

TELENIUM®



Innovative Network
Management Solutions

TELENIUM NETWORK MANAGEMENT

Courtesy of MegaSys Computer Technologies

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CHAPTER 1: INTRODUCTION TO TELENMIUM



MegaSys® is the provider of Telenium® Network Management Solutions. Focusing exclusively on telecom network management and provisioning, MegaSys has developed a powerful network management tool that provides complete EML/NML/SML functionality – including full FCAPS capability, auto-population of network architecture, circuit management, high throughput alarm processing and network element backup – integrated in an intelligent, high performance database.

Telenium's versatility, scalability, and ease of configuration is what makes it the network management solution of choice for utility, telecom, cable, government, and other service providers wanting to maximize the return on their network infrastructure investment while achieving compliance with regulatory standards, including FERC/NERC and CIP.



Telenium applications and features that are key to regulatory compliance.

This booklet highlights the Telenium features and applications that contribute to the successful management of a communications network.

It outlines managing all types of network devices with a single user interface for accurate representation of your network configuration, condition, and connections with photo-realistic dynamic graphics. It demonstrates Telenium Service Management applications that provide a real-time accurate view of the circuit path through your network. It also details the fault, configuration, administration, performance monitoring, and security control applications that have factored in the Utilities Telecom Council's selection of Telenium as the *Best Telecom Services Product* multiple times.

TELENIOUM NETWORK MANAGEMENT AT A GLANCE

Telenioum provides functionality to all aspects of the FCAPS model.

Fault	Configuration	Administration	Performance	Security
Alarm Handling	System Turn-Up	Track Service Usage	Data Collection	Control NE Access
Trouble Detection	Network Provisioning	Store History for Billing	Report Generation	Enable NE Functions
Trouble Correction	Auto-Discovery	Automatic Archiving	Data Analysis	Access Logs
Test and Acceptance	Backup and Restore		Quality of Service	
Network Recovery	Database Handling			

COMMUNICATIONS PROTOCOLS

Today's networks are populated with both new and legacy equipment, necessitating communication between your network equipment and your network management applications via many different protocols. Telenioum successfully manages network elements using a wide variety of protocols including TL1, DNP3, SNMPv1, SNMPv2c, SNMPv3, ASCII, PDS, TBOS, MCS11, NETCONF, LARSE, DCP, DCPF, DCPX, FARSCAN, MOSCAD, PING, CLI, SYSLOG, DMS, Badger, NEC N21, 5ESS, IMUX 2000, PRESIDE, P4, DCM, MXVEW, and LLDP, ensuring its effectiveness as a single network management solution for all your network devices.

DATABASE PERFORMANCE

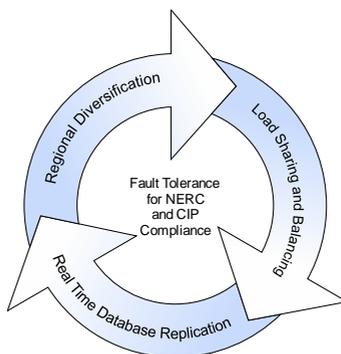
The Telenium system provides unsurpassed database performance and can handle thousands of alarms per second, continuously. This critical capability assures Telenium users that all information is available to the operators. There is no need to filter and potentially block key information.

DATABASE SYNCHRONIZATION



Telenium supports the ability to synchronize the same database on different appliances. For synchronized databases, a change to the database on one Telenium appliance is instantly synchronized on all other Telenium appliances, providing the following advantages:

- Instant replication of database information.
- No loss of visibility or control of your network in the event of an appliance failure.
- Optimized network resources by the distribution of database loads across multiple synchronized systems.
- Compliance with the survivability and redundancy requirements of NERC, FERC, and CIP.



Databases can be installed on multiple Telenium appliances on a local area or wide area network.

DATABASE SCALABILITY

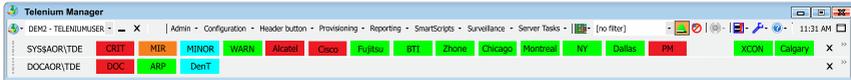
A key requirement for any network management system is scalability of the database. The Telenium system allows for massive scalability through its object-oriented database and its support of a distributed system architecture. Automatic consolidation of information between the Telenium EML systems and the Telenium NML and SML systems provides operators with a single pane-of-glass management capability.

CHAPTER 2: GRAPHICAL USER INTERFACES



Telium provides several different dynamic graphical user interfaces to easily navigate, diagnose, and solve network issues.

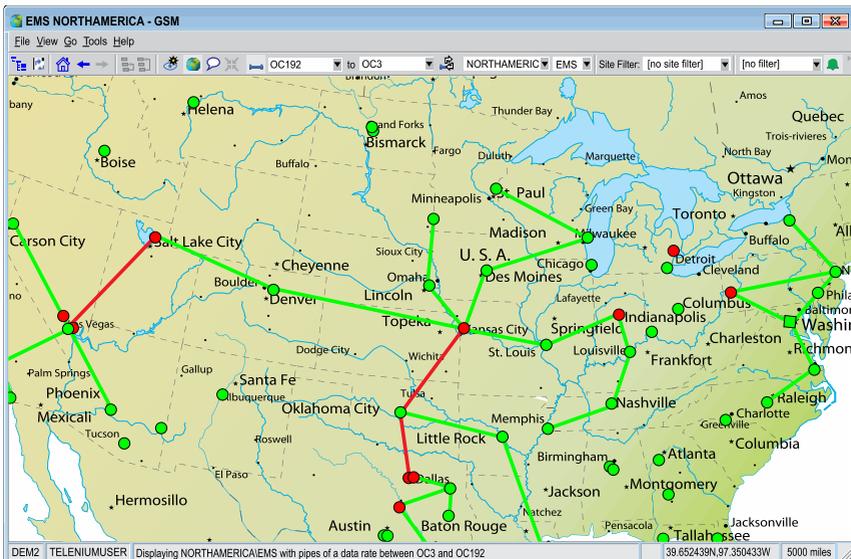
TELENIUM MANAGER AND TELENIUM CLIENT SUITE



Telenium Manager is the all-in-one network management interface. Opening Telenium Manager permits users to log on to Telenium databases and start Client Suite applications. The Telenium Client Suite is a group of applications used to monitor, provision, and maintain networks. The Telenium Manager Client Suite is installed locally on your PC.

GRAPHIC SCREEN MANAGER (GSM)

GSM is a graphical user interface that dynamically displays database information. A geographical GSM presents alarms and their network locations, while the graphical manager depicts real-life representations of physical equipment.



TELENIUM SMART TILES

Telenium’s Smart Tiles application is a dynamic solution featuring contextual navigation. It provides a customizable dashboard which simplifies tasks by reducing the number of application windows open at one time. Smart Tiles displays alarms, PM data, physical topology, facilities and circuits, and a host of additional views and Telenium applications that react dynamically to the operator’s selections, providing a cohesive representation of network and device statuses.

The screenshot displays the Telenium Smart Tiles application interface. At the top, there is a navigation bar with 'Smart Tile Tools' and 'Smart Tiles' tabs. Below this is a toolbar with icons for 'Parent', 'Refresh', 'Details', 'History', and 'Notes'. The main content area is divided into several sections:

- AOR (Area of Responsibility) Summary:** Three pie charts showing data distribution:
 - DATARATE:** 10GBE (9), MPLS (5), OCH (13), OC48 (32).
 - EQUIPMENT:** RTU (2), OPTICAL (2), MICROWAVE (5).
 - REGION:** GERMANY (5), JAPAN (2), NORTHEAST USA (6), WESTERN CANADA (3), SOUTHWEST USA (13).
- Map:** A map showing the location of Calgary, Alberta, Canada, with various geographical features and labels like Fort Saskatchewan, Leduc, and Wetaskiwin.
- Alarm List - Calgary (14):** A table listing recent alarms:

Time	Point ID	AID	Description	Condition	Site	Priority
12/1/2017 9:29:53 AM	cgj-td-1	Analogs	Temperature	Hi	Calgary	10
11/29/2017 1:55:01 PM	cgj-td-1	Analogs	Temperature	Lo	Calgary	5
11/23/2017 1:35:54 PM	cgj-420-1	cgj-420-1	ST-356	failure *	Calgary	12
11/13/2017 1:33:38 PM	cgj-cs-3	cgj-cs-3	ST-635	Lo	Calgary	25
- Alarm Detail:** A detailed view of a specific alarm:
 - RECEIVE SIGNAL LEVEL** On **CGJ-CS-2 CALGARY** Priority: 45
 - 11/10/2017 10:16:56 AM Duration: 59 days 22:06:01 State: 1
 - Maint Region: Condition: MN-SA *
 - Ticket: Ack By: at 11/10/2017 12:03:53 PM
- Graph:** A line graph titled 'RECEIVE SIGNAL LEVEL On Items' showing signal level over time from 03/03/00:00 to 03/21/00:00. The Y-axis is labeled 'Value' and ranges from 0 to 300.

