TELECOMMUNICATION BACKHAUL
THE INTERNET IS GETTING CLOGGED
AND
THE DWL SOLUTION

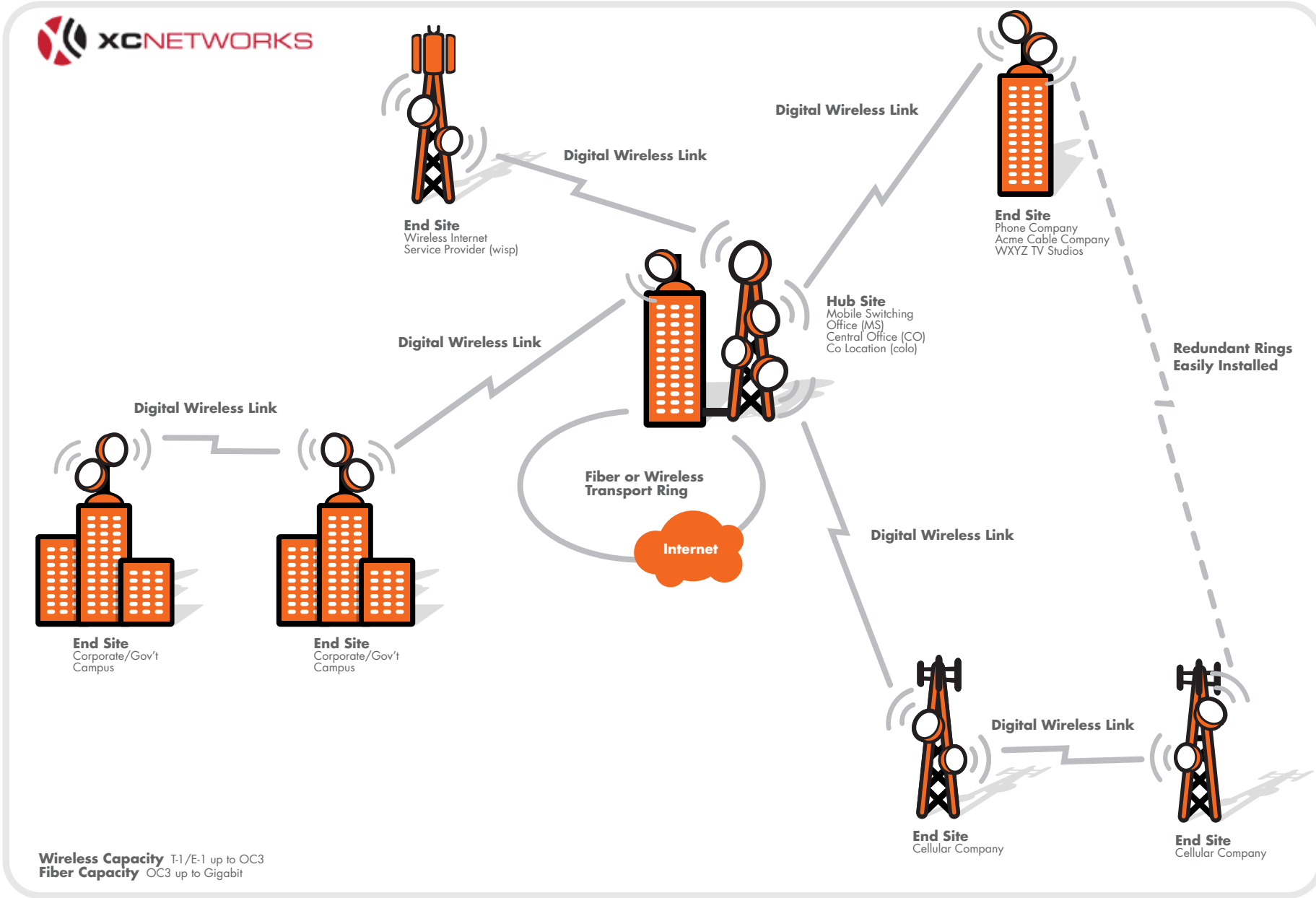
BY THOMAS J. SPACKMAN

There is general consensus among technology gurus that the next "killer" application in telecommunications will be mobile broadband wireless – cutting the cord and un tethering us from physical connection to the Internet. Text messaging, gaming, mobile data services (think Blackberry), mobile video (think Verizon's VCAST or Apple's iPhone) and "services yet to be invented" will drive demand. All have one thing in common, the need for super fast connections through "fat pipes".

