



Navigating Network Migration Challenges: Upgrade Your 1GE Metro Ethernet Access Network to 10GE

A WHITE PAPER FROM TELCO SYSTEMS

Introduction

Many businesses and service providers are migrating from 1GE to 10GE networks as they attempt to avoid the obstacles presented by heavy bandwidth, while leveraging the benefits that 10GE networking has to offer. The requirement for more bandwidth has become a constant battle. As internet usage continues to increase with the popularity of data and streaming services, so does the demand for more bandwidth. From education (homework, e-learning, campus networks), finance (online banking, stock trading, bill pay), and business purposes (company intranets, remote workers), to social media (Facebook, Instagram, Twitter, Snapchat), political (campaigns and outreach) and personal purposes, data requirements continue to rise – quicker than service providers can react.

In support of these activities, service providers are being driven to enhance their network capacities in their business Ethernet, mobile backhaul, E-Rate, cloud networking, and SDN & NFV network applications.

The challenge with today's 1GE Metro Ethernet Access Networks is: how do you upgrade your current network as fast and efficient as possible, without incurring a large amount of OPEX or CAPEX?

Identifying the challenges:

- Every device connected to the network is demanding more data, applications and access, at a higher rate
- Current networks are not keeping pace with the increasing demand
- Bandwidth is getting maxed out, servers are overtaxed, bottlenecks are occurring more often
- Today's 1GE networks and 1GE rings use xWDM or LAG, so they're not going to be sufficient to handle the increased demand and will prove to be too expensive and too complex to manage
- Many current solutions may require multiple boxes to meet the requirements of IP Access Routing, advanced switching, or higher port counts, driving up the expense to cover multiple boxes
- Service providers are finding it more difficult to live up to their customers' service level agreements (SLA) to provide multiple services, which require more bandwidth
- Generating more revenue within the current limits of a 1Gig network

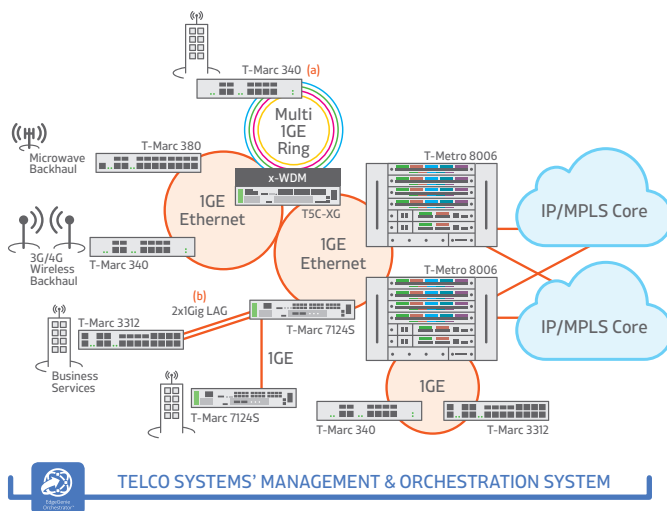
As the gap between service revenues and the demand for higher bandwidth grows, providers are looking for ways to better control their expenses while offering higher bandwidth and more services to more customers. With the increasing demand for more bandwidth with OTT (over-the-top) applications like video streaming, Hulu, Netflix, and Amazon Prime becoming more popular, 1GE networks aren't going to cut it anymore.

To conquer these challenges, enterprises and service providers are migrating their 1GE networks to 10GE. Networks that support 10 Gigabit Ethernet provide many benefits, including:

- **Lower OPEX and CAPEX:** 10GE allows for less fiber usage and fewer Ethernet ports, reducing overall infrastructure and increasing overall efficiency of the network – less components means less to set up, manage, monitor and run
 - Migrate your access network one hop or location at a time, as your customer dictates
 - Use a single device to combine delivery, transport and life cycle management via MPLS, Layer 2 or Layer 3 VPN
- **Increased Scalability:** 10G Ethernet provides greater scalability over aggregating multiple Gigabit Ethernet links using LAG, LACP or xWDM
- **Management made simple:** advanced data services and hardware based tools can be offered on a single device, simplifying the network and making it easier to manage
 - Simplify service activation and reduce time to deploy by 10 times

