tellabs™

Tellabs® 1000 Solves the Challenges of Class 5 Switch Replacement

As service providers transition their networks to an all-IP Ethernet-centric infrastructure, they are struggling with the challenges of Class 5 switch migration. Class 5 switches have reliably delivered POTS, Special Services and Business Services for many decades, but now operation of these legacy network elements presents tough challenges:

- **Lack of Support:** No new parts are available because the systems are Manufacturer Discontinued, and most of the original manufacturers are out of business or are no longer supporting the equipment.
- **Lack of Expertise:** As personnel retire, service providers are faced with significant costs to retain or develop technical support capabilities without the manufacturer's support.
- **Greater Liability:** As systems near end of life, component and system failure rates increase.
- **Increased Operational Expense:** A drastic increase of Wireless customers generally creates a drastic decrease of Wireline customers. Also relative to newer softswitch solutions, the Class 5 switches use significantly more power and HVAC, and occupy more real estate.

Migrating to a packet-based regional softswitch addresses most of these challenges but fails to provide a complete solution. Softswitches do not support all of the Special Services and Business Services that the Class 5 switch provides. Many of these services represent meaningful revenue streams, and some are mandated by regulation. This means that service providers cannot simply remove all of the Class 5 switches from their network. A small number of Class 5 switches will need to be retained in order to offer Class 5-based services until alternative solutions are developed. A complete distribution system is what is most needed.

The Tellabs® 1000 Multiservice Access Platform (MSAP) was specifically created to cost-effectively distribute 100 percent of the Class 5 services over TDM or IP/Ethernet transport networks. This capability will allow rehoming of services to a reduced number of Class 5 switches so that most can be removed from the network. The Tellabs 1000 MSAP also delivers IPDSL and Ethernet services, allowing for continuing network and service evolution long after the last Class 5 switch is finally retired. With Tellabs Access and the Tellabs 1000 MSAP, service providers can begin rehoming and removing Class 5 switches today without giving up the services and revenue associated with them. Moving forward with softswitch migration will reduce service providers' operational expenses, improve service reliability and permanently improve their cost structures.

A Solution with a Strong Heritage in the Telco Industry

An ideal solution is the Tellabs® 1000 Multiservice Access Platform (MSAP). By replacing selected Class 5 switches or subtending remote switching units with this small energy-conserving platform, service providers can migrate from their current high-cost structure toward a more cost-efficient, streamlined network, which can evolve smoothly to an all-IP infrastructure.

More than 9,000 Tellabs 1000 systems currently carry traffic in service provider networks throughout North America. This large installed base of next-generation digital loop carriers (NGDLCs) is part of the strong Tellabs heritage of serving the telco market. Building on that heritage and backed by the strength and stability of Marlin Equity Partners' $2.6 billion portfolio, the new Tellabs Access continues to invest in solutions designed to help its service provider customers grow their businesses and strengthen their profitability.

As one of the two divisions that make up the new Tellabs, Telco Access will continue to support and evolve the Tellabs 1000. Working closely with our customers, we will focus our R&D resources on developing new Tellabs 1000 applications that support service providers not only today but also well into the future.

A Comprehensive Set of Features

The Tellabs 1000, also known as the AccessMax, DMAX1120 and UMC1000, is a highly flexible Multiservice Access Platform (MSAP), which has a modular building-block design and incorporates state-of-the-art technologies. Among the Tellabs 1000 features are:

1. a full set of services on one platform (BPON, POTS, DSL, Specials, Hi-Caps, DS-3)
2. high-capacity T1, OC-3c, Ethernet 10/100, OC-12c or GigE for interterminal transport
3. SONET-compliant OC-3 for interterminal transport as well as card support for GR253-compliant SONET 1+1 automatic protection switching
4. one set of fibers per OC3/OC3c module to each remote terminal — no need for dedicated fibers by service or technology type
5. an advanced EMS — the Tellabs robust Panorama Manager, which is widely deployed in service provider networks. However, it is not a requirement as Tellabs also provides an easy to use craft interface tool called the Tellabs Utility Program. It is a menu driven, CLI based program that can be loaded on your laptop.
6. low-cost interfaces that provide a full set of required services, including locally switched services and locally switched specials, as well as nonlocally switched services and nonswitched services
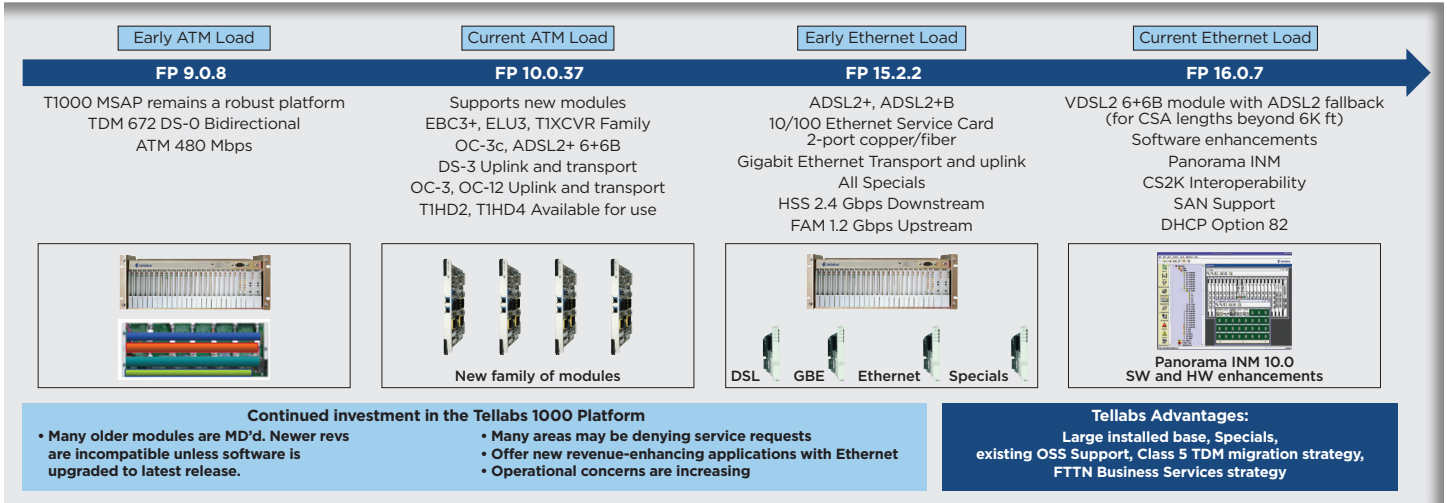7. upgrade to IP with software and cards

Early ATM Load	Current ATM Load	Early Ethernet Load	Current Ethernet Load
FP 9.0.8	**FP 10.0.37**	**FP 15.2.2**	**FP 16.0.7**
T1000 MSAP remains a robust platform TDM 672 DS-0 Bidirectional ATM 480 Mbps	Supports new modules EBC3+, ELU3, T1XCVR Family OC-3c, ADSL2+ 6+6B DS-3 Uplink and transport OC-3, OC-12 Uplink and transport T1HD2, T1HD4 Available for use	ADSL2+, ADSL2+B 10/100 Ethernet Service Card 2-port copper/fiber Gigabit Ethernet Transport and uplink All Specials HSS 2.4 Gbps Downstream FAM 1.2 Gbps Upstream	VDSL2 6+6B module with ADSL2 fallback (for CSA lengths beyond 6K ft) Software enhancements Panorama INM CS2K Interoperability SAN Support DHCP Option 82
	New family of modules	DSL GBE Ethernet Specials	Panorama INM 10.0 SW and HW enhancements
Continued investment in the Tellabs 1000 Platform • Many older modules are MD'd. Newer revs are incompatible unless software is upgraded to latest release.	• Many areas may be denying service requests • Offer new revenue-enhancing applications with Ethernet • Operational concerns are increasing		**Tellabs Advantages:** Large installed base, Specials, existing OSS Support, Class 5 TDM migration strategy, FTTN Business Services strategy

Figure 1. Tellabs 1000 MSAP Evolution

Tellabs continues to add features to the Tellabs 1000 platform, as shown in **Figure 1 (above)**.