TELENIUM ONLINE

Telenium Online is an application that enables viewing the Telenium system remotely via the Web. You can view and acknowledge alarms from a system-wide alarm list, view sites, NEs, and customers, as well as retrieve network element backup files.

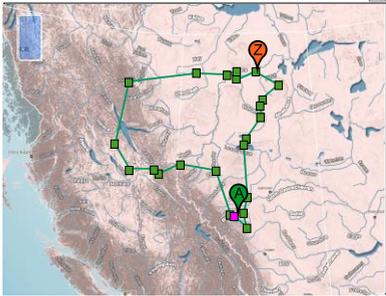
Logon groups can be used to partition users in Telenium Online. Users who are part of a logon group only see the information that is allowed according to the privileges and priorities defined within the group.

The service screen features a map view and connection layout of the service.




Service: ■ CAD-201

Description : T1 Protection for power generation
Type : TIFACILITY
State : Enabled
Customer : ■ MegaSys
Account : ■ DS1



Connection Layout for : FACILITY 210-001

■ Pipe [JSP-AB-KTY03/018:3:HSPPM:5365][JSP-AB-KTY04/T3:7-2]
■ JSP-AB-KTY-04
 GT1:5-2-1-3
■ [JSP-AB-KTY01/VT1:5-2-1-3][JSP-AB-KTY01/GCTP//35270:10:ZCTP/VT1#1]

Alarm List Tue Mar 26 14:49:10 2013

Viewing Alarms 1 to 2 of 2 Filter: NO-FILTER

TimeStamp	Root	AID	Description	Condition	Prio	A	PLNK
15:46:54 05-FEB-13	6625:10:zCONN	[CALG-ABY-1-0...	Broken Connection	Alarm	88		354228:10:zDI
19:13:13 22-JUN-12	29894:10:zCONN	[CALG-ABX-1-1...	Service Affecting Incid...	Causal	85	Y	■ 8078:10:zDI

Enter New Note View Modifications

Home
 Back
 Forward
 Log out

The unique object-oriented design of the database ensures the impact of an alarm within the network context is quickly and easily realized. This allows operators to identify equipment, facilities, and customers affected by these failures.

The Telenium system also self-monitors and raises alarms when disk or other system faults occur, such as when:

- Disk or memory capacities reach operationally low conditions.
- Applications consume excess CPU time.
- Applications shut down unexpectedly.

All Telenium system applications are monitored and automatically restarted if a failure occurs.

ALARM PROCESSING

Alarms are displayed graphically within seconds of being received from the network element. Network fault management alarm data consists of conditions reported by the field equipment. All alarm event details, including the original message received from the element, can be archived for analysis. An adjustable periodic display of alarm events in your network is available from the Alarm Journal tile in the Smart Tiles application.

2161341:11:zDI\TSP - Alarm Detail

Description:	Demodulator not locked	ID:	NWYKNYLU10
AID:	Slot 1	Event Count:	1
Condition:	Normal +	Duration of alarm:	000-00-00:01
Acknowledged at:		By:	

Current Normalized Information: 29-NOV-2012 13:32:30 Duration: 000-00:01:09

Trap detail : Enterprise 'sbxnEventLogEvents' Trap 'eventLogOccurrence' (1)
 Description : This event indicates that an event defined in STXN-EVENTS-MIB has occurred and has been logged in the event log. The event contains details on the event described in the eventLogText object, and the unit's serial number defined in the m event Log Text: 16446 2012-11-25.03:33:02 6 Demodulator not locked 0 Slot 1 Slot 1 SYS

Previous Alarm Information: 29-NOV-2012 13:32:29

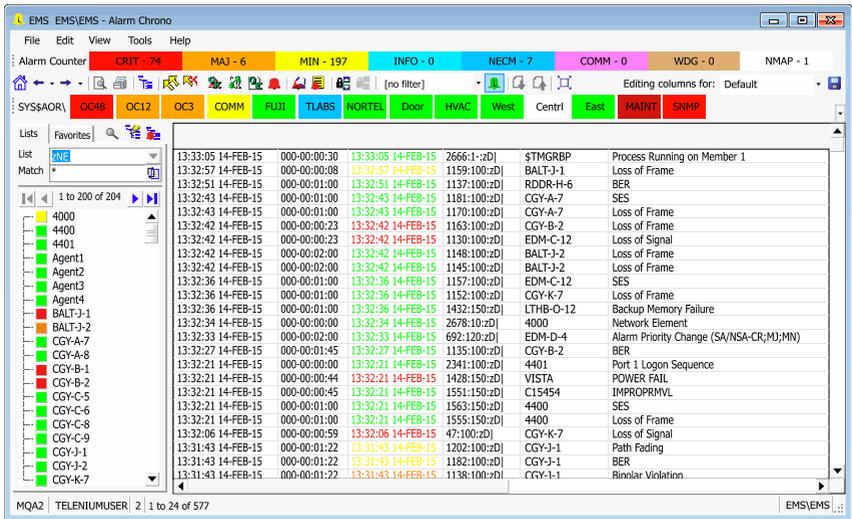
Trap detail : Enterprise 'sbxnEventLogEvents' Trap 'eventLogOccurrence' (1)
 Description : This event indicates that an event defined in STXN-EVENTS-MIB has occurred and has been logged in the event log. The event contains details on the event described in the eventLogText object, and the unit's serial number defined in the m event Log Text: 16440 2012-11-25.03:32:45 2 Demodulator not locked 0 Slot 1 Slot 1 SYS

Partition: Function:
 Ticket:

ALARM CHRONO

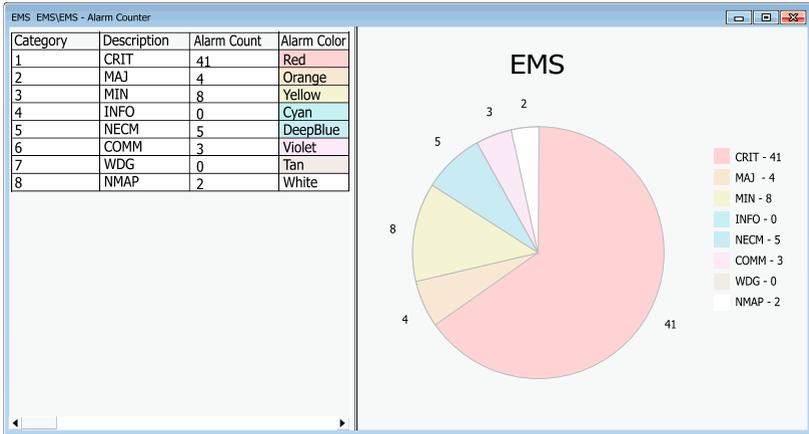
Alarm surveillance is crucial for detecting network problems. Telenium’s fault management applications continuously process thousands of alarms per second and automatically sort alarms into user configurable groups. System Administrators can color code alarms, so their priority reflects the severity of the originating alarm.

Alarm Chrono displays current alarm lists and alarm information for all equipment in the network, and can be used to acknowledge, enable, disable, and sort alarms for enhanced system monitoring. Alarm comments can also be added to alarms to help field technicians communicate with operators.



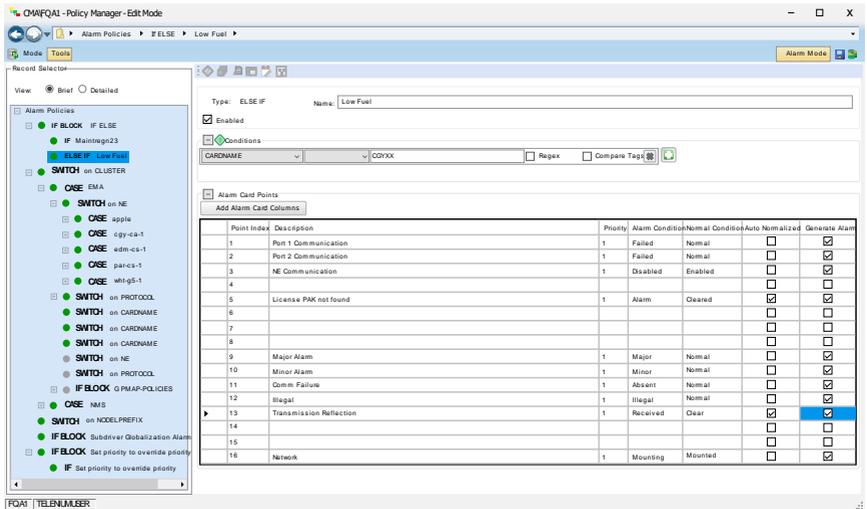
ALARM COUNTER

Alarm information can be exported into easy-to-use presentation views, charts, and 3D rotations through our Alarm Counter application. This tool provides a categorized count and graphical interpretation of active alarms, to quickly assess the health of the network.



