Pipeline

Knowledge Is Power

Two Steps Forward-One Step Back… Ethernet Network Visibility and Performance Monitoring

By Charles R. Kenmore

Frequently, I read various trade articles, and it strikes me that we typically only talk about progressive, new innovations that stress novel ideas in the post-Internet era. Perhaps I'm a bit jaded, having gone through the ups and downs of the industry (e.g. the go-go-90's, the tech bubble bust, and the latest recession). That said, when one looks at the telecom industry today, it's really not *that* much different conceptually than nearly 25 years ago when the divestiture or break-up of Ma Bell (AT&T) occurred to stimulate competition, growth, and innovation in the telecom space. Sure we've met the goals of doing things faster, cheaper, and with better technology, but many of the same goals and themes are relevant in this new age of "social media networking," "converged services," and "triple or quadruple play" nomenclature. Instead of acronyms like SMDS, ATM, ISDN, SNA, and MS-DOS, we've simply developed new 4+ letter acronyms like E-LAN, DWDM, and the five-letter GMPLS to pick-up the slack. So is it just a matter of degree that we continuously improve? Have we actually learned from our past mistakes as we blaze new trails of innovation?

In retrospect, one could say telecom has, and is still, focused on many of the same underlying principles, goals, challenges, and processes that built the original TDM-based public phone network, but with an emphasis on newer IP-based networking technologies that leverage the largest IP-based public network called the Internet.

So how does all of this relate to network visibility and performance monitoring? I contend that once the dust has settled, many of the problems and challenges end-customers have with their network resources today are not that much different than 25 years ago but require newer packet-based approaches to achieve the same end goal of effectively managing one's network resources faster, cheaper, and better than before.

Two Steps Forward...IP and Lower Cost Carrier Ethernet Connections

Identifying network problems through various test mechanisms such as loopbacks, pings, OAM test packets, deep packet inspection (DPI), and other network troubleshooting tools has provided network visibility to carriers, service providers, and enterprise businesses for new IP/packet-based networks. In the past, legacy network providers had many years to perfect performance monitoring tools for detecting problems and enhancing the manageability and reliability of their TDM-based network. Typically, business end-customers' network links used traditional TDM-based techniques such as loopbacks, BERT tests, byte and error correction counters for link visibility and performance monitoring of private lines, frame relay, and ATM circuits. An entire testing industry was born by companies developing fancy test sets and probes to address the network visibility problem. However, as we moved to newer, faster, cheaper, layer 2- and 3-based transport networks, where are all the features to support operator visibility?

One Step Back...Re-inventing the Wheel-- Enhanced Network Visibility and Performance Monitoring

As customers moved to new IP/packet-based network connections, the industry needed to institute tools, processes, and methodologies to implement at least the same or better network visibility and performance monitoring requirements already available in their legacy networks. Ushering in the era of faster, cheaper pipes, IP/packet services such as Carrier Ethernet services are now delivered over fiber optics, wireless microwave, and even existing TDM copper infrastructure. Carriers and businesses are incented to displace legacy Frame Relay, ATM, and SONET/SDH business services given that the cost per bit has dropped dramatically from approximately $300/MB to under $100/MB using Carrier Ethernet, while typical 3-year costs of legacy solutions such as Private line and Frame Relay are typically five to six times more expensive than Carrier Ethernet E-Line services:
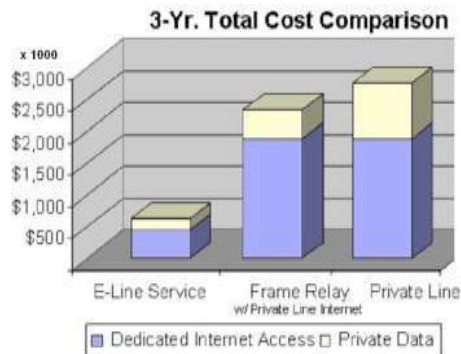

Source: Point East Research, 2007-2009

But while customers gobble up more bandwidth at increasingly lower costs per bit, they still require reliable five 9's service availability, resilience, and network visibility provided by those former legacy transport technologies. Initially, SLAs, or Service Level Agreements, were used by service providers to

make customers feel comfortable with new packet based offerings through guarantees for certain performance levels—no different than what had taken place 25 years ago with Ma Bell's network.

