

Network topology display of three MSPxG networks. Drill-down navigation is provided by clicking on a selected network node

System Functional Description

The IPITEK® NodeWizard® Network Management System (NMS) is a powerful element and network management tool that allows remote monitoring and control of system equipment. This software-based system is designed for use with IPITEK's telecommunications and networking products. A wide variety of network architectures can be managed by NodeWizard, providing an effective network management tool for both large and small systems.

NodeWizard monitors critical elements of the distribution network, allowing operators to identify problems and initiate repairs before any loss of service is encountered. NodeWizard enables operators to remotely manage Quality of Service (QoS), Operations Administration and Maintenance (OAM) with Local Loop feedback, and provides performance monitoring via Service Level Agreement (SLA) reports. SLA report history is saved to a report database and can be reviewed at any time.

A user-friendly graphical interface provides information to the network operator in a concise, easy to understand format, containing topological, tabular and shelf views of the network.

FEATURES

- Client-Server based Architecture
- Windows 2000/XP/Vista/7 Ready
- Open SNMP Northbound Interface
- Multi-level Security Control
- Immediate Chassis Status Visibility
- Client Intuitive JAVA-powered GUI

APPLICATIONS

- Metropolitan Ethernet Networks
- CATV Backbone & HFC Access
- WDM Optical Networks
- Broadcast Video Networks

Color-coded network summary information and simple drill-down navigation tools provide the operator fast access to critical information. Tools for provisioning and cross-connect configuration allow the operator to execute remote commands using a few simple mouse clicks.

NodeWizard software is a java based, client/server-based architecture that has been designed to run on any PC-compatible computer with the Java™ Runtime environment installed. The NodeWizard server software runs on Windows 2000/XP/Vista/7, OSX or Linux system. It can monitor and control multiple different networks utilizing IPITEK's fully-loaded HBR-2500, HFC, or MSPxG Ethernet nodes. The NodeWizard client connects to the server over a standard TCP/IP network. The basic NodeWizard server can be accessed simultaneously by up to 5 individual clients.

NodeWizard remotely monitors and controls equipment using out-of-band communications. However, when monitoring a network of HBR-2500's, MSP-110/220's, MSP-10GE, MSP-1GE, or MSP-CES in-band communications may be used, eliminating the need for external communication devices.

Monitoring Functional Description

NodeWizard monitors key status parameters of the managed network, including:

- Temperature/Power Supply Status
- Interface Statistics/Packet Monitoring Statistics
- Port Utilization
- Optical Power Levels
- Module inventory
- Link State/Network topology
- SLA monitoring and reporting

Reports

Top-level reports include: Current Alarms, Alarm History, Node Inventory, Module Inventory, Active Connections, and SLA status. The content of each report is configurable from the associated database table's fields.

The Alarm report provides a summary of all the current alarms in the system. Alarm notifications are color-coded by severity and are displayed on both the Topology and Hierarchical views. User-level alarm filtering allows control of displayed alarms by severity or by network, node or module association. Audio and email alarm notifications are supported.

The Alarm History report displays all alarms that have been cleared in the last 45 days. The displayed information includes alarm time, alarm acknowledge time, alarm clear time and the user account associate with each action on the alarm. The Inventory reports provide information on all node and module model information. Displayable data includes serial number, model number, alarm state, name and alarm controls.

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Network Hierarchical and Topology Views

The Network Hierarchical display provides a tree-based view of all equipment in the network. The display supports drill-down navigation to the node and module-level data. Each item in the display offers a selection menu to access dialogs associated with the item. The menus support network-level, node-level and module-level access. Network-level menu items include network properties, configured circuits report, subnet report and circuit configuration dialogs. The node-level menus provide access to alarms, properties, configuration, Interface Statistics, Ports, VLANs, Quality of Service, Optics, Layer-2 tunneling SNMP configuration, Telnet and HTTP access to the node. Module-level menus provide access to alarm and module properties.

