



Alcatel 1686 WM

32 Channels DWDM System (Regional & Metro)



- Compliant with G.692 ITU-T standards.
- Product based on flat gain amplifiers and dense wavelength division multiplexers.
- Designed for very high capacity networks: up to 32 wavelengths @ STM-64.
- Tributary bit rate from 100Mbit/s to 1.25 Gbit/s, 2.5 Gbit/s and 10 Gbits/s.
- Optical Terminal multiplexer (in the 1530 nm-1560 nm band) for point to point, point to multi-point and ring configuration.
- Optimised architecture for configuration without in-line amplifier or short haul application.
- In-line equipment for multi-span long haul links: up to 700 km without Dispersion Compensating Unit (DCU).
- Optical Add Drop function.
- Dispersion Compensation units for long distance/high bit-rate transmission.
- Fully compatible with G.652 and G.655 fibres, also compatible with G.653 fibre with some limitations.
- Wavelength adapter with optional Forward Error Correction codes (FEC) for performance improvement and Optical Performance Monitoring.
- Regenerator units to extend the reach of the system.
- Linear and Ring Optical Protection.
- Service channel availability.
- Network Management facilities.
- Optical Safety implemented according to G.681.
- Performance Monitoring capability.

Experience what's next in optical networking with the OPTINEX™ DWDM systems portfolio. It offers the most complete and cost effective solution for end to end provisioning of a full range of broadband services.



ALCATEL

ARCHITECTS OF AN INTERNET WORLD

Overview

The Alcatel 1686 WM wavelength division multiplexer is part of the Alcatel Optinex catalogue.

The 1686 WM is a multi-channel optical transmission system designed to transmit up to 32 bi-directional signals on a pair of fibres.

The Alcatel 1686 WM covers a wide range of optical interfaces ranging from 4L-16.2 to 32L8-16.2 and 32L6-64.2 as defined in G.692 ITU-T specification.

This system is composed by two terminal stations and several line stations, the line stations can be Line repeaters (optical amplifiers) or OADM repeaters (optical add drop multiplexers).

By means of the Optical Multiplexer/Demultiplexer the system is able to combine up to 32 optical signals and to transmit the resulting aggregate signal on one optical fibre.

The system can accept direct connection of SDH, IP, ATM equipment, but optional wavelength adapters are also available, when the 1686 WM is used in an open environment, to increase the capacity of an existing network.

The wavelength adapters can add a Forward Error Correction code (FEC) to the output signal to improve the system performances and to implement the Performance Monitoring of each transmitted channel.

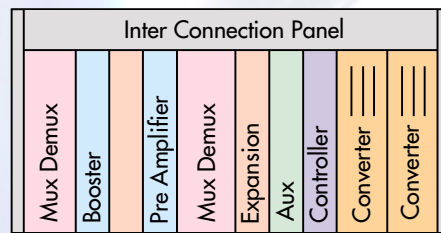
For very long haul transmission, Regenerators can be used to extend the reach of the system.

Typically the system is installed in the telecommunication network as part of national backbones, in linear links

and in international gateways where the amount of traffic requires the transmission of more than one optical signal.

Spans length longer than 180 Km can be achieved without in line amplification and up to 700 km can be achieved without Dispersion Compensation.

Fig. 1: Mechanical layout of the master terminal of the 1686 WM.

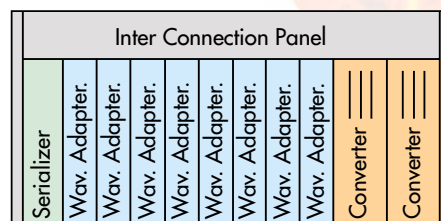


The system is fully managed locally by a standard PC, connected via the craft terminal F interface, with standard MS-DOS/Windows based software. This allows access to the equipment configuration and alarm status.

Centralised management is possible through the Q interface connection to the Transmission Network Management.

A dedicated channel (Optical supervisory channel) is provided to manage and to communicate with the distant in line amplifiers and the remote terminal.

Fig. 2: Mechanical layout of the fully equipped optional wavelength adapter subrack at 2.5 Gb/s.



Equipment structure

The mechanical design of the 1686 WM is compact and modular. The equipment is divided into two blocks, one for the terminal station and one for the line station. It can be mounted in the Alcatel S9 rack or Alcatel Optinex rack, which complies with ETSI standard ETS 300119.

Terminal station

Up to three 1686 WM shelves can be housed in a single S9 or Optinex equipment rack.

Fig. 1 shows the mechanical layout of the master terminal of the 1686 WM, fig. 2 shows the layout of the optional wavelength adapter @ 2.5 Gb/s. The master terminal provides the multiplexing and demultiplexing functions.

It contains:

- two multiplexing and demultiplexing boards to mix up to 16 wavelengths per unit in one direction and to divide them in the opposite one;
- two optical amplifiers to be used as booster in one direction and as preamplifier in the other ;
- an auxiliary board and an equipment controller board for management of the equipment through F and Q interfaces and for the provisioning of auxiliary data channels;
- an expansion unit to combine the two 16 channels signals into the 32 wavelengths multiplexed signal in one direction and to divide them in the opposite one;
- two power supplies.

The booster amplifier can be removed for short haul/metro applications.

The optional wavelength adapter subrack is devoted to the adaptation of standard signals to signals compatible with multi-wavelength transmission system.

The subrack for 2.5 Gb/s wavelength adapters contains:

- a serialiser board for management of the subrack ;
- one to eight wavelength adapter boards ;
- two power supplies.

The power units are 1+1 protected.

