



network maintenance & management

TELECOMMUNICATION NETWORKS EVOLVE FROM YEAR TO YEAR, AND INCREASINGLY PEOPLE RELY ON THESE NETWORKS FOR CONDUCTING THEIR BUSINESS. AS A RESULT, PERFORMANCE AND RELIABILITY OF THESE INFRASTRUCTURES HAVE BECOME AN ESSENTIAL REQUIREMENT IN TODAY'S WORLD.

IMPROVING EFFICIENCY

Telindus offers a complete range of maintenance and management tools for keeping its access products tuned to their optimal performance level.

It includes both interactive and script-based software operating on a multitude of operating systems.

The combination of these complementary systems drastically improves the efficiency of the day-to-day operation of those networks. The concept allows to co-ordinate the work of the field engineer and the operations handled by the network manager.

The field engineer is responsible for installing the access equipment both at the access point and at the customer premises. The field engineer works very closely with the network manager, who is responsible for the supervision of the network.

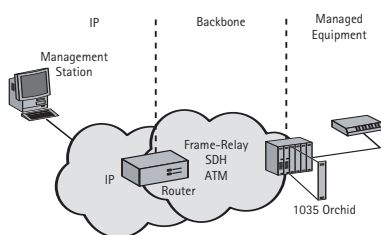
The network manager detects network problems in its earliest stages. However, only the field engineer can solve some of those problems because they require on-site intervention. At this point, when the field engineer can use powerful maintenance tools to verify locally the condition of the access equipment, the co-ordination between the network manager and field engineer can be significantly improved.

FLEXIBLE TRANSPORT OF MANAGEMENT INFORMATION

One of the traditional problems in the network management of access equipment is the multiplicity of backbone networks in service.

This can cause difficulties because the network management information needs to be transported from the access equipment to a central management centre. For practical and economic reasons, it is desirable to use the backbone itself for this transport and not to use a separate overlay network.

FLEXIBLE TRANSPORT OF MANAGEMENT INFORMATION



Most of the described maintenance and management mechanisms below use IP as the underlying protocol to communicate with the Telindus equipment. Some units (such as the router range) have a direct IP Ethernet port, whilst other units (such as the Aster and Crocus modem ranges) are connected through a controller device (1035 Orchid) which acts as an IP proxy device.

Only centrally installed equipment is connected to the 1035 Orchid. An out-band auxiliary channel on the communication-link is used to give management access to remote equipment. Also more complex configurations such as management on extended links are possible.

Telindus access management is different from other systems because it directly supports many protocols for the transport of management information.

This is possible because the 1035 Orchid, which acts as an IP proxy, can encapsulate the intrinsic IP information in a multitude of transmission protocols.

The controller device (1035 Orchid) is equipped with a 10/100 Base-T connection for direct IP connectivity or it can encapsulate the IP management traffic directly into Frame-Relay and ATM PVCs or PPP serial links. This permits the transport of the management information over different types of backbone installations without the need for an overlay network.

SNMP

All Telindus equipment (for equipment without built-in IP protocol stack through the use of the IP proxy controller called 1035 Orchid) supports MIB 2 as well as a private MIB.

It is ideal for performance monitoring based on the polling of different parameters (e.g. noise level, line attenuation). Additionally, it offers an open interface for integrating the management into third-party management platforms.

TELNET

Every field engineer can use a Telnet session (for equipment without built-in IP protocol stack through the use of the IP proxy controller called 1035 Orchid) to reach any Telindus access device in the network.

