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2010

# **Opening The Door To The Mid-Band Ethernet Market Opportunity:**

## **Ethernet over Copper-Based Access For Carriers, Resellers, Cable MSOs and Managed Services Providers**

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**On behalf of XO Communications, Inc.**



**April, 2010**

## Executive Summary

Business customers continue to demand more bandwidth, to support their own growth, their customer growth, or for new and increasingly interactive applications. This demand for cost-effective, scalable bandwidth, plus the demand for increased access or “democratization” – available to any business at virtually any location – creates a significant market opportunity for forward-thinking service providers.

Traditional bandwidth solutions have been largely TDM-based (DS1, bonded NxDS1s or DS3), or fiber-based. Unfortunately, the scale and availability of these services are uneven or “lumpy” at best, and do not offer cost-efficiencies as customers purchase additional bandwidth. For a DS1-based customer requiring additional bandwidth, the options are simple but limited: Add another DS1. Available bandwidth doubles, but so does the price. The Mbps price remains relatively constant until the customer jumps to DS3 service, at which point the Mbps price drops. Unfortunately, at that point the customer has most likely purchased more capacity than they need.

While business users at virtually any location can order a DS1, fiber-based bandwidth offers a different challenge: Availability. Only 15% of commercial buildings in the United States are connected via fiber, and most of these are located in or near the central business districts of major metropolitan markets. Most businesses in outlying areas, including growing suburban markets, cannot receive fiber-based, high-bandwidth service.

Carrier-grade mid-band Ethernet has emerged as the technology that levels the playing field, providing cost-effective bandwidth to the greatest number of businesses. Ethernet is available via copper, TDM, wireless, and fiber interfaces. Where Ethernet services are not currently available, service providers can quickly respond to market demand by extending the service on a local service office (LSO) basis. With service options from 2 Mbps to 10 Gbps, Ethernet offers the scale that growing businesses demand, at declining price per Mbps rates.

Beyond economic value, Ethernet is already a well understood technology, virtually ubiquitous as the local area network (LAN) protocol of choice. Businesses have long embraced Ethernet’s stability and are now extending it into their metropolitan and wide area networks.

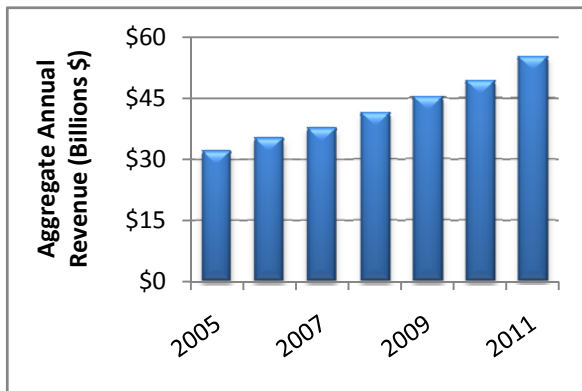
This white paper examines the growing mid-band Ethernet market opportunity, defined as bandwidth from 2 Mbps to 44 Mbps (speeds between DS1 and DS3 services), emphasizing how service providers can benefit from Ethernet-over-copper (EoC) solutions. These service providers can be facilities-based carriers, cable operators, international carriers network resellers, managed service providers, or any mix of facilities and resale. This paper also addresses the speed-to-market pressure all service providers face and speaks to the value of partnering with a wholesale service provider. The paper concludes with a discussion of factors service providers should consider when choosing an underlying wholesale EoC partner.

## The Mid-band Access Market: Size and Growth

Businesses, large and small, have a nearly insatiable bandwidth appetite, fueled by the adoption of bandwidth-intensive applications and services such as data sharing, collaboration, teleconferencing, and cloud computing. While some trends have questionable staying power, *increasing bandwidth demand* reigns supreme, a long-term, growing trend with no drop-off in sight.

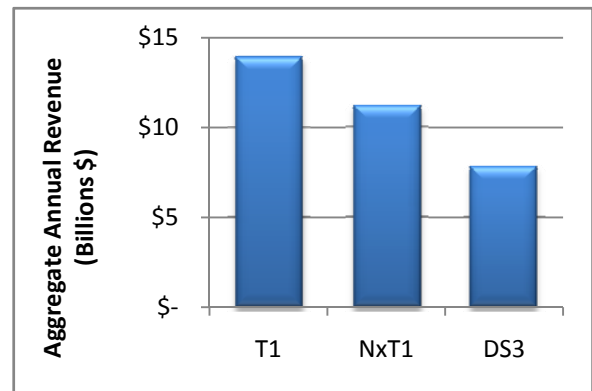
The *total* market for broadband services provided to U.S. businesses is illustrated in Figure 1<sup>1</sup> below. While this figure represents the aggregate broadband market, it is important to note that the overall market is stratified with each level having different requirements: Small and medium-sized businesses (SMBs) have different access needs (*i.e.*, complexity, geography) than large, enterprise-size businesses. SMBs have neither the need nor the budget for custom fiber builds, supporting Gigabit speeds and beyond. Instead, they are best served by *mid-band access solutions* (*i.e.*, between DS1 and DS3 speeds).<sup>2</sup> Figure 2 highlights the relative market size for mid-band U.S. broadband services between DS1 and DS3 speeds.

