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Gig-E and the Next Round of Innovation

Gigabit Ethernet's emergence as the leading protocol in metropolitan area networks is subject to less and less debate. However, I believe that even advocates will be surprised at the speed and completeness of the gig-E victory.

We're about to see nothing less than a user-driven, gigabit Ethernet takeover of the metro that will bring proprietary telecom protocols tumbling down everywhere. The takeover will open the way for innovation in the telecom space that, I believe, may even match what we've experienced in recent years in the IP space. This will occur at every level, from new services to new network software and systems, down to new optical components.

An early portent of gigabit Ethernet's coming dominance occurred last year when, unexpectedly to many, including venture capitalists, gig-E stood up to the OC48 (2.488 Gbit/s) assault led by carriers. No matter what the purported advantages of ATM or Sonet-based OC48 (for example, remote management), carrier promises came with a hard-to-accept Trojan Horse: the equipment necessary to deploy the services that would allow carriers to extend their reach into customer premises. Most Ethernet-enabled businesses refused anything that would dilute direct control over the equipment in their buildings and their remote LANs.

When you come down to it, there's not a lot of value added by Sonet and ATM in the metro ring. Either you're going to connect your LAN directly to an ISP (Internet service provider) or directly to some kind of VPN (virtual private network) across the metro region. There's no need for a service intermediary.

Looking ahead, gig-E's increasing dominance will give it a volume/cost advantage in electronics manufacturing and an intelligence advantage in the development of code and applications. As the Sonet/ATM crowd attempts to move up the performance curve to OC192 (10 Gbit/s) and beyond, the gap will widen. Each iteration of these protocols takes two to three years to receive the blessing of the industry.

By contrast, the Ethernet world will be able, as it always has, to maintain its old core standards even as it advances technologically. Rather than lengthily debating the future, Ethernet proponents will be able to focus on minor modifications aimed at better functioning at higher speeds or improved Quality of Service (QOS).

Increasingly, we're going to be dealing with a different kind of network and, for all of us, a different kind of world. Here are some of the elements of the gigabit Ethernet revolution:

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New Tools and Applications. Every revolution requires new software tools. Normally, I'm skeptical about investing in software for telecom networks. That's because there has been no incentive for carriers to communicate with one another. But traditional carrier *customers* have tremendous incentive to talk to one another. A new generation of telecom applications based on IP standards such as HTTP and XML will be introduced to the metro telecom network.

Already we're seeing the first signs of VPNs that are only incrementally more difficult to implement than access to the Internet itself. Encryption hardware and software has improved, and so has the ability of people to distribute VPN software and upgrades automatically.

We will also see the emergence of strong classical "follow-me" services — those that enable a phone caller to easily leave a voice mail, send a fax, contact a secretary, or launch a page. Until now, such services required huge customized system integration efforts. New services, however, will work off existing Ethernet, HTML, and other standards and enable us to launch a packet to our paging service provider and talk to whomever we want via HTML.

We'll see a rise in the use of databases. Business users will want to constantly gather data on how customers are using the Internet and react with quick decisions on how to package their next product offering. We'll need more dynamic database approaches than we now have — making for other potential investment opportunities.

And, of course, we'll need a host of new Ethernet-specific switches, routers, and grooming devices. Unlike proprietary telecom switches, these devices will speak in a common control language of gig-E, and they will follow instructions encapsulated within the Ethernet packet, rather than following a telco switching script. As with the Internet itself, metro users will regain control over their own signals and information.

New Components. Even within one building, Ethernet traffic tends to come in bursts. Multiplied across a richly connected network, traffic will become exponentially harder to manage. This will require a new generation of highly flexible components and subsystems. Information will be stacked bit upon bit, necessitating new linear modulators and detectors to separate out the different bit streams. The increased potential for signal loss will require the optical equivalent of signal reconditioning points, or what [Lightchip Inc.](#) (a [Morgenthaler Ventures](#) portfolio company) calls "dynamic optical nodes."

Needless to say, the new generation of metro gig-E components must be simple to deploy. Gigabit Ethernet will become so widespread that we will quickly outrun our supply of telecom and optical-grade engineers to help us manage it. Component interfaces will have to become so simple that they can just snap in, as easily as snapping in a telephone.

And, above all, the new components will have to be cheap. Certainly, this is the great opportunity for an industry that still, after all these years, manufacturers lasers and photo detectors as tiny jewels and then laboriously assembles them into every single laser package. The volumes implicit in the spread of gigabit Ethernet ports — which will number in the hundreds of thousands and millions — certainly offers the opportunity. The price points we need to reach — less by a factor of ten! — provide the necessity.

In short, another communications revolution is underway that is both broad and deep. The current malaise in telecom investing should not distract us from this fact.

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