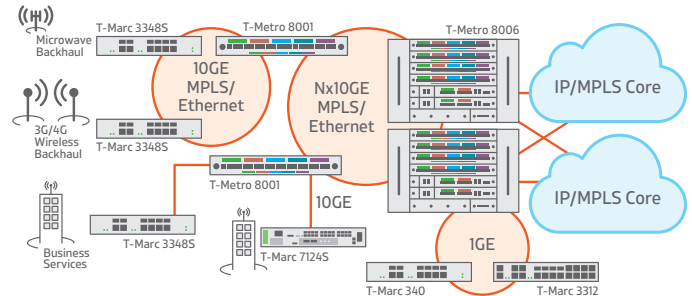
- **Enhanced network service resiliency:** strengthen network resiliency by deploying a ring, mesh or dual homed network – ensuring fast switchover time to minimize degradation or interruption of services in case of failure, and provide high availability and sub-50ms resiliency using G.8031, G.8032, FRR, and Fast Ring standards
- **Increased Revenue:** service providers are able to offer more revenue generating services, such as dedicated internet access (DIA), mobile backhaul, bandwidth on demand, managed services, and other types of 1GE and 10GE UNI services
- **Future-proof solution:** upgrading to 10GE will future proof your network for years to come

Telco Systems meets these challenges with its future-proof, end-to-end, assured high bandwidth solution for migrating from current 1GE networks to advanced 10GE networks.



Today's 1 Gigabit Ethernet Network

In today's 1G Ethernet network, you can see how the service provider increases the bandwidth to the end-user by (a) using xWDM technologies and/or (b) the use of LAG or LACP.



Tomorrow's 10 Gigabit Ethernet Network

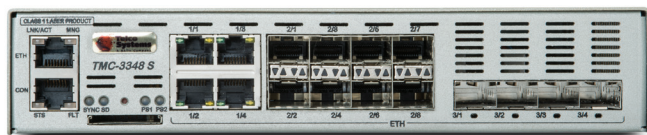
Tomorrow's high-bandwidth 10G Ethernet networks are created by upgrading to a 10Gig Ethernet ring and inserting a T-Marc 3348S/SH or other similar 10Gig-supporting device at the end-user location. Devices that support both 1GE and 10GE offer multiple options for service delivery.

The Answer: Proven Telco Systems solution with T-Marc 3348S/SH MEF CE2.0 certified 10G Ethernet NID -- the go-to switch for CPE or aggregation

Telco Systems enables service providers to offer their customers flexible, comprehensive, managed, end-to-end solution sets for differentiated, assured multi-service delivery, such as Ethernet business services, mobile backhaul, residential and cloud services, across 1GE and 10GE networks, as well as SDN & NFV infrastructures. At the forefront of Telco Systems 10GE solution is the T-Marc 3348S/SH – our best-selling, award-winning 1GE/10GE Carrier Ethernet 2.0/MPLS Layer 2/3 network interface device.

Featured 1GE to 10GE Migration Product

T-Marc 3348S Carrier Ethernet 2.0/MPLS/L3 Services NID



*Our best-selling, award-winning
1GE/10GE CE 2.0/MPLS Layer 2/3 Device*

Telco Systems T-Marc 3348S/T-Marc 3348SH device supports MEF Carrier Ethernet 2.0 and provides 10GE Ethernet/MPLS Layer 2 and Layer 3 VPN demarcation, offering an all in-one solution that meets the increasing challenges of mobile operators, mobile backhaul wholesalers, and service providers to cost effectively connect base stations and controller sites running LTE and LTE Advanced. The T-Marc 3348S/T-Marc 3348SH also offers enterprises 10GE connectivity for heavy duty cloud applications. The device supports IEEE 802.1q, Q-in-Q, MPLS and Layer 3 VPN transport technologies, increasing network flexibility and future-proofing the network while reducing technological risks. The device also supports TWAMP and Dual Tagging. It provides access to advanced data services such as virtual private wire services (VPWS), virtual private LAN services (VPLS) and hierarchical virtual private LAN services (HVPLS), simplifying the network and making it easier to manage, while gaining the added value that MPLS provides.

As an advanced 10GE demarcation device, the T-Marc 3348S/T-Marc 3348SH incorporates high capacity in a compact size (1RU high, ½ shelf wide), with 4 x 10GE/1GE SFP+ ports (two active ports and two ports which require license activation), 8 x dual-speed (100Mbps/1GE) fiber ports and 4 x 10/100/1000Mbps copper ports, making it one of the densest capacity demarcation devices in the industry. All ports can be any-to-any either customer facing (UNI) or network facing (NNI) and can accept several types of SFP's: CWDM, DWDM, dual fiber, BiDi and Smart SFP's for CES or Ethernet over TDM or PDH. It also supports redundant power supplies, including wide range DC power supplies, making it optimal for cell site deployment.