TELNET INTERFACE



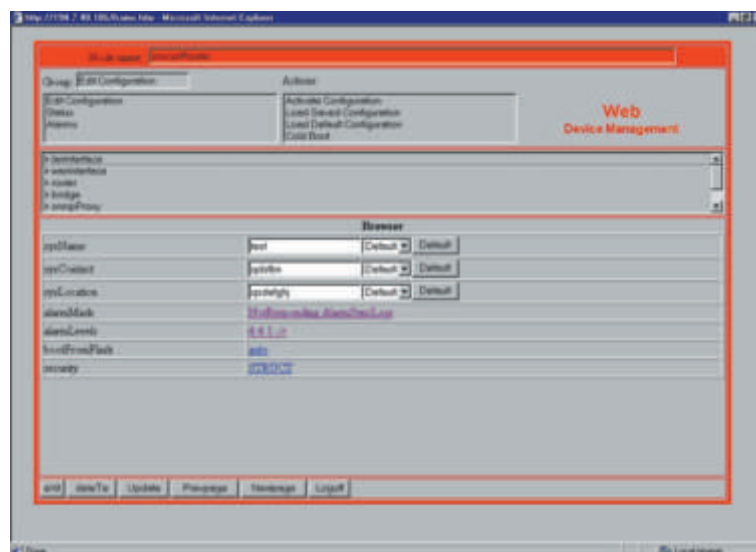
This Telnet interface offers an interactive windows-like interface, offering full configuration possibilities for the device, and giving access to status and statistical information. The Telnet interface also provides a command-line interface that allows the same actions in script mode.

WEB BROWSER INTERFACE

The 1035 Orchid and all router products implement a web server protocol stack.

Therefore, it is possible to use a simple web browser client to control any network element. The functionality of the web browser interface is identical to the Telnet interface described above.

WEB BROWSER INTERFACE



v "EASY CONFIGURATOR" WEB INTERFACE



The latest IP products from Telindus also can be configured through a web interface that can be tailored to the customer needs. This "Easy configurator" is an XML based web-interface where the layout parameters that will be visible to the user can be fully controlled.

TELINDUS MAINTENANCE APPLICATION (TMA)

TMA (Telindus Maintenance Application) is a free Windows software for the complete control of locally and remotely installed Telindus access equipment.

The system offers not only configuration functionality, but also includes the creation of configuration profiles stored on the harddisk, a completely interactive picture of the connected device, real-time monitoring, interrogation and export of status and statistics, test-loop facilities, etc.

One possibility to make a maintenance connection to a device is a straight serial cable between the equipment and the PC. It will provide the TMA access to

the locally and remotely installed equipment (including also possible extensions of the link).

Other topologies include connectivity over an IP network and the maintenance concentration through a concentration device (1035 Orchid), extending the maintenance access to a large number of network elements from one central location.

TMA COMMAND LINE INTERFACE

The Command Line Interface (CLI) module offers an open interface module that can be installed on different operating systems (Windows, Sun Solaris).

The module allows the use of a simple ASCII syntax for configuration, initiation of test-loops and retrieval of status or statistical information for all equipment present in the network. It is an ideal base for the development of automated scripts or for the interfacing with custom network management developments.

TMA COMMAND LINE INTERFACE SPECIFICATIONS

MINIMUM SYSTEM REQUIREMENTS

- > Solaris 7, Solaris 8
- > Windows 9x, Windows ME, Windows NT 4.X, Windows 2000, Windows XP

