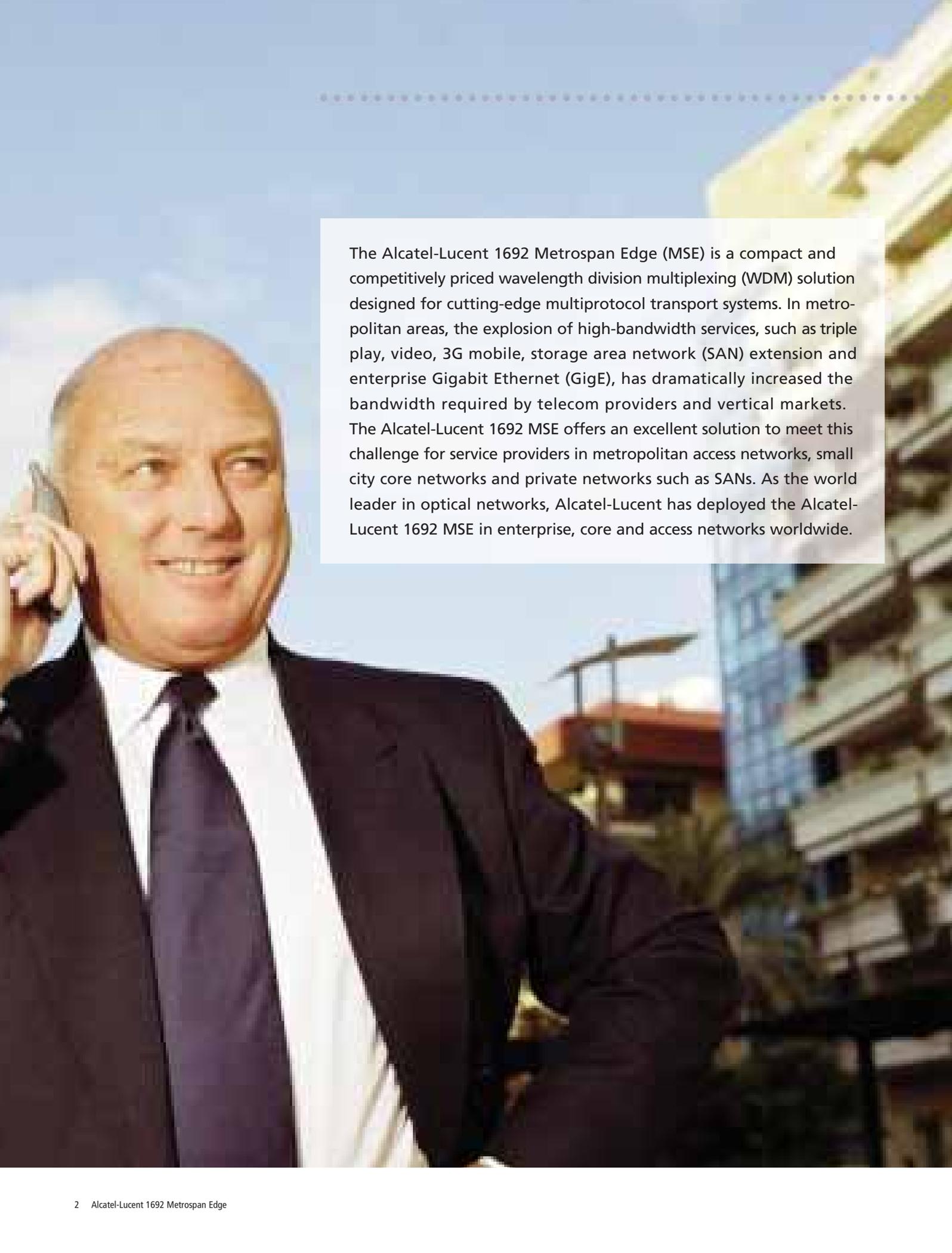


# Alcatel-Lucent 1692 Metrospan Edge

Versatile Wavelength Division  
Multiplexing Solution for  
Enterprise and Metro Access  
Optical Transport Networks

Alcatel·Lucent 





The Alcatel-Lucent 1692 Metrospan Edge (MSE) is a compact and competitively priced wavelength division multiplexing (WDM) solution designed for cutting-edge multiprotocol transport systems. In metropolitan areas, the explosion of high-bandwidth services, such as triple play, video, 3G mobile, storage area network (SAN) extension and enterprise Gigabit Ethernet (GigE), has dramatically increased the bandwidth required by telecom providers and vertical markets. The Alcatel-Lucent 1692 MSE offers an excellent solution to meet this challenge for service providers in metropolitan access networks, small city core networks and private networks such as SANs. As the world leader in optical networks, Alcatel-Lucent has deployed the Alcatel-Lucent 1692 MSE in enterprise, core and access networks worldwide.

