MHz.
- FreeWave offers training! We can do this at your place or ours, please contact us for more information.



Diagnostics screen sample

FreeWave and ABB worked together to install a test system of a small number of units between the propane tank storage area and the operations office. The field installation was able to use the same antennas and cable and merely swap out the radios. After a 30 day evaluation period the hardware was purchased, and other sites have been added on.

The FreeWave system has been incredibly reliable. It has worked through all sorts of weather conditions when the 900 MHz licensed system goes down. In addition, FreeWave's 32 bit CRC and auto retry ensure that the data that arrives is always error free. The performance of the FreeWave network allowed ABB to save a project that otherwise would have gone south.



FreeWave Technologies 1880 S. Flatiron Court Boulder, Colorado 80301

Phone: 303-444-3862 Fax: 303-786-9948 Tell us your best FreeWave stories!

If we use your story in our next newsletter we will send you a Garmin 12XL GPS Receiver.

Send your stories to moreinfo@freewave.com

We're on the WEB! www.freewave.com

100,000th Radio Manufactured by FreeWave

Boulder Colorado

The fourth quarter of 2001 marked the sale of the

100,000th radio manufactured by FreeWave. We at FreeWave find this an incredible feat. Founded in 1993 FreeWave has surpassed 100,00 radios sold in less than 8 years. When you put this together with the fact that FreeWave has maintained its rigid quality control (375,000 hours between failures) it's a testimonial to the FreeWave spirit.

The FreeWave battle cry has been "better radios at better

prices" The old adage that Marketing gets the first order , but operations gets the second order has never been truer than at FreeWave. When a customer needs his order in two weeks FreeWave operations has always been able to deliver and when the customer needs a

left-handed thing-a-ma-bob the FreeWave engineering team always seems to be able to come through. Maybe the most telling FreeWave story has to be about the salesman who was chewed out by a customer on his first sales call to this customer because he had not contacted the customer sooner.

It will be interesting to see how long it takes to sell the second 100,000 radios.

At the rate the FreeWave revolution is sweeping the

country one thing is sure it won't be long.

