Maximizing the Value of Your Mobile Broadband Service

The Advantages of the WiPipe™ Platform

Overview

This white paper looks at how users can maximize the value they get from their mobile broadband service plans. It explains how mobile broadband routers (also known as cellular routers or 3G/4G broadband routers) allow users to share their mobile broadband access via a Wi-Fi hotspot and/or Ethernet LAN connections. Further, it examines CradlePoint's WiPipe™ platform for mobile broadband routing and how it enhances security, ease of use, performance, functionality and management control.
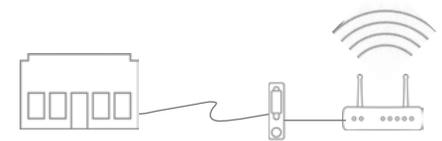
Mobile vs. wired broadband routers

Mobile broadband routers and wired broadband routers share a number of similar capabilities/functions:

- Connect to a broadband source for Internet access (generally this is a DSL, cable, satellite or T1 Internet service delivered via a wired network)

- Provide a 802.11 wireless LAN (a.k.a. Wi-Fi hotspot) that enables multiple Wi-Fi-enabled devices to share the broadband Internet connection
  - Laptops
  - Printers
  - Desktop PCs
  - PDAs
  - Gaming consoles
  - Any device capable of receiving a Wi-Fi signal

- Provide Ethernet port(s) that enable devices to share the broadband Internet connection through a wired connection
  - Desktop computer
  - Laptop
  - Printers
  - Server
  - Storage device/appliance
  - Network switch/print server
  - Any device with an Ethernet port

The two main differences between mobile and traditional wired broadband routers are:

1. Source of the broadband connection
2. Modem (the device that modulates/demodulates the broadband signal before it goes into the router)

	Source	Modem
Wired broadband router	• DSL/T1/Fiber – phone service provider (e.g., SBC, Qwest, Ameritech, Bellsouth, AT&T, etc.) • Cable – cable service company (e.g., Charter, Comcast, Cox, Time-Warner, etc.) • Satellite – satellite service provider (e.g., HughesNet, Wildblue, Skyway USA, Starband Satellite, etc.)	• DSL modem • T1 modem • Fiber modem • Cable modem • Satellite modem
Mobile broadband router	• Mobile/3G/4G – wireless or mobile provider (e.g., AllTell, AT&T, Cricket, Ntelos, Sprint, Verizon, etc.)	• ExpressCard • USB air card • Handheld/Phone

Wired broadband router
A wired broadband connection from a telephone or cable company central office terminates at a DSL/cable modem, which plugs into the conventional broadband router that then creates a Wi-Fi hotspot.

Mobile broadband router
A wireless broadband connection from a wireless service provider terminates at an ExpressCard and/or USB air card plugged into the mobile broadband router. The router then creates a Wi-Fi hotspot.

The benefits of mobile broadband routers

When mobile broadband/3G service first became available, users bought ExpressCards or USB air cards (modems) that plugged into their laptops. These modems established a mobile broadband connection to the Internet. Thus, users could get email, download music and surf the Internet at broadband speeds anywhere there was a mobile broadband/3G/4G signal. No hunting for Wi-Fi spots (or paying for them) or plugging into strange networks. The only problem? The mobile broadband connection was restricted to the laptop that had the ExpressCard or USB air card physically plugged into it and could not be shared.

Mobile broadband routers solve that problem and take the next logical step: allowing users of mobile broadband/3G/4G service to share their mobile broadband connection. Instead of plugging the ExpressCard or USB air card into an individual laptop, it gets plugged into the mobile broadband router. The mobile broadband router takes that fast mobile broadband connection and allows it to be shared by creating a Wi-Fi hotspot and/or by providing physical Ethernet jacks that other devices can plug into.

cradlepoint
TECHNOLOGY

The WiPipe™ platform provides a better 3G/4G mobile broadband router experience

The transport technology of mobile broadband is different from that of DSL, cable, T1, fiber and satellite. In order to maximize performance, compatibility and ease of use, it's critical that a mobile broadband router account for this difference. Router solutions that do not use the WiPipe™ platform usually start with conventional DSL/cable routing technology and then "bolt on" the mobile broadband component. But CradlePoint mobile broadband routers take as their starting point the inherent uniqueness of 3G/4G mobile broadband service. The WiPipe™ platform is built from the ground up for mobile broadband routing, enabling highly robust, efficient, powerful and interoperable router solutions, while maintaining "plug-and-play" simplicity.

