

# 4G LTE: CAPABLE NETWORK BACKUP FOR REMOTE LOCATIONS

By Kurt Marko



FEBRUARY 2016 | US\$25

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# ABOUT THE AUTHOR



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**KURT MARKO** is an IT industry analyst, consultant and regular contributor to a number of technology publications, pursuing his passion for communications after a varied career that has spanned virtually the entire high-tech food chain from chips to systems. Upon graduating from Stanford University with bachelor's and master's degrees in electrical engineering, Marko spent several years as a semiconductor device physicist, doing process design, modeling and testing. He then joined AT&T Bell Laboratories as a memory chip designer and CAD and simulation developer. Moving to Hewlett-Packard, he started in the laser printer R&D lab doing electrophotography development, for which he earned a patent, but his love of computers eventually led him to join HP's nascent technical IT group. Marko spent 15 years as an IT engineer and was a lead architect for several enterprisewide infrastructure projects at HP, including the Windows domain infrastructure, remote access service, Exchange email infrastructure and managed Web services.



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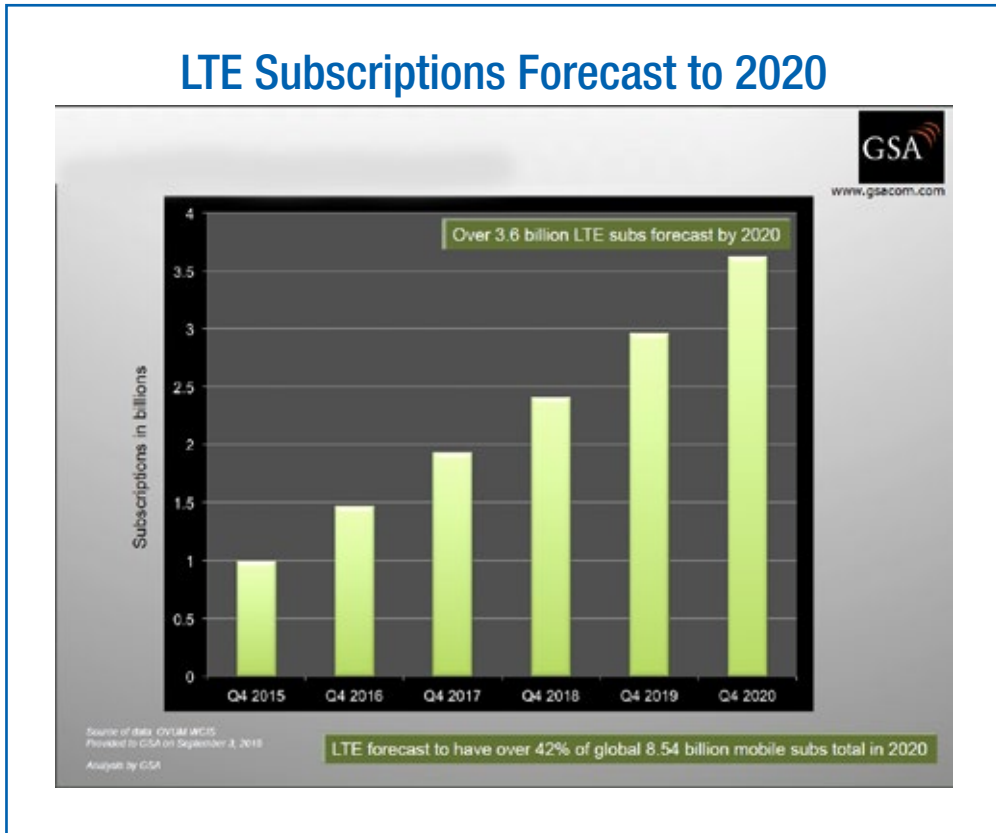
## RELIABLE NETWORK CONNECTIVITY IS SUCH A FUNDAMENTAL REQUIREMENT FOR THE DIGITAL BUSINESS AND MOBILE