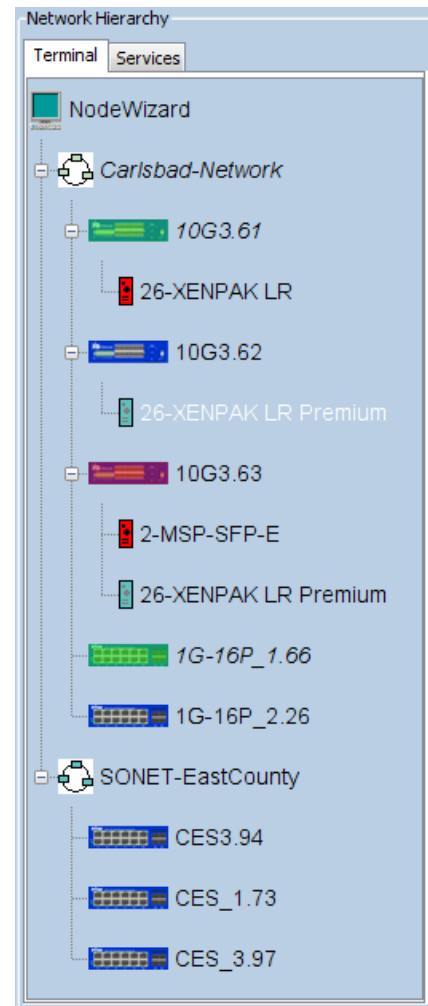
The Topology display also offers drill down functionality to the node and module level. In addition to the same menus available from the Hierarchical display, the topology display also shows the links provisioned in the network and information on link traffic.

NodeName	NetworkName	ModuleID	ModelNumber	SerialNumber	ModuleName	ModelDescription	AlarmsEnabled
CES3_94	SONET-EastCo...	301	MSP-CES-TCXO	A00000	-1-301-MSP CE...	MSP CES TCXO ...	Enabled
CES_1.73	SONET-EastCo...	301	MSP-CES-TCXO	A00000	-1-301-MSP CE...	MSP CES TCXO ...	Enabled
CES_3.97	SONET-EastCo...	301	MSP-CES-TCXO	A90983	-1-301-MSP CE...	MSP CES TCXO ...	Enabled
CES_1.73	SONET-EastCo...	104	CES-1GE-12P	A90996	2-104-MSP CES...	MSP CES 1 Giga...	Enabled
CES3_94	SONET-EastCo...	104	CES-1GE-12P	A90837	2-104-MSP CES...	MSP CES 1 Giga...	Enabled
CES_3.97	SONET-EastCo...	104	CES-1GE-12P	A90836	2-104-MSP CES...	MSP CES 1 Giga...	Enabled
CES_1.73	SONET-EastCo...	102	CES-4T1E1	A90388	0-102-MSP CES...	MSP CES D51 pl...	Enabled
CES3_94	SONET-EastCo...	102	CES-10C35TM1	A90313	0-102-MSP CES...	MSP CES OC3 pl...	Enabled
CES_3.97	SONET-EastCo...	102	CES-3T3E3	A93222	0-102-MSP CES...	MSP CES D53 pl...	Enabled
CES_1.73	SONET-EastCo...	11	MSP-SFP-E-LX++	A94277	11-MSP-SFP-E	dual LC/LJC co...	Enabled
CES3_94	SONET-EastCo...	11	MSP-SFP-E-BLA	A94278	11-MSP-SFP-E	dual LC/LJC co...	Enabled
CES_3.97	SONET-EastCo...	11	MSP-SFP-E-BLB+	A94276	11-MSP-SFP-E	dual LC/LJC co...	Enabled
CES_3.97	SONET-EastCo...	12	MSP-SFP-E-BLA	A94273	12-MSP-SFP-E	dual LC/LJC co...	Enabled
CES_1.73	SONET-EastCo...	12	MSP-SFP-E-BLA+	A94272	12-MSP-SFP-E	dual LC/LJC co...	Enabled
CES3_94	SONET-EastCo...	12	MSP-SFP-E-LX	A94279	12-MSP-SFP-E-LX	10km via SMF, ...	Enabled

