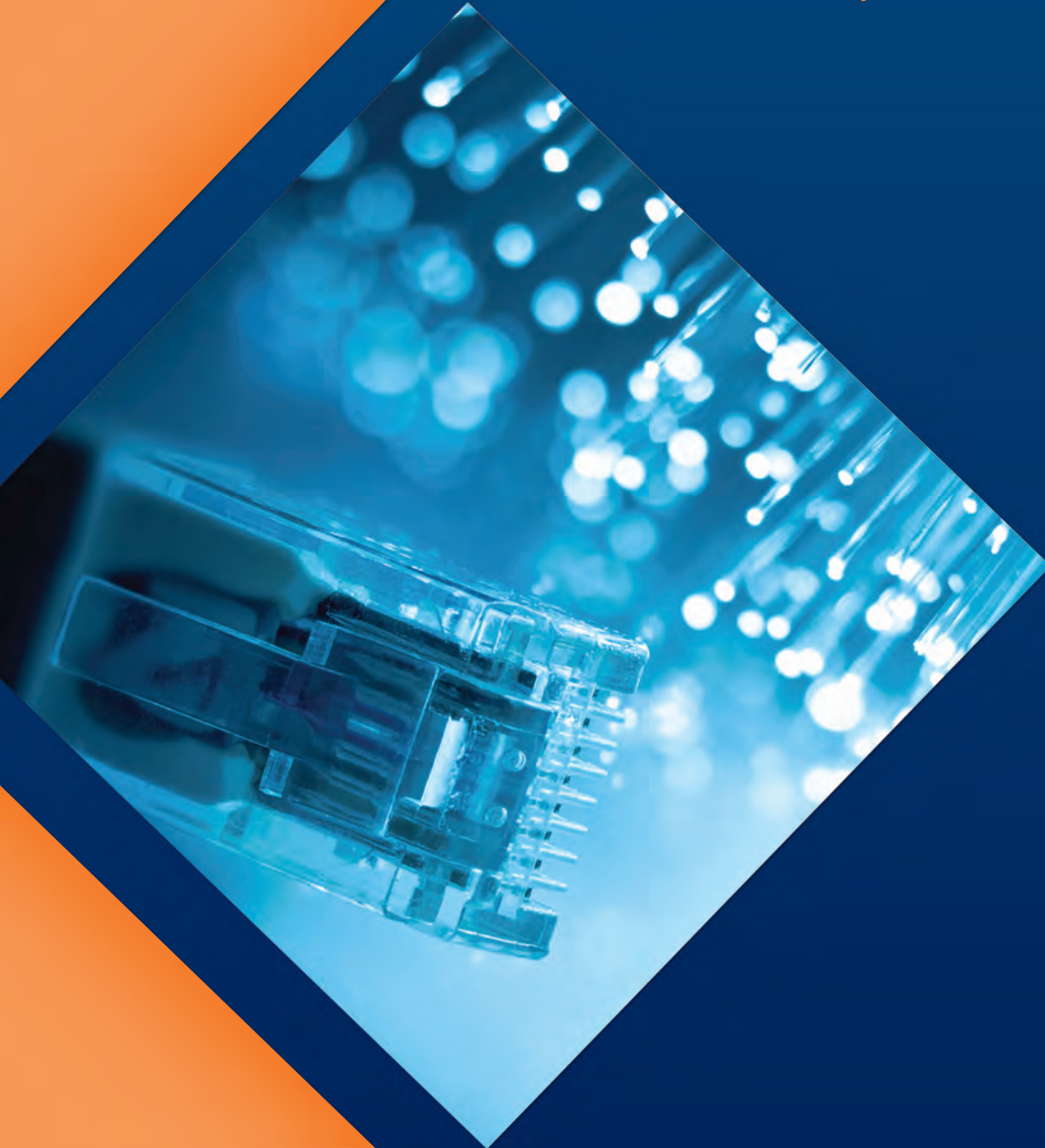# 10 **REASONS** TO REPLACE YOUR TDM SERVICE WITH **ETHERNET**

SMB'S GETTING MORE **BANDWIDTH**, **FLEXIBILITY**, AND **COST SAVINGS**

First Communications®

Executive Brief

10 Reasons SMBs Should Move to Metro Ethernet Service

Introduction
Reliable Dedicated Internet Access (DIA) is essential for most small-to-medium (SMB) businesses today. This access has historically been provided to businesses by T1 service utilizing TDM technology, because of its near universal availability from telecommunications providers like AT&T. For a long time, there were few other options outside of TDM based services for businesses needing more bandwidth or functionality, especially for businesses on the smaller end of the SMB spectrum.