To some extent, we have achieved some of this functionality though WiFi devices installed in our homes, offices or at the corner coffee bar. But WiFi has two inherent shortcomings: the WiFi "router" needs a physical Internet connection that costs money and is not always available and a WiFi device offers coverage only over a very limited area that does not provide true mobility for the user.

The cellular companies now offer data transmission and mobile video through technological upgrades to their existing voice networks and mobile video. The cellular companies have spent billions of dollars to build their original networks and the prospect of building a completely new network is not at all appealing. Obviously, incumbent cellular companies would prefer upgrades of existing networks rather than the rollout of a brand new parallel 4G network. It is unknown what additional services the consumer will eventually demand or how it they will be delivered, but we do know that the existing generation of wireless broadband services are too clunky, slow, limiting and expensive for mass adoption.

I believe in a mobile broadband future and am convinced that the next generation of services will be quickly adopted by consumers worldwide. In the last five years, the Internet has changed the way we live. Mobile phones have also changed the way we live. The combination of these two systems will provide exponential advances in services that soon we will find hard to believe we ever lived without.


XCNETWORKS
End Site
Wireless Internet
Service Provider (wisp)
Digital Wireless Link
Digital Wireless Link
End Site
Phone Company
Acme Cable Company
WXYZ TV Studios
Hub Site
Mobile Switching
Office (MS)
Central Office (CO)
Co Location (colo)
Redundant Rings
Easily Installed
Digital Wireless Link
Digital Wireless Link
Fiber or Wireless
Transport Ring
Internet
Digital Wireless Link
End Site
Corporate/Gov't
Campus
End Site
Corporate/Gov't
Campus
Digital Wireless Link
End Site
Cellular Company
End Site
Cellular Company
Wireless Capacity T-1/E-1 up to OC3
Fiber Capacity OC3 up to Gigabit

The anticipated mass adoption of 4G broadband services by consumers and enterprises will result in a material increase in backhaul requirements to power modified legacy networks or new next generation networks. In telecommunication, a backhaul link is the physical layer that connects distributed sites, typically a cellular base station or access point, to more central points of presence, typically the central office. The physical layer is either a wireline, usually copper, sometimes fiber, or wireless (digital microwave radio). Examples of typical backhaul applications include:

- connecting wireless base stations to base station controllers or hubs
- connecting a large company's network to the Internet or dedicated private network
- connecting DSLAMs to an Ethernet aggregation node (in other words, connecting a certain portion of a carrier's network back to a central office)

A good analogy for a telecommunication backhaul link is the water main operated by the local water company. The pipe that delivers water to the home from the street is narrow with limited capacity but is sufficient for residential or small office needs. However, the pipes in the street are connected to water mains or "fat pipes" crisscrossing cities and tying communities to their actual water source. Backhaul links are communication water mains tying communities to the Internet.

And, like a water main, a backhaul link must be industrial grade because of the required capacity and quality of service demands. If the narrow pipe to the home fails, only a single household loses water service. If the water main breaks, the entire community loses service. And this is the same with backhaul links that must be engineered and installed in a manner that guarantees that they handle the load and achieve uptimes in excess of 99.99%. Now, imagine that overnight most of the homes increase their demand for water 100 or 1000 times. What would that do to the need for more or bigger water mains? For cellular carriers, this resulted in an expense of $16 billion for mobile backhaul link services in 2005 and that is expected to double by 2009 (see www.infonetics.com).

In the United States, backhaul is traditionally provided by the wholesale group at the local phone company through interfaces such at DSL, T1, DS3/T3, or OC-3. Point to

point microwave radio transmission is gaining acceptance in the U.S. and is used extensively throughout the rest of the world. Telmex, Mexico's incumbent telephone company, owns Telcel, a cellular sister company. Telcel uses microwave radio to connect to over 9,000 cellular sites, even though its parent company owns a copper based network. Similar examples are found throughout the developed and undeveloped world. Infonetics reports that microwave radio makes up 81% of total mobile backhaul equipment sales and 56% of total backhaul links worldwide.