Module Inventory Report

NodeID	NodeName	NetworkName	ModelNumber	SerialNumber	ModelDescription	AlarmSeverity	AlarmsEnabled
1	CES_1.73	SONET-EastCounty	MSP-CES-CH-TCXO	A00000	MSP CES TCXO	Normal	Enabled
2	10G3.63	Carlsbad-Network	MSP-10GE-OP-DC	A12345	Base Unit, 24 1G...	Normal	Enabled
3	CES3_94	SONET-EastCounty	MSP-CES-CH-TCXO	A00000	MSP CES TCXO	Normal	Enabled
4	1G-16P_2.26	Carlsbad-Network	MSP-1GE-16P	A00000	MSP 1 Gigabyte ...	Normal	Enabled
5	10G3.62	Carlsbad-Network	MSP-10GE-CO-AC	A00000	Base Unit, 24 10...	Normal	Enabled
6	1G-16P_1.66	Carlsbad-Network	MSP-1GE-16P	A89932	MSP 1 Gigabyte ...	Normal	Enabled

Node Inventory Report

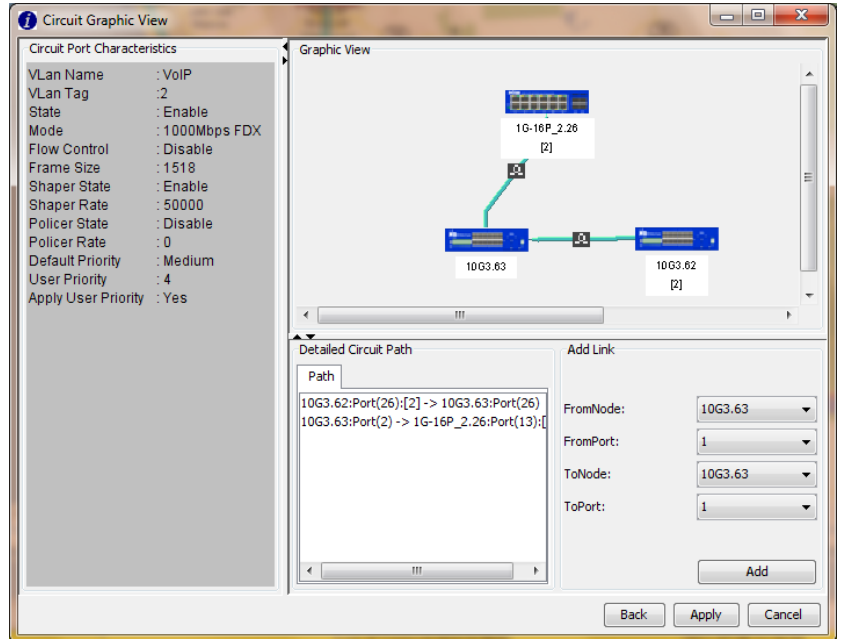


Hierarchical View

Network Provisioning

Network cross-connect changes are accomplished by selecting a set of node/source pairs representing a network-level VLAN connection. Network-level VLANs are created by first selecting a single node/port pair and then selecting additional node/port pairs from the list of possible destination pairs. With each node/port pair selection, the routing information for the circuit is updated with additional reachable port pairs. The NodeWizard server performs all of the routing and path determination required to create the connection.

After initial circuit provisioning, a graphical view of the circuit is presented. In the circuit graphical view, the final circuit routing can be modified before the server issues SNMP commands to create the circuit.



Circuit Graphical View

Control Functional Description

Network provisioning is provided through easy-to-use dialogs. All NodeWizard dialogs integrate status display with command and control functions. This allows operators to monitor and control data from the same dialogs.

An example of the control dialogs is the Node Overview dialog. The Node Overview dialog provides a visual representation of a single MSPxG node. The dialog provides summary information including alarms, provisioned circuits and port data. Selection of a port within a chassis provides access to the Port Overview Dialog.

