

# Ethernet LAN and MAN Solutions for Hickory Tech

## Transparent LAN Services

### THE PROBLEM

As new technologies and products become available, carriers compete to provide leading edge services for their customers at reasonable prices. The telecommunications industry has reached the point where organizations are demanding high-speed Ethernet access over LANs and MANs (Local and Metropolitan Area Networks). Traditionally, copper cable and multi-mode fiber limited the implementation of Ethernet to buildings and campuses. The arrival of single-mode fiber Ethernet ports now makes it practical to move Ethernet data over Metropolitan Area distances.

A common expectation—and a quite reasonable one—is that high-speed (100Mb/s) telecommunications services are available and will provide the reliability that the US telephone system is known for maintaining. The obstacle that carriers' face is finding a way to implement and offer networking service options at affordable prices.

Hickory Tech Corporation, based in Mankato, MN, is a leading provider of an array of communications services to businesses and consumers in parts of Minnesota and Iowa. Hickory Tech has been installing fiber cabling for new high-bandwidth services to customer premises, and has an extensive infrastructure of single-mode "dark" fiber to handle projected growth.

In addition to providing innovative solutions and a variety of networking products, Hickory Tech looks for cost-effective ways to enhance their services, such as providing access for their customers to high bandwidth in their single-mode fiber Metropolitan Area Networks (MANs). Data traffic equipment options have been readily available to build out these Metropolitan Area Networks, but it has been very costly.

The high cost OC3-based MAN used routers to convert traffic at each network connection point. Typically, an ATM multiplexer was in the Central Office connecting several OC3 lines. These OC3s terminate with routers at the customer premise. Then, these premises' routers convert data from ATM to Ethernet TCP/IP. Finally, copper cabling extends out to users via hubs and switches in the local area network (Figure 1).

This type of network would require significant capital equipment investment because of the high router costs at each site. Routers capable of 100+ Mb speeds are expensive (about \$15-\$25K per customer site), consequently they add significant costs to the network facilities.

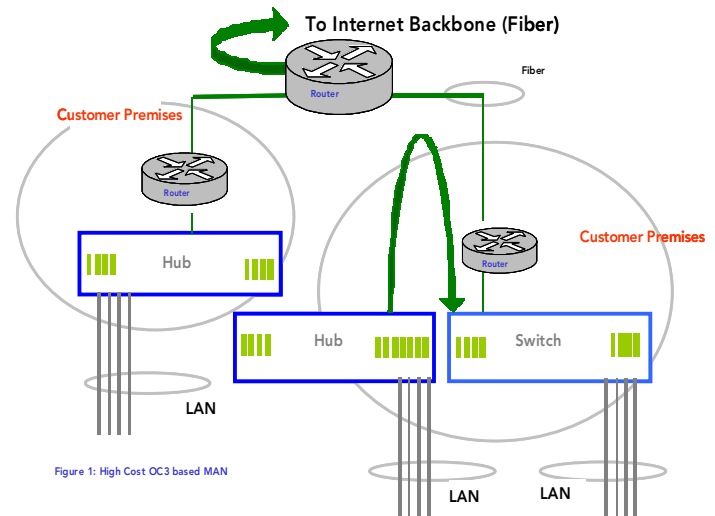


Figure 1: High Cost OC3 based MAN

### THE SOLUTION

The cost-efficient solution is a TLS (Transparent LAN Service) that provides the bandwidth for 100Mb Ethernet traffic without protocol conversion, as well as the security and high availability of a phone line. By placing a multi-gigabit ATM Router in a central office, dark fiber to customer premises can be "lit up" and the customers will have the high speed of a 100Mb single mode fiber link—without an expensive local router. Customer premises can essentially be "daisy-chained" together on secure lines through the central office or on spliced short-cuts—creating a MAN solution (Figure 2).

By utilizing Hickory Tech's existing fiber cables running from each customer location to the nearby CO (Central Office), TLS can readily be implemented. Further, the CO and its router are not always a requirement for the Ethernet communication link between customer sites. The CO router, typically used to communicate to the external world such as the Internet, may sometimes be bypassed by directly connecting fiber cables. With this type of architecture, metro Ethernet networks become more feasible for organizations with several metropolitan area locations.