Tellabs® 1000 Solutions

The Tellabs 1000 is an extremely flexible system that provides all the features and services listed above (in building-block fashion). One primary shelf interconnects via redundant fibers with up to 7 expansion shelves. Both standard- and high-density channel bank assemblies (CBAs) are available; the standard-density CBA has 22 universal slots supporting up to 6 circuits per slot and 4 control slots, while the high-density CBA has 20 slots for HD POTS cards supporting 24 circuits each and 4 control slots.

Service providers can deploy the Tellabs 1000 as a central office (CO)-based Line Equipment Terminal (LET) in the receiving CO and as a CO-based Remote Service Terminal (RST) in the collapsing CO. This scenario resembles normal NGDLC deployments, except for the fact that the RST is located in the CO rather than in the outside plant (OSP). The network topologies supported include point to point, star, chain, tree and branch.

Figure 2 (below) shows a TR-057 or Universal application, although service providers also can deploy the Tellabs 1000 as an integrated digital loop carrier (IDLC) with TR-008 or GR-303 interfaces.
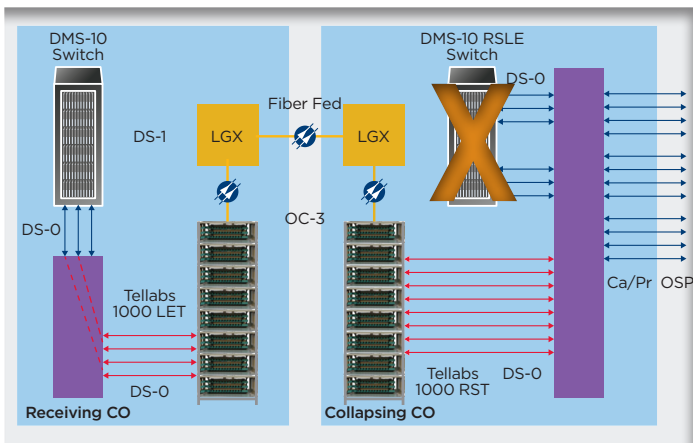

Figure 2

Service providers also can deploy the Tellabs 1000 as a line aggregation gateway (LAG), placing the LET and RST function in the same bay. **Figure 3 (below)** shows that the LAG is located in the collapsing CO and will be transported to the host CO via ADMs and IDLC interfaces (either TR-008 or GR-303).

Both **Figures 2 and 3** illustrate the collapse of a remote switch into a Class 5 switch, with the Tellabs 1000 taking over the function of the collapsed switch. The NNX code, which is derived from the host office, remains unchanged. All emergency stand-alone features remain within the host switch.

However, the EMS is not required as the Tellabs 1000 can also be managed by our Tellabs 1000 Utility Program loaded on the user's laptop. This is a very easy to use menu driven, CLI based interface.
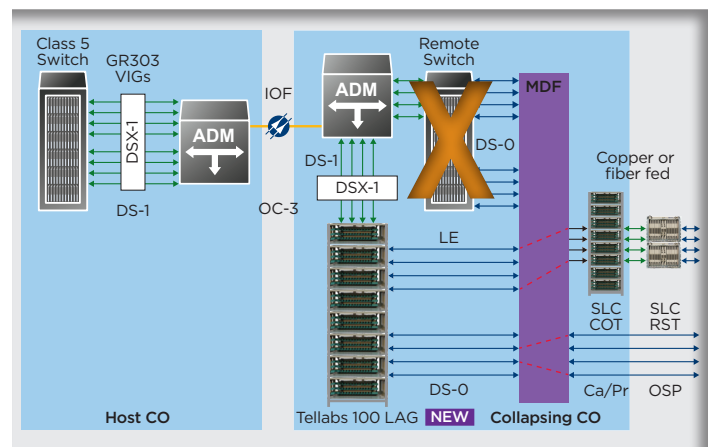