POLICY MANAGER

Policy Manager gives you extensive control over every alarm, event and analog handled by the Telenium system. Policies can be created to affect a myriad of characteristics including setting alarms to one of 99 different priorities, enforcing analog threshold limit checking and modifying alarm descriptions to improve readability



ALARM HISTORY

The Alarm History application shows the local alarm history stored in the database. The number of history entries stored in the logs at the network element and global level is determined by a customizable parameter.

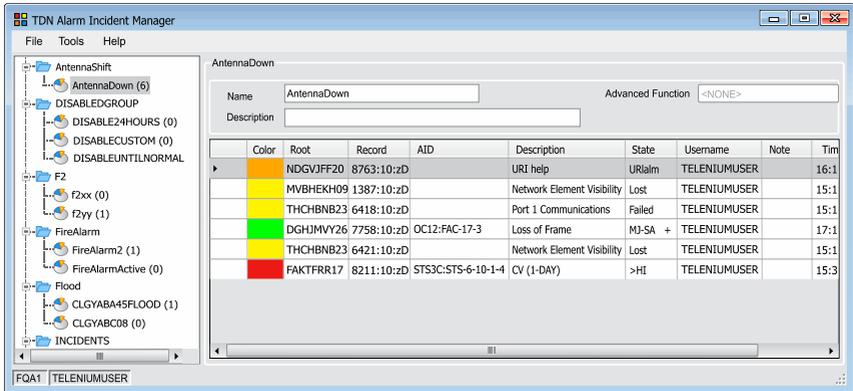
The screenshot shows the 'Alarm History' application window. The main area displays a table of alarm entries. The table has the following columns: Date/Time, NE, AID, Description, and Condition. The entries are sorted by date and time, showing a sequence of alarms from 2012/04/12 10:4... to 2012/04/12 10:3... The conditions vary, including MJ-NSA +, CR-SA +, MJ-NSA, and CR-SA.

The left sidebar shows a list of elements, including agents (Agent1-4) and CGY/EDM elements (CGY-A-7 to CGY-P-5, EDM-F-1 to EDM-P-5, HRVR-I-1). The status of each element is indicated by a colored square (green for active, red for inactive).

Date/Time	NE	AID	Description	Condition
2012/04/12 10:4...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA +
2012/04/12 10:4...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA +
2012/04/12 10:4...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA
2012/04/12 10:4...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA
2012/04/12 10:4...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA +
2012/04/12 10:4...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA +
2012/04/12 10:4...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA
2012/04/12 10:4...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA
2012/04/12 10:4...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA +
2012/04/12 10:4...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA +
2012/04/12 10:4...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA
2012/04/12 10:3...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA
2012/04/12 10:3...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA
2012/04/12 10:3...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA +
2012/04/12 10:3...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA +
2012/04/12 10:3...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA
2012/04/12 10:3...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA
2012/04/12 10:3...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA +
2012/04/12 10:3...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA +
2012/04/12 10:3...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA
2012/04/12 10:3...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA
2012/04/12 10:3...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA +
2012/04/12 10:3...	OPM34-HX	EQPT:VTX-13	IMPROPRMVL	CR-SA +
2012/04/12 10:3...	OPM34-HX	EQPT:PSX	FRNGSYNC	MJ-NSA

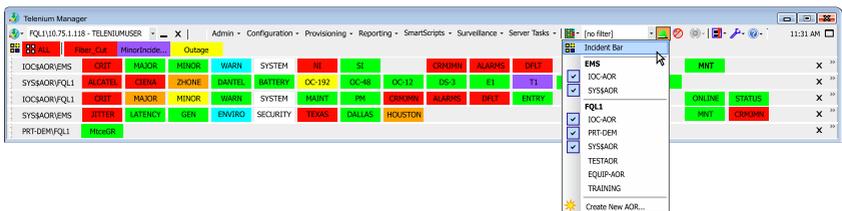
ALARM INCIDENT MANAGER

Telenium allows associated alarms to be organized into incidents for better tracking and control of alarm events. Once created, these incidents are available in other applicable Telenium applications.



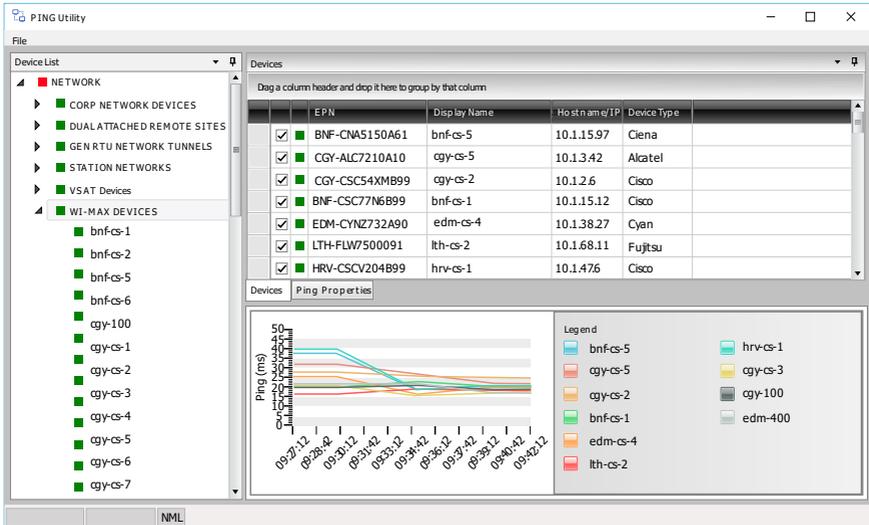
AREA OF RESPONSIBILITY (AOR)

Telenium AORs allow correlation of alarms based on user-defined parameters such as geographic location, network element type, alarm severity, alarm impact, and many other combinations of criteria.

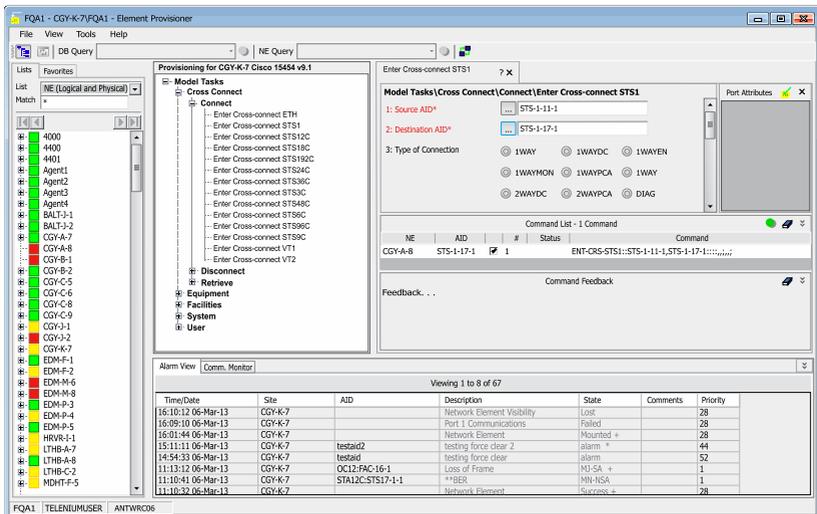


PING UTILITY

The PING Utility application displays the ping status of the selected network devices and indicates a loss of signal alarm if the ping timeout threshold has been crossed. Numerous networks can be displayed concurrently for a specified time range.



CHAPTER 4: CONFIGURATION MANAGEMENT



Network elements are accessed and managed over your network using Telenium's configuration tools.