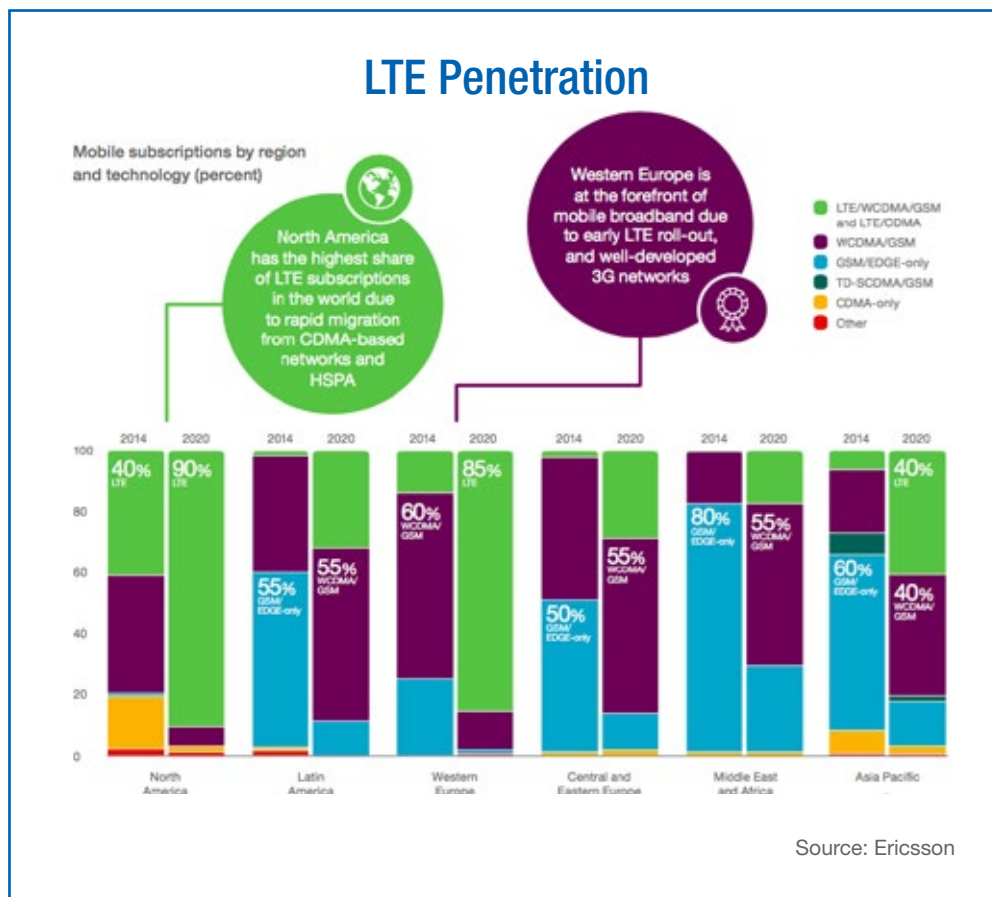
lifestyle that most people consider it on par with power and water — a critical utility. For individuals, network downtime is an inconvenience; your Facebook feed will be waiting when the cable modem comes back online. But for business customers, it's a matter of money. When the network goes down, sales and critical processes grind to a halt. Although data center and campus networks are hardened with multiple WAN connections, multi-WAN load balancing and link failover, cost and availability concerns mean branch offices, retail stores and temporary locations like construction sites, drilling rigs and convention center booths are almost always dependent on a single connection.

The potential for adverse consequences of a network outage on remote sites surges as organizations increase the use of virtualization and private cloud to consolidate applications and data in central data centers, leaving off-site employees and customers completely dependent on a reliable network tether. A single WAN circuit means some level of network downtime is a given, regardless of the service type. In fact, your customers may be surprised to learn that even business-class broadband rarely comes with uptime guarantees. For example, [Comcast Business](#) merely promises to resolve an outage “as quickly as possible” and provide billing credits for the duration. Other business cable and DSL services are often just two or [two-and-one-half nines](#). While MPLS circuits [typically](#) commit to three-nines availability, that's still an average of almost 45 minutes of downtime per month.

