



THE QORVUS NEWSLETTER

Fall, 2006 - Vancouver, WA

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Qorvus Systems, Inc. designs, manufactures, and supplies fully-routed wireless mesh equipment, software, and field-engineering services primarily to rural Internet Service Providers, municipal wireless projects, and industrial companies, allowing these organizations to bring high-quality reliable wireless broadband connectivity and services to their end-users.

Our compact, affordable, reliable, and durable outdoor industrial wireless mesh network and wireless internet access equipment includes the [Qnode™](#) and [QnodeJr™](#) outdoor mesh routers, [MeshCam™](#) wireless mesh camera systems, and [Qcode™](#) embedded mesh software. In addition, we provide field engineering, installation, and optimization services for wireless equipment, wide-area wireless applications, custom engineering and back-end services to bring all of this technology together.

Qorvus uses a fully-routed dual-radio mesh technology to flexibly and organically overcome many of the disadvantages inherent in traditional wireless deployments.

Qorvus networks typically feature uniform coverage without dead spots, excellent bandwidth and stability, inexpensive or no customer premises equipment, built-in backhaul, firewall, QoS, and VPN support, and easy scalability & growth.

Welcome to the fifth edition of the **Qnews™** Newsletter, which happens to coincide with the end of our fourth year in business! We'll do our best to make it useful and informative. As always, your suggestions are most welcome.

Tom Sharples
President
tsharples@qorvus.com

New faces at Qorvus!

Before we get to our other topics, I'd like to introduce a couple of key folks who have joined the Qorvus family since our last newsletter came out in April, and to regretfully announce the departure of another.

I'm very pleased to announce two new members of the software support and development team. First, *Clark Weeks*, a senior software engineer with over 20 years of experience in Linux, C, php, and scripting has joined us as the primary sustaining engineer for our **Qcode™** embedded mesh and hotzone software, and thanks to his tremendous efforts over the last several months, we will soon be shipping what I believe is the most solid, flexible, and reliable version of our mesh software we have ever released, **Qcode 3.2** (more on this below).



Clark Weeks

In addition, *Ric Johnston*, a senior Linux developer with many years of experience as both an engineer and entrepreneur in wide-ranging VOIP, web, and network applications, is now working on a part-time project basis with Qorvus. He has been helping us bring a new 2.6 kernel-based wireless software development environment to the testing point, and will also be helping us develop wireless-specific VOIP applications and services for our customers who, increasingly, find themselves competing with bundled offering from companies like Qwest.

Adam Saylor, who had been heading up the development of **Qcode** and **Qportal™**, has left Qorvus (except for very occasional consulting) to join another hi-tech company here in the Portland area as senior web applications developer. Adam has been the key contributor to **Qcode**, as well as our back-end applications over the last two years, and his contributions have been greatly appreciated and will be missed.

Darwin Melnyk, who was acting in a part-time business development role for Qorvus, has taken a full-time position as CEO of a heavy equipment database company. He continues to be a consulting resource for us, as well as a member of our Board of Advisors, and we wish him well in his new endeavor.

Dog Days of Summer:

While most folks who aren't total computer geeks spend at least a week (or maybe a couple of weekends) during the summer months on vacation, relaxing or at the beach, we've taken advantage of the slow season to really focus our efforts on cleaning up several remaining bugs in **Qcode 3.x**, and on improving our back-end **Qportal** functions and services. I have to say I'm very pleased with the results, soon being released as **Qcode 3.2**. Not only have we taken care of almost every known remaining bug in **Qcode**, but we've also really improved the overall performance, and added several important features:

- **Greatly improved splash reliability.** The legacy OS splash software has been sensitive to certain kinds of traffic and poor client links, and the previous system code had the effect of interrupting already logged-on users when the splash program reset itself. This has been completely re-engineered so that any problem in an individual splash session does not affect any other users, and can be rapidly overcome, often in just a few seconds. To quote one of our customers who has been testing this new code:

"You guys really did a good job at making the Captive Portal stand up to our increased loads. I have not had a single complaint about the splash page since the patch! It is a definite improvement over the LW splash ;)"