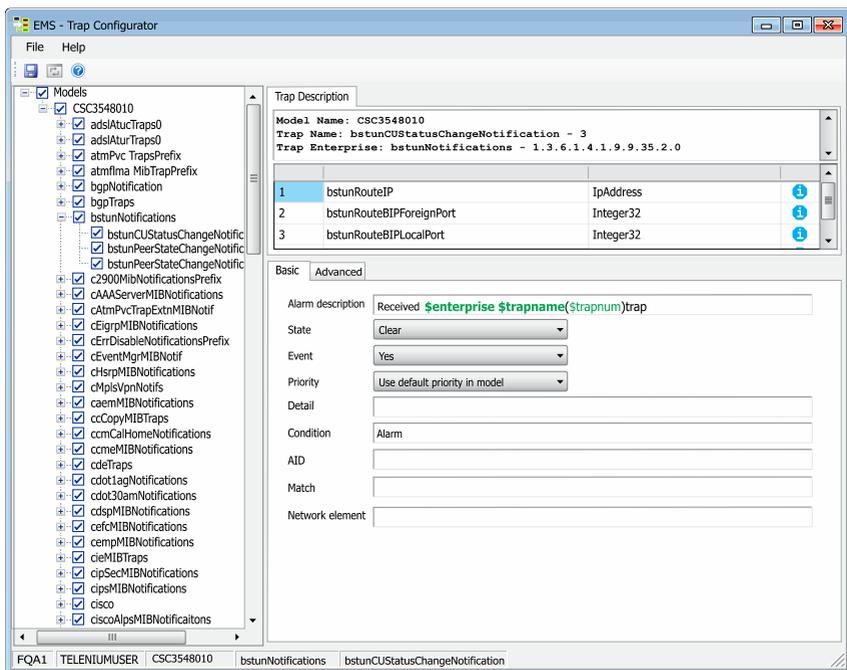
TELENIUM MODELS

Telenium's unique concept of modeling network elements makes turning up and maintaining your network management system fast and simple. Models describe the entire range of card configuration, alarms, and provisioning commands available on a network element. This template can be applied multiple times to represent each unique element in your network. When combined with the AutoDiscover feature, you can have full network surveillance on your network within hours, not days. AutoDiscover queries the database to populate records to exactly match the physical configuration of a piece of network equipment.

The screenshot displays the Telenium EMS software interface for a network element. The window title is "EMS CGY-KT-J2EMS | BTI720093A1 - GSM". The main display area shows the network element name "NE: BTI720093" and "BTI 7200 R9.3". Below this, there are several checkboxes for configuration options, including "Re-Sync All", "Re-Sync Alarms VERIFIED", "Re-Sync X-Connects VERIFIED", "Re-Sync Svc State VERIFIED", and "Auto Discover". On the left side, there is a tree view showing the hierarchy of components, including "NE Info", "Main Shelf Info", and "Expansion Shelf - 1". The main display area also shows a detailed view of the "BTI 7200 Main Shelf" hardware, which is a rack-mounted device with multiple slots and ports. The Telenium logo is visible in the bottom right corner of the interface.

SNMP MANAGEMENT

This application allows system administrators to compile SNMP MIBs, create a model, and customize how Telenium processes traps received from the equipment associated with the MIBs. A model generated in this way will not support any of the higher functions offered by a full model developed by MegaSys, but still allows you to monitor the device.

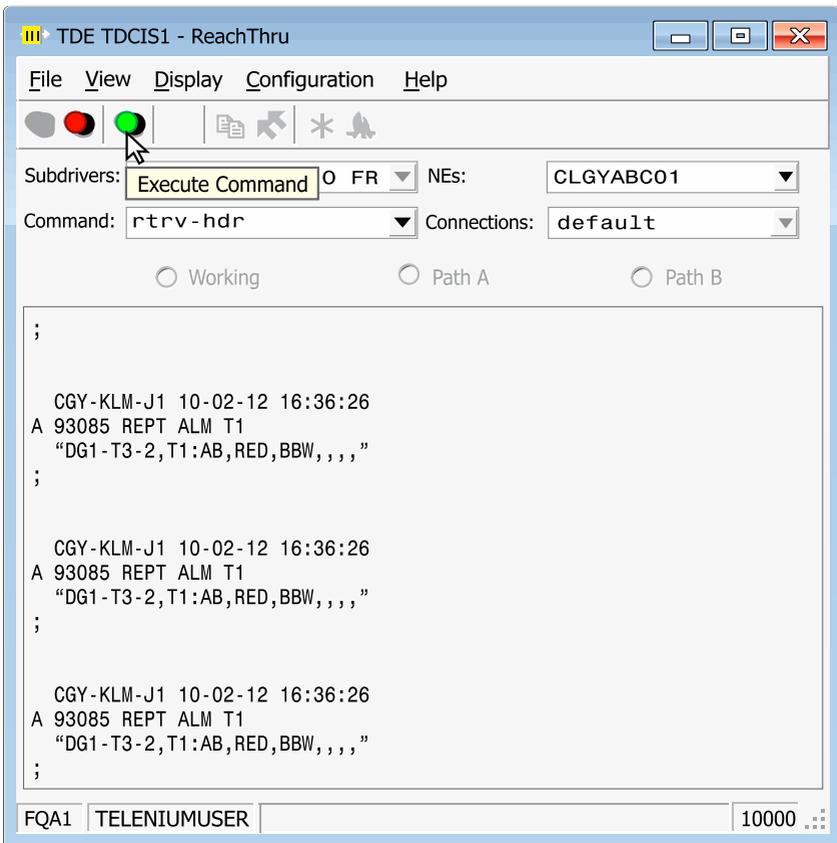


REACHTHRU

This diagnostic tool for communication issues reviews messages passed between a network element and the database, pinpointing the source of communication breakdowns so they can be fixed.

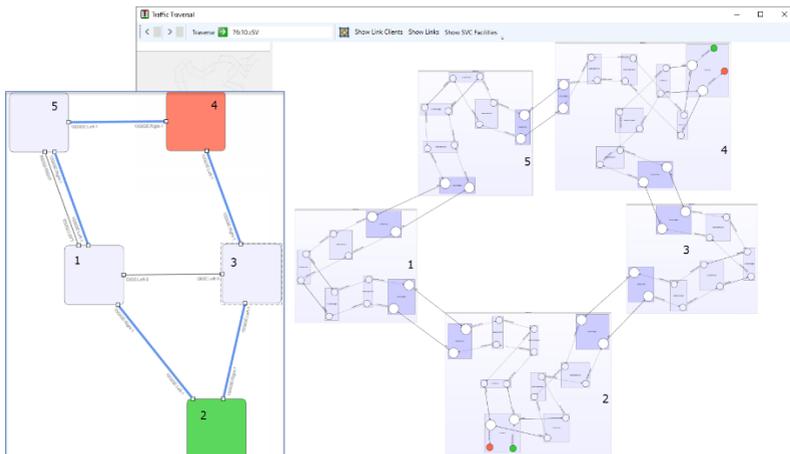
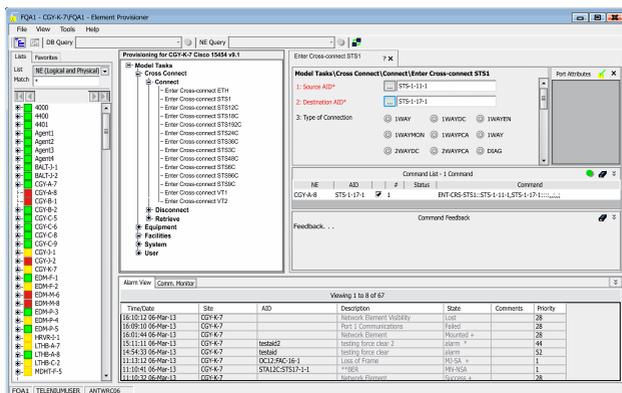
Messages consist of:

- Commands sent by the subdriver.
- Physical equipment responses to these commands.
- Autonomous messages sent by the equipment.



PROVISIONING

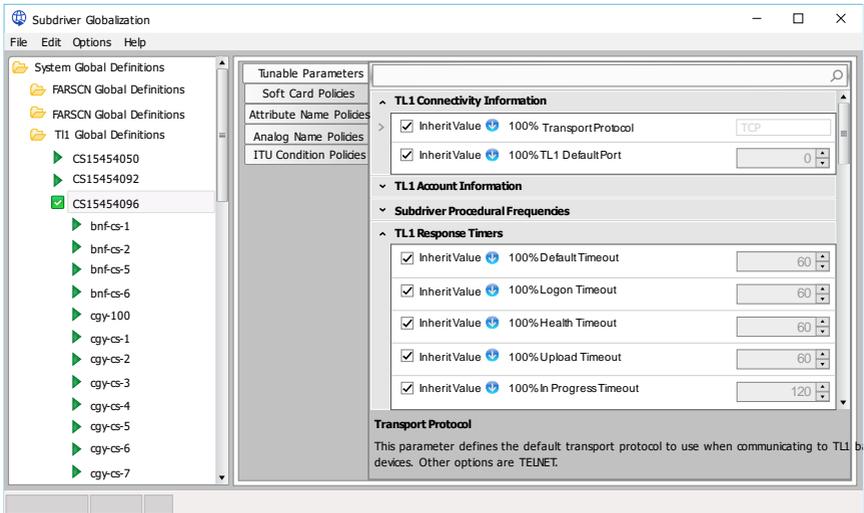
Telenum users can provision managed devices through an intuitive interface that supports the customizable sequencing of commands. The integrated security features of the Telenum database implement user level restrictions on provisioning commands, and all commands are logged in audit history.