> The WiPipe™ platform is built from the ground up for mobile broadband routing. 🔊

Making robust functionality and high-performance…simple

The first, most immediately noticeable aspect of the WiPipe™ platform is how simple CradlePoint routers are to set up and use. CradlePoint mobile broadband routers plug in and start working right out of the box. There is no software to install or drivers to download. Yet even with this easy, plug-and-play setup, the WiPipe™ platform provides enhanced security protection. Here's how: the first time a user starts up a CradlePoint router, he or she enters a code—printed on the side of the product box—to access the router's Wi-Fi network. This simple layer of added security requires tight integration between firmware, hardware and packaging operations. Then the user has the opportunity to establish even tighter, enterprise-levels of security. The end result is higher security and a simplified experience for users.

Another example of how the WiPipe™ platform simplifies operations: the user interface is laid out so commonly used features and functions—the ones used by an overwhelming majority of customers—are automatically implemented through simple, point-and-click wizards. Yet for power users, the WiPipe™ platform provides a comprehensive menu of user-configurable options that allow robust control of security, performance, access, maintenance and other functions

Specifically tuned for 3G/4G mobile broadband

The WiPipe™ platform employs highly optimized software that incorporates algorithms which assess the link quality of the connection and accelerate certain packets to ensure that the user-experience is optimized. Routers built on generic platforms lack this optimization and are not able to provide the performance, security and reliability necessary to meet business-critical demands.

Further, solutions that don't use the WiPipe™ platform typically employ non-optimized drivers for their USB air card or ExpressCard interface. These "canned" drivers often incorporate many services that are unnecessary and/or superfluous. The result can be slower startup and sluggish throughput, as well as potential compatibility issues.

CradlePoint engineers work closely with manufacturers of USB air cards and ExpressCards to build drivers tailored specifically for their particular modem implementation. This ability to control hardware and software at a fundamental, OS level provides a number of benefits:

- Cleaner, leaner interface for faster start up
- Maximum compatibility/interoperability with the greatest number of USB air cards and ExpressCards
- Peak efficiency with all carriers and signal types
- Optimum throughput for best-possible performance

Dynamic optimization for the greatest performance under changing mobile broadband conditions

A WiPipe™-powered router is capable of identifying the wireless environment in which it is deployed, and as the mobile environment changes from session to session, can automatically self-configure for best performance. Not only can the WiPipe™ platform determine a mobile broadband router's position within the carrier infrastructure and provide information to the user as to changes in available service levels, it can also detect interfering traffic in the immediate area and change its local broadcast configuration to minimize interference and optimize throughput.

Load balancing optimized for 3G/4G mobile broadband

Load balancing for conventional broadband environments is often implemented through hardware. But the special circumstances of mobile/3G/4G broadband routers require a different approach. Some CradlePoint router models can accommodate up to three USB air cards/ExpressCards connections (plus an Ethernet WAN connection). The WiPipe™ platform can load balance between the three mobile broadband sources, providing, in effect, a single "aggregated stream" that maximizes throughput to a degree that no other mobile/3G/4G broadband router can match.
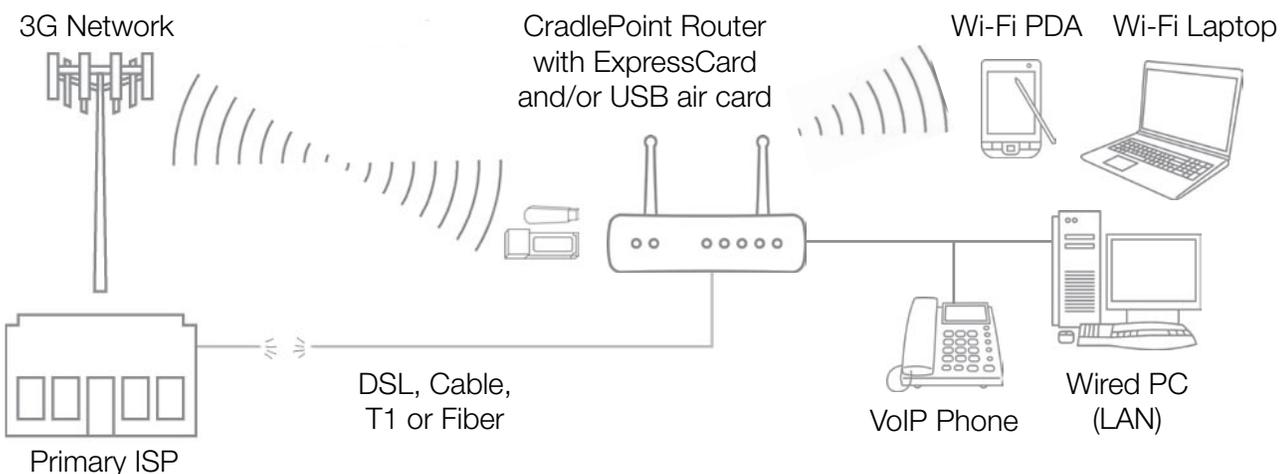
Best-in-class Quality of Service features