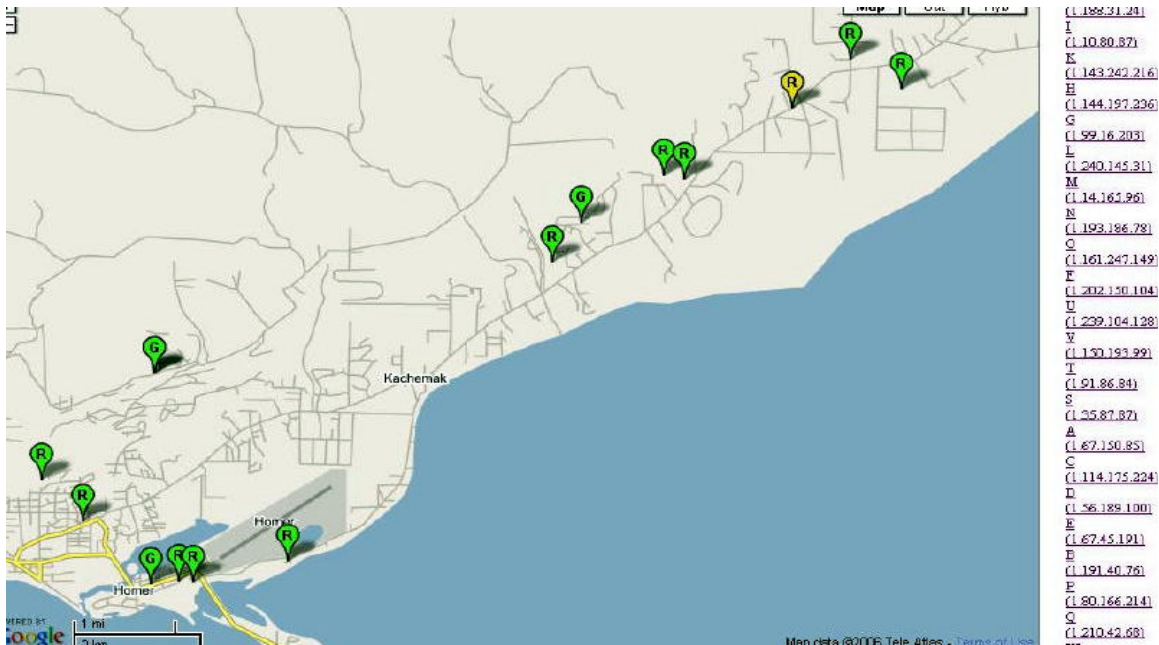
- **Reduced compact-flash system loading.** We'd already begun to reduce the unnecessary loads on the CF memory in **Qcode 3.11**, by dynamically relocating actively-changed files and pipes to DRAM wherever possible to preserve CF life.

Now we've taken it even further in 3.20. While our main purpose was just to prevent early CF failure from excessive write cycles, we ended up with a great side-benefit- noticeably improved performance and speed. This may not make much sense at first, until you think about the much slower read/write cycles on Compact Flash vs DRAM. For files that are only written once in a while it's no big deal, but we found several areas in the legacy code that constantly hammered the heck out of the CF, these have now been engineered out.

- **Improved CMUPS and Wiana radius compatibility.** When we first branched **Qcode** from the original meshAP / openAP code two years ago, we rewrote large portions of the code to achieve reliability. Keeping backwards compatibility with existing meshAP installations and the Wiana radius system was secondary to improving reliability and performance. But we continue to get new customers who have decided to upgrade from LW and LW-pro to **Qcode**, but really don't want to give up the convenience of using all of the features of the **Feedpro CMUPS** payment portal which, in turn, heavily relies on the Wiana radius system. So we decided several months ago to undertake a focused effort, providing those customers with the easiest possible upgrade path consistent with reliability. **Qcode 3.2** now provides GUI-selectable compatibility with Wiana radius plus improved performance for CMUPS users including support for the \$RemoteMac variable (which lets you pass the customer's MAC address directly to CMUPS for automated authentication), and support for Wiana automac & user name/ password management for both standard and VPN customers. While we were at it, we also circumvented several bugs at the Wiana end, that made authentication or shaping class hit-or-miss depending on various external factors.
- **Improved Layer 2 selective meshing.** **Qcode** has supported selective blocking of aodv routes and nodes for some time, but we've now added the ability to selectively block or add Layer 2 WDS links, which previously were added automatically. Automatic WDS, while easy to implement, can mean a serious performance penalty when nodes attempt to establish WDS links with neighboring nodes via a poor-quality radio link. AODV blocking does not take care of this issue entirely, because it only affects Layer 3 routing. Adding the ability to selectively pick WDS links allows you to completely block those poor radio links at the MAC layer for greatly improved bandwidth and route stability.
- **Improved upgrade tracking system.** The **Qupdate** program now keeps track of patches and upgrades on each node, making it easy to see which have been applied, and when. This data is now stored here: /usr/local/qupdate.log

