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Poised to Dominate the Future of Access & Change the Grounds for Competition: Carrier Ethernet

By Craig M. Clausen & Dick Tomlinson, PhD[1], New Paradigm Resources Group, Inc.

It took awhile. We've waited, and waited, and waited and finally Ethernet seems ready to emerge into an explosive growth phase in carrier networks. Five years ago, we issued our first report on Ethernet in the Metro Area Network (MAN) with a long, deep look at Gigabit Ethernet. Then, Ethernet technology seemed tantalizingly close to having all the attributes needed to be the dominant access technology in the metro arena. But taking the last few steps proved excruciatingly slow. Ethernet still lacked the standards, robustness and features required for wide-spread deployment in the carrier networks. Now that has changed. For a range of reasons, we expect Carrier Ethernet to follow an impressive growth path and, eventually, dominate the metro access market.

Setting the Stage: Standards Setting

Today Carrier Ethernet stands about where Frame Relay (a technology it is rapidly replacing) did in 1984. That was the year that an industry alliance - the Frame Relay Forum - issued standards that enabled the adoption of the technology as a universal transport mechanism, and carriers began a serious roll-out. This ignited 20 years of growth for Frame Relay that led to some two million ports in service by 2004.

The Metro Ethernet Forum (MEF – *if this body were formed today it would probably be called the CEF-see sidebar*) was formed in 2004 to create the standards required to make Ethernet suitable for carrier-grade WAN service. The MEF, an industry body supported by equipment suppliers, telecom carriers and services companies, has continued to develop and issue a series of technical standards. It now certifies carriers and vendors (or more accurately the services and equipment provided by each) that meet those standards. The tables below show Metro Ethernet service providers (those with MEF certified services are asterisked) and all vendors producing MEF certified equipment. These standards development and certification processes have added the requisite order to the sector to provide essential comfort to carriers and vendors, setting the stage for rational investment and continued growth.

Table 1: Leading Metro Ethernet Service Providers (U.S.) 2006

AboveNet	Charter Communications	IP Networks	
Alpheus Communications	Cincinnati Bell	Level 3 Communications	*Time Warner Cable**
American Fiber Systems	Cogent Communications	McLeodUSA	Time Warner Telecom
*AT&T**	Cox Communications	*Met-Net Communications**	Verizon/Verizon Business
Bellsouth	Embarq	One Communications	Windstream
Broadview Networks	Expedient	*Optimum Lightpath**	XO Communications
Broadwing	General Communication, Inc. (GCI)	PPL Telcom	Xspedius
CenturyTel	Globix	*Qwest Communications**	Yipes Enterprise Services, Inc.

Source: New Paradigm Resources Group, Inc. (*Metro Ethernet Report™*)

[1] The authors are President and Executive Vice President, respectively, with New Paradigm Resources Group, Inc., a Chicago-based consultancy providing strategic consulting and analytical services to communications innovators. They can be reached at (312) 980-7848 or www.nprg.com.

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Table2: Vendors with MEF Certified Equipment			
Actelis	Ciena	Hatteras Networks	RAD Data Communications
Adtran	Cisco Systems	Huawei Technologies	Siemens
ADVA	Scientific Atlanta	Huawei 3com	Telco Systems
Aktino	Corrigent Systems	Juniper Networks	Tellabs
Alcatel	Ericsson	Lucent Technologies	T|pack
Anda Networks	Extreme Networks	MRV	Turin Networks
Atrica	Foundry Networks	Nortel	UT Starcom
Canoga Perkins	Fujitsu	Omnitron Systems Technology (OST)	World Wide Packets

Source: Metro Ethernet Forum
Source: New Paradigm Resources Group, Inc.

It's a Natural, But…

Ethernet is a natural for transporting IP. Bytes pass efficiently from the LAN to the WAN —they don't have to be chopped up and transmitted to the WAN with lots of extra overhead or empty packets. The CPE-network interface can be Ethernet "plug and play" without additional equipment, such as expensive WAN cards. This compatibility, along with its characteristic simplicity, low-cost and universal interface, made Ethernet metro transport instantly attractive to customers' IT staffs and some competitive carriers. If only the rest of the story had continued that smoothly.

While end-users were receptive to the idea of "Ethernet everywhere," some remained suspicious that the Ethernet protocol, developed for the LAN environment, might prove too fragile for WAN use. These concerns were reinforced by the fact that initial Carrier Ethernet offerings were "best efforts only" and were not backed by any Service Level Agreements (SLAs). End-users expected carriers to offer Metro Ethernet SLAs comparable to those for traditional services (*e.g.* Frame Relay or DS3).