The WiPipe™ platform incorporates high-end Quality of Service capabilities that are typically found only in much more costly solutions. For example, other routers within the class handle VoIP optimization by reserving a certain amount of the available bandwidth strictly for VoIP packets at all times. That means that there is always less bandwidth available for non-VoIP packets, even when there is no VoIP traffic.

On the other hand, the WiPipe™ platform offers dynamic optimization for VoIP packets. This provides great voice quality and clarity for VoIP calls. But when there is no VoIP traffic, other packets can take full advantage of the maximum available bandwidth. Even under demanding conditions—for example simultaneous VoIP calls and streaming video, a CradlePoint router can deliver the highest levels of service for both applications.

Other Quality of Service features include prioritizing traffic for various wireless applications (like video conferencing), specific application protocols and specific computers on the wireless network.

Automatic Failover protects against DSL/cable outages

In select CradlePoint mobile broadband router models, the WiPipe™ platform provides Automatic Failover protection. If DSL/Cable/T1/Fiber is the primary source of broadband connectivity, a user can also plug in an ExpressCard and/or USB air card into the CradlePoint router, and configure it for failover. In the event of a DSL/Cable/T1/Fiber outage, the CradlePoint router senses the problem and automatically switches to mobile broadband Internet service. All wired and Wi-Fi devices connected to the CradlePoint router continue to operate at broadband speeds without interruption. When the DSL/Cable/T1/Fiber connection is restored, the CradlePoint router automatically switches back. No user intervention is needed.

3G Network   CradlePoint Router   Wi-Fi PDA   Wi-Fi Laptop
                    with ExpressCard
                    and/or USB air card

DSL, Cable,
T1 or Fiber   Wired PC
                                                (LAN)
                                    VoIP Phone

Primary ISP

1. Outage occurs at primary ISP or DSL/Cable/T1/Fiber provider.

2. Sensing outage, the WiPipe™ platform automatically switches to the mobile broadband connection (less than 60 seconds).

3. All wired and WiFi devices connected to the CradlePoint router continue to operate at broadband speeds without interruption.

Added-value VPN functionality

Virtual Private Networks (VPNs) provide a secure connection between two public endpoints, ensuring the confidentiality of the data that passes between them. Most mobile broadband providers offer a VPN service option. However, this service option typically requires the purchase of a new air card, new service setup and higher monthly fees.

With CradlePoint routers and the WiPipe™ platform, users can create up to five secure VPN tunnels simultaneously…without the expense and hassle of purchasing a VPN service option. What's more, the encryption ciphers/algorithms employed by the WiPipe™ platform are far more robust than the VPN encryption offered by non-WiPipe™-powered solutions at similar price points.*

Enhanced security/filtering options

In addition to the base-level security of the login page, the WiPipe™ platform supports multiple levels of security, including: WEP, WPA-Personal, and WPA-Enterprise. The WiPipe™ platform enables access control that can limit access to approved sites, limit web access based on time or dates, and/or block access from applications such as P2P utilities or games.

Optimized Wi-Fi performance

Not only does the WiPipe™ platform maximize performance on the mobile/wireless side of the equation, it also enhances Wi-Fi and Ethernet performance. CradlePoint's Wi-Fi subsystem is tested to ensure compatibility with the greatest number of Wi-Fi devices. As part of the WiPipe™ platform, all CradlePoint routers are certified by the Wi-Fi Alliance—the governing body for Wi-Fi standards. This third party certification ensures interoperability and adherence to Wi-Fi standards, which provides additional confidence for users.

Conclusion

The WiPipe™ platform is based on more than 27 patents pending. The over arching principle is to provide highly robust capabilities, a powerful feature set and superior performance, while maintaining maximum, security, compatibility/interoperability and ease of use. The results are valuable benefits for all users—whether they are beginners or sophisticated power users:

- Robust functionality and high-performance that's simple
- OS/ drivers specifically tuned for mobile/3G/4G broadband
- Load balancing optimized for mobile/3G/4G broadband
- Best-in-class Quality of Service features
- Automatic Failover protection against DSL/cable/T1/Fiber outages
- Added-value VPN functionality
- Enhanced security/filtering options
- Optimized Wi-Fi performance