**Figure 1**  
Broadband Market Opportunity:  
Aggregate Broadband Revenue,  
US Business Services (1 Mbps -1 Gbps)



Source: New Paradigm Resources Group, Inc.

**Figure 2**  
Mid-Band US Business Services Market:  
Aggregate Revenue by Circuit Size (2009)



Source: New Paradigm Resources Group, Inc.

Addressing this market is a challenge for service providers, but those that best meet these needs will seize “first-mover” advantage on a substantial revenue opportunity. Equally important, they will be well-positioned to offer new services, create new revenue streams, increase customer loyalty, and reduce future churn.

<sup>1</sup> **New Paradigm Resources Group, Inc.** (NPRG) is a recognized leader among telecommunications industry analyst firms. NPRG has been covering the competitive telecom space since 1993 and the Ethernet services sector since 2001. All estimates and projections provided in this report are therefore derived from NPRG’s ongoing research and analysis of the both the broad communications industry and the Ethernet services market.

<sup>2</sup> Definitions of “mid-band” service vary. Given the service characteristics and relevant market segments to which these services appeal, New Paradigm Resources Group, Inc. defines mid-band services as ranging from 2 Mbps to 44 Mbps.

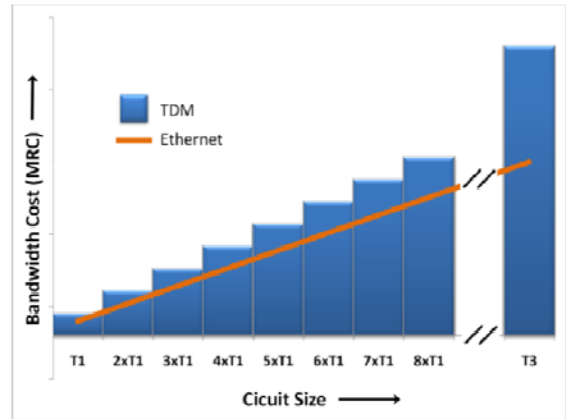
## TDM's Waning Relevancy in an IP-Centric World

Circuit-based TDM services (DS1 and DS3) have been businesses' default high-speed connectivity option for decades. Since the mid-'90s, with the rise of the Internet and increasingly ambitious corporate WANs, the communications industry has shifted towards packet-based technologies. This provides improved efficiency, flexibility, scalability, lower costs and pricing, service development, and layered applications, to name a few.

TDM circuits are uneven, and provide limited scalability. Interfaces and equipment may be required as customers grow from a single T1 to bonded NxT1 to DS3 service. When customers add a second T1, not only does bandwidth capacity double, but so does the cost. Further bonding increases the price, usually at nearly the same rate per Mbps. When the bundle approaches 10 Mbps (7xT1), TDM customers usually migrate to DS3 (45 Mbps) service, always at a significant price increase. Once at DS3 level, the price per Mbps finally drops, but primarily because the price is spread over a 45 Mbps service, which is often not needed. As shown in Figure 3, the "lumpiness" of TDM-based services provide neither cost-savings nor efficient bandwidth management to customers nor service providers.

Ethernet is different. Ethernet equipment is less expensive than TDM gear, and often already integrated into network switches and routers. Ethernet bandwidth can scale in smooth increments up to full port speed without requiring physical changes to equipment or carrier facilities. This enables bandwidth to scale quickly, keeping pace with the customer's business. As a result, the Ethernet model is more cost- and network efficient for both customers and service providers.

**Figure 3**  
Cost Efficiency of Ethernet Bandwidth:  
End-User Cost - Ethernet vs. TDM Services



Source: New Paradigm Resources Group, Inc.