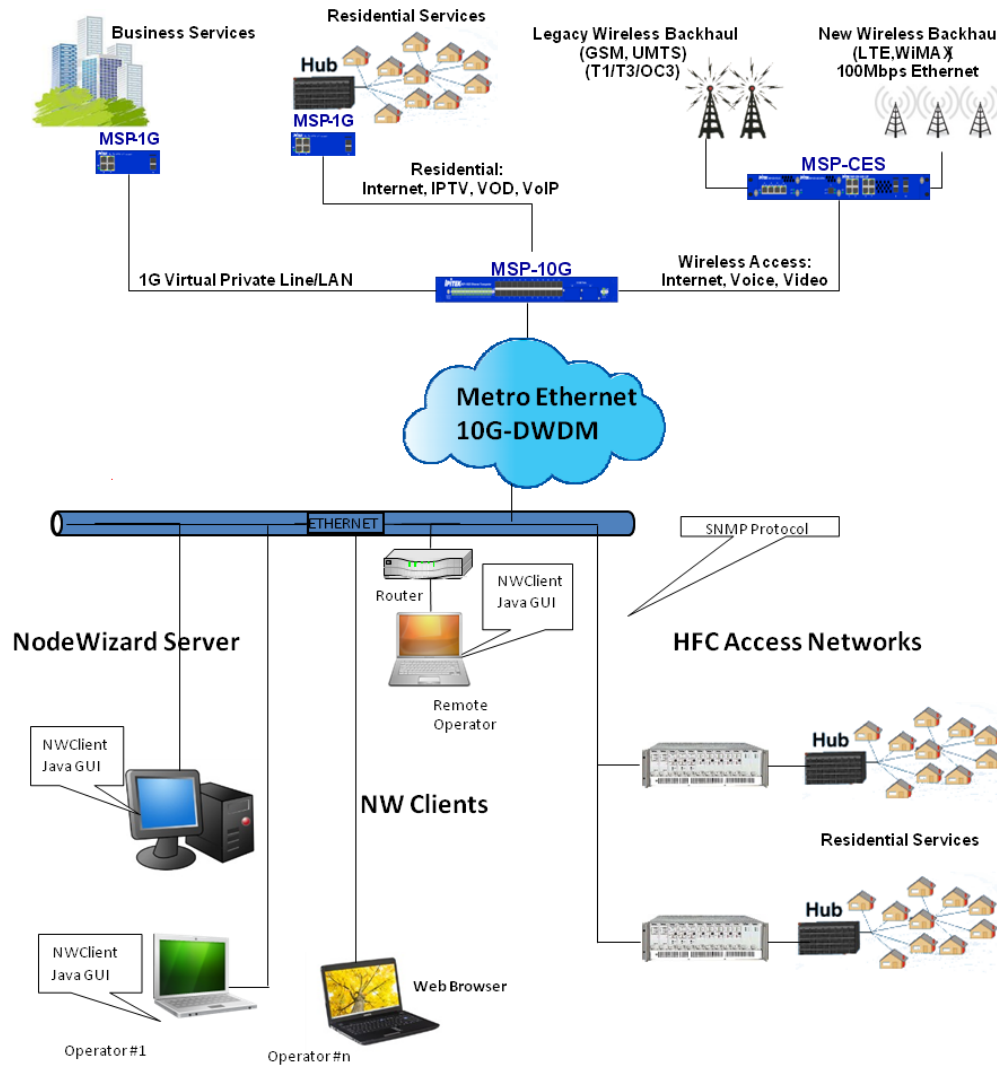
Multi-Level Permissions

Multi-level password protection allows access to network configuration menus to be restricted to specific user accounts. The supported permission levels include user administration, network provisioning and alarm management. Management operations are divided into permission levels. Any attempt to access a control function outside the authorized level is prohibited.