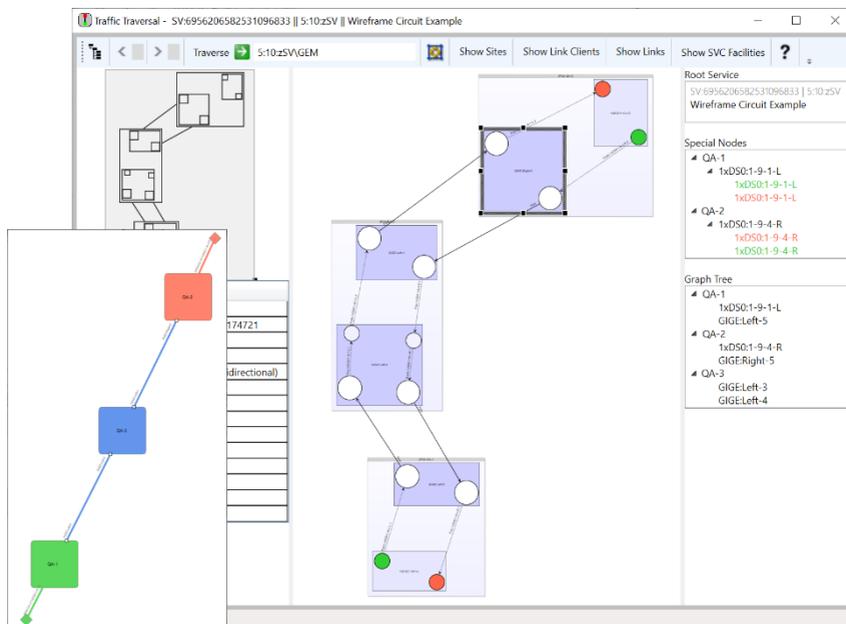
SUBDRIVER GLOBALIZATION

Subdriver Globalization helps to avoid frequent individual updating of model and communication parameters and helps manage tunable parameters and policies from a global view. Changes can be made to model and network element parameters and policies and then the settings can be saved in Subdriver Globalization.

Subdriver Globalization gives you the option to set parameters such as accounts, passwords, community strings and other security related information at a global, protocol, model, and network element level across the database.



CHAPTER 5: ADMINISTRATION MANAGEMENT



Telenium's administration features allow you to generate reports reflecting information contained in the Telenium database. In addition to Telenium's easy-to-access pre-defined reports, you can create customized, historical, and automated reports.

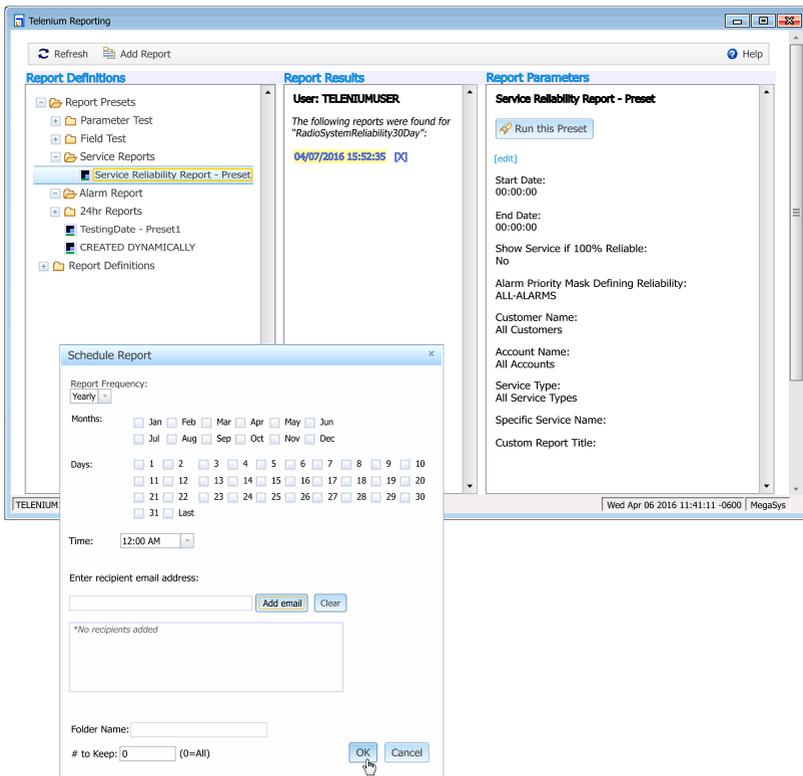
You always have an up-to-date listing of what is in your network because Telenium builds its database by querying the equipment directly. Inventory reports identify circuit packs and their associated service states and attributes, and are easily generated with Telenium's reporting tools. Telenium also provides a quick view of your current bandwidth allocation.

TELENIUM REPORTING



Regulatory
Compliance

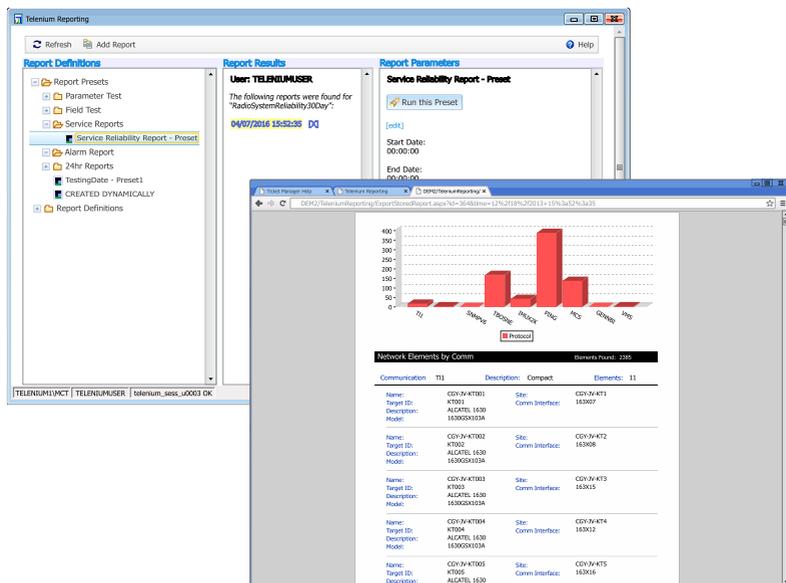
Telenium's reporting application is used to collect historical and online data, and automatically publish this data to reports that can be emailed to selected individuals or stored in a directory. Telenium Reporting includes the ability to create custom reports and also contains a selection of pre-defined reports.



TELENIUM REPORTING – PRE-DEFINED REPORTS

Pre-defined reports provide quick access to network data. Telenium Reporting includes a selection of ready-to-use reports, such as:

- General Network Element Information
- Network Element Inventory
- Network Element Performance
- General User
- QOS Manager Entries
- Service Reliability
- Network Element Reliability
- Site Visibility
- Alarm Frequency



HISTORICAL REPORTER



Review previous alarms, audits, logins, and performance management data to identify bottlenecks and potential opportunities.

Historical Reporter
⌵ ⌵ ⌵

Fields

Applied Filters

Export:

Grid: Alarms 4

From: 2013-06-19 00:00:00

To: 2013-06-19 02:00:00

Where:

Sort:

No	Time	Prio	Detail	NE	User	Service Count	AID	Site	Client	Protocol
1	06/19/2013 00:00:00	61	N	EML		0	NIGHTLY			
2	06/19/2013 00:00:02	61	N	EML		0	TO-SRCHFILES			
3	06/19/2013 00:00:02	61	N	EML		0	KITCHECK			
4	06/19/2013 00:00:02	61	N	EML		0	SDELINE			
5	06/19/2013 00:00:02	61	N	EML		0	3:10z:TSKTY			
6	06/19/2013 00:00:02	61	N	EML		0	2:10z:TSKTY			
7	06/19/2013 00:00:02	61	N	EML		0	PAKCHECK			
8	06/19/2013 00:00:02	1	Y	CGV-J2-KTY002		81	OC48:OC48-1-1	NORTH02	CDMINTRO1A	T11
9	06/19/2013 00:00:02	61	Y	CGV-J2-KTY002		164	OC48:OC48-3-1	NORTH02	CDMINTRO1A	T11
10	06/19/2013 00:00:02	63	N	SML		0	TO-SRCHFILES			
11	06/19/2013 00:00:02	63	N	SML		0	3:10z:TSKTY			
12	06/19/2013 00:00:02	63	N	SML		0	2:10z:TSKTY			
13	06/19/2013 00:00:02	63	N	SML		0	NIGHTLY			
14	06/19/2013 00:00:02	61	N	EML		0	SDELINE			
15	06/19/2013 00:00:03	1	N	SML		81	[CGV-J2-KTY004/OC48:OC48-2-1]			
16	06/19/2013 00:00:03	1	N	SML		65	[CGV-J2-KTY002S TO:ST31-EPG1-1-3-MG]			
17	06/19/2013 00:00:04	61	N	EML		0	PAKCHECK			
18	06/19/2013 00:00:04	63	N	SML		0	3:10z:TSKTY			
19	06/19/2013 00:00:04	63	N	SML		0	NIGHTLY			
20	06/19/2013 00:00:04	63	N	SML		0	2:10z:TSKTY			
21	06/19/2013 00:00:05	61	N	EML		0	NIGHTLY			
22	06/19/2013 00:00:05	21	Y	CGV-J2-KTY001		4	OC3-1-MSB-1	SOUTH01	CDMINTRO5A	T11

