

# Tellabs® Optical Networking Solutions Provide Cost-Effective, Scalable Bandwidth and Services

This business case illustrates how service providers can quadruple transport network bandwidth while reducing costs by as much as 75%.

As is the case with many Tier 2 service providers, one United States-based service provider was experiencing shrinking voice service revenues year over year due to increasing competition from cable, mobile and alternative providers like Skype. Since the number of potential customers in its 18-state primarily rural service area was stagnant, the only way for the provider to maintain or increase revenues was to reduce churn and grow Average Revenue Per User (ARPU). With just 30% of its existing customers subscribing to the 3 Mbps DSL service offering, the provider had the opportunity to expand its ARPU by improving broadband adoption rates and also considered developing a 12 Mbps service offering to enabling them to market more diverse high-speed services, including digital TV.

In order to offer higher speed IP-based services, the provider needed to upgrade its Asynchronous Transfer Mode (ATM) Digital Subscriber Line Access Multiplexers (DSLAM) to an Internet Protocol (IP)-based infrastructure. As access traffic increased, the Synchronous Optical Networking/Synchronous Digital Hierarchy (SONET/SDH) transport network, which functioned as a Multiservice Provisioning Platform (MSPP), would also require an upgrade to carry the higher traffic volumes. In order to capture new revenue opportunities and maximize profits, the provider needed to determine the best and quickest way to deliver additional bandwidth and services while minimizing Capital Expenditures (CapEx) and Operating Expenditures (OpEx).

**Tellabs® Optical Networking Solutions can help service providers accelerate new revenue streams with significantly lower CapEx/OpEx than alternative solutions.**

This business case demonstrates how Tellabs Optical Networking Solutions can help service providers accelerate new revenue streams with significantly lower CapEx/OpEx than alternative solutions. In this example, the cost of the necessary transport network upgrade using Tellabs Optical Networking Solutions is compared to stacking new SONET OC-48-based Add/Drop Multiplexers (ADMs) on

the existing point-to-point Dense Wavelength Division Multiplexing (DWDM) infrastructure. Tellabs demonstrated that with Tellabs Optical Networking Solutions, the provider could immediately achieve 4 times more bandwidth for a similar initial investment. And, more importantly, for future upgrades Tellabs could deliver 4 times the bandwidth at just 50%–75% of the cost and in a greatly reduced timeframe when compared to the cost and time required to upgrade an OC-48-based DWDM infrastructure.



In order to capture new revenue opportunities and maximize profits, providers need to determine the best and quickest way to deliver additional bandwidth and services while minimizing CapEx and OpEx.

## Challenges for Service Providers

Most existing transport networks were designed to handle voice traffic, and thus require relatively low bandwidth capabilities. Provisioning a voice circuit for statistical predictability is fairly straightforward using Time Division Multiplexing (TDM) and ATM circuits, which handle the anticipated load based on the number of subscribers estimated to be using the service at any one time. However, when IP-based data services are introduced not only is more bandwidth typically required, but it can also be much more difficult to predict exactly how much bandwidth will be needed in any given location at any given time.

One option is to upgrade the transport network by stacking additional SONET OC-48 rings using ADMs along with DWDM, which improves the carrying capacity of the fiber and enables the network to transmit data in a protocol and bit-rate independent fashion. While ADMs are available with greater bandwidth (up to OC-192), most Tier 2 service providers prefer upgrading in increments of OC-48 for budgetary allocation reasons.

However, using ADMs with DWDM in the transport network presented 3 primary disadvantages for the service provider discussed in this business case:

- **Wasteful CapEx**

In transport networks that rely on ADMs and DWDM, traffic flows in a ring configuration. All traffic traverses the entire ring and must be regenerated and processed at each office within the ring. As a result, in a scenario in which there is greater growth in High Speed Internet (HSI) subscriptions served out of some offices than others; the provider must stack an entire new ring and install new ADM/DWDM equipment in every office on the ring just to accommodate the additional traffic in the affected offices.

