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LEASED-LINE REPLACEMENT

Utilizing gigabit wireless links to provide fiber-like performance at significant savings compared to leased lines.





Leased-Line Replacement

When considering high-bandwidth connections between locations, the thinking used to be that the only way to get service was to pick up the phone, call the Local Exchange Carrier (LEC) and order a circuit. As long as the startup costs and monthly recurring charges were within the IT budget, and the IT manager and business administrators were content with the level of service provided, writing a monthly check to the LEC was not a problem. If troubles were encountered with the service, a phone call to the provider was all that was necessary to resolve the problem.

Businesses relying on leased lines find a wide range of performance options tailored to suit their needs, from T1/E1 (1.5/2 Mbps), multiple T1/E1s, up to T3/E3 (45/34 Mbps), OC-3/STM-1 (155 Mbps), and even gigabit and multi-gigabit data rates. Depending on the length of contract, these services run on the order of a few hundred dollars per month for a single T1 connection, up to thousands of dollars per month for gigabit service. Establishing leased line service often entails startup fees, in addition to the monthly OPEX charges, that can range from a few hundred dollars to tens or hundreds of thousands of dollars when new copper or fiber circuits need to be constructed.



Due to competitive market pressures, businesses are increasing looking to IT departments to improve productivity and control costs. This paper examines the benefits of replacing leased line circuits with affordable gigabit Ethernet wireless links.

The Economics of Leased Line Services

In this section we'll consider three scenarios that involve interconnecting buildings located within a few miles of each other.

In the first scenario, a growing small business needs room to house its expanding workforce and finds a suitable building one-half mile away from the main office. The IT manager is tasked to connect the two buildings, with voice and data being the primary applications. Since one

T1 (1.5 Mbps) line is not enough capacity to handle the need, four T1s are ordered from the telco at a monthly rate of \$500 each (\$2,000 per month). This twelve month commitment also requires a startup fee of \$1,000 to cover equipment and provisioning of the circuits. This amounts to \$25,000 for the one year lease to provide a 6 Mbps connection between the corporate headquarters and the satellite office.

In the second scenario, a DS3 leased line is used to connect a school's LAN to the district office backbone three miles away. Services such as voice, data, Internet access, and classroom video are transported over the circuit. To establish service, the local carrier requires a startup fee of \$3,000 that covers the cost of edge devices, as well as installation and commissioning. The recurring monthly charge of \$1,700 for this connection is based on a thirty-six month contract. When one adds up the startup and recurring costs for this circuit, the school district will pay just under \$65,000 for this three year commitment.

In the third scenario, a gigabit leased line is used to provide a high speed connection from an outpatient clinic to a hospital two miles away, and transport medical image files, patient records, pharmacy information, as well as provide Internet/intranet access and voice over IP (VoIP). This all-IP based network doesn't require special interfaces, as gigabit Ethernet leased lines feed directly into the network routers at the edge. As its unlikely the hospital will move in the next five years, the administrator signs a long term contract with the service provider to get the best possible per-month price on the leased line. For a gigabit fiber-based circuit, the rates are typically at least \$5,000 per month, including the startup costs based on the 5-year contract term. The hospital will pay \$300,000 over the life of the contract for this high-speed connection.

Replacing Wired Services with High Capacity Wireless Links

Microwave radio systems have been used for decades to provide highly reliable, trouble-free transmission of voice, data, and video by service providers that depend on them to generate revenues, or by businesses needing backhaul for essential company network services. Because of their limited bandwidth, transmission rates top out at a few hundred megabits per second.

With the opening of the millimeter wave spectrum in the 60 GHz and 80 GHz bands, full-gigabit wireless transmission has become an affordable alternative to high capacity leased circuits.