1 - 19774 of 19774 items

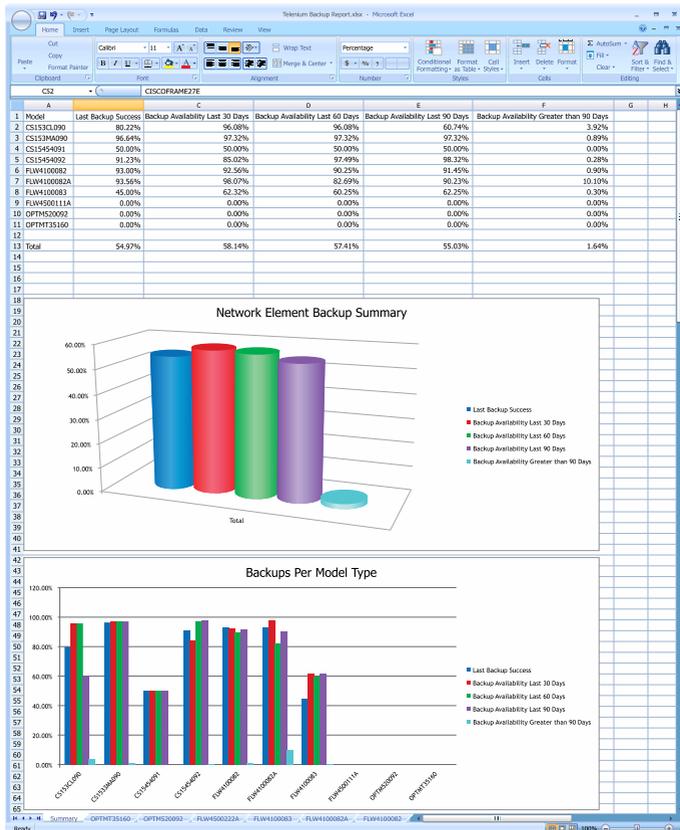
Filters: Alarms 4 x DB Logins 1 x PM Data 1 x

TELENUMUSER / telenum_sess_u0001 OK 1427MF_4 Thu Dec 19 16:57:18 2013

NETWORK ELEMENT BACKUP AND RESTORE

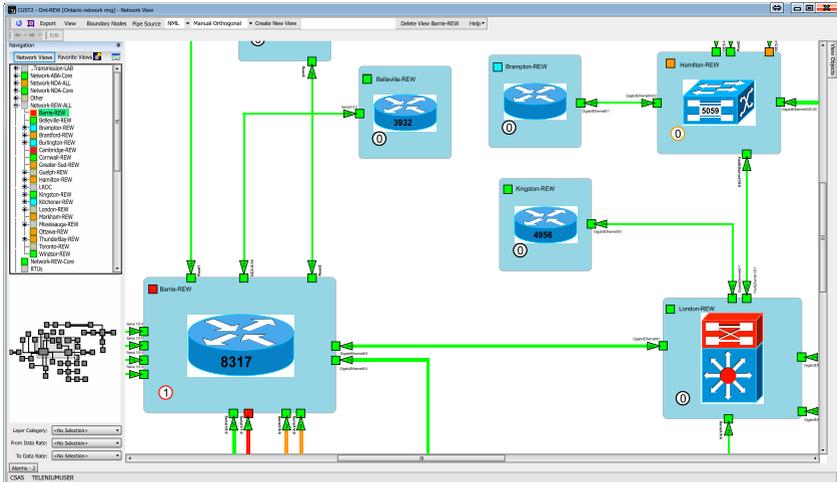


Telenium automatically backs up network element databases to the Telenium server. Backups can be scheduled as often as required, and the Telenium system automatically stores the last ten backups on its server. Telenium can also perform a restoration of a previously saved backup to the network element, providing rapid reinstatement of service to customers. If the network element is completely isolated, a field technician can simply download the backup image and restore it directly to the network element.



NETWORK VIEW

This application is used to view the topology of a telecom network. Network View displays pipes, port names, port loads, and alarm counts, as well as other information. The network can be presented in a variety of different formats.



TRAFFIC TRAVERSAL

This application presents the complete traversal of a service. You can identify missing pipes or cross connects and broken endpoints are displayed. You can also select a point in the depicted service to launch supporting Telenium applications to facilitate troubleshooting. The circuit topology presented is based on knowledge gathered by Telenium from the network elements.

Property	Value
plink	537:11z1IP
ssid	092875922714796289
name	(xTDM:1-5-7:1)
description	
traffic type	VirtualPoint
traffic category	Virtual
layer	
point type	
point class	
point mask	0
ne name	QA-2
model	GEM120

Root Service
SV 6058575789570785537 | 10:10zSV
P2P BulkT1E1 Unprotected xTDM to xTDM 1-2 vlan 103 PR

Special Nodes

- QA-1
 - (xTDM:1-4-6:1)
 - (xTDM:1-4-6:1)
 - (xTDM:1-4-6:1)
- QA-2
 - (xTDM:1-5-7:1)
 - (xTDM:1-5-7:1)
 - (xTDM:1-5-7:1)

Graph Tree

- QA-1
 - (xTDM:1-4-6:1)
 - ETHRPLeft-2
 - ETHRPRight-2
 - GGERight 5
 - TunnelLeftLER-6
 - TunnelRightLER-6
- QA-2
 - (xTDM:1-5-7:1)
 - GGELeft 5
 - TunnelLeftLER-6

TRAFFIC MANAGER

Capable of creating and displaying the entire layout of a service connection, Traffic Manager presents a high-level view as a starting point. Create different types of services to carry network traffic. Traffic Manager can create new tunnels and pipes between network elements to complete a service. Wireframe services facilitate traffic getting from point A to point B.

The screenshot shows the Traffic Manager interface for a "Wireframe Circuit Example". The main window displays a network diagram with four nodes: QA-1 (blue), QA-2 (red, dashed border), QA-3 (green), and QA-4 (green). QA-1 is connected to QA-2 and QA-3. QA-2 is connected to QA-4. QA-3 is connected to QA-4. The QA-2 node is highlighted with a dashed red border. The left panel shows the Design Components, Path Hop List, and Forward/Reverse Next Hops tables.

Design Components

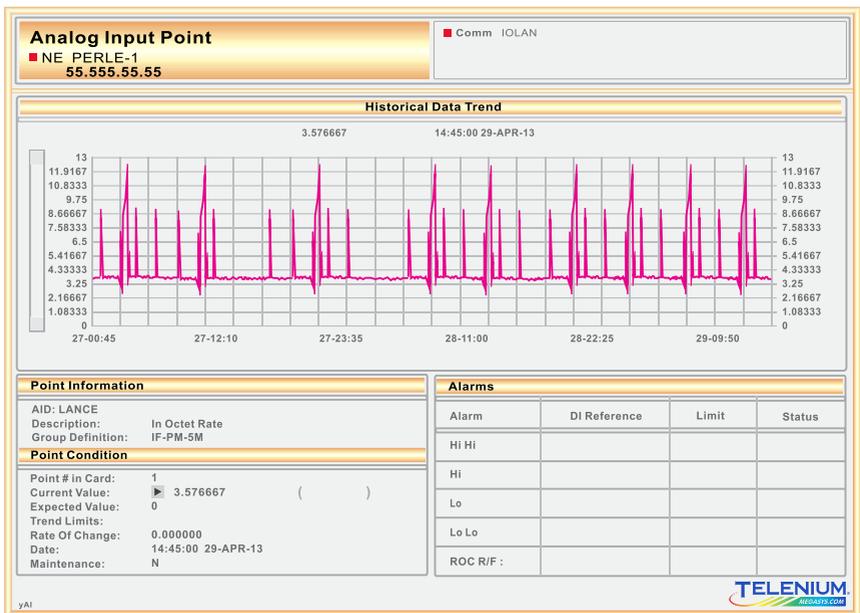
Path Hop List

QA-1-QA-1/1XDS0:1-9-1-L
QA-1-QA-1/GIGE-Left-5
QA-2-QA-2/1XDS0:1-9-4-R

Forward Next Hops

NL	Port	Hop
QA-2	GIGE-Right-5	QA-3/GIGE-Left-4
QA-1	Tunnel-Left-LLER-4	Tunnel-for-1:1-21
QA-2	Tunnel-Right-ELLER-5	Tunnel-for-1:1-22