- **High OpEx**

With ADM/DWDM systems, network administrators must manually install and configure new ADM and DWDM equipment in each location every time a new ring is added, even if traffic has only increased in a few locations. For example, highly trained technicians must balance amplifiers, manage wavelengths with banded filters and deal with express traffic. This takes considerable time and cost each time the provider needs additional capacity — even for offices that are not driving additional revenues. In addition, every time technicians are required to wire up and install new equipment, the risk increases that existing services might be interrupted.

- **Slow Response Means Lost Customers**

Upgrading capacity to an ADM and DWDM network can take more than 30 days due to the time necessary to manually install and configure the new ring. If a provider is unable to respond to customer service demands as quickly as the competition, business will be lost to more nimble providers.

With the flexibility to support any number of locations, expand to any capacity and deliver any kind of services, a Tellabs optical transport network integrates multiple network elements onto a single platform.



Provide flexible, virtually unlimited bandwidth, improving resiliency, reliability and survivability.

## How Tellabs Optical Networking Solutions Address These Challenges

Tellabs Optical Networking Solutions provide a smooth, cost-effective migration path that supports the evolution of transport networks to higher speed broadband services. With the flexibility to support any number of locations, expand to any capacity and deliver any kind of services, a Tellabs optical transport network integrates multiple network elements onto a single platform, using Reconfigurable Optical ADM (ROADM) technology to meet today's network needs while supporting future expansion. Tellabs solutions also enable reduced CapEx/OpEx, quicker time to market and accelerated time to revenue.

In the case of the provider profiled in this business case, the CapEx and OpEx savings realized for incremental bandwidth upgrades was 50%–75%, along with a gain of four times the bandwidth available with the existing solution. The following examples demonstrate how Tellabs Optical Networking Solutions address the three primary disadvantages of a SONET/SDH network with ADM/DWDM, leading to considerable savings and greater revenue opportunities.

## Reducing CapEx

### SOLUTION:

Even though the initial installation cost is comparable to that of an ADM/DWDM solution, the Tellabs® 7100 Optical Transport System (OTS) offers four times the bandwidth capacity (Table 1). Additionally, the Tellabs® 7100 OTS becomes significantly more cost-effective as demand for capacity grows (Table 2). In an ADM and DWDM-based implementation, a provider must upgrade the entire ring when capacity demands increase, at considerable expense, as illustrated in Figure 1. In contrast, with Tellabs Optical Networking Solutions, the provider only needs to add equipment to gain additional capacity at the points where new demands enter and exit the network, as shown in Figure 2. This ability to roll out targeted capacity upgrades is due to an optical pass-through technology that eliminates the need to regenerate and process traffic at each stop around the ring.

The Tellabs 7100 OTS ROADM technology also enables sophisticated optical signal routing. The ROADM and integrated ADM technology in the Tellabs 7100 OTS allows the provider to add additional sites to the optical network on an “as needed” basis by simply extending the existing infrastructure — without the need for overlays or back-to-back equipment. As a result, the Tellabs 7100 OTS is the most cost-effective choice for networks with unpredictable data traffic, allowing providers to selectively provision capacity only where it is needed (Figure 2).

In addition, because the Tellabs 7100 OTS is fully programmable, a single card can be used to offer various services — Gigabit Ethernet, SONET OC-3/OC-12/OC-48, Fibre Channel or other Storage Area Network (SAN) services. Each of these cards contains multiple ports, which means the provider can mix and match services on a single card simultaneously. The same card can also be tuned to any of the DWDM channels, eliminating the need for different cards for each channel. This versatility reduces the need to purchase and store a full range of spares, in contrast to ADM/DWDM systems for which providers needed to keep quantities of separate cards in inventory for each type of service offered.

The cost to install ADM/DWDM with OC-192 in 13 offices totals \$1.69 million — nearly twice as much as the \$975,000 cost to install the Tellabs 7100 OTS with comparable capacity.