Figure 3

Applications

Universal (TR-057) — This is used if there are no digital switch interfaces available at the receiving Class 5 switch because the objective of any Class 5 switch replacement project is to remove cost, so the addition of digital interfaces would be counterproductive. This application extends the Class 5 switch's analog line unit termination to the outside plant, thereby eliminating direct copper pairs and moving closer to the customer's premises.

The Class 5 switch replacement application calls for the deployment of a Tellabs 1000 LET in the receiving CO and the Tellabs 1000 RST in the collapsing CO. If the objective is to eliminate the collapsing building, the service provider can deploy the RST in a controlled environmental vault (CEV), hut or cabinet separate from the CO building. The LET to RST transport can be copper or fiber fed.

Integrated (TR-008) — The Telcordia TR-008 technical specification defines the overall system functions and performance levels required when integrating a DLC system into a Class 5 switch to emulate the SLC-96 system. The TR-008-compliant integrated access interface allows the Tellabs® 1000 system to consolidate T1 spans coming from a local digital switch.

For TR-008, the Tellabs 1000 system supports POTS, Pay/Coin, and universal voice grade (UVG) circuits. After creating a TR-008 interface group (IG), the service provider maps individual DSO circuits to specific TR-008 channels. The two TR-008 deployment modes are: Mode 1 with no concentration — 96 POTS lines require four T1 lines, and Mode 2, which supports 2:1 concentration — 96 POTS lines require two T1 lines. The Tellabs 1000 supports up to 24 TR-008 IGs in one system The LET to RST transport can be copper or fiber fed.

Integrated (GR-303) — The Telcordia GR-303 technical specification defines the overall system functions and performance levels required when integrating a DLC system into a Class 5 switch. Within this application, the LET bay requires two Tellabs 1000 Data Link Processor (DLP) cards. These provide a redundant embedded operations channel and time slot management channel for a 64 Kbps datalink to the Tellabs 1000 system. The DLP cards operate in conjunction with a minimum of two T1X-XCVR modules to terminate the GR-303 switch virtual interface group (VIG) up to a maximum of 28 T1X-XCVR modules.

The service provider assigns call reference values (CRVs) from the Class 5 switch to POTS lines at the RST. A GR-303 virtual interface group can support up to 2048 CRVs or POTS lines with 2–28 T1s, depending on the desired concentration ratio. The Tellabs 1000 supports up to 3 GR-303 VIGs in one system. The LET to RST transport can be copper or fiber fed.

Current Switch Topologies

Up to this point, we have addressed the Class 5 switch replacement of remote switches into receiving switches. On occasion, however, service providers may need to collapse a stand-alone Class 5 switch into another stand-alone Class 5 switch or host softswitch. In these situations, service providers must decide whether to:

- use LNP until full cutover of the collapsed switch, which could require "add" and "disconnect" service orders for each working line in each switch
- rehome the NNX code to the receiving switch prior to cutover, which could require additional trunking back to the collapsed switch until after the cutover

- use a flash cut or a roll cut
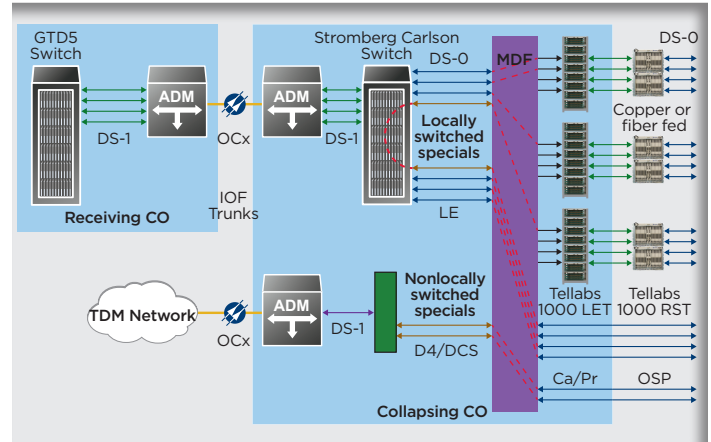- preprovision receiving office translations or develop a Class 5 switch cut script