PortNum	PortName	State	Mode	Flow Ctrl	Frame Size	Link
1		Enable	1000Mbps FDX	Disable		1518 Down
2		Enable	1000Mbps FDX	Disable		1518 Down
3		Enable	1000Mbps FDX	Disable		1518 Down
4		Enable	1000Mbps FDX	Disable		1518 Down
5		Enable	1000Mbps FDX	Disable		1518 Down
6		Enable	1000Mbps FDX	Disable		1518 Down
7		Enable	1000Mbps FDX	Disable		1518 Down
8		Enable	1000Mbps FDX	Disable		1518 Down
9		Enable	1000Mbps FDX	Disable		1518 Down
10		Enable	1000Mbps FDX	Disable		1518 Down
11		Enable	1000Mbps FDX	Disable		1518 Down

Node Dialog (MSP-10GE-OP-AC)

FUNCTIONAL ARCHITECTURE DESCRIPTION



The NodeWizard server is connected to one piece of equipment within a remotely-managed network. In a bi-directional network, the digital transport equipment acts as a gateway. Monitor and control messages are transmitted along with the main traffic through an in-band communications channel. In a unidirectional configuration, an out-of-band communications channel is required. This may require access to an external third party network or dial-up line. NodeWizard polls the elements within each node of a network. The status values are stored within a database on the NodeWizard server. Comparisons to alarm thresholds automatically trigger alarm notifications to the various display mechanisms and via the SNMP Agent to higher-level management systems.

NodeWizard can automatically determine changes in network topology and inventory, and update its own configuration table entries.

The NodeWizard system consists of a Java-based application that interfaces to one or more networks via an out-of-band Ethernet LAN or in-band when no

LAN is present. As can be seen in the diagram above, NodeWizard has the ability to manage a broad set of network elements. These elements show the diversity of NodeWizard for applications ranging from broadcast, broadband, HFC access networks, and video surveillance to large scale DWDM networks. This includes IPITEK's full line of transmission products such as:

- HBR-2500
- MSP-1GE
- MSP-10GE
- MSP-CES
- MSP-110/220
- MSP-DWDM
- CQ-5/CQ-10
- FSX/DTX
- ION Nodes

Specifications

Software Requirements

Server Operating System: Windows 2000/XP/Vista/7 Professional, OSX, Linux
Client Operating System: Any Java-based web interface
Database: MySQL5.0 (included in distribution)

Minimum Hardware Requirements

Processor: Pentium 4 CPU
Memory: 2+GB RAM
Disk space: 100+ GB Hard Disk
Media: CD ROM
Display: 17" Monitor
I/O ports: 1 serial port per managed network (if RS-232 connected)
Network: 1 Network card
Interfaces: Windows compatible mouse and keyboard

Distribution Media

CD ROM
Digital Download

The screenshot displays the IPITEK NodeWizard Network Management System (version 10.0.3.204) interface. The main window shows a network topology map of San Diego, with various nodes and connections overlaid on a geographical map. The left sidebar shows a network hierarchy with nodes like Carlsbad-Network, SONET-EastCounty, and various 10G and 26-XENPAK LR modules. The bottom section is an Alarm Management table with columns for NodeName, ModuleID, ModuleName, Message, AlarmTime, and AckState. The table lists several alarms, including 'Loss of Communication to Node' and 'LinkUp/LinkDown' events for various modules. The interface also includes a terminal window, a network ring diagram, and a server connection status indicator.

NodeName	ModuleID	ModuleName	Message	AlarmTime	AckState
10G3.61			Loss of Communication to Node	2011-07-08 11:16:56	UnAck
10G3.63	1	1-MSP-SFP-E	LinkUp 1	2011-07-08 11:10:25	UnAck
10G3.63	1	1-MSP-SFP-E	LinkDown 1	2011-07-08 11:10:03	UnAck
10G3.61	26	26-XENPAK LR	LinkUp 26	2011-07-08 11:09:16	UnAck
10G3.63	25	25-XENPAK LR Premium	LinkUp 25	2011-07-08 11:09:16	UnAck
10G3.63	25	25-XENPAK LR Premium	LinkDown 25	2011-07-08 11:09:04	UnAck
10G3.61	26	26-XENPAK LR	LinkDown 26	2011-07-08 11:09:04	UnAck
10G3.63	2	2-MSP-SFP-E	LinkUp 2	2011-07-08 11:09:00	UnAck
10G3.63	2	2-MSP-SFP-E	LinkDown 2	2011-07-08 11:08:51	UnAck