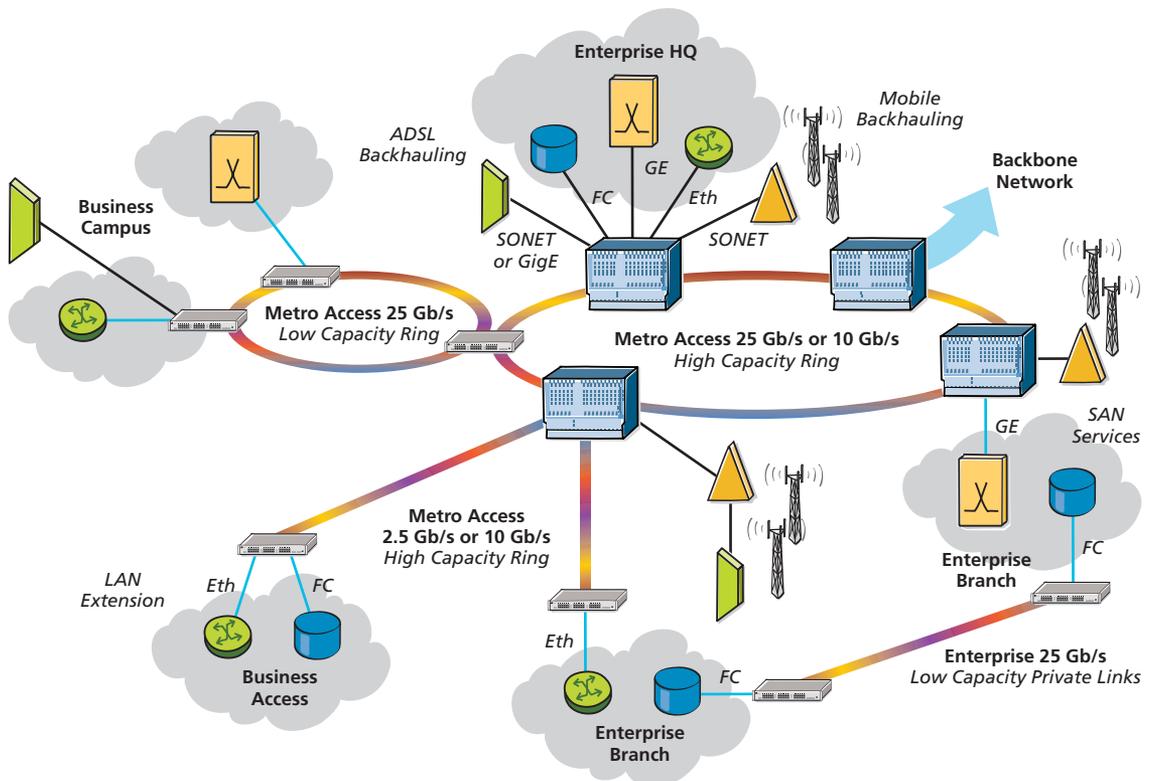
# Customer Requirements

Today's competitive environment places taxing demands on service providers, forcing them to drive down costs and reduce the complexity of their networks and operations. Bandwidth-intensive services such as triple play, video, 3G mobile, SAN extension and enterprise GigE, are already placing greater demands on these networks. The Alcatel-Lucent 1692 MSE targets metro access service providers as well as vertical markets, and enterprises. Using WDM, the Alcatel-Lucent 1692 MSE allows service providers and enterprises to meet continually increasing bandwidth requirements by increasing the capacity of each available optical fiber. In addition, the Alcatel-Lucent 1692 MSE simplifies network planning, speeds up wavelength provisioning and eases the overall maintenance load required for enterprise and metro access optical transport networks.