For a retail location serving 100 customers per hour and relying on the network for credit card transactions, a few hours' service credits won't come close to compensating for the lost business.

Fortunately, there's an easy way partners can help boost remote site availability: an independent, redundant circuit using wireless LTE. Availability is virtually universal in North America, with five-bar coverage areas constantly increasing. According to the [Global mobile Suppliers Association](#) (GSA) there are 1 billion LTE subscribers worldwide, and adoption is growing at a 29 percent CAGR over the next five years. The most recent [Ericsson mobility report](#) pegs current LTE North American penetration at 40 percent, expected to hit 90 percent by 2020.





LTE provides more than enough speed to act as a remote WAN backup. A recent [PC Magazine survey](#) found that average download speeds for the four U.S. national carriers in 30 cities ranged from around 13 to 19 Mbps, with upload speeds running 5 to 10 Mbps. A more comprehensive [OpenSignal report](#) measured average download speeds across carriers at 9 Mbps. Indeed, these numbers are faster than many DSL circuits and leave legacy T1s in the dust.

## HARDWARE OPTIONS

There are several ways to seamlessly integrate LTE into a customer WAN using existing equipment — don't worry, you needn't ask employees to tether their PCs to a smartphone. The most common is plugging a USB modem like the AT&T Beam or Verizon MiFi into a WAN router or UTM appliance; however there are other options, as we explain below.

The cleanest, most tightly integrated LTE solutions use a plug-in module or come with a modem embedded in the WAN router chassis. For example, the entry-level Cisco ISR 800 series as well as gear from [Fortinet](#) and others offer several fixed-configuration models, covering both the [low](#) and [high](#) end of the range. Built-in LTE

modems support automatic failover between primary and backup links, offer the ability to do remote firmware upgrades over 4G LTE and enable cellular multihoming via dual-SIMs.

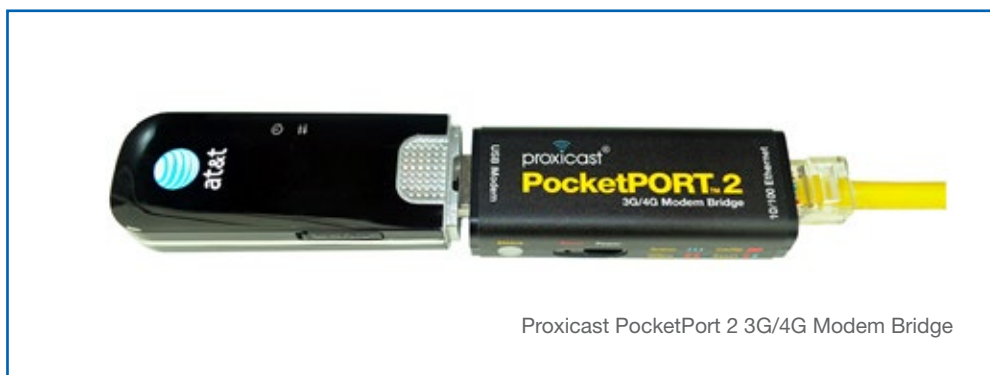
Larger branch-office WAN router chassis like the [Cisco ISR 4000](#) series or HPE [MSR 3000](#) and [4000 series](#) offer optional plug-in modules providing LTE connectivity. Due to differences in each carrier's frequency bands and wireless protocols, vendors typically offer two models, one for AT&T (examples for [Cisco](#) and [HP](#)) another for Verizon. The LTE card acts as just another network interface, meaning wireless circuits have access to the full suite of router services, like virtual route forwarding (VRF), QoS, security, VPN termination and of course automatic route failover and fallback should the primary link go down. Plug-in modules also offer the convenience of virtually instant installation and circuit availability — no waiting for a telco.