Technological Overview

Dedicated Internet Access
Dedicated Internet Access means that the connectivity purchased is dedicated 100% to your organization 24/7/365, and is not shared with other users outside of your organization. T1 is a form of a leased line, meaning that 1.5 mbps (for a single T1) will always be available to users. The capacity of a DIA circuit is symmetrical, meaning that data can flow in either direction, but the total data carrying capacity is a fixed 1.5 mbps (or a multiple thereof) for TDM based solutions.

Shared Internet Access
Shared access solutions, such as Digital Subscriber Line (DSL) or Cable Broadband service, often advertise high rates of speed at a relatively low price. The advertised speed is shown with download speed listed first, then the upload speed. For example, 25/5 refers to 25 mbps upload speed, and 5 mbps download speed. Shared access solutions are often bundled with phone and television packages, and are primarily used by residential and small office/home office (SOHO) or very small businesses. Shared access solutions do not offer an SLA (Service Level Agreement), meaning that the provider provides no guarantee and will make "Best Efforts" to provide services promised, with no recourse if the provider fails to provide contracted level of service. Shared access is generally not adequate for all but the smallest business users, because fluctuations in available bandwidth can be disruptive or result in poor quality of service (QoS) for a number of applications like video conferencing, VoIP, VPN, or Cloud Backup.

T1/TDM Technology

What is T1 Technology?
T1 technology is a widely used form of TDM (Time Division Multiplexing) that has been in use since the early 1960s. T1 became the leading transport technology used in the Public Switched Telephone Network (PSTN), and has been the default last mile transport for many organizations needing access to switched voice, dedicated internet, and managed data services.

How T1 Technology Works
T1s can provide 24 time slots that are called DS0s which can support up to 24 voice channels between telephone switches. T1s can also be used for clear channel data throughput with a maximum bandwidth of 1.544 mbps. Up to 8 T1s can be bonded together to provide 12 mbps of throughput. Other types of TDM technologies include DS3 (45 mbps) and OC3 (155 mbps).

Last Mile Access for T1
T1 service is run to the service location over 4 copper wires, so the last mile is already in place for the vast majority of businesses and other organizations in the US.

Limitations of T1/TDM Technology

TDM Scalability
TDM services do not scale quickly or easily, and getting the bandwidth your business needs can be a costly and time consuming process. When additional bandwidth is needed, additional circuits must be added. In addition, moving from T1 service to DS3 service requires a complete redesign of circuits and the addition of hardware for each of the new circuits.

TDM Monthly Recurring Cost
While T1 service is initially less expensive than Ethernet at the lowest speeds, it very quickly becomes more expensive because of the need to add circuits to increase bandwidth. The cost of T1 services rises directly as a function of the number of circuits needed. In order to get close to the capacity of a 10mbps bandwidth Ethernet line which might cost $500/mo, 7 T1 lines are needed. At an estimated cost of $250 per T1 line, the cost to provide 7 T1s is $1,500 per month, making the T1 cost 3X the cost of the same bandwidth provided over an Ethernet circuit.

TDM Bandwidth Limitations
In the example shown above, 10 mbps would be available with Bonded T1 service, and in order to continue using TDM technology a costly and time consuming upgrade to DS3 service would be required to get to 45 mbps. Going from 10mbps to 50mbps with Ethernet service is a simple matter that is handled seamlessly through the service providers back office.

TDM Hardware Cost
A CSU/DSU (Channel Service Unit/Data Service Unit) is like an expensive modem or network card that is required for T1 or other TDM service. Higher bandwidth provided by T1 service generally means more expensive equipment that must be purchased.

TDM Maintenance Costs
Compared to Ethernet, there is additional complexity that is inherent in the TDM technology. Adding additional bandwidth magnifies this problem. Users of T1 and other TDM technologies must be familiar with this technology in the event of problems. Most IT professionals are not familiar with the inner workings of TDM, as they are with Ethernet since it is the same technology foundation that has been used by IT professionals for LAN technology for many years.

The Incredible Growth of Metro Ethernet
Carrier Metro Ethernet is a fiber wide area network (WAN) located in and around a specific metropolitan area that enables organizations to easily connect with other locations or organizations. A number of factors have contributed to the growth of Metro Ethernet, including demand for bandwidth and connectivity, need for operational simplicity and reliability, and reduced cost as Metro Ethernet subscribers and usage increases.

What is Ethernet?