## An Entirely Optical Network

The Alcatel-Lucent 1692 MSE is part of Alcatel-Lucent's vision for an entirely optical network: a network that provides all the functions of the SONET/SDH layer including routing, wavelength add/drop and survivability. The various protocols present in metropolitan areas benefit by having the Alcatel-Lucent 1692 MSE as the common platform upon which to develop connectivity and protocol requirements. The Alcatel-Lucent 1692 MSE includes the same winning features as those of the Alcatel-Lucent WDM product family but with key differentiators that further reduce purchasing and operating costs. Figure 1 illustrates both the central office and the compact versions of the Alcatel-Lucent 1692 MSE in a metro WDM network.

Figure 1. A Metro WDM Network





### **A Cost-optimized System**

The Alcatel-Lucent 1692 MSE is a cost-optimized coarse WDM (CWDM) transport system designed to meet the requirements of enterprise and metro access networks. This means that the service provider or enterprise can start with (and pay for) only the number of channels and associated equipment identified by short-term forecasts. As the forecast moves forward in time and as demand increases, the capacity and number of wavelengths can be increased. Alcatel-Lucent further reduces its customers' initial costs by using small form-factor pluggable (SFP) laser diode modules that do not need to be purchased until the appropriate fibers are lit or new wavelengths are added. Over time, the 1692 MSE can easily be upgraded (in situ) to the 1696 Metrospan, allowing the introduction of dense WDM (DWDM).

In addition to these low-cost SFP modules, the Alcatel-Lucent 1692 MSE uses a sophisticated optical mux/ demux unit that eliminates the need for an expensive wavelength controller. This provides enterprises and network operators with a low-cost CWDM system, perfectly suited to short-haul and medium-haul applications.

The Alcatel-Lucent 1692 MSE not only provides reliable transport of new revenue generating services for metropolitan markets, but also offers a low-cost solution for cost-sensitive metropolitan access networks and private networks. The Alcatel-Lucent 1692 MSE is a low-cost CWDM transport system. It uses laser diodes spaced at 20 nm, thereby relaxing requirements for the optical mux/demux unit, and reducing the cost of components. With the wide wavelength range of CWDM, generally no amplifiers are required for ranges less than 80 km.

## Benefits and Features

### Key Features

The Alcatel-Lucent 1692 MSE:

- Optimizes the transport of a bundle of signals, groomed according to a synchronous-compliant frame structure, using dedicated TDM transponders
- Supports rapid roll-outs of new services
- Transparently transports multiple protocols (SONET/SDH, SAN, IP, video) on a single wavelength
- Provides optical layer protection (e.g., optical multiplexing section protection [OMSP] and optical channel subnetwork connection protection [OCH-SNCP])

With so much functionality and scalability packed into a 3 rack unit (RU) (5¼ inch) compact shelf, the Alcatel-Lucent 1692 MSE stands out from its competition. First, it is designed to minimize initial CAPEX and support ever-growing traffic volumes on an incremental basis. Second, its well-known and trusted 4xAny/2xGE-FC concentrators groom traffic and fill transport pipes in a flexible and non-blocking manner. Third, native signals such as IP, IP video, ATM and data are transported transparently to the end user with optical channel protection/restoration safeguards. And fourth, class-leading scalability allows the Alcatel-Lucent 1692 MSE solution to grow to support sixteen discrete ITU wavelengths, enabling an unsurpassed per-fiber bandwidth yield.

Table 1 lists the benefits, features and functions of the Alcatel-Lucent 1692 MSE.

**Table 1. Alcatel-Lucent 1692 MSE Benefits, Features and Functions**

BENEFIT	FEATURE	FUNCTION
Low real estate and power requirements	Class-leading compact size, minimal electrical power requirements and minimal heat generation	Three rack unit physical shelf size; optical components require minimal power
Bandwidth scalability at optimized cost	Modular, incremental upgrades plus the option to upgrade to the 1696 Metrospan, thereby allowing a mixture of CWDM and DWDM on the same platform	Increasing capacity requirements are addressed using the same platform to answer various bandwidth needs
Spare parts reduction	Tunable transponders; SFP modules	Transponder tuning or SFP swap-out allows new wavelength assignments at minimal costs
Cost efficient transport of sub-rate traffic	Sub-rate multiplexing and grooming	Concentration reduces the required number of optical channels per source signal
Simple network design and reduced forecast criticality	Flexible, modular 4xAny and backplane architecture; simplified upscaling	Simplified hardware installation; easier upgrades as forecasts evolve

## Technical Superiority

The Alcatel-Lucent 1692 MSE supports up to 16 wavelengths sustaining variable-rate and fixed-rate optical interfaces, capable of accepting a broad range of data rates. Dedicated TDM concentrators (4xAny card and 2xGE-FC card) are available to optimize transportation of a bundle of signals, groomed accordingly to a synchronous frame structure. These cards reduce the cost of each client service and maximize optical channel usage.