## OTHER OPTIONS: USB MODEMS, GATEWAYS

Channel partners supporting smaller offices or retail locations using fixed-configuration routers or UTM appliances can add LTE connectivity in a couple of ways, depending on a router's capabilities. The easiest is via a USB modem like those used for PCs. Many WAN routers and UTM appliances, including the [Peplink Balance](#), [SonicWall](#) TZ Series and WatchGuard XTM series include USB ports with firmware support for a variety of LTE modems. As with integrated modems, the router/security appliance treats a USB modem as just another network interface, meaning it can be [configured for automatic link failover](#) and inherit all the WAN security policies of the primary link.

Customers whose branch-office hardware supports neither integrated nor USB modems still have options for incorporating LTE links by using a wireless Ethernet gateway. Much like a Wi-Fi bridge or powerline adapter, cellular gateways combine an LTE modem and Ethernet bridge and present the cellular connection as a standard Ethernet port. This means they can be plugged into one of the router's WAN interfaces and configured like any other WAN circuit as either a backup or load-balanced link, a handy option for periods of demand spike, such as around the holidays.

Product options include the [Juniper CX111](#), [Netgear 6100D](#) and [Microhard VIP4Gb](#). For even more flexibility, the [Proxicast PocketPORT](#) even disaggregates the modem, providing an Ethernet bridge to any LTE USB modem, allowing customers to mix and match different carriers at will.



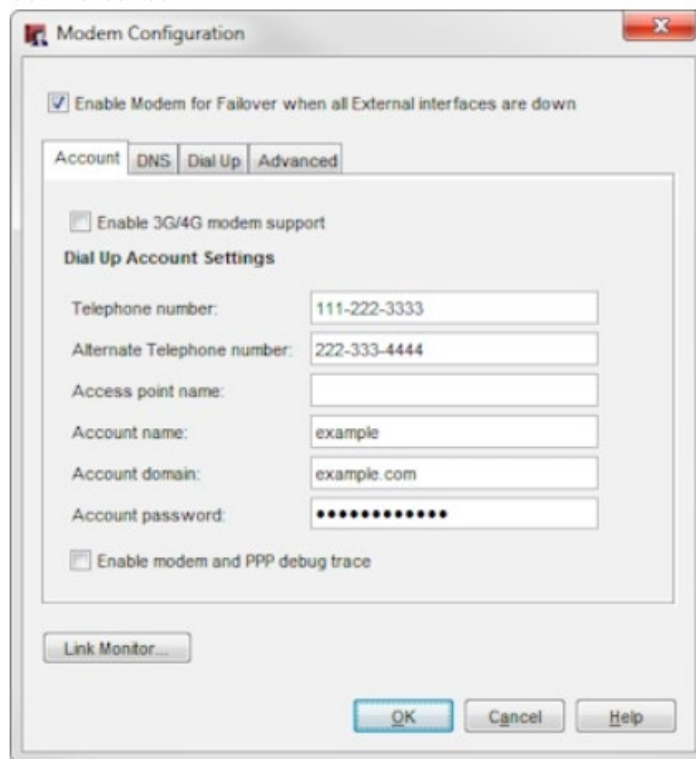
Proxicast PocketPort 2 3G/4G Modem Bridge

## TYPICAL NETWORK CONFIGURATION

The beauty of connecting an LTE modem into a branch-office router is the seamless integration into an existing WAN design and network policies. As mentioned earlier, the wireless link looks and acts like a normal WAN connection.