TMA SPECIFICATIONS

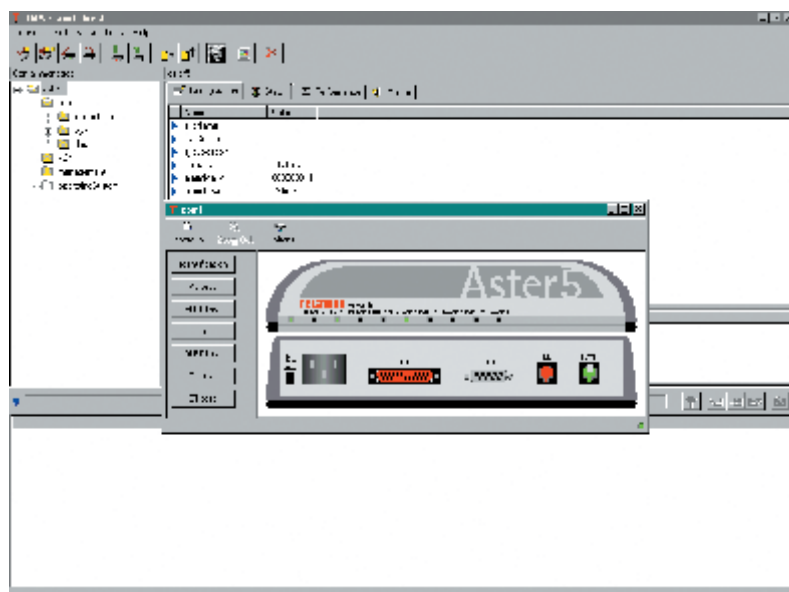
TMA SYSTEM FUNCTIONALITY

- > Password protected access
- > Reading and changing configuration of the equipment
- > Real time monitoring (e.g. of interface signals or line parameters)
- > Retrieving status information (current operation) of the equipment, including the current alarm status
- > Retrieving statistical information (e.g. covering a period of 24 hours)
- > Diagnostic tests
- > Configuration storage and retrieval on harddisk
- > Statistics storage and retrieval on harddisk
- > Software download to equipment with flash-memory (software upgrades)
- > Interactive pictures reflecting the equipment and the status of indicators and push-buttons

MINIMUM SYSTEM REQUIREMENTS

- > One serial communication port or Ethernet adapter
- > Windows 9x, Windows ME, Windows NT 4.X, Windows 2000, Windows XP

v TELINDUS MAINTENANCE APPLICATION (TMA) INTERFACE



TMA ELEMENT MANAGEMENT

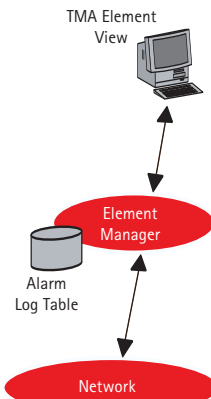
TMA Element Management offers a stand-alone element management solution for Telindus access networks, running on Windows or Unix based platforms.

It is constituted of a background process (Element Manager) and one or more graphical user interfaces, called TMA ElementView. It is ideally suited for the network management of small and medium size networks.

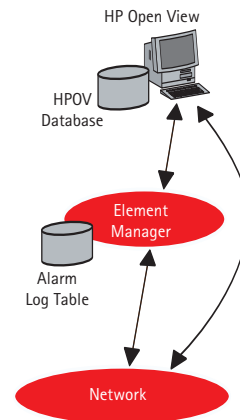
TMA Element Management offers a complete network management solution, including a logical

representation of the network, status and alarm reporting, configuration, and performance monitoring. Clicking the network icon opens the interactive TMA graphical interface to the selected device.

TMA ELEMENT MANAGEMENT ARCHITECTURE



TMA FOR HP OPENVIEW ARCHITECTURE



The system is designed to support large numbers of Telindus network elements and supports permanent performance monitoring (alarms, status and statistics), network element configuration, and operator initiated actions (such as testing).

All alarms on each individual network element are immediately logged in the HP OpenView event-log, and the icon in the HP OpenView map reflects the resulting status.

For this purpose, TMA for HP OpenView fully supports the HP OpenView alarm levels (warning, minor, major, critical). The status of all network equipment is also easily visualised by an interactive picture (including LED and push-button status), where colour-codes allow for a quick identification of the cause of potential network trouble.

TMA ELEMENT MANAGEMENT SPECIFICATIONS

TMA ELEMENT MANAGEMENT FUNCTIONALITY

- > Guaranteed reception of alarm from the network elements by connection oriented sessions
- > Alarm status and alarm history
- > Alarm re-synchronisation after connection loss
- > Alarm history log file in Ascii format
- > Alarm visualization by coloured icons
- > Alarm acknowledgement
- > Start of TMA graphical user session by clicking on the device icon
- > Auto-discovery of 1035 Orchid proxied devices