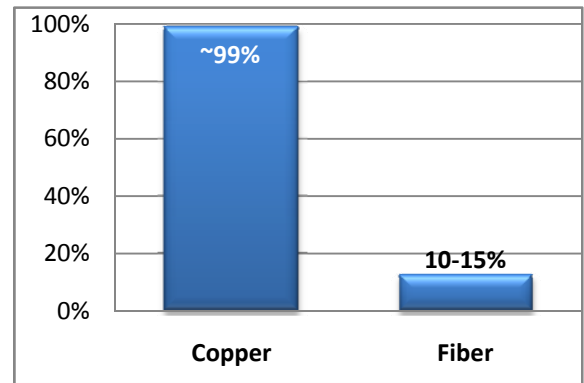
## Physical Connections to Business Customers – Copper's Superior Reach

Technical limitations have historically restricted commercial Ethernet services to carriers' fiber facilities, severely restricting availability. Today, approximately 10% to 15% of commercial office buildings, and fewer than 5% of all businesses, have direct access to fiber networks and the high-bandwidth options they offer.

In contrast to fiber's reach, the copper plant touches nearly everyone. After more than a century of network building, copper access lines now reach virtually all U.S. businesses, penetrating roughly 99% of commercial office buildings (see Figure 4).

While fiber is still the ultimate high-bandwidth delivery media, capital costs and construction timeframes severely restrict its penetration, especially to SMBs. In areas where business densities are low and the returns on high-bandwidth access deployment are less certain, fiber reach will continue to lag, limiting the availability of cost-effective and scalable bandwidth options to end-users. Therefore, an alternative solution is required: one that is less “lumpy” than TDM, enabling smooth upgrades and downgrades, more cost-effective than fiber-based Ethernet, and available to all who seek it.

**Figure 4**  
**Commercial Buildings Served:**  
**Copper vs. Fiber (2009)**



Source: New Paradigm Resources Group, Inc.

### Providing Mid-Band Service: The Ethernet-over-Copper (EoC) Solution<sup>3</sup>

Recognizing this opportunity, equipment manufacturers have developed gear that transmits Ethernet packets over copper loops. This new technology (2BASE-TL/EFM) is able to expand the capacity of the existing copper plant facility by up to 400% over a traditional DS1. By adding additional loops, i.e., bonding the copper, service providers are able to scale the delivered bandwidth in meaningful, cost-effective steps. The resulting “Ether-net over bonded copper” technology neatly addresses the mid-band gap by combining the advantages of Ethernet with the superior reach of copper facilities (approaching UNE DS1 reach per LSO), but in a more cost-effective, flexible service.

By making use of the existing copper plant, EoC can extend native Ethernet to the vast majority of businesses — especially those in major urban areas, central business districts, and other commercial centers. By decoupling Ethernet availability from fiber networks, EoC “democratizes” Ethernet, spreading the benefits enjoyed by large corporate WANs to branch offices and to SMB customers.

EoC copper bonding is reliable, using the same copper infrastructure as DS1 services, but providing for improved redundancy and service quality versus NxDS1 services. As a result, service providers can use EoC to address multiple business objectives: Not only to open new markets and a new range of customers, but also to sell high-value services into their existing customer base, thus retaining and growing the existing revenue base. For DSx-based carriers, the low-hanging fruit is the migration of existing TDM-based customers to EoC service, providing more bandwidth at comparable or even lower prices. EoC opens the door to these opportunities, enabling service providers to enter new markets, create new products, and attract new customers. Mid-band Ethernet may be a relatively new service, but forward-looking service providers are deploying it aggressively, and are being rewarded in the marketplace for their efforts.

<sup>3</sup> Carriers may also refer to EoC as EFM (Ethernet in the First Mile).

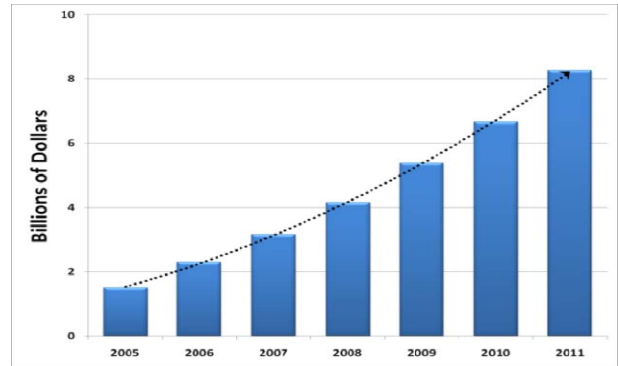
Figure 5 shows the growth of the business Ethernet service market and forecasts show it will be a leading telecom growth engine over the next decade. Ethernet-over-copper will be a major driver of that growth.

While the EoC business case is compelling, deploying it is neither fast nor inexpensive. “Speed to market” is always a critical consideration for any service provider planning to enter or expand into any market. Wholesale agreements for EoC services are therefore a practical option for providers wanting to avoid the capital requirements of an extensive, front-loaded network build-out.