### Enable Modem Failover

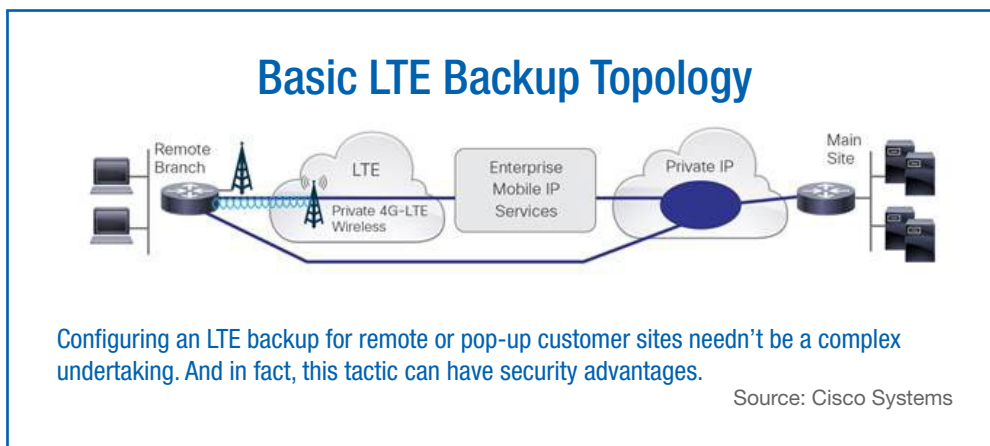
1. Select **Network > Modem**.  
*The Modem Configuration dialog box appears.*
2. Select the **Enable Modem for Failover when all External interfaces are down** check box.



Routers and appliances offering built-in LTE support will typically have dedicated configuration screens. For example, WatchGuard devices can [enable LTE failover](#) with just a checkbox. Typical options include router-controlled automatic failover/failback to LTE, custom DNS configuration for the LTE link (typically using the carrier's servers), link monitor settings to determine the connection status using pings (ICMP) or TCP connections to known servers/ports.

Some routers also support using the LTE modem's GPS for location-based services (application geo-fencing), voice calls, SMS and out-of-band hardware administration.





LTE circuits can also be used to create application-specific WAN connections that isolate more vulnerable endpoints, like PoS systems or public kiosks, from other branch office LANs. Physically isolating traffic from endpoint to Internet terminus improves security by creating a physical barrier between exposed devices more likely to be compromised (like PoS card scanners or show floor PCs) and internal employee networks.

A [Cradlepoint white paper](#) walks through the rationale and specifics of deploying multiple 4G LTE-enabled, application-specific networks, also known as “air-gapping” or “parallel networking.” The paper points out that this sort of setup is often used for isolating guest Wi-Fi, employee devices and point-of-sale systems on their own networks, but it’s also an option for third parties, such as vendors, partners and kiosks, that require Internet access. Physically separating data on parallel networks prevents attackers from leveraging a compromised device to jump to other nodes or servers, which may hold sensitive data. It also helps to limit the scope of work for maintaining network PCI compliance, as partners or IT can move non-critical applications off the PCI-auditable network.

A third common scenario for LTE WANs is connectivity for temporary locations or remote worksites. In areas where wired options are unavailable, incur lengthy setups or high installation fees, wireless may be the only option.

## BUSINESS CONSIDERATIONS, RECOMMENDATIONS

In most cases, we believe the benefits of using LTE as a ROBO backup circuit outweigh the drawbacks, but there are several potential snags. The most obvious is LTE coverage. While together AT&T and Verizon blanket well over 90 percent of the U.S. population with LTE, coverage can still be spotty with weak or dead zones in certain urban pockets or within large office buildings. Although [RootMetrics](#) gives both carriers aggregate performance scores of 90+ out of 100, your customers’ mileage will vary. Even in areas with good, four-bar LTE coverage, we’ve seen speeds vary between 5 Mbps and 40 Mbps, with the high end usually in rural areas with virtually no network contention (oversubscription).

Perhaps a more significant issue is cost. Although LTE is remarkably inexpensive by business broadband standards, it comes at the price of severe data caps. For example, both AT&T and Verizon charge \$140 per month for 20 GB of shared data. While that may be plenty for a family of several smartphone users, a business WAN could quickly go through that with indiscriminate use. Thus, you'll want to carefully configure the applications and data types allowed through an LTE circuit and block bandwidth hogs like non-business video streaming, device backups and large file copies.

Caveats aside, for branch locations without a secondary WAN link, we recommend that partners strongly advise customers to add LTE to the mix. We also recommend investigating LTE, in conjunction with a VPN for maximum security, for securely isolating internal networks from public-facing systems, at least for low-bandwidth applications like PoS transactions. Hardware and LTE service options abound, so there's no reason to leave remote employees and customers exposed to the vagaries of a single broadband carrier.