



THE SHIFT FROM TDM NETWORKS TO IP NETWORKS: WHY IT WON'T HAPPEN OVERNIGHT.

BACKGROUND

It's no secret that there is a significant trend related to the growth of IP (Internet Protocol) networks, as well as a serious movement toward making IP the de facto network. However, the older TDM (Time-Division Multiplexing) networks still exist, which begs the question: If there is a huge push to switch to IP networks, then do TDM networks still even need to exist? Or can and should they automatically be replaced by IP as soon as possible? There are actually a couple of reasons why TDM networks still need to continue to exist, at least for awhile, despite the fact that IP networks are taking over. One reason relates to the technology itself. The other relates to regulatory issues and previous infrastructure investment costs.

TECHNOLOGY ISSUES

Even though the TDM concept, which includes the traditional POTS (plain old telephone service) voice network, has an "age" connotation to it, it continues to have value, according to Andy Heins, operations manager in the Communications Division of Finley Engineering. "There are a lot of devices that still run on a TDM network and need a POTS line to function," he said. Examples include alarm systems, security systems, and ATMs. The fact that these systems currently rely on TDM systems to function raises a couple of challenges to service providers who think that they should be able to switch to IP systems to continue to function.

One challenge relates to reliability. "Many municipalities still have subscribers, such as banks, that want the reliability afforded by a T1 line," said Heins. Granted, this technology costs more, but reliability is more important to these subscribers than is cost. As such, you can't just eliminate TDM, simply because it seems antiquated. It still does serve a purpose. Over time, however, as technology continues to evolve, IP networks will improve in terms of reliability. When this happens, according to Heins, TDM networks will then finally begin to fade away.

The other challenge relates to cost. Even when IP

technology does evolve to where its reliability matches that of TDM for alarm, security and ATM technology needs, subscribers may still not want to automatically switch their systems over to IP, because of embedded investment costs. For example, if a bank has an alarm system operating on a TDM network, and if that system works well, that bank may not be particularly interested in switching over to a new alarm system that might cost them \$8,000, simply because it can operate on an IP network. That is, the bank will likely want to wait until its TDM-based investment is nearing the end of its life cycle before it is willing to invest in a new IP-based alarm system.

REGULATORY ISSUES

The Telecommunications Act of 1996, which was the first significant overhaul of U.S. telecommunications law in more than 60 years, opened the door to competition by the FCC. "At that point in time, we transitioned from the regulated utility model of doing business to the market-based environment that we live in today," said Heins. The 1996 Act remained the law until the new act that the FCC introduced in 2010, the Twenty-First Century Communications and Video Accessibility Act of 2010. One result of this act is that it placed a lot of providers between a rock and a hard place. "It is very difficult to tell an industry that has spent billions of dollars on embedded investments, which they paid for in a regulated environment, that they need to throw those investments away," said Heins. Most of the investments that the companies in this industry have made since 1996 were based on 20-year payback cycles, so, in some cases, payback may not occur for another several years.

Deregulation is causing other challenges, in that there are certain states that have deregulated telecom. In those states, incumbent carriers are precluded from having "carrier of last resort" obligations. "Carrier of last resort" means that, if every other carrier leaves an area, there would still be one carrier that was required to remain to provide service.

In a regulated environment, a “carrier of last resort” was expected to set up facilities with every customer, whether they took service or not, and there was a payback on the carrier’s investment, because it was willing to take on that obligation.

As telecom was deregulated, though, the economic incentives for being “carrier of last resort” were eliminated. In addition, there were no more requirements to have a “carrier of last resort.” As a result, according to Heins, a carrier isn’t going to make an investment somewhere just because, some day, someone might have a phone line. “There are areas that are starting to look like this - where the business case for infrastructure development does not exist, so there is no ‘carrier of last resort,’” he said. If and when the market decides that there is a business case in a certain area, then someone will make the decision to serve it from a purely economic standpoint. However, problems can still exist. “There have actually been some situations where carriers have gone bankrupt, meaning that there are no carriers remaining in place to serve those areas,” said Heins.

This can lead to problems related to lack of public safety and other serious problems, in which cases the municipalities themselves may need to step in and begin offering this service.

Steven P. Senne, P.E., chief technology officer for Finley Engineering, sees similar problems. “As municipal utilities start to look at doing a broadband service or telephone service, they might prefer

having everything on an IP network, but they may find that they also need to support some legacy TDM circuits, the biggest of these being ISDN-PRI,” said Senne. PRI (Primary Rate Interface) is a standardized telecommunications service level within the ISDN (Integrated Services Digital Network). “That is, if ABC Company has a legacy TDM system, the municipality may need to be able to interface with that equipment.”

There can also be what Senne calls “far end problems.” “You may be the service provider for ABC Company, and you can offer them Internet or other new services, but they may not be able to accept these services because of what is available as an interconnect on the far end,” he said. For example, if the business currently has a PRI between two office locations, and you want to try to convert them to an ethernet connection on your local end, you may not be able to do so, because the far end may not be able to be converted.

THE FUTURE

According to Senne, it will probably take five to ten years to get rid of all of the existing TDM circuits. In the meantime, municipalities will need to be able to provide service for both TDM and IP networks.

Is there a need to explain any of this to subscribers or to the public as a whole? Probably not, according to Heins. “In fact, the general public usually doesn’t have any knowledge of the underlying infrastructure that makes these things happen,” he said.