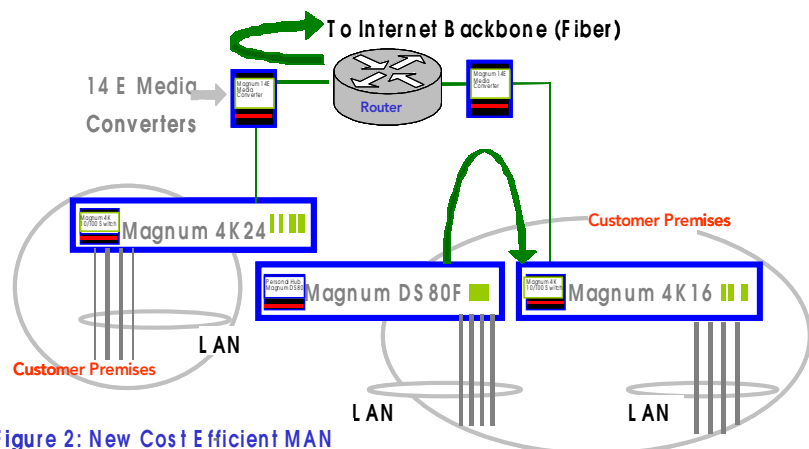


Figure 2: New Cost Efficient MAN

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### Hickory Tech

Hickory Tech, who needed the best alternative available, still had to find the equipment to make this network function. A quality vendor was needed to provide premises Ethernet hubs and switches with 100Mb single-mode fiber ports, as well as media converters to provide a 100Mb connection from fiber to the router's copper Ethernet ports.

In a current application, Hickory Tech is providing Ethernet connectivity for a school district in Mankato, MN. This MAN has fiber cables running from the central ATM switch to each of the 16 schools within a two-mile radius. This cost-efficient network is based on Garrett's line of Magnum Ethernet connectivity products. A TLS was implemented by simply choosing the Ethernet system elements from the Magnum line of 100Mb single-mode fiber products that suit a customer's MAN and LAN requirements.

### The Results

Carriers get what they expect with this kind of solution—a cost-effective way to implement and offer intra-LATA TLS to their customers while maintaining reliability. Intra-LATA (Intra-Local Access and Transport Area) is the area within which a regulated phone company is permitted to offer exchange telecommunications and exchange access services. U.S. telephone companies are allowed to provide any services within this domain, but are not permitted to offer long-distance phone services. For Hickory Tech, this means that customers with multiple facilities within Hickory Tech's operating region can utilize a TLS to communicate. Within the LATA geography, a bank with branch offices, a supermarket with several stores, a business with employees in several buildings, an ASP (Application Service Provider) with many business customers, an educational system with several schools; each can readily benefit from a TLS providing direct Ethernet connections to multiple "local" metropolitan area sites.

By going to this solution, you eliminate the need for customer-premises Multiplexers and routers that are big cost drivers. Customers can have reasonably-priced LANs with 100Mb Ethernet by utilizing dark fiber and implementing Magnum Hubs, Switches and Media Converters with single-mode fiber ports. Additional cost savings, as well as better reliability, can be achieved by eliminating media converters using built-in fiber ports on switches such as the Magnum model 4K24-2SSC.

### About Magnum Single-mode Fiber Products

Magnum Quad Switches are configurable 10/100 fiber switches, with up to 16 fiber or copper ports. The fiber ports may be a mix of fiber modes and connector types, including single-mode.

Magnum 4K-Series Switches come in 8, 16, and 24-port models. The RJ-45 ports are 10/100 auto-negotiating, and up to 2 built-in single-mode fiber ports may be configured. The switches, available with -48VDC power, NEBS certification and a reverse rack-mountable package, are also acceptable in telco and ISP environments.

Magnum DS80 Personal Hubs and P80 Personal Switches are 8-port 10/100 office-size units. Some standard models have built-in single-mode fiber ports.

Magnum 14E Media Converters offer a compact, cost-effective way to incorporate fiber media, into a 100Mb Ethernet network. Each Magnum 14E supports auto-negotiation so that an attached "N-way" auto-negotiating 10/100 RJ-45 switch or hub port operates at its highest performance level. The Link Pass-Through feature is standard in all Magnum 14E units, a feature especially desirable in managed networks. The Magnum 14E is available with fiber connectors for SC, ST, or MT-RJ types, multi-mode, 20km single mode, or 40km "long-reach" single mode.

### About GarrettCom

GarrettCom is the leading supplier of Carrier Class Ethernet LAN products. GarrettCom designs, manufactures and markets a comprehensive line of ETSI and NEBS-certified hubs and switches for use in data and telecommunications systems worldwide. For more information on GarrettCom and its products, please visit [www.garrettcom.com](http://www.garrettcom.com).

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