The Ethernet Protocol was invented in the mid 1970's by Robert Metcalfe, who was a founder of 3Com Corp. Ethernet quickly became the standard protocol for Local Area Networking (LAN), facilitating communications between computers connected to the LAN via Ethernet cable. Unlike TDM technology, which was adapted to transport data, Ethernet was specifically designed to transport data from day one.

How Ethernet is Delivered/Last Mile

EoF (Ethernet over Fiber)

Ethernet over Fiber is generally available from 10Mbps to 1000Mbps. In order to take advantage of this service, your organization needs to either a) be located in a "Lit Building" where fiber already exists or b) pay for (or convince carrier) to build fiber to your location. The cost can be minimal or quite substantial, depending on the distance from the fiber loop that will be tied into. EoF is generally considered the best option for Ethernet connectivity if you can get it at your location.

EoC (Ethernet over Copper)

EoC is a very practical option available to connect organizations to an Ethernet network. Traditional copper wires, known as Plain Ordinary Telephone Service (POTS) lines, are used to transmit data from the customer's location to the ISP. Ethernet over Copper fills the gap between traditional telecom circuits (T1/ DS3) and fiber based products. Speeds normally start at 3Mbps and go up to 45Mbps. The amount of bandwidth available is based on distance. Install times are about the same as EoC, unless you are not in a lit building, in which case EoC can be a great option and gets installed faster since the copper lines already exist in in virtually all commercial and residential buildings.

Fixed Wireless (Ethernet over Wireless)

Fixed wireless is also a good option for businesses looking for Ethernet connectivity, but do not have access to fiber in their buildings. The connectivity is delivered by the provider via an antenna that transmits line-of-site to a receiver at customer premises. This solution is very reliable, and can provide higher speeds than EoC for those organizations who cannot access EoF. EoW is often used as a temporary solution, because it can be deployed in days rather than weeks or months in the event that you are waiting for fiber to be installed at your location. EoW is also used a redundant connection, those businesses that incur a high cost when their primary EoF connection is down.

Types of Metro Ethernet Services

There are several types of network configurations that commonly utilize Ethernet Technology:

Ethernet Private Line - a dedicated point-to-point connection between two locations. For example, a corporate HQ might use Ethernet Private Line (EVPL) to connect to a data center.

Ethernet Virtual Private Line - dedicated point-to-multiple-point connections between locations. For example, a regional corporate office might connect to branch offices using Ethernet Virtual Private Line, or EVPL.

Ethernet Network Service – a more cost-effective alternate to traditional hub and spoke networks.

Ethernet Dedicated Internet Access – a simple, reliable and flexible high bandwidth fiber optic service.

Obstacles to Metro Ethernet Adoption
Despite the incredible growth of Metro Ethernet, there are still several reasons that adoption hasn't occurred even faster. These reasons are:

Perceived Higher Monthly Recurring Cost (MRC)
At the lowest level of T1 service, the monthly recurring cost of Ethernet services appears higher at first glance than some of the other means of data transport used to access the internet. If logical apples to apples comparison are made, it quickly becomes apparent that Ethernet services are the better value, particularly when the organization has more technology demands, multiple locations, etc.

Not Available Everywhere
According to a recent survey by IDC, 22% of US businesses now have easy access to EoF. This % is growing because of the high demand for these services, but the cost to build out the Metro Ethernet Network is high, and requires a high number of users in order to justify the capital expense. If you have Metro Ethernet available in your area, but not in your building, you have some options. If you are in a rural area, you may fewer options. Some rural areas will not see this technology for some time, if ever.

Not Everyone Needs Ethernet
Most SMB businesses (those with 25-1,000 employees) are probably past the point of needing Ethernet connectivity, because of their number of users, budgets, and their reliance on the technologies that drive high bandwidth usage. These include VoIP and Unified Communications, Cloud Applications, Video Conferencing and Meeting software. If you are in an organization that uses email and traditional phone service as your primary means of communicating, then you probably have yet to justify the initially higher MRC to move to Metro Ethernet.

Top 10 Benefits of Ethernet for SMBs:
If it is available in your area, Metro Ethernet warrants serious consideration for most SMBs if you have not made the move away from T1/TDM technology already. What follows is a quick listing of benefits that your organization can likely derive from moving to Ethernet technology:

1) **Delivers Higher Bandwidth**
   Simply put, the bandwidth that can be carried by T1 or any TDM technology is paltry compared to the almost limitless capacity of Ethernet over Fiber EoF) Bandwidths of 1-10Gbps or more are routinely available on a single line, which is simply not possible with TDM technology.