Figure 4

Figure 4 (above) shows a typical CO prior to a Class 5 to Class 5 switch replacement. Customers in the collapsing CO receive their dial tone and services from that Class 5 switch; the interoffice facilities (IOF) trunks between the COs route their calls to other end offices. The local Class 5 switch handles call processing within this CO serving area.

Figure 5 (below) shows the result of collapsing a Class 5 switch into another Class 5 switch. The new receiving switch now processes all calls, and local copper pairs and cables as well as additional DLCs are consolidated in the Tellabs 1000 LAG bays.

If the existing local DLCs are Tellabs 1000s, the service provider can consolidate existing Tellabs 1000 LET bays into the Tellabs 1000 LAG bays to reuse the "now spare" equipment at other locations. If the existing local DLCs are not Tellabs 1000s, the service provider can reterminate those central office terminals into the Tellabs 1000 LAG bays. The Tellabs 1000 LAG now handles call processing within the CO serving area.
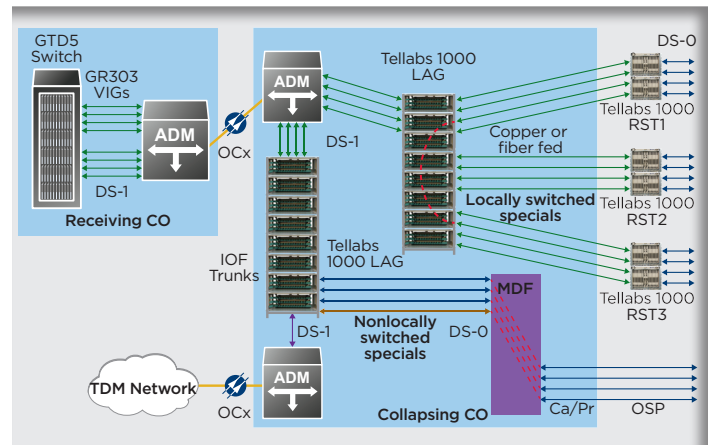

Figure 5

Figure 6 (right) shows the end result of collapsing a Class 5 switch into a softswitch. This collapse scenario requires the addition of a softswitch with a SIP Mediation gateway. The softswitch functions as an IP gateway, converting the TDM-based GR303 DS1 links from the Tellabs® 1000 and transporting them to the softswitch.

For additional information, a detailed overview or pricing information, please contact your Telco Access Sales representative below:
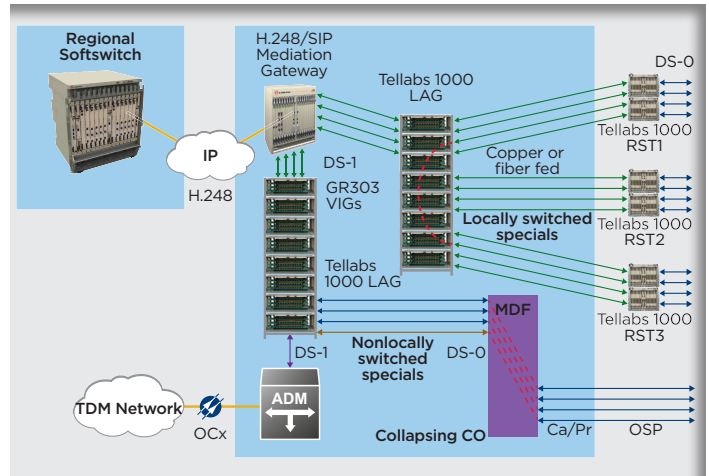
Figure 6

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