Numerous companies are emerging in the United States with infrastructure solutions for either wireless or wireline backhaul. In large urban areas, entrepreneurial metro fiber providers offer an alternative solution through dark fiber or high capacity lit services. "Wireless Fiber" microwave radio technology is an excellent alternative solution to the backhaul requirements for carriers or large enterprises. Using digital microwave radio technology, companies like BorderComm, XC Networks, Fibertower and XO Communications can, and do, offer a robust backhaul capacity. Radio equipment manufactured by the companies such as NEC (Japan), Harris (U.S.) Sagem (France) and Alcatel (France) are carrier class and historically proven in the field.

XC Networks provides mission critical transport solutions, including backhaul and enterprise access services to major wireless carriers as well as multi-national enterprises located in the Southwestern United States and Northern regions of Mexico. XC Network's links are engineered using licensed spectrum offering carrier-grade performance on point-to-point and point-to-multipoint configurations. Since its humble beginnings in 1986, XC has evolved into a "carrier's carrier" and a leading provider of backhaul operating over 2600 high capacity links throughout North America.

XC Networks' Digital Wireless Link ("DWL") service offers a turnkey solution by supplying all or part of the equipment, maintenance, engineering, frequency coordination, installation and operation of links capable of running high capacity TDM (legacy) and IP traffic. DWL service is highly scalable from fractional T1/E1 to greater than 100 Mbps and offers a seamless transition path to next generation IP. DWL is essentially the next generation twist on the traditional service provided by the local phone company over its legacy terrestrial copper network – but without its limitations. XC is responsible for all aspects of the service, a complete outsource for the client providing this part of their core infrastructure. It is also important to note that XC provides this all at a more cost-effective

rate than a traditional phone company. Competitive pricing coupled with operational flexibility allows XC to compete in the marketplace.

XC Networks' core infrastructure is powered by Cisco gear operating on redundant fiber and wireless rings in a carrier class configuration to warranty 99.99% availability on its core network. XC Networks owns a "carrier hotel" in Dallas, TX that is one of the most important Internet peering points in North America and is capable of interconnecting to more than a dozen national and multi-national carriers at GigE speeds. In addition, XC Networks owns nationwide spectrum concessions in Mexico and leases spectrum capacity as part of its solution. In the United States, licensed spectrum is obtained from the FCC on a station by station basis and XC is an expert at the engineering required to obtain these licenses.

The primary driver for this next general solution is the fact that backhaul will become the new bottleneck in wireless carriers' networks. Mobile phone subscriptions and bandwidth usage are skyrocketing. According to Infonetics there were more than 2 billion mobile subscribers worldwide in 2005, and that number will jump to over 3 billion by 2009. Our "in the trenches" field experience indicates that many carriers have not prepared for upgrading existing backhaul networks to handle 3.5G or 4G traffic requirements. Essentially, the existing networks can handle the load…for now. However, if broadband wireless is adopted by the general population as predicted, legacy backhaul networks must be upgraded as the capacity requirements will overwhelm them. The NTIA reported in the United States revenues from wireless data services jumped more than 86% to $8.58 billion in 2005, up from $4.6 billion in 2004 (www.ntia.doc.gov). And perhaps more importantly, regardless of the technology adopted, the physics of RF dictate that broadband services will require denser installations of cell sites resulting in significant growth for new backhaul links.

In addition, existing backhaul strategies have made reliability an issue as the legacy copper connections remain the weakest link in the communication chain. Copper connections are the single largest source of failure at a cell site because of their susceptibility to "backhoe fade", lightning, ice, high temperatures and other physical insults. The legacy copper infrastructure has not been upgraded in decades.

There are existing techniques to increase the capacity of legacy copper networks, but bandwidth requirements will eventually dictate a fiber build or the installation of a

high capacity wireless link. Building fiber networks has proven to be time consuming and a costly endeavor and they may not be technically feasible because of location, terrain, easement availability and other factors.

Mobile broadband services are coming and consumers will ultimately choose among WiMax, 4G, EV-DO or "services yet to be invented". Regardless of the winning technology, the requirements for backhaul will be immense. XC Networks is ready.

Tom Spackman, 41, is the Chairman and CEO of BorderComm, XC Networks and their operating subsidiaries. He received his Juris Doctor from Southern Methodist University School of Law and is a graduate of DePauw University, where he was a Management Fellow. He is a licensed attorney in Texas, a member of the Dallas Bar, the Federal Communications Bar and is admitted to the Federal Court North District of Texas. Tom has a long history of entrepreneurial ventures as a lawyer, investor and chief executive. He can be reached at tspackman@xcnetworks.com.