Telco Systems T-Marc 3348S/T-Marc 3348SH offers many benefits when migrating to 10GE, including:

- Small footprint (1RU high, ½ shelf wide): you can install 2 devices side-by-side in a 19" or 23" rack in 1RU
- Flexibility: the device supports IEEE 802.1q, Q-in-Q, and MPLS transport technologies with no licensing fees, increasing network flexibility and future-proofing the network while reducing technological risks.
- Cost of ownership: very low power consumption and heat dissipation and with the 19" rack bracket you can install 2 devices side-by-side in a 19" or 23" rack in 1RU.
- Available in both commercial and hardened versions

The T-Marc 3348S/SH, as well as all of Telco Systems T-Marc and T-Metro products, can be further supplemented with the EdgeGenie Orchestrator™ CE 2.0 and SDN & NFV service management system. This GUI based service management system offers a modular and complete solution for the full life cycle of network deployment and Ethernet service activation, from planning to managing, monitoring and maintaining your network. EdgeGenie Orchestrator will take you "from now into the future" with its SDN & NFV capabilities.

The T-Marc 3348S/T-Marc 3348SH includes an optional IP-PLUS enhancement package that adds Layer 3 Capabilities to the device through a simple software download.

This enables operators to deploy L3VPN from the aggregation (T-Metro) point or the access (T-Marc) point, without having to deploy a router, and provides DIA (direct Internet access) services over existing T-Marc NIDs by remotely deploying routing capabilities. This means no additional hardware, zero truck rolls and much faster provisioning by using an advanced set of Layer 3 features including IP protocols, Open Shortest Path First (OSPF), Border Gateway Protocol Version 4 (BGPv4), VRRP, DHCP and others. With IP-PLUS as an added value package, it eliminates the need for a 2 box solution at your customers' sites. This gives you all the MEF CE2.0 features along with Layer 3 capabilities. T-Marc 3348S/T-Marc 3348SH provides full SDN support with comprehensive adoption of NETCONF, the network configuration protocol, and YANG, its data

modeling language. These features are also supported in other Telco Systems CPE's: T-Marc3308, T-Marc3312SC/H and aggregation devices: T-Metro 7124S and T-Metro 8001.

The T-Marc 3348WD also comes in a hardened version with an optional weatherized demarcation enclosure. More than ever, the tremendous growth of Ethernet network deployments across the world is driving the need for metro service switches that can be deployed outdoors or in uncontrolled indoor environments. This requires an environmentally hardened, physically secured enclosure to house the metro service switches. T-Marc 3348WD enclosure provides the solution for supporting picocell, small cell and business applications that would require 24 hour access. This version has optional support for battery back-up, power-over-Ethernet with surge protection, internal CWDM splicing and fiber tray, and alarm security.



Telco Systems' products reduce total cost of ownership (TCO) by offering cutting-edge features balanced with cost optimized solutions. Telco Systems T-Marc 3348S and T-Marc 3348SH helps service providers reach their ROI while upgrading their network to the next level of bandwidth with a proven carrier grade device.

Contact Telco Systems today to learn more about the T-Marc 3348S/T-Marc 3348SH, and our full portfolio of 1GE and 10GE solutions. Schedule a meeting or webinar with one of our sales representatives, get a quote and start your POC. See how much more we can help you save! Call 800-221-2849 x2250 or e-mail sales@telco.com.

About Telco Systems

Telco Systems has been providing networking solutions globally for over 40 years, providing an industry-leading portfolio of diverse multi-service Carrier Ethernet 2.0 and MPLS edge access solutions focused on five primary vertical markets (1) business Ethernet services, (2) mobile backhaul, (3) SDN & NFV solutions, (4) cloud networking and (5) AdvancedTCA® switching blades that provide carriers with enhanced applications and services. This broad offering of products extends from the edge of the network to the core and edge of the cloud, and is supported by our EdgeGenie Orchestrator™ service management system.

Among the first vendors to receive the MEF Carrier Ethernet 2.0 certification, Telco Systems' CE 2.0-compliant, end-to-end Ethernet product portfolio delivers market-leading solutions that enable service providers to create and operate high quality, service assured, intelligent networks by offering best-in-class, service-aware, purpose-built networking solutions that support a wide range of technologies including Ethernet, MPLS, and circuit emulation services.

www.telco.com

Contact information

International Headquarters

13 HaYetzira St., Yokneam Ilit,
20692, Israel
Tel: +972-4-993-5630
Fax: +972-4-993-7926

North & Latin America

15 Berkshire Rd
Mansfield, MA 02048
Tel: +1-781-255-2120
Fax: +1-781-255-2122

Asia Pacific (APAC)

10 Anson Road,
#17-03 Intl Plaza
Singapore, 079903
Tel: +65 6224 3112
Fax: +65 6220 5848

Europe, Middle East & Africa (EMEA)

Peterstr. 2-4,
52062 Aachen
Tel: +49 241 463 5490
Fax: +49 241 463 5491