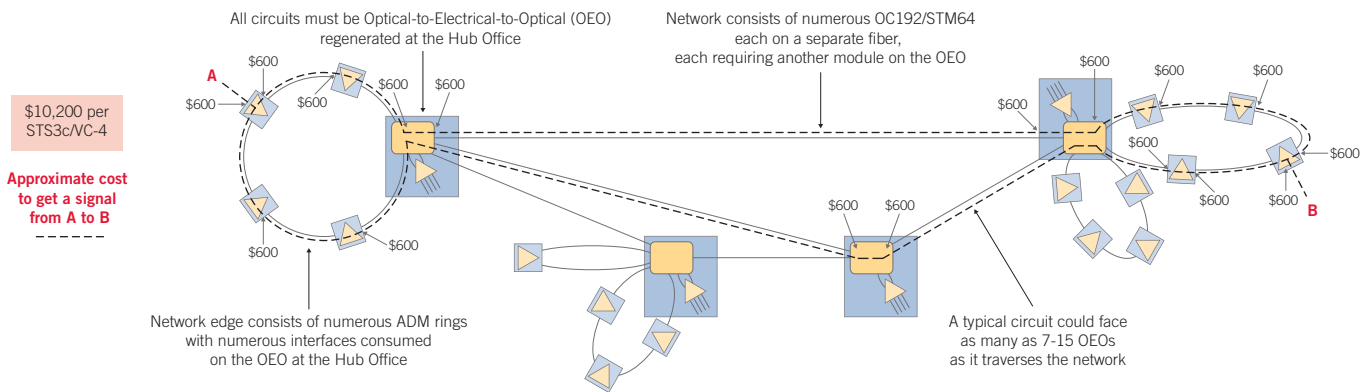


Figure 1. Economics of traditional SONET/SDH ADM-based networking

	Initial Cost	Available Capacity
Tellabs Optical Networking Solutions	\$975,000	10 Gbps
SONET ADM+DWDM	\$910,000	2.5 Gbps

Table 1. Comparison of Tellabs Optical Networking Solutions vs. SONET/ADM and DWDM: Initial installation costs and capacity

	Initial Cost for 10 Gbps	Cost for Subsequent Upgrades	Total Cost: Initial Install + Upgrades
Tellabs Optical Networking Solutions	\$975,000	\$120,000	\$1.095 million
SONET ADM+DWDM	\$1.69 million	\$910,000	\$2.6 million

Table 2. Comparison of Tellabs Optical Networking Solutions vs. SONET/ADM and DWDM: Initial installation cost at 10 Gbps plus increased capacity to three offices

**SAVINGS:**

In this business case, the initial cost of purchasing the typical ADM/DWDM OC-48 solution — the configuration most commonly purchased by Tier 2 providers — to support 2.5 Gbps for 13 offices is compared to the Tellabs 7100 OTS OC-192 solution, which offers 10 Gbps. As Table 1 shows, the initial cost for installing Tellabs Optical Networking Solutions is just slightly higher than that for the ADM/DWDM solution, but it offers four times the capacity — increasing the time interval before the transport network must be upgraded.

For a more realistic “apples-to-apples” comparison, the cost of the Tellabs 7100 OTS OC-192 solution must be compared to an ADM/DWDM solution offering the same capacity. The cost to install ADM/DWDM with OC-192 in 13 offices totals \$1.69 million — nearly twice as much as the \$975,000 cost to install the Tellabs 7100 OTS with comparable capacity. Should the

provider experience growth in 3 of the 13 offices and need to upgrade the transport network to support the additional traffic, the Tellabs solution would only require upgrades to the three offices experiencing growth rather than all the offices, as would be required with the ADM/DWDM solution. In addition, each Tellabs 7100 OTS office upgrade would entail adding a pair of ADM modules at \$44,000 per node, which is less than half the cost of an ADM/DWDM upgrade.

In this example, it is clear that though the initial installation cost may be approximately seven percent higher for the Tellabs 7100 OTS, the Tellabs solution provides 10 Gbps compared to only 2.5 Gbps with the ADM/WDM solution. And, when costs for just one three-office upgrade are factored in, the CapEx for the for the ADM/DWDM solution is roughly five times higher (Table 2).

