Why Ethernet Access is a Critical Part of Enterprise Wireline Telecom

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In today's Brave New World of enterprise telecom, MPLS has supplanted private lines, frame relay and ATM as the backbone of data networks. At the same time, SIP trunking is well on its way to replacing TDM-based PRI's for voice. By the end of this decade – at the latest - MPLS and SIP will be the near-universal model for enterprise wireline communications.

Sounds like a great plan. And it is.

The fly in the ointment – or, if you prefer, the bug in the code – is dedicated access, the pipe your voice and data traffic rides from your corporate locations to the nearest network node. In other words, the last (and first) mile. Access is not trivial -- traditionally it accounts for 30-40% of your total network costs and for decades it has been the thinnest connection (hence the bottleneck) of corporate networks. And since it's the last bastion of the ILEC's near-monopoly when CLEC alternatives aren't available, it's notable for high prices and lousy terms.

Until recently, the workhorse of dedicated access was DS-1 [1.5 mbps] special access or, for really large locations and data centers, its big brother, DS-3 [45 mbps]. Separate lines were procured for voice and data (a PRI is a DS-1 divided into 23 voice channels).

But today, DS-1's don't cut it anymore, DS-3's are expensive, and carriers are making noises about discontinuing both. Voice is now an "app" that increases the load on special access lines dedicated to data traffic. And even without voice, who wants 1.5 mbps speeds when FIOS or Comcast gives you 10-30X that *at home*? Lastly, bandwidth demand is soaring as employees use more and more cloud based apps.

Ethernet to the Rescue

The good news is there is no real debate about the replacement for TDM access, and we don't have to wait for it to mature because it has been deployed for decades. It's Ethernet.

Ethernet grew out of ALOHAnet, which was developed 40+ years ago in (where else) Hawaii. Over time, Ethernet beat out IBM's token ring and became ***the*** standard for routing traffic over local area networks. About a decade ago it began to appear in carrier networks as Carrier, Metro, or Wide Area Ethernet.

Ethernet for dedicated access has many advantages, even beyond the fact that unlike TDM carriers aren't trying to do away with it.

- It's the native protocol on virtually all LANS, so using it in wide area networks is simple, and reduces the number of protocol translations required to traverse a network from end to end.
- It's more granular and more easily scalable than TDM: going from 5 to 10 to 20 to 100 mbps in the Ethernet world doesn't require bonding DS-1's, and then converting to a 45 mbps DS-3, and then bonding those DS-3's into 155 mbps OC-3 or higher circuits.
- It doesn't require a lot of education – IT personnel already know Ethernet.
- Ethernet customer premises equipment is much less expensive than TDM equipment.
- But most of all it is relatively cheap and getting cheaper (although it's Layer 2, which means that it's a telecom service subject to USF and associated surcharges). Today Ethernet access is less expensive than TDM for anything over about 5 mbps. For 10 mbps or higher – the new norm – the comparison isn't even close.

THE PROBLEM

Is there a catch? Well, if all you need is 1.5 mbps, a DS-1 is still cheaper and more widely available than a 2 mbps Ethernet connection. But the real 'gotchas' of Ethernet access flow from the fact that it likes to run over optical fiber.

Before the second tier vendors descend on us like a pack of flying monkeys,[1] we hasten to add that Ethernet is independent of its medium and one can in fact buy Ethernet over Copper (EOC) and even Ethernet over Wireless (EOW). However, except as a backup and for cell site backhaul, EOW is more talked about than deployed. And EOC has limitations – it doesn't work at locations more than 12,000 feet from a central office; it has bandwidth limits (vendors talk about 50 mbps but don't count on anything more than 10 mbps); and it is subject to technical issues like throughput fluctuation and signal degradation. EOC can be useful, and it absolutely beats nothing, but twisted pair is not the ideal Ethernet medium.

So what's the problem with fiber? In a word (OK, three words) it's not ubiquitous. The most widely quoted estimate is that optical fiber has been deployed to about 40% of US buildings housing more than 20 employees, though that is increasing

[1] In *The Wizard of Oz*, the Wicked Witch of the West never says "Fly my pretties, fly!" Of course, in *Casablanca* Rick never says "Play it again, Sam." And no one in *The Treasure of Sierra Madre* ever says "We don't need no stinking badges." But we digress.

rapidly (in significant part because of demand for Ethernet access)[2]. For smaller buildings the penetration is considerably lower.

That means a large user planning to deploy SIP trunking, video services or other bandwidth intensive applications across a region or nationwide (and/or contemplating a substantial upgrade of its data network bandwidth) will likely encounter what the telecom world calls Special Construction to reach a less than trivial portion of its key locations. And Special Construction has two problems:

- *Delay* – it can take months (3-6 months; longer if you're unlucky) to actually bring optical fiber from the street (or several blocks away) into a building. It isn't just the construction – it's the time to deal with your landlord and secure building permits from the local authorities.
- *Cost* – Special Construction is *not* cheap. Typical quotes are $100-125 per *foot* (!) to build a fiber lateral connection to an office building, which works out to around $60K if you need to go 1/10th of a mile. Recently, Windstream filed a letter with the FCC that reported a special construction quote from AT&T for a single 10 mbps Ethernet circuit of $99,685 plus $53,125 in "revenue recovery charges." And you can't predict the financial impact of Special Construction in advance; each quote is prepared on an individual case basis (ICB) *after* you place an order.

Separately, these issues can be challenging. Together, they threaten to bust budgets and schedules in a way that enterprises do not expect and cannot tolerate.

How to Protect Yourself

So what can you do? A lot, actually. Here are two general tips that will help (in this and lots of other areas):

1. Procure Ethernet access as part of the RFP for the services that will use it (mostly likely your MPLS network and SIP trunks). If you single source, you're toast.
2. Remember that access is only one component of the total cost of what you're buying – no one buys access to nowhere.[3] Other costs include port

[2] Vertical Systems Group - http://www.verticalsystems.com/vsgpr/u-s-business-fiber-gap-narrows-in-2013/. Used with permission from Vertical Systems Group, Inc. Copyright 2014. All rights reserved.

[3] Actually, Hank was once involved in a transaction where we did exactly that, but it's too long a story to tell here.

and class of service (CoS) elements in an MPLS network solution. What really matters is your total cost of ownership.

And to deal specifically with optical fiber build-out issues:

1. In the RFP, list your principal sites and ask vendors which are already served – not just passed – by fiber to which they have access.
2. If you ask *and* your procurement is perceived as competitive, the vendors will give you an allowance for special construction. For a starting point, take what you think you'll need and double it. You may have to agree to a lengthy commitment (overall and for each circuit) to get everything you need. Without that, be prepared to pay at least some costs up front.
3. Ethernet access pricing is not yet uniform across the country, though it's moving in that direction. The most common approach is custom rates for distinct bandwidths that vary by "zone" or area code. Work to achieve a more standardized pricing model during negotiations, as that can substantially affect your costs when you need to add the next new location.
4. Finally, if you're introducing (or greatly expanding) Ethernet access as part of your migration to SIP trunking, use the fact that SIP trunking can be rolled out to locations over time to plan your Ethernet access implementation. For example, if a building or office park isn't served by fiber yet but there are firm plans to do that in a year, it may make sense to defer that location until the fiber is in place.

The bottom line is that Ethernet access is the perfect complement to MPLS and SIP and will become the "on ramp" of your wireline network over the next few years, if it isn't already. It is a key source of savings and improved service, and since the technology is mature deploying it is not a major risk. So avoid the pitfalls as you migrate, and enjoy the results.