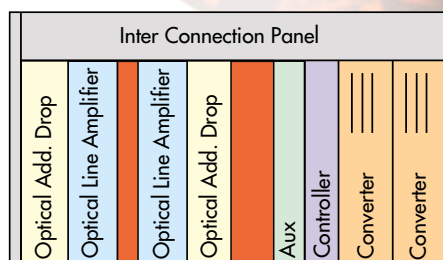
In this subrack the Multiclock wavelength adapters can also be installed. These units accept at their input signals with different bit/rates ranging from 100 Mb/s to 1.25 Gb/s. The subrack for 10 Gb/s wavelength adapters contains:

- one to four bi-directional wavelength adapters boards;
- one modified serialiser for the management of the subrack
- three power supplies

The power units are 2+1 protected.

In the standard configuration,

Fig. 3: Line station subrack layout



all optical boards are equipped with FC/SPC, SC/SPC or SC2/SPC connectors located on the front panel.

Line station

Fig. 3 shows the mechanical layout of the line subrack. The line station provides the optical amplifying functions. It contains:

- two optical line amplifier boards per station (one for each direction);
- two optional optical add drop units to insert or extract up to eight wavelengths per direction
- an auxiliary board;
- an equipment controller board for the management of the equipment and provisioning of auxiliary data channels;
- two power supplies.

The power units are 1+1 protected
All the optical boards are equipped with FC/SPC, SC/SPC or SC2/SPC connectors located on the front panel.

System description

Fig. 4 shows the block diagram of the 1686 WM.

Terminal Equipment

The input signals of the 1686 WM may be either standard optical signals or pre "coloured" signals. In the first case, the use of the wavelength adapter is mandatory. In this unit, the wavelength of the input signals is shifted to a value compliant with multi-wavelength transmission.

The optical signals at the output of the wavelength adapters are said to be "coloured signals".

The wavelength adapter optionally adds a Forward Error Correction code to the output signal in order to improve the transmission quality, the performances and to provide per channel Performance Monitoring.

In the second case, which corresponds to STM-16 or to STM-64 ADM Alcatel products, the optical signals are already coloured by the optical interfaces of the SDH equipment.

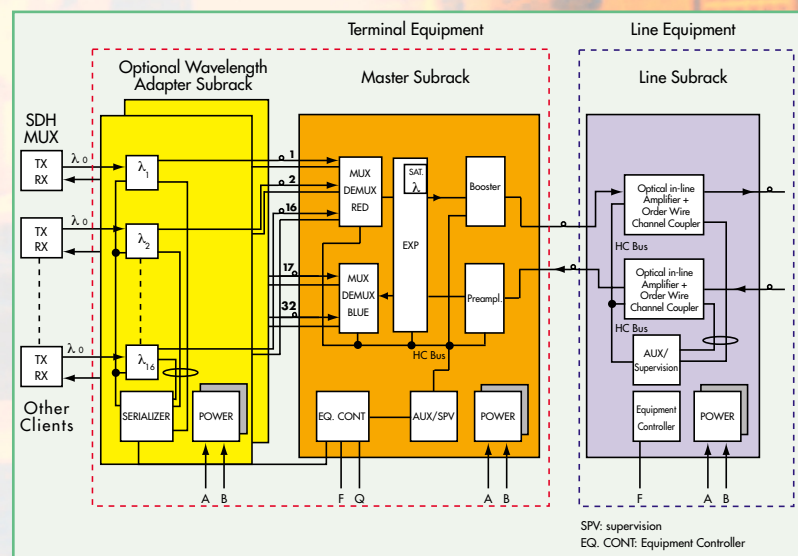
So the wavelength adapter is no longer necessary, which leads to cost optimised solutions and improved reliability.

Other different clients (IP, ATM,...) are supported by the system using the wavelength adapters.

The "coloured" signals are sent to the input of the multiplexers and then to the expansion unit.

The composite signal enters an optical amplifier (booster) to increase the optical power.

Fig. 4: 1686 WM Block diagram



At this stage, an extra channel (the optical supervisory channel) is added to transport auxiliary data channels and management information to the remote equipment. The behaviour of the optical amplifiers is always controlled by an extra channel called saturation channel. It helps to maintain the system performances unchanged whatever the channel count is. The saturation channel is added/removed by the Expansion unit. On the receiver side, an optical amplifier separates the supervisory channel from the optical signal, which is then amplified. The demultiplexer separates the composite signal into individual signals, which are sent to the receiver of the associated equipment.

Line Equipment

In the line equipment, the supervisory channel is separated from the optical signal inside the in-line amplifier board.

The multiplexed signal is then amplified by an in-line optical amplifier and added to the optical supervisory channel provided by the Aux. board.

Add and drop of one or more wavelengths is possible with the use of the optical add drop unit.

This unit is configurable by software. This means that an operator can remotely decide if a wavelength can go through or must be dropped in the station.

Safety

Automatic laser shut down is implemented in the system. This feature is compliant with the G.681 ITU-T recommendation.

Optical interfaces

The 1686 WM system can be connected either directly to ALCATEL SDH equipment or, via wavelength adapters, to different kind of signals. If Alcatel STM-16 or STM-64 SDH products are used, a large choice of interfaces is available, compliant with the relevant ITU-T specifications. These optical interfaces are located in the Alcatel SDH equipment. If the wavelength adapter is used, the optical interface depends on the type of input signal. The wavelength adapter is compatible to S.1.1; L.1.2; S.4.1. L.4.2; S.16.1; S.64.2 and other interfaces are available on request.

Optical protections

For all the services that do not provide intrinsic protection, the following optical protections are available:

- Linear configurations
 - OMS (Optical Multiplex Section)
 - OCh (Optical Channel)
- Rings
 - O-SNCP
 - O-SNCP with D&C (drop and continue) to protect from multiple faults in the rings interconnection

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The information in this leaflet is generally applicable to the equipment described. However, Alcatel is committed to continuous research and development. Changes may therefore be made in the future without notice.

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