CHAPTER 6: PERFORMANCE MANAGEMENT

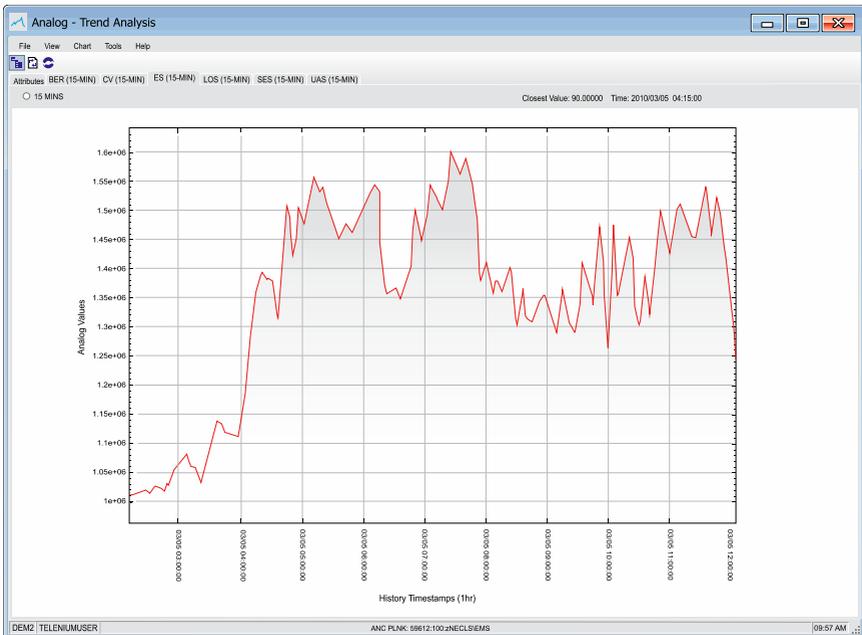


Performance management includes network utilization reports for capacity planning and switch reports for cost analysis, service quality metrics, reports for isolation of fault locations in degraded incidents, and archival of performance data for various management reports and trending.

REAL-TIME GRAPHICAL TRENDS

The most recent 120 values of network performance monitoring data are maintained in the database for immediate trend analysis. Network performance monitoring data can be archived to allow long-term analysis trending.

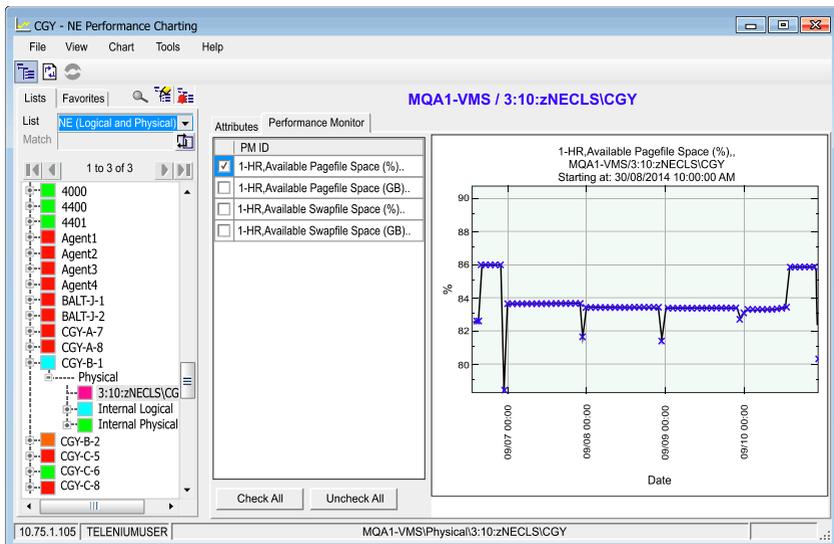
You can design performance trends with the Telenium Graphics Editor (GED) for monitoring bit error rates, and other user-definable network performance thresholds.



NETWORK ELEMENT PERFORMANCE CHARTING

Network Element (NE) Performance Charting displays any type of performance or analog data collected by the Telenium database.

Users have the option of viewing data as text values or one of three graph types: area, line, or step.



QUALITY OF SERVICE MANAGER



Use the Quality of Service Manager application to monitor all types of performance and analog data, and to automatically initiate alarms based on customizable service level agreement parameters.

☰ **QOS Manager** ☑ Edit Mode 🏠 QOS 🔴 Auto Rules 📄 Severity Levels 🔗 Help

- Tier 1
- Tier 2
- Tier 3
- Basic
- Classic Plus
- Advantage Plus

#Entries Currently in Alarm

Classic Plus - Charts

#Entries Currently in Alarm by Severity Levels

Alarm duration

Duration of entry oldest alarm

Classic Plus - List Filter Sort by Priority > Name

Service Name	Customer/Account Information	Chrono Alarms
<input type="checkbox"/> G2-PSRTOA01-PRTLNDAE052001	Customer: 1611TSL5 Account: SRG	🔔 (1)
<input type="checkbox"/> B3-ARBTIGH03-ATLSTBBLP036001	Customer: 0281BRH2 Account: EQU	🔔 (1)
<input type="checkbox"/> A1-GONFERD01-TBLNTSLD040001	Customer: 4047RLJ3 Account: MATI	🔔 (1)
<input type="checkbox"/> MA-RTDLAV001-VBRUSTA029004	Customer: 4046STS2 Account: MATI	🔔 (10)
<input type="checkbox"/> A2-GHITBRA42-SWSTGANTS10003	Customer: 2584IMU2 Account: ST	🔔 (10)
<input type="checkbox"/> N3-GILTEBRA02-TBBLILTYV420501	Customer: 8357GVA5 Account: ST	🔔 (6)
<input type="checkbox"/> N3-GILTEBRA02-TBBLILTYV420501	Customer: 8357GVA5 Account: ST	🔔 (13)
<input type="checkbox"/> A2-GHITBRA42-SWSTGANTS10003	Customer: 2588TNU2 Account: ST	🔔 (3)
<input type="checkbox"/> FA-YRDWRK133-SMWRHTB84001	Customer: 8815XXL4 Account: ARCO	🔔 (1)

11-20 of 92 10 | 25 | 50 | 100 | All

CHAPTER 7:

SECURITY MANAGEMENT

Telenium utilizes a variety of features for network security controls to protect your network from tampering.

MULTIPLE LEVELS OF ACCESS



Set appropriate access privileges for a wide array of users. Users can be configured for no access, read-only access, or read/write access to the database. Users with read/write access can be further limited to write privileges on specific fields only.

User Identification* <input type="checkbox"/> Enable all (*) <input checked="" type="checkbox"/> Training <input checked="" type="checkbox"/> Alarm Block <input checked="" type="checkbox"/> System Admin. <input checked="" type="checkbox"/> System Configurator <input checked="" type="checkbox"/> RCC Operator <input checked="" type="checkbox"/> DCP Operator <input checked="" type="checkbox"/> Security <input checked="" type="checkbox"/> Provisioner	User Task Activation* <input type="checkbox"/> Enable all (*) <input checked="" type="checkbox"/> DBM Read/Write Mode <input type="checkbox"/> DBM Read-Only Mode <input type="checkbox"/> Create/Edit DI Help <input checked="" type="checkbox"/> GED Access <input checked="" type="checkbox"/> GSM Access <input type="checkbox"/> Can Send Messages <input type="checkbox"/> Can Receive Messages <input checked="" type="checkbox"/> Future Use	Session Activation Rights* <input type="checkbox"/> Enable all (*) <input checked="" type="checkbox"/> Read-Only Access Allowed <input checked="" type="checkbox"/> Read/Write Access Allowed <input checked="" type="checkbox"/> GSM Audio Alarm Y=On <input checked="" type="checkbox"/> Create Service Permitted <input checked="" type="checkbox"/> Upload Files in TelOnline <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> Authentication Methods <input checked="" type="checkbox"/> Telenium Standard Allowed <input checked="" type="checkbox"/> LDAP Allowed <input checked="" type="checkbox"/> Server O/S Allowed <input checked="" type="checkbox"/> Windows Proxy Allowed </div>
Supervisor : <input style="width: 150px;" type="text"/> Home Phone : <input style="width: 150px;" type="text"/> Office Phone: <input style="width: 150px;" type="text"/>		

USER ACTIVITY TRACKING



All of a user's activity, such as logins, login failures, alarm acknowledgements, provisioning commands, system configuration changes, and rejected attempts to perform any actions outside the user's rights and privileges is tracked in the Telenium database and is held in the historical files of the database for reference and reporting.