2) **Lower Monthly Recurring Cost (MRC)**
   At all but the very lowest levels of T1 service, which is inadequate bandwidth for most organizations, the MRC for Ethernet is considerably less expensive that TDM technology that provides the same bandwidth. The difference in cost of TDM vs Ethernet becomes more pronounced as the bandwidth needs of your organization increase.

3) **CapEx Savings**
   Ethernet uses "off-the-shelf" equipment that costs less initially and scales better down the road than TDM equipment. A bandwidth upgrade of an existing Ethernet circuit requires no capital expenditure, while T1/TDM requires a significant investment in new equipment.

4) **Easy Scalability**
   Once your organization has Ethernet service, increasing the bandwidth is normally a matter of contacting your service provider and amending your existing agreement. From the providers prospective, they are very happy to quickly provision additional bandwidth. Typically nothing else is required on the user end.

5) **Buy Only Bandwidth that You Need**
   When purchasing or upgrading bandwidth, Metro Ethernet offers the ability to purchase bandwidth in smaller increments than TDM or SONET Technology. For example, if your organization requires 30Mbps, if you use DS3 you need to purchase 45Mbps, and you will not have the ability to easily upgrade the service when you outgrow the 30Mbps service. This is not true. This should be about bandwidth flexibility. T1s maximum bandwidth is 12 mbps using 8 bonded T1s. Anything greater than 12 mbps, requires DS3 access and service providers can offer fractional bandwidths from 12 mbps on up to 45 mbps. The limitation for TDM is the physical access and costly terminating equipment needed to move from T1s to DS3s and even more for OC3 and above level services. With Ethernet, the same physical interface is used for 10, 50, 100 or 1000 mbps.

6) **Simple Technology = Less Burden on IT Staff or Owners**
   Because Ethernet is ubiquitous in the IT world, there is greater knowledge and a higher comfort level among users of Ethernet than TDM technology. In addition, Ethernet in the WAN is the same technology that is used in the LAN, which simplifies interactions between the two.

7) **Enables Cloud Technology (Applications and Storage)**
   "The Cloud" provides SMBs with tremendous opportunities for increased efficiencies and enhanced capabilities. Many applications that hadn't been thought of 5 years ago, like DropBox or Freshbooks, are now relied upon by Managers and Business Owners to do some of the heavy lifting in their organizations. Metro Ethernet provides affordable reliability and scalability so that these increasingly critical applications can be accessed on demand.

8) **Enables Video Conferencing & Collaboration**
   Video conferencing and applications like GoToMeeting or WebEx are used to communicate with remote locations, vendors, and customers. These applications have become indispensable to many organizations. Inadequate bandwidth and poor Quality of Service can turn these applications into a headache or even a liability. Ethernet can easily help you stay ahead of bandwidth issues and prevent these problems from happening.

9) **Enables Quality VOIP and Unified Communications**
   Ethernet service provides adequate bandwidth for current needs, and can be scaled quickly to meet future needs and avoid quality of service (QoS) degradation. Ethernet can also be configured to provide Class of Service (CoS) in order to segregate VoIP traffic from other network traffic, avoiding packet loss and latency which can cause noticeably poor quality voice and video connections.

10) **Enables Business Continuity & Disaster Recovery**
    Organizations can use Ethernet to tie into data centers in order to run real time applications offsite, and establish redundancy that may be required for practical as well as for good risk

reduction practices and regulatory compliance. In addition, flexible Ethernet connectivity facilitates offsite data backup and recovery, as well as remote work locations that may need to be established in the event of severe weather or other disasters that prevent workers from traveling to affected office locations.

Conclusion

Metro Ethernet service is experiencing explosive adoption and growth because it delivers high value relative to costs for its users, who are largely SMB and enterprise businesses and other organizations who are technology reliant. These users place a high value on their ability to stay connected with other locations, vendors, consultants, and last but not least, customers. TDM technology has been a reliable workhorse for many years, but the increasing need for more bandwidth and flexibility have made T1 into more of a niche product whose limitations have made TDM technology a less valuable solution. The demands placed on networks by Cloud applications, VoIP and Unified Communications, Video, and Business Continuity make Ethernet the best networking option for most SMBs and Enterprise customers.

About First Communications

First Communications LLC is a provider of technology solutions to businesses in the Midwest and throughout the United States. Businesses ranging from SMBs to Enterprise are increasing reliant on technology and connectivity to increase efficiency, productivity, and growth. First Communications provides the products, depth of technical expertise, and highly responsive customer service that businesses today need to succeed. First Communications - **Taking Your Business Technology Further.**