Network News:

We're pleased to announce that a new client, **SPITwSPOTS** in Homer, Alaska, operated by *Aaron Larson, Brian Ormond, and Darius Klein*, has deployed 100% **Qcode** (upgrading from a LW pro installation) in their very well implemented 25 node wireless network, with outstanding results. Using the splash portal & walled garden functions, SPITwSPOTS has one of the more sophisticated location-based advertising setups that we've seen to date. And, it's nicely integrated with the CMUPS payment portal back-end. You can see an example of what they've done here: <http://www.spitwspots.com/dynamic/dynamic-a.html> Nice work! Their setup is what really inspired us to engineer a good solution (released as a patch, and in **Qcode 3.2**) for the annoying legacy splash problem.



A portion of the SPITwSPOTS network

We were also excited to hear from *Chad Shelkett* at **Sirius Networks**, who let us know that their 75+ node Qorvus 2.4 / 5.8 Ghz mesh network now has **in excess of 500 paid subscribers**, most experiencing net downloads of 2 - 3 Mb/s. Sirius uses a combination of tower-mounted **Qnodes** and **QnodeJr's** equipped with 5.8 Ghz radios in a point-to-multipoint arrangement, and then uses low-lying dual-radio **QnodeJr** 5.8 / 2.4 Ghz radios within the covered neighborhoods running mesh to provide customer access. This hybrid approach has proven to be very scalable and provides plenty of end-user bandwidth.

Field Engineering Services:



Dave Davault (right)

Several of our clients have had the opportunity this year to work with *Dave Davault*, who heads up our field engineering services. Dave is based in Texas, centrally located in the general area of many of our clients, but can (and has) traveled throughout the U.S. helping our clients plan, set up, or debug both new and existing wireless networks. Dave is a true expert at getting the last iota of performance out of a Qorvus mesh network, and if you're having performance issues, especially those related to node installation, antenna selection & installation, tower climbing (Dave is a certified climber), and other RF issues, we strongly recommend giving his services a try- you won't be disappointed. You can reach Dave through our office at 800.757.1571 Ext. 107 or schedule him at support@qorvus.com

VAR's and more:



Bob Kehr

With the increased acceptance and use of our **Qcode** and **Qnode** products have come some serious challenges. We've come to realize over the last few months that it can be really tough for a small company like Qorvus to adequately respond to requests we get from all over the world, and to market and service our hardware, software and services to multiple vertical markets, without occasionally falling on our face. I guess this is what you'd call growing pains. In any event, we've taken several steps to improve our responsiveness, and to better support our customers. One is the recent appointment of **Kehr Wireless** as our principal manufacturer' rep and distributor to overseas and domestic VAR markets. Kehr Wireless is owned and operated by *Bob Kehr*, who has a very impressive resume with years of senior-level experience in wireless and networking, including stints at Ericsson and at Nortel. He's also a principal in one of the rural ISP's that uses our technology so has valuable personal experience in running a wireless ISP. Bob can be reached at Qorvus: 800.757.1571 Ext 103 or bkehr@qorvus.com

George Evans, a Qorvus veteran who is already familiar to many of our clients, continues to expertly handle our in-house ISP and industrial sales, and can be reached at 800.757.1571 Ext. 104, or gevans@qorvus.com

In addition, we recently moved our Qorvus.com and **Qportal** servers from our local Colo facility to a world-class location in Chicago that features unparalleled reliability, bandwidth, and uptime. Yes, they are considerably more expensive than our previous Colo, but we think it's worth it, and we hope our **Qportal** users do too.

Qportal:

While our Network Support and **Qnode** check-in system **Qportal** looks pretty much the same from the outside, there's been quite a bit going on in the background. We've really expanded the data fields that each **Qnode** can upload to the portal, and are in the process of making changes so that those additional field are available to our backend processes and to you. Among them, is an adjacent-node and link-quality system that will let you instantly see the available net bandwidth from one node to the next, track changes in bandwidth over time, and clone settings from one node to another. In addition, a number of special features are being developed to support our **MeshCam** clients, including a tool that will let you mouse over the Google map icon for any **MeshCam** and see a jpg of that **MeshCam**'s image!

New Customer Support Plan:

This month, we are introducing a new long-term **Customer Support Plan** for our current ISP clients. Some of this just formalizes what's been in place for some time, but with the added number of networks using **Qcode** and the ongoing expense of our enhanced software development, backend services and 800 number tech support, it's become necessary for us to

be a bit more formal in our efforts to bring you the high quality of software and ongoing technical support you've come to expect. And, to continue to operate at this high level, we need to recover some of our significantly increased costs for these services.