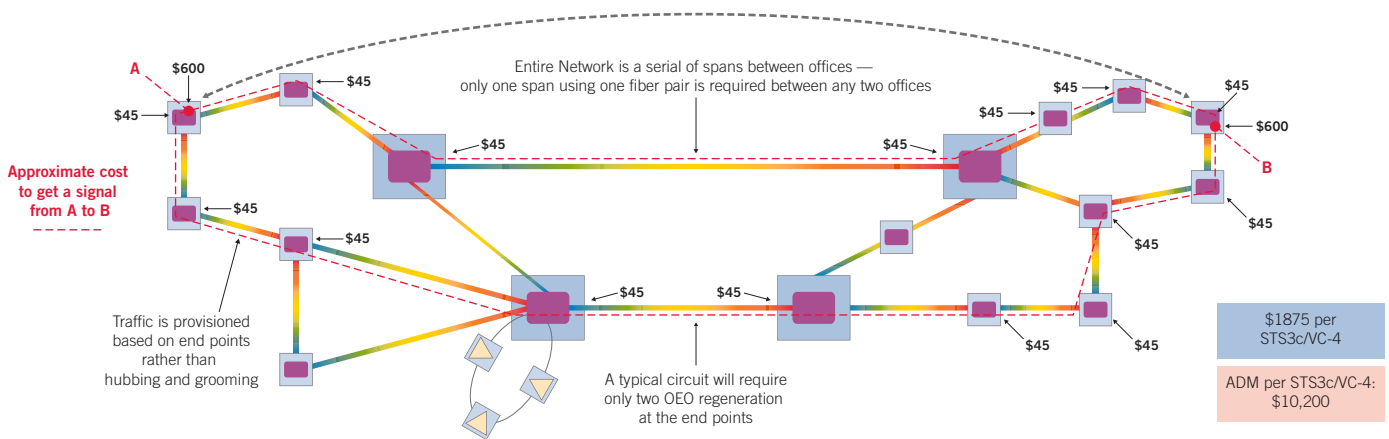


Figure 2. Economics of Tellabs Optical Networking Solutions

Installing a new 13-site transport network using the Tellabs 7100 OTS would be about three weeks faster than setting up a similar ADM/DWDM network.



## Reducing OpEx

### SOLUTION:

When a provider’s highly skilled technical staff is involved, time is money. By decreasing the time required to upgrade network capacity and install new services, service providers can significantly reduce operating costs. With the Tellabs 7100 OTS, providers realize lower investments in time and money both during initial installation and as capacity and services are added.

Case	Time for Initial Installation at 13 sites	Time Required to Upgrade
Tellabs Optical Networking Solutions	1–3 weeks	2–4 hours
ADM+DWDM	4–6 weeks	4–6 weeks

Table 3. Comparison of Tellabs Optical Networking Solutions vs. SONET/ADM and DWDM: Time required to install and upgrade

### SAVINGS:

The work involved for initial installation of both the Tellabs 7100 OTS and ADM/DWDM solutions are similar — put a shelf in a rack, provision power and install cards. However, once the initial install is complete, upgrades to the Tellabs 7100 OTS are much faster. With ADM/DWDM, providers must manually provision each system, adjusting amplifier gains, setting fiber jumpers, managing power and considering the impact of each network element on downstream sites. In contrast, intelligent Tellabs 7100 OTS network elements are “self-provisioning” and each intelligent network element also communicates with other elements in the transport network to ensure that all are in sync. This not only saves time, but also does not require a provider’s most highly skilled technicians.

Overall, installing a new 13-site transport network using the Tellabs 7100 OTS would be about three weeks faster than setting up a similar ADM/DWDM network.

When a provider needs to add capacity, the OpEx advantage that the Tellabs 7100 OTS offers becomes even more pronounced. In this case, providers using ADM/DWDM would essentially need to repeat the initial installation process — stacking an entirely new SONET/SDH ring by installing and configuring ADM/DWDM at all 13 sites, requiring another four to six weeks and a skilled technical team. With the Tellabs 7100 OTS, however, new cards are installed only at the sites that need to handle increased traffic — a task that would not require a highly skilled technician to perform. And, just as at initial installation, the network elements are self-provisioning and communicate with other elements on the network. To support increased traffic at three sites, as in our previous example, upgrade time would total just two to four hours with the Tellabs 7100 OTS (Table 3).