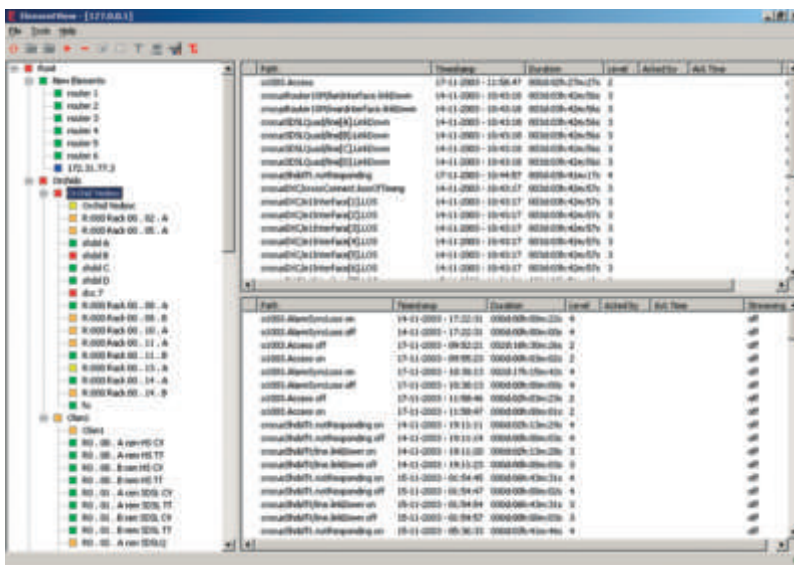
MINIMUM SYSTEM REQUIREMENTS

- > Sun Solaris 7, Solaris 8
- > Windows NT 4.0, Windows 2000, Windows XP

TMA FOR HP OPENVIEW

TMA (Telindus Management Application) for HP OpenView is the plug-in module for HP OpenView Network Node Manager (NNM) for the support of Telindus access equipment.

TMA ELEMENTVIEW INTERFACE



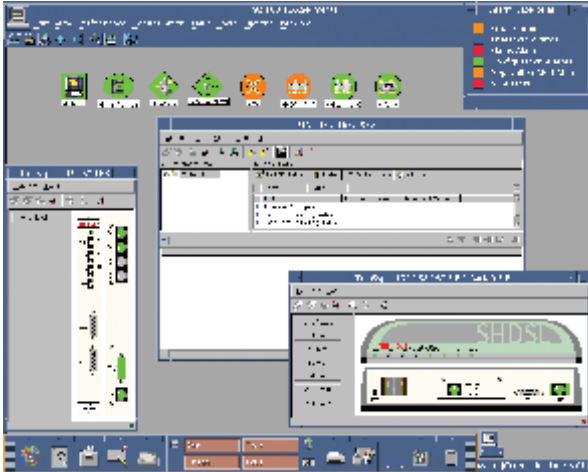
TMA FOR HP OPENVIEW SPECIFICATIONS

TMA FOR HP OPENVIEW FUNCTIONALITY

- > Individual network element configuration
- > Configuration distribution
- > Interactive picture of every network element
- > Alarm notification with user-selectable severity
- > Coupling of alarms to the HP OpenView® map
- > Private MIB for continuous performance monitoring

MINIMUM SYSTEM REQUIREMENTS

- > OPERATING SYSTEM
 - > Solaris 7, Solaris 8
 - > Windows NT 4.X, Windows 2000, Windows XP
- > MANAGEMENT PLATFORM
 - > HP OpenView Network Node Manager 6.x or 7.0 native GUI)



A user-friendly menu enables the configuration of any individual network element, and allows distributing the same configuration profile to a multitude of network elements.

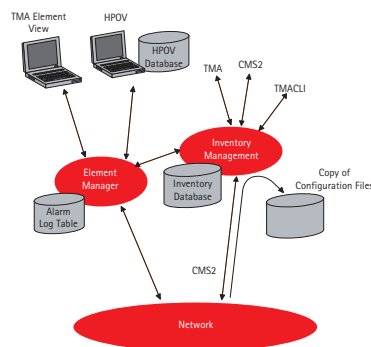
TMA for HP OpenView can be installed together with third-party management modules for HP OpenView, making it possible to integrate the management of Telindus access and third-party equipment on the same platform.