For businesses, there are many advantages to utilizing high-capacity gigabit wireless links to replace fiber or aging copper-based circuits, both in terms cost and network performance. On the cost side, GigE wireless links provide a rapid return-on-investment, relative to the costs of leasing high-speed circuits. In the third scenario described above, leased line OPEX costs for a gigabit fiber service were shown in the order of \$5,000 per month; a rate of \$60,000 per year. By comparison, a GigE wireless link can provide fiber-like speeds and latency for a one-time expenditure of about two-thirds of the annual cost of leasing an equivalent fiber-based service. In many cases, when new fiber runs need to be constructed, the initial installation costs for fiber services can actually exceed the cost of installing a GigE wireless system.

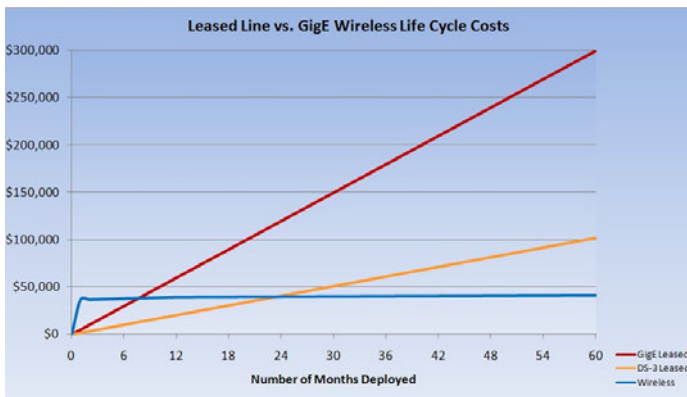


Chart 1 - Leased Line vs. GigE Wireless Life Cycle Costs

As the life-cycle costs are charted, it's evident that the financial advantage of the small initial CAPEX investment in GigE wireless systems can be realized in a relatively short period of time compared to recurring OPEX charges for leased lines. In many cases, the breakeven point is measured in months, not years.

The Economics of Replacing Leased Lines with High Capacity Wireless Links

Consider the three earlier scenarios. Let's examine each one and show how high-capacity wireless links provide significant savings.

Scenario #1: It was shown that four T1 lines would cost the business a total of \$25,000 for the one year commitment. Replacing these leased lines with a 100 Mbps license-free 60 GHz link would not only save almost 20% over the leased costs, but also yield 16x faster speeds between locations. The 60 GHz, 100 Mbps link provides a future-proof solution that can be upgraded to a full gigabit, as capacity needs grow.



	60 GHz FE Wireless	Leased NxT1
Telco service fee	\$0	\$24,000
Leased Line provisioning	\$0	\$1,000
60 GHz FE60U radios	\$14,900	\$0
Installation & turn-up	\$5,000	\$0
Total	\$19,000	\$25,000
Throughput	100 Mbs	6 Mbs

Table 1 - Cost Benefits of Wireless Link in Scenario #1



Scenario #2: The school district is poised to pay almost \$65,000 over the three year term of the contract; however an alternative would be to connect the school to the district office using a gigabit Ethernet 80 GHz wireless link. Replacing this 45

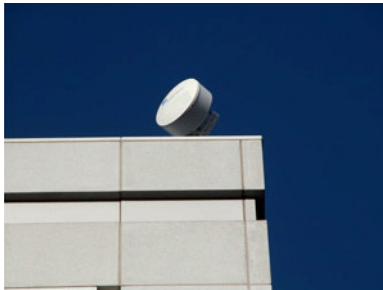
Mbps leased circuit would save 30% over the life-cycle cost of leasing the line, with the added benefit of a twenty-two times improvement in connection speed with this full-rate gigabit wireless link.



	80 GHz GE Wireless	Leased DS3
Telco service fee	\$0	\$61,200
Leased Line provisioning	\$0	\$3,000
80 GHz GE80 radios	\$31,900	\$0
Installation & turn-up	\$5,000	\$0
License	\$75	\$0
Three year Extended Warranty	\$7,975	\$0
Total	\$44,950	\$64,200
Throughput	1000 Mbs	45 Mbps

Table 2- Cost Benefits of Wireless Link in Scenario #2

Scenario #3: Leasing a gigabit fiber service between the hospital and medical office building will cost \$300,000 over the five year term of the contract. Replacing this leased circuit with an 80 GHz gigabit wireless link would save 80% over the life-cycle



cost of leasing the line with an equivalent gigabit speed and with improved latency between the buildings.