The Alcatel-Lucent 1692 MSE's 4xAny concentrator card can multiplex up to 4 low-speed client signals (for example OC-3/12, ATM1/4, FE,

GE, FC etc.) to one OC-48 signal. The 2xGE-FC card multiplexes two GigE or FC signals using the transparent-mapped generic framing procedure (GFP-T) standard. A small number of backup cards, (compact in size and low in power consumption) keep the operation, administration, and maintenance (OAM) costs of the Alcatel-Lucent 1692 MSE low. Tributary cards for the Alcatel-Lucent 1692 MSE have hot plug-and-play optics; this permits customization of the transponder, resulting in increased flexibility of the product.





## Ultimate Scalability and Versatility

Fully scalable from two wavelengths up to 16, the Alcatel-Lucent 1692 MSE allows service providers to purchase only the capacity required and then to increase capacity only as consumer demand increases. That is, as requirements change over time, the system's manageability and functionality can be adapted in incremental steps.

Adaptable solutions allow quick reaction to rapidly changing market conditions and ensure timely implementation of new services. The

Alcatel-Lucent 1692 MSE ensures that combinations of very different client services (SONET/SDH, SAN, IP, video) can be transported transparently on a single wavelength, without the need to upgrade the whole network; this shortens the overall time-to-market and increases the number of services that can be delivered. Each wavelength can be unidirectional or bidirectional. The Alcatel-Lucent 1692 MSE tributary cards feature hot plug-and-play optics, so the user can customize provisioning while the remainder of the NE is under load.



## Multiple Topologies and Configurations

The Alcatel-Lucent 1692 MSE supports point-to-point links and ring networks with coarse optical add/drop multiplexer (COADM) technology. The terminal can support up to 16 wavelengths of unidirectional transmission or 4 wavelengths of one fiber bidirectional transmission. The back-to-back terminal, which normally is used as the hub node in a ring network, can add/drop 16 wavelengths. The COADM node can add/drop 1, 2 or 4 wavelengths for unidirectional application, while it adds/drops one channel for a one fiber bidirectional application. There are two types of CPE: one channel CPEs and two channel CPEs; this provides a cost-effective solution when the remote network node has only one channel.

Figure 2 shows a two fiber ring network.

With the Alcatel-Lucent 1692 MSE, data applications are easily implemented

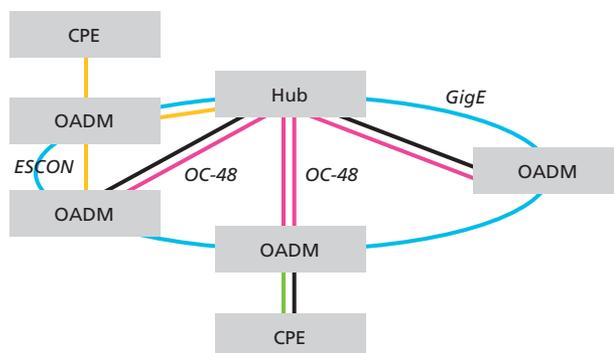
and network expansions, based on end-user demand, are simplified. Easy to install, operate and maintain, the Alcatel-Lucent 1692 MSE allows enterprise and network operators to simplify their overall deployment process, directly improving both CAPEX and OPEX. No amplification is required for short-haul applications; however if longer reaches are required, electrical regeneration can be provided for distances greater than 80 km.

With temperature-hardened components, the Alcatel-Lucent 1692 MSE can be installed in virtually any network environment, from a basement closet to a central office.

The Alcatel-Lucent 1692 MSE supports the following network topologies:

- Ring networks
- Point-to-point links
- CPE configuration in point-to-point links
- CPE configuration in ring networks

**Figure 2. Example of a Two Fiber Ring Network**





## Simplified Provisioning, Guaranteed Reliability

The Alcatel-Lucent 1692 MSE provides a single, cost-optimized, managed solution that supports different services, network topologies and traffic matrices, and is transparent to protocols. It supports a mix of services with multi-rate tributaries and pluggable optical interfaces, on both the client and WDM sides. Optical services range from 125 Mb/s to 2.67 Gb/s. Compatible with 10 Gb/s services, the Alcatel-Lucent 1692 MSE easily interfaces with all types of fiber and transmission equipment, providing high flexibility through interfaces that are transparent to the transmitted protocols.