## Meeting Customer Demands for New Services

### SOLUTION:

Because adding new capacity to a network built on a Tellabs 7100 OTS platform consists of simply dropping in new cards only where the need for increased bandwidth exists, providers can quickly meet the need for additional capacity. Additionally, multiple services can be provisioned from a single card in the Tellabs 7100 OTS, including SONET/SDH, Ethernet and SAN services. These new services are easily provisioned with the Tellabs® 7194 Network Management System (NMS), which gives network administrators a “point and click” interface for rapid roll out of new services. In contrast, adding new services to an ADM/DWDM network requires a separate card or box and manual provisioning for each service.

By increasing customer retention and attracting new business, the ability to rapidly increase capacity and add new services can directly translate into increased revenues and a competitive advantage.

### SAVINGS:

By implementing the Tellabs 7100 OTS to add capacity and services to optical transport networks, providers can provide a wide range of new services in a flexible, reliable and scalable manner. In addition to savings in both money and time, providers benefit from:

- Easy-to-use administrative tools that simplify the provisioning of additional capacity and new services and reduce the need for highly skilled technicians
- Support for TDM preserves existing investments
- Layer 2 Ethernet service support helps enable more efficient transport
- ROADM technology supports flexible network configurations
- Subnet planning tools simplify network additions and modifications
- Intelligent network elements find new pathways in the event of a network failure, improving reliability

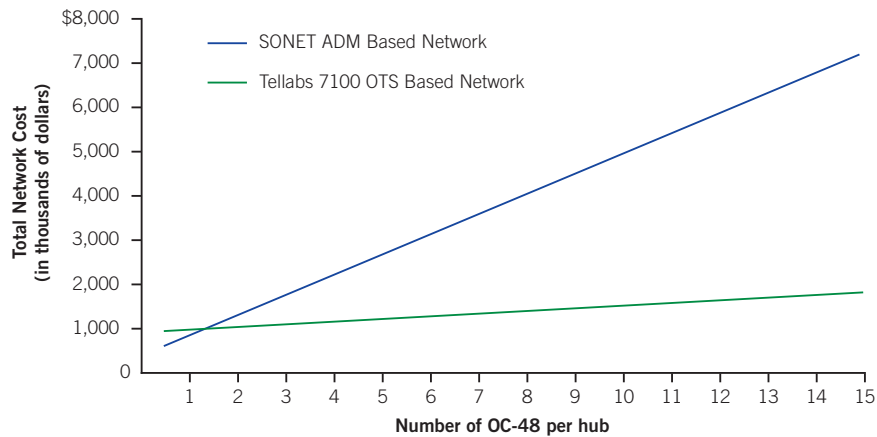


Figure 3. SONET/SDH ADM vs. Tellabs 7100 OTS: Economic comparison

### Substantial Return on Investment

This business case represents the experience of a single Tier 2 provider and specific network results will vary, depending on the number of sites and the capacity and services a specific provider wishes to provide. For the provider featured in this business case, Tellabs was able to demonstrate that by implementing Tellabs Optical Network Solutions vs. an ADM/DWDM network, the provider would:

- Gain four times the bandwidth for a nearly comparable initial cost
- Accomplish subsequent upgrades at just 50% to 75% of the cost (Figure 3)
- Reduce time-to-market for the initial installation by several weeks
- Add additional capacity and services in just hours, rather than weeks
- Be far more responsive to market demand for higher bandwidth and new services
- Open new and larger revenue opportunities
- Increase retention of current customers and gain new ones with high bandwidth and diverse new services

### For More Information

Tellabs offers solid platforms that provide reliable and scalable transport network solutions. The end result is a smoother and more cost-effective phased evolution to a converged network architecture.

To investigate the potential savings for your particular network configuration, please contact your local Tellabs sales representative.

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