**Selecting an EoC Mid-Band Access Partner**

Many service providers conducting a “build vs. buy” analysis conclude that obtaining EoC services from a wholesale provider is the more cost-effective, faster path to market. Once that decision is made, the purchasing (end-user-facing, or retail) carrier or reseller must carefully select the wholesale service provider with whom they will partner for service delivery. Purchasing carriers should use defined criteria to guide their identification of the optimal partner. Table 1 below presents some core decision considerations that service providers should evaluate during their selection of an EoC wholesale partner.

**Figure 5  
Business Ethernet Market Opportunity:  
US Metro Ethernet Service Revenue  
(2005-2011)**



Source: New Paradigm Resources Group, Inc.

**Table 1  
Identifying Ethernet Access Partners: Core Decision Considerations**

Factors	Considerations
National Footprint	Nationwide footprint enables retail service providers to serve all major domestic markets, plus minimizes the need to work with multiple wholesale partners to address market gaps.
Facilities-based	Wholesale service providers must have sufficient facilities already in place to provide the retail service provider rapid turn-up and the best possible quality control.
Range of Bandwidth Options	Having a wide range of bandwidth options enables retail service providers and customers to change capacity up and down as needed.
Multiple Access Options	Wholesale providers offering multiple access platforms provide retail service providers with additional options and flexibility. Access options should include: copper, fiber, TDM, and wireless (if available).

Service Level Agreements (SLAs)	Business customers expect Ethernet-based services to perform just as well as circuit-based TDM services. Therefore, wholesale Ethernet service providers must provide strong SLAs to their retail partners.
Addressable Market Size	Wholesale service providers should provide access to a significant customer base within available markets to open large opportunities.
Customer Support	Excellent customer support should be expected. Retail service providers should also consider if the wholesale partner offers aids such as online circuit qualification, pricing, and ordering tools.

## Summary

Business demand for scalable, flexible, cost-efficient broadband access will continue to grow. Carrier-grade, mid-band Ethernet provides a platform that allows service providers to both address this requirement and grow markets. Well-positioned carriers - those with extensive networks, Ethernet services and experience - are reaping the rewards as Ethernet quickly becomes the access method of choice for business customers. The “lumpy,” uneven nature of DSx services and limited availability of fiber has constrained carriers’ ability to deploy Ethernet. Ethernet-over-copper (EoC) technology overcomes these issues, extends the metro Ethernet opportunity further into the carrier community, and creates significant growth opportunities for service providers.

The mid-band Ethernet opportunity is not limited to facilities-based service providers. Other service providers – network resellers, cable MSOs, managed services providers, international carriers as well as facilities-based providers not looking to build EoC networks – can participate in this market opportunity by partnering with an established wholesale Ethernet provider. Partnering is a cost-efficient and time-effective route to enter or extend their reach into markets.

After first deciding if the mid-band Ethernet market fits a service provider’s portfolio and making the “buy vs. build” decision, service providers pursuing a wholesale model face an equally important decision: selecting the appropriate EoC service partner. Service providers should carefully consider a number of factors before establishing a partnership for reselling mid-band EoC services. This white paper provides an initial set of criteria service providers should consider as they identify the wholesale carrier most capable of helping them maximize the mid-band market opportunity.

## Case Study:

### MegaPath's Strategy for Growth - Find An Effective Access Partner

MegaPath has seen significant growth across its portfolio, including broadband connectivity, VPN, VoIP, data and security services. This portfolio enables MegaPath's customer base to lower costs, increase security, and enhance productivity. Cost-efficient, flexible broadband connectivity lies at the core of MegaPath's ability to deliver these services.

MegaPath recognized they needed additional flexibility and access options beyond the traditional access methods such as T1s, and felt Ethernet-based solutions would better enable their business strategy, particularly as it rolled out new, enhanced services. Beth Tyebjee, MegaPath Senior Vice President for Products and Project Management remarked, "We need broadband services that will allow us to address our customers' evolving needs and growth. Ethernet-based services provide this, they are increasingly being requested by our customers, and they are well understood."

After working through a build versus buy analysis, the company determined that acquiring Ethernet access services from a wholesale partner would be more cost effective, and get their new services to market faster. After a detailed review, MegaPath selected XO Communications as its access partner. This selection was based on XO's ability to deliver nationwide service; a wide range of flexible, service options that can grow; and their ability to integrate pre-qualification, ordering, and trouble ticket interfaces with MegaPath's back office.

Steve Guastella, MegaPath Senior Vice President of Network Operations and Engineering observed, "XO offered MegaPath value and some of the best coverage available. We have confidence in XO's ability to deliver."