Each **Qcode**, **Qnode**, **QnodeJr**, and **MeshCam** receives 30-day free basic support, and 6-months free software upgrades. After that period has elapsed, there are now several levels of longer-term ongoing support available to you. These are detailed in the table below:

Feature	Copper	Silver	Gold	Platinum
Support BBS	Yes	Yes	Yes	Yes
Qportal access (includes email alerts, trouble tickets, and geo-mapping)	No	Yes	Yes	Yes
Free software upgrades after 6 months	No	No	Yes	Yes
Up to 4 hours / mo. real-time phone and email support	No	No	No	Yes
Cost per month	Free	\$49/month	\$89/month	\$195 / month

To subscribe to the Customer Support Plan, please go here:

<http://www.qorvus.com/products.html>

Is participation in the new Customer Support Plan mandatory? No, if you're an inactive client (see below) and your initial 6-month free period has lapsed, your account will stay at the Silver level until the end of September 2006. On October 1, you will automatically be entered at the Copper service level and can purchase services and products on an as-needed basis. For current pricing, please refer to our support website here:

<http://www.qorvus.com/techsupport/index.htm>

The monthly charges for Silver and Gold are **currently waived for active clients**. What's an active client? Simply one who has purchased and paid for at least at \$1500 in goods or services from us in the last 60 days. This can be any combination of equipment, software, or support services.

Referral program!

This month, we're introducing a new referral program. It's simple: send us a new client, and we will pay you a fee of 5% of that client's initial purchase. Of course, for this to work, we need to know that you've made the referral! So please send an email to sales@qorvus.com, identifying the potential client (business and contact name & phone number) and we'll add that to our prospects database, so that we can credit you accordingly when and if a sale takes place.

Wimax developments:

We've continued to follow, with great interest, recent developments in the world of Wimax. Sprint announced a few weeks ago that it would deploy Wimax on the licensed 2.5 bands it purchased (for billions of dollars) several years ago. But it has become very apparent, and even industry leaders are now openly acknowledging, that Wimax is not an appropriate technology for unlicensed bands, with the possible exception of the severely limited 3.5 Ghz allocation.

Why? Simply because Wimax has little if any tolerance for in-band interference. When co-located with other non-coordinated signals in the same band, it very rapidly falls on its face. What this means is that, unless you're e.g. a Sprint and can afford to pick up a chunk of spectrum for your exclusive use, you're much better off sticking with 802.11a or b WiFi / mesh, which has its own protections against outside interference and, properly installed, can deliver acceptable bandwidth to end-users even with competing devices all around.

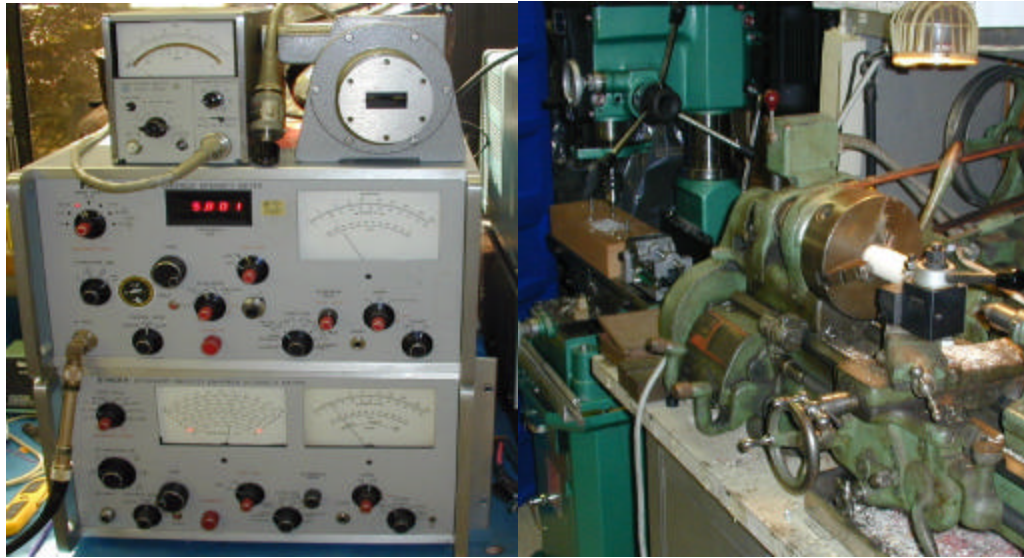
Qcode 2.5:

A number of our client networks are still running our older **Qcode 2.5** software. With the significant improvements in reliability and performance in **Qcode 3.2**, we are now suggesting that older 2.5 installations be upgraded to 3.2. We realize that this can be an operational burden, but we think the improved reliability and performance is worth it. **Qcode 2.5 is now well over a year old**, and most new patches and features won't be back-ported or tested for **Qcode 2.5** compatibility. Of course, it is up to you to make the decision, and we will continue to provide support to the extent we can, for our **Qcode 2.5** users.

There are two upgrade paths. One, you can download 3.2 onto your existing 2.5 nodes, however doing this means that you won't have support for Atheros radios and the fully-expanded image (which isn't compatible with the older CF's disk layout). But as a practical matter this may not make much of a difference to your specific network. The second, and better option, is to have us burn a new CF, and replace the older one with a new one, so that you get both the fully expanded image, and Atheros support. If you are a Gold or Platinum customer these upgrades are free of charge, other than a \$25 cost for the CF media, if needed.

Odds and ends:

- We commonly supply single-radio nodes with Prism radios like the Senao 2511mp, and dual-radio nodes with an Atheros CM-9 radio in the second slot, usable as a backhaul on 5 Ghz. How about using Atheros radios in a single-radio solution? While it's possible, we don't usually recommend it because the 2.4 Ghz output power of the standard 2511mp is around 250mw, compared with about 100mw for the cm9. Furthermore, the stable Atheros drivers don't support WDS so that you'd have to run that node in ad-hoc mode in order to have it provide both customer connectivity, and backhaul to the neighboring nodes. We are testing updated Atheros drivers that support WDS, but until they are at least as stable as the ones we currently ship, they won't be incorporated in Qcode.
- Please initiate support requests by logging into the **Qportal** Customer Portal using your customer number and password, and initiating a trouble ticket. Our support@qorvus.com email address is being spammed into oblivion.
- As many of our clients already know, we extensively test each of our **Qnodes**, **QnodeJr**'s and **MeshCams** prior to delivery. One of the main things we test is that there's actually RF coming out of the N connector, and that it meets or exceeds the manufacturer's specifications. This testing regimen finds not only bad radios, but also bad uFL connectors, pigtailed, and bulkhead N's. We use a variety of equipment to do this testing. This includes an HP 431 microwave power meter, a General Microwave power meter (not shown), HP precision attenuators, and the Eaton NM-series 2 and 5 Ghz selective frequency meters that can read down to -130 dbm. This very sensitive and selective equipment represents an investment of several tens of thousands of dollars, but it's essential if you are going to be sure of what is going up the tower. Qorvus also has a small but well-equipped machine shop. This has proven to be really useful when doing custom projects for our clients including such things as embedding custom boards, housings, brackets, mounting plates or special antennas in or on our equipment.



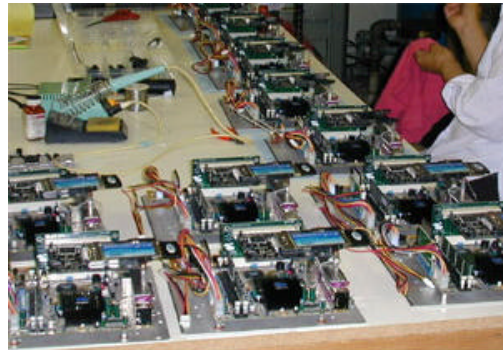
Eaton & HP microwave test equipment

Qorvus machine shop

- We've recently upgraded several aspects of the **QnodeJr.** hardware. One real added convenience feature is shown below. As you may already know, **Qcode 3.x** activates the 3 LED's on the mother board in sequence as the node boots up. In addition, during antenna alignment using the built-in **Qaim** function the LED's blink at an increasing rate as the antenna is optimized. But these features aren't too useful if you can't see the LED's! So as of earlier this year, all **QnodeJr.**'s now have a 1 " slot machined in the cover and a custom-made refractive waterproof prism installed below the surface, so that the LED's are now visible from outside the case.



QnodeJr with viewable LED window



Qnode production line

Thanks again for your ongoing support, and we wish you a happy and prosperous fall 2006!

Your team at Qorvus Systems, Inc.

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Questions? Please contact us at sales@qorvus.com , support@qorvus.com or 800.757.1571

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