TMA INVENTORY MANAGEMENT

TMA inventory management is an add-on product to TMA for HP OpenView or TMA Element Management. It provides a communication interface to a database with inventory information on the Telindus access products in a network.

TMA inventory management automatically builds a database with a number of inventory parameters from each Telindus access device in the network. It retrieves the information automatically from the devices and the 1035 Orchid concentrators.

The database includes device information such as the name, the contact person, the location, the description, the unique identification code, the software version(s) and the available interfaces. Additionally the most recent configurations of all devices are stored as well.



The database information is accessible from an outside application, using the Telindus proprietary CMS2 protocol. This is a CORBA-like protocol, thus making the integration with other network management platforms easier. TMA inventory management includes complete protocol documentation. Once a session with an outside management platform is established, the outside application is automatically triggered of any database changes.

The database information is also available on the TMA user interface. Any changes can be logged in a file.

Subscription of a maintenance contract for TMA inventory management is required. The maintenance contract includes web-based assistance concerning the operation and the application. The service is provided

during office hours Central European Time. It also includes free upgrades for new releases for TMA inventory management.

TMA INVENTORY SPECIFICATIONS

INVENTORY DATABASE INFORMATION PER TELINDUS DEVICE

- > Most recent configuration files (default 3)
- > Device selection name: unambiguously unique name for each device. Based on IP addresses and the name or position for proxied devices.
- > sysName: The SNMP sysName value as configured in the device
- > sysContact: the SNMP sysContact value as configured in the device
- > sysLocation: the SNMP sysLocation value as configured in the device
- > sysDescription: the SNMP sysDescription status attribute
- > sysObjectID: the SNMP sysObjectID status attribute
- > sysServices: the SNMP sysServices status attribute
- > Identification: the unique identification code for the device
- > Software table: this table contains the software revisions in the device
- > Interfaces table: lists all the interfaces. Per interface it contains the following information:
 - > name
 - > interface reference
 - > ifAdminStatus: whether the interface is administratively up or down
 - > ifType: SNMP interface type
 - > ifSpeed: current interface speed of this interface

MINIMUM SYSTEM REQUIREMENTS

- > Sun Solaris 7, Solaris 8
- > Windows NT 4.0, Windows 2000, Windows XP
- > Installation of TMA for HP OpenView or TMA Element management

TMA TDM PATH MANAGEMENT

With the advent of devices with TDM multiplexing features like Crocus SHDSL Quad, Crocus DXC and Crocus ADM 2P, users can build complete backbone extensions and even points of presence (POPs) with only Telindus access products.

Along with this there is an increasing demand to manage not only all devices as separate entities (element management), but to manage as well the logical TDM connections within such network.

TMA path management is the answer to this. It is a software product for end-to-end management (network management) between different Telindus access devices. TMA path management is an add-on product to TMA inventory management.

TMA TDM PATH MANAGEMENT SPECIFICATIONS

PATH CONFIGURATION

- > Each path has a name (uniquely refers to the path), a description and a section table.
- > Each section contains a description (optional), the end points for the section and whether the section is active or passive.
- > Each section end point is defined by the device's name in TMA inventory management, the interface name and either the path speed or its E2/E1/Time slot selection.

PATH MONITORING AND ALARMS

- > A status table gives the actual path status for all paths. Additionally the status for all individual path constituting links is listed as well, being one of the following:
 - > Up: this link is working correctly for this path
 - > Passive up: this link is passive and therefore always up
 - > Down: this link is down
 - > Unknown: no information could be retrieved from this link, i.e. at least one of the link end points is not reachable
 - > Not configured: due to a configuration error, this link cannot be up within this path
- > Applicable restrictions to automatically find the individual links in a path:
 - > Only digital interconnections with G703 2Mbit/s interfaces between different Telindus devices can be automatically detected
- > A performance table shows per path the creation date, the total up and down times, the last time the state changed and how many times the path state has changed.
- > Performance tables show per path the up and down times and how many times the path state changed for the following most recent periods:
 - > 1 day (2 hour intervals)
 - > 1 month (1 day intervals)
 - > 1 year (1 month intervals)
- > Log table with most recent path related alarms.