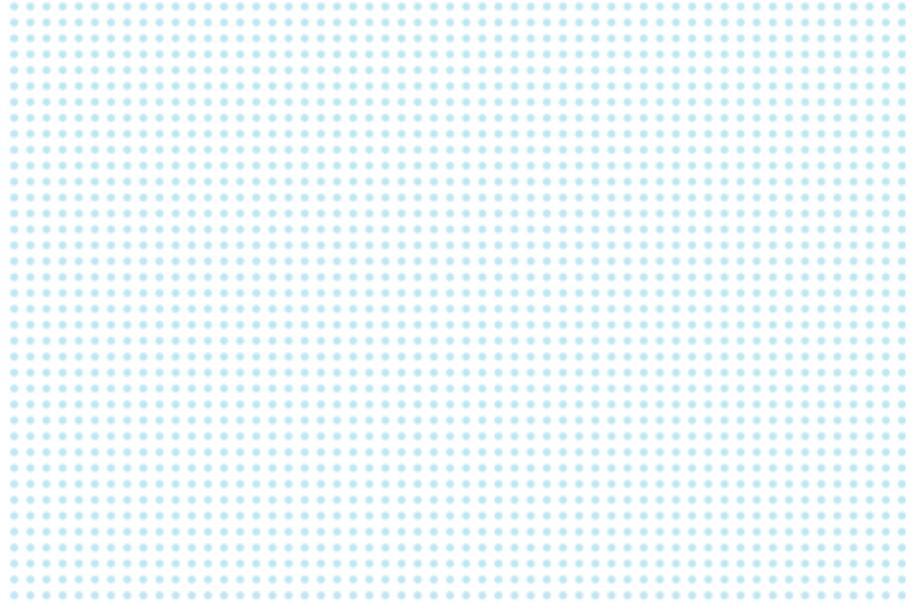
The Alcatel-Lucent 1692 MSE is a robust platform offering signal restoration and protection. Alcatel-Lucent believes that signal protection is necessary in all optical transport systems, including applications in private networks and small core networks. The Alcatel-Lucent 1692 MSE provides optical layer protection such as OMSP and OCH-SNCP, which includes a 50 millisecond network recovery. For maintenance purposes, it offers an integrated 8x8 switch on each transponder that enables electrical protection and loopback operations on both the client side and the WDM side.



## Summary

The Alcatel-Lucent 1692 MSE is a cost-effective CWDM system intended for the metropolitan access and enterprise markets to help providers deliver popular high-revenue, bandwidth-intensive services, such as triple play, video, 3G mobile, SAN extension and enterprise GigE.

The Alcatel-Lucent 1692 MSE is able to multiplex up to 16 channels compatible with ITU G.694.2 CWDM grid in a single network element (NE). It can be configured as a terminal or optical add/drop multiplexer (OADM) providing optical layer protection capabilities for both point-to-point and ring topologies. It can be equipped with the traffic concentrator 4xAny (multiplexes up to four low-speed client signals into a 2.5 Gb/s SONET/SDH signal) or 2xGE-FC (multiplexes two GigE or FC signals using the GFP-T standard), reducing the cost of each client service and maximizing optical channel usage.



## Recognized World Leader in Optical Networking

Alcatel-Lucent provides end-to-end communications solutions, allowing service providers and enterprises to deliver any content type to any user type, anywhere in the world.

Leveraging its long-term leadership in providing telecommunications network equipment as well as its expertise in applications and network services, Alcatel-Lucent enables its customers to focus on optimizing their service offerings and revenue streams.

Alcatel-Lucent, as a recognized world leader in optical networking, is in a unique position to help service providers navigate through current market conditions. Its global reach and scale, combined with its local presence in over 150 countries, has led to a deep understanding of global market dynamics and the ability to anticipate local requirements.

Deployed extensively around the globe, the Alcatel-Lucent 1692 MSE provides the flexibility and functionality required by today's service providers and enterprises, accelerating revenue generation and providing the dynamic capabilities that combine to reduce operational expenses and improve network performance.

For more information about our products and solutions, please visit us on-line at [www.alcatel-lucent.com](http://www.alcatel-lucent.com)

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