	80 GHz GE Wireless	Leased GigE Fiber
Telco service fee	\$0	\$300,000
Leased Line provisioning	\$0	\$0
80 GHz GE80 radios	\$36,900	\$0
Installation & turn-up	\$5,000	\$0
License	\$75	\$0
Five year Extended Warranty	\$16,605	\$0
Total	\$58,580	\$300,000
Throughput	1000 Mbs	1000 Mbps

Table 3- Cost Benefits of Wireless Link in Scenario #3

Server Centralization Utilizing Gigabit Wireless Links

Often, the greatest savings realized by deploying gigabit wireless links are not in the direct savings from eliminating monthly leased-line charges,

but in the indirect savings resulting from centralizing IT facilities and staff. Rather than tying together remote-site server facilities using lower-speed leased lines, gigabit wireless links provide the performance needed to centralize servers, while providing remote users with server access performance equal to those of local users. This consolidation eliminates duplicated server hardware, software licenses, backup systems and server room costs at multiple locations, which can result in savings of tens or hundreds of thousands of dollars. Also, centralizing server gear greatly simplifies network administration and server management, improving service reliability and reducing the costs of deploying new applications and server capacity.

Other Tangible Benefits to Replacing Leased Line Services with High Capacity Wireless Links

In addition to the significant savings realized by utilizing high capacity gigabit wireless links, businesses can future-proof their networks, and provide ample capacity as new applications need to be transported over the link or as the workforce continues to expand. Transmission rates provided by these gigabit wireless links mean that the backbone will remain free of bottlenecks as application capacity needs grow.

In regards to performance, these millimeter wave GigE wireless links provide full-rate, non-blocked gigabit throughput speeds with latency comparable to that of an Ethernet switch, yielding a fiber-equivalent backbone link that is perfect for transporting real-time applications such as video and VoIP. With GigE wireless links, there are no protocol conversions to make (e.g. SDH/ATM-to-IP) no expensive edge devices to purchase, configure and maintain; GigE wireless links provide the simplicity of native IP interfaces, matching the interfaces used by server and user systems.

Even when the costs of leased line services are deemed to be acceptable, often the time to provision these services can be prohibitive. High-speed wireless links can be commissioned in days, allowing the organization to react quickly to changes in the business environment, while new fiber installations are often burdened with construction delays of up to nine months.

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While it can be comforting to simply call someone else (e.g. a service provider) to address network issues or outages, many IT organizations prefer to have local control over their own network to ensure that any network issue troubleshooting or resolution actions can be undertaken without being dependent on outside parties. Gigabit wireless links include extensive management facilities that are consistent with those found on other Ethernet switching equipment. This allows network administrators to easily integrate the links into their existing network management systems without the complexity of dealing with proprietary management solutions. This gives IT managers complete visibility into their network, with the tools necessary to quickly diagnose issues without waiting for a service provider to respond to a trouble ticket.

Summary

Gigabit wireless links provide a direct substitution for leased services, with the performance, reliability and security of fiber. These links allow IT departments to simultaneously improve user services while reducing communications expenses. The direct savings over recurring leased-line costs are compounded by the indirect savings realized through IT facility centralization and simplified network management, as well as providing the peace-of-mind of complete network visibility and control.

About BridgeWave Communications

Founded in 1999, BridgeWave Communications is the leading supplier of outdoor Gigabit wireless connectivity solutions. The company's exclusive AdaptRate™ and AdaptPath™ technologies combined with its advanced Forward Error Correction capability deliver the highest availability at the longest distances for full-rate gigabit links. BridgeWave's point-to-point, wireless solutions are widely deployed in mainstream enterprise and service provider network applications and are poised to play a key role in the migration to 4G mobile network backhaul. With the largest installed base of GigE radios worldwide, BridgeWave delivers the highest levels of product quality and reliability. For more information, visit www.bridgewave.com.



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