PATH PROVISIONING

- > Only unused (but available) bandwidth can be used to provision a new path
- > Line speed configuration on modem links is not automatically adapted
- > Path provisioning logging

USER AND APPLICATION INTERFACES

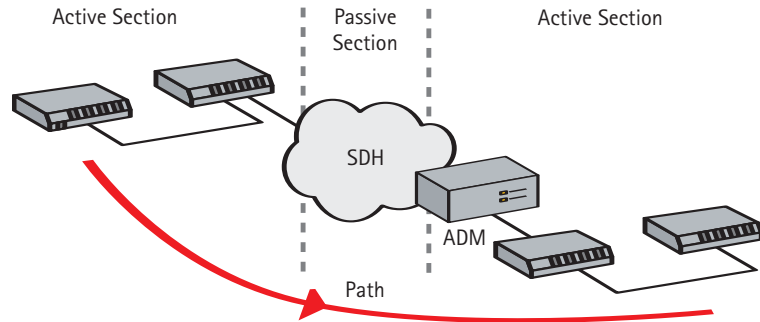
- > TMA for configuration (administration level)
- > Web interface (operator level). Supports click through to device level.
- > CLI interface

MINIMUM SYSTEM REQUIREMENTS

- > Sun Solaris 7, Solaris 8
- > Windows NT 4.0, Windows 2000, Windows XP
- > Installation of TMA for HP OpenView or TMA Elements Management
- > Installation of TMA inventory management

Paths are defined by reference to their end points. For an existing path, TMA path management tries to find out the complete path given only the end points. It continuously monitors the path status and keeps related performance information for the last day, the last

PATH DEFINITION



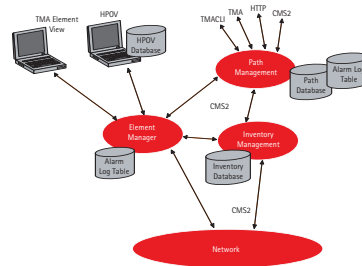
month and the last year. Changes in the path status are logged and may be forwarded as alarms to other platforms.

TMA path management provides also the possibility to completely provision a path. Provisioning results in the correct configuration of all the equipment along the path.

TMA path management has 2 different user interfaces. For administration purposes (definition of the paths, configuration) the TMA user interface is available. For operation and maintenance purposes a web interface is available with click-through possibilities to the individual devices.

Subscription of a maintenance contract for TMA path management is required. The maintenance contract includes Web-based assistance related to the operation and the application. It also includes free upgrades for new releases for TMA path management..

TMA PATH MANAGEMENT ARCHITECTURE



SALES CODES

- TMA FOR HP OPENVIEW (INCLUDING 3 YEAR MAINTENANCE)**
- > 186600 TMA_HP/OV Sun Solaris Entry Level (up to 250 devices)
 - > 186601 TMA_HP/OV Sun Solaris Unlimited
 - > 186598 TMA_HP/OV Windows Entry Level (up to 250 devices)
 - > 186599 TMA_HP/OV Windows Unlimited Version
 - > 156986 Demo version for Windows/Solaris (Max 8 devices)
 - > 171269 TMA_HP/OV Entry Level to unlimited upgrade

TMA ELEMENT MANAGEMENT (INCLUDING 3 YEAR MAINTENANCE)

- > 187387 TMA element management Sun Solaris Entry level (up to 250 devices)
- > 187388 TMA element management Sun Solaris Unlimited
- > 187385 TMA element management Windows Entry level (up to 250 devices)
- > 187386 TMA element management Window Unlimited
- > 156986 Demo version for Windows/Solaris (Max 8 devices)

TMA INVENTORY MANAGEMENT (INCLUDING 3 YEAR MAINTENANCE)

- > 177948 TMA inventory management
- > 156986 Demo version for Windows/Solaris (Max 8 devices)

TMA PATH MANAGEMENT (INCLUDING 3 YEAR MAINTENANCE)

- > 177952 TMA path management
- > 156986 Demo version for Windows/Solaris (Max 8 devices)

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