Carriers have, indeed, begun offering SLAs, although not up to the standards of traditional transport like Frame Relay. Interestingly, even with SLAs now available, "best efforts" Ethernet services currently outsell those with SLA guarantees. Apparently many end-users are in effect saying, "We wanted to know that you had the confidence in your service to offer an SLA. We didn't mean that we actually wanted to *pay* for it."

A second reason that SLAs do not currently play a more important role in the choice of Ethernet service is the way in which end-users are employing it. As New Paradigm Resources Group describes in its forthcoming *Metro Ethernet Report™*, most Carrier Ethernet service today is used for relatively unsophisticated, point-to-point, dedicated transport. The consensus is that as end-users become more comfortable with Carrier Ethernet, it will be adopted for more complex, multi-point, integrated services including real-time services like voice and video, and for mission-critical applications. Under these conditions end-users will be more concerned with service quality and will demand rigorous SLAs. In addition to routine SLA parameters like network availability and mean-time-to-repair (MTTR), more detailed transport quality parameters like latency, jitter and packet loss will be of great concern and will serve as "differentiators" for carrier products.

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Great Expectations…

Enthusiastic promoters of Carrier Ethernet have created some unfortunate expectations in the minds of end-users when it comes to price comparisons between emerging metro Ethernet services and traditional transport. As a result, some end-users are predisposed to believe that if they replace, say, a T1 circuit with a 10 Mbps Ethernet circuit or a T3 circuit with a 100 Mbps Ethernet circuit, their *cost per circuit* will be lower. In reality, of course, their *cost per unit of bandwidth* will decrease, but their cost per circuit will increase. Rather than simply "more for less," customers are discovering that Ethernet promises "several times more" if they're willing to pay "a bit more."

Optical Carrier Ethernet offerings have typically had a minimum port speed of 10 Mbps. Thus, critics suggest, Ethernet's value proposition to a standard T1 dedicated transport customer is "ten times the bandwidth at twice the cost per circuit." For offices pushing the limits of a single T1, or even a couple T1s, the big leap in bandwidth would certainly be nice—but not at an extra cost. Furthermore optical Carrier Ethernet access availability has been limited since only about 15% of office buildings in the US are fed by fiber. This still presents a quandary for risk-averse and cost-conscious IT managers. Their existing Frame Relay, ATM, and private line networks are stable, proven and have ubiquitous coverage.

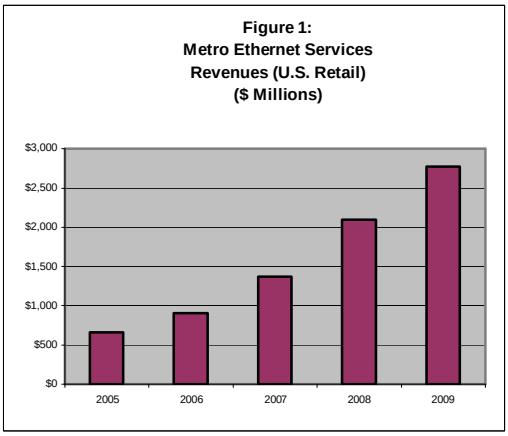
Looking Forward

A technology development that addresses both the "bandwidth gap" between a T1 and standard 10 Mbps Ethernet and the limited availability of fiber to end user buildings is Ethernet over copper. This technology uses dry copper pairs for transport. It can provide "mid-band Ethernet" in the 2-8 Mbps range in configurations using multiple bonded copper pairs. This neatly satisfies the gap many end-users face. It also allows service providers to begin addressing the vast majority of customers who are not served by fiber, and do so at price-points that challenge customers' existing T1 and DSL services.

The need to serve a sub-10 Mbps, enterprise Ethernet market may fade in importance however. The *Metro Ethernet Report™* explores two current trends that are inexorably—but ever more quickly—

overwhelming arguments about optical carrier Ethernet's suitability. First, the proliferation of bandwidth-consuming applications—the voice, image, and video effect—is rapidly driving up end-user throughput requirements. Second, there is an interactive effect. The availability of bandwidth at a low per-unit cost does, in itself, stimulate applications that demand even greater bandwidth. The continued extension of fiber networks, at least to business locations, seems likely to accelerate and along with it Ethernet accessibility.

Carrier Ethernet can provide much more than just cheap, scaleable bandwidth. It supports advanced, virtual network services and integrates well with multiple applications to create high value services. We forecast that service revenues will approach $3 billion by 2009 (see Figure 1). Many of these services will be unique and differentiated, providing telecommunications operators many opportunities to compete. Future competition will not be the simple price competition that has characterized "me-too" services. Clever service providers will now have the tools to provide much more than just simple transport or traditional telecommunications offerings. The era ahead will be fun and exciting as creativity is unleashed.



Source: New Paradigm Resources Group, Inc.