Why the Move to "2.0"

The industry had to "reinvent" some of the tried-and-true toolsets that we use for TDM legacy networks, so in keeping with the times, we came up with a neat new buzzword emphasized by a number version such as the oft labeled "2.0" trend. Web 2.0, SAAS 2.0, Internet 2.0, so why not Carrier Ethernet 2.0? It's not surprising that the industry needed to adopt methods to address network visibility and performance monitoring for Carrier Ethernet 2.0. The new Ethernet Operations Administration and Maintenance (OAM) standards (e.g. IEEE 802.1ag, 802.3ah, ITU Y.1731, RFC2544) were developed to address the health monitoring of customers' Ethernet network connections.
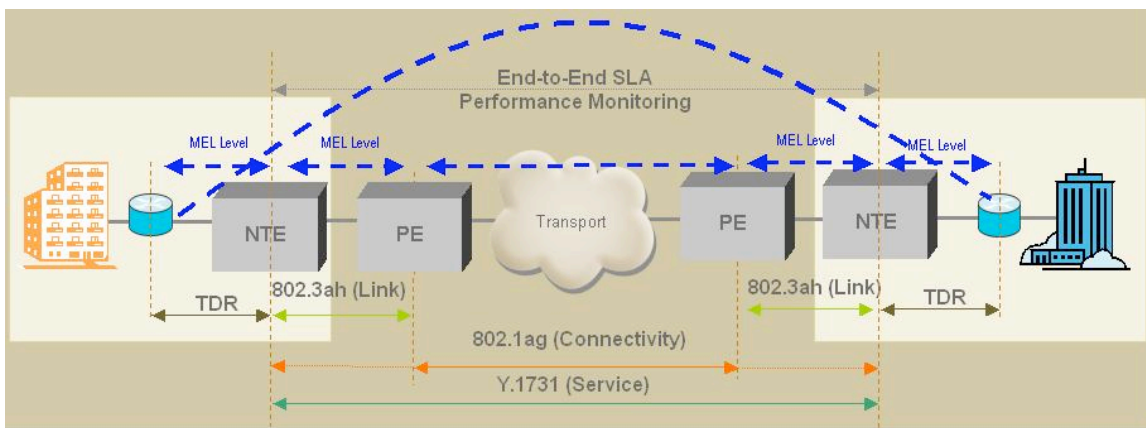
ANDA Networks, 2009.

While standards are typically drivers for carriers, the real motivation for OAM and Carrier Ethernet 2.0 may actually lie behind massive OPEX savings carriers need to bolster ROIs on their massive infrastructure upgrades to support new IP/packet-based networks and the growing list of bandwidth "hogging" applications. An interesting dilemma is that while bandwidth needs have doubled and continue to grow exponentially due to increased streaming video applications such as HULU, YouTube, and exploding mobile 3G/4G handsets capable of data Internet usage, actual overall network ARPU (average revenue per user) for carriers has only increased a paltry 3% (AT&T public network figures, 2008). Further, recent studies from TIA and Point East Research (2009) indicate that nearly 71% of the total carrier service revenues are spent on (OPEX) operational related expenses, totaling a whopping $77.1B of OPEX spent nationally. So in actuality, one of the major areas from which carriers can drive cost savings is in the actual OPEX to manage these new IP/Packet networks rather than traditional CAPEX reductions alone.

OAM Network Visibility and Performance Monitoring to the Rescue...

So how do we enhance network visibility and performance monitoring through OAM to lower precious OPEX while perhaps also generating new ARPU to continue proliferation of low-cost bandwidth to support all these new media rich applications? There are several upcoming trends which may help address the gaps:

1) <u>Standards:</u> OAM standards are now in place, and most equipment vendors and carriers are starting to deploy them into their equipment and networks. For example, in addition to the ITU and IEEE specifications mentioned previously, the Metro Ethernet Forum (MEF) is close to completing a common OA&M certification for carriers and equipment providers.

2) <u>Chipsets</u>: Integration of these OA&M standards is taking place within silicon, which will lower the cost of implementation for all parties and accelerate adoption of these new tools.

3) <u>Equipment Integration:</u> Several equipment providers are now offering performance monitoring capabilities directly into the network terminating equipment, minimizing the need for placement of additional network probes or truck rolls for troubleshooting.

4) <u>Standards Extensions in Management Platforms</u>: Enhancements to the existing standards via OAM TLV extensions can offer carriers and end-users non-intrusive performance monitoring in real-time for end-to-end network visibility, thus minimizing operator interventions and enhancing real-time protection services triggered due to network degradation. Many of these new proactive protection services can now occur in the equipment in real time and in concert with the EMS/NMS/OSS systems.

In summary, by recreating many of the tried and true TDM tools for Carrier Ethernet networks, we've brought the best tools of the TDM world into the Ethernet and packet network domain. As Alexander Graham Bell, the grandfather of telecom, once said: "When one door closes, another simply opens; but we often look so long and so regretfully upon the closed door that we do not see the one which has opened for us." So let us not rest on our accomplishments by simply bringing the best TDM capabilities to IP networks but, instead, truly step through the next open door for true innovation. I can't wait…