The screenshot displays the 'Historical Reporter' application interface. On the left, there is a 'Fields' sidebar with a tree view containing categories like 'DB Login Failures', 'Alarms', 'DB Login Failures', 'DB Logins', 'DB Write Log', 'Notification Log', and 'PM Data'. Under 'DB Login Failures', several sub-items are checked: 'AuthMethod', 'RemoteAddr', and 'Error'. The main area shows a table of activity logs with columns: No, Time, Action, User, Client, Server, and Server App. The table contains 25 rows of data, all for the user 'TELENUMUSER' on 'primary2' servers. The actions include LOGIN, LOGOUT, and LOGOUT. At the bottom, there are filter controls showing 'Filters | Alarms 4 | DB Logins 1 | PM Data 1' and a status bar with '1 - 606 of 606 items'. The footer includes 'TELENUMUSER / telenium_sess_u0001 OK', '71QIH_1', and a timestamp 'Thu Dec 19 16:57:16 2013'.

No	Time	Action	User	Client	Server	Server App
1	06/19/2013 00:00:03	LOGIN	TELENUMUSER		primary2	watchdog_log
2	06/19/2013 00:00:03	LOGIN	TELENUMUSER		primary2	watchdog_log
3	06/19/2013 00:00:03	LOGIN	TELENUMUSER		primary2	hiscot_posfeetch
4	06/19/2013 00:00:03	LOGIN	TELENUMUSER		primary2	watchdog_log
5	06/19/2013 00:00:03	LOGOUT	TELENUMUSER		primary2	hiscot_posfeetch
6	06/19/2013 00:00:03	LOGIN	TELENUMUSER		primary2	watchdog_log
7	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
8	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
9	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
10	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
11	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
12	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
13	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
14	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
15	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	hiscot_posfeetch
16	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
17	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
18	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
19	06/19/2013 00:00:04	LOGOUT	TELENUMUSER		primary2	hiscot_posfeetch
20	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
21	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
22	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
23	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
24	06/19/2013 00:00:04	LOGIN	TELENUMUSER		primary2	watchdog_log
25	06/19/2013 00:00:04	LOGOUT	TELENUMUSER		primary2	watchdog_log

SECURE AUTHENTICATION



Telenium supports both the Lightweight Directory Access Protocol (LDAP) and the Remote Authentication Dial-In User Service (RADIUS) for authentication to the Telenium database. Additionally, a user account must be defined within the Telenium database to describe the rights and privileges any users have once they authenticate with the external LDAP and RADIUS servers.

The screenshot shows the login window for the Telenium Network Management System. The window title is "Log In - Telenium Network Management System". At the top, there is a "Server" dropdown menu set to "TELENIUM1". Below this is the Telenium Spectra logo. There are two tabs: "Log In" (selected) and "Advanced". The login form contains the following fields and controls:

- Username:** A text input field containing "teleniumuser".
- Password:** A password input field.
- Database:** A dropdown menu set to "MCT".
- Log In:** A button to submit the login information.

At the bottom of the window, there is a license notice: "This software is licensed and registered to: MegaSys Computer Technologies". The MegaSys logo and "Network Management Solutions" are also present in the bottom right corner.

NE PASSWORD MANAGER



From the Telenium network management suite, appropriately privileged users can add, delete and revise all accounts and passwords on network elements. NE Password Manager provides an intuitive interface for the creation of user-defined macros of the procedures required to change user names and passwords on even the most complex devices.

The screenshot displays the NE Password Manager interface within the Telenium Power Tools application. The window title is "DBS - Telenium Power Tools". The main menu includes "Spreadsheet Management", "Run Password Management", "Run SNMP Management", "Run Firmware Management", "Run Custom", and "Procedures". The "Run Password Management" tab is active, showing options like "Select all network elements", "Select only Failed/Not Validated network elements", and "Unselect all network elements". A list of network elements is displayed, with "BARRIE03X001" selected and its status "Passed". The "Accounts" section shows options for "Create Tech_manager4", "Create Maint9", "Delete Maint2", and "Modify admin". The "Network Element Terminal" window shows a "User Access Verification" process with a password prompt and a successful login for "admin".

Network Element	Status
BARRIE03X001	Passed
BELLEV01B002	Not Validated
BRAMP05T001	Not Validated
BRANT01X003	Not Validated
BURLIN01S008	Not Validated
CAMBR123H001	Not Validated
CORNW08G013	Not Validated
GRSUD04X002	Not Validated
GUELPH01B007	Not Validated
HAMILT03C001	Not Validated
HAMILT10R013	Not Validated
KINGST15U010	Not Validated
KITCHE07J003	Not Validated
LONDON08V009	Not Validated
MARKHA01Y001	Not Validated
MISSIS05P014	Not Validated
OTTAWA03N001	Not Validated
THUNDE01Z010	Not Validated
TORONTO9A003	Not Validated
TORONT10X001	Not Validated
TORONT11B004	Not Validated
WINDSOR5T002	Not Validated

```

User Access Verification
Password:
meg-cac2600:enable
Password:
meg-cac2600#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
meg-cac2600(config)#username admin password admin level [Level]
meg-cac2600(config)#exit
meg-cac2600#exit
  
```

Process Complete!

FIRMWARE COMPLIANCE REPORTING



NERC and CIP v5 require reporting of current firmware versions of network elements. Firmware Compliance Reporting provides the firmware status of devices, and also issues a non-compliance report based on a comparison of actual firmware versions to the acceptable firmware versions entered into the Telenium application.

The screenshot displays the 'DBS - Telenium Power Tools' application window. The 'Run Firmware Management' tab is active. The interface is divided into several sections:

- Run/Stop Controls:** Includes 'Run' and 'Stop' buttons, and checkboxes for 'Select all network elements', 'Select only Failed/Not Validated network elements', 'Unselect all network elements', 'Hide network elements without a valid profile', and 'Hide network elements without valid procedure(s)'.
- Evacuate/Select:** A list of network elements with their compliance status. BARRIE03X001 is highlighted in red and marked as 'Failed'. Other elements like BELLEV01B002, BRAMP05T001, etc., are marked as 'Not Validated'.
- Options:** A section for configuring the report.
- Firmware Details:** Shows 'Network Element: BARRIE03X001', 'Valid Firmware: 13.15',16.8', and 'Current Firmware: 12.2(8)'.
- Network Element Terminal:** A terminal window displaying the output of the 'meg-csc2600enable' command, including system version (12.2(15)T11), uptime (3 weeks, 4 days, 16 hours, 56 minutes), and hardware specifications (MPC860P processor, 32Mbit flash).
- Process Status:** A green progress bar at the bottom right indicates 'Process Complete!'.

SECURE VISIBILITY OF SHARED INFRASTRUCTURE



SECURE GATEWAY EXCHANGE (SGX)

SGX has been developed to provide secure visibility to shared network infrastructure. The owner of shared or leased facilities can grant trusted access to independent users of network components, allowing cooperating providers to better manage their networks with real-time network usage and performance information while maintaining the security and confidentiality of all participants without impacting the integrity of any of the individual intranets.

The screenshot displays the 'EMA - Telenium Power Tools' application window. The main interface is titled 'Secure Gateway Exchange' and is divided into several sections:

- Management Controls:** Includes 'Add' and 'Remove' dropdown menus, 'IP Address' (SGX01.megasys.com), 'Port' (2060), and buttons for 'Restart Subdriver', 'MegaSys Server Default Reset', and 'Refresh Network elements'.
- Manage Trusts:** Shows a list with 'MegaSys_B Accepted'.
- Configure Server:**
 - Network Elements:** A list containing 'AIR' and 'AIRDABOC3D01' (checked).
 - Share Selected Network Elements:** A button to share the selected elements.
 - Statistics:**
 - Name: MegaSys_B
 - Connection: Online
 - Status: Accepted
 - Remote system is licensed to received shares: Licensed
 - Queue Length (Outgoing): 0
 - Queue Length (Incoming): 0
 - Flow:** 'Sending to MegaSys_B (2)' and 'Receiving from MegaSys_B (1)'.
 - Table:**

Network Element	Queue Length (Outgoing)	
BANFABOC3D01	0	Remove
CALGABOC3D01	0	Remove

The Windows taskbar at the bottom shows the user 'TELENIUMUSER' and active windows for 'FQL1' and 'DBS'.

EXTERNAL PERIMETER SECURITY



Telenium External Perimeter Security records all MAC and IP addresses detected by IP-based network equipment. Referencing user-defined authorizations, EPS raises configurable events and alarms upon detection of new or recurring connecting entities. Information presented to the operators and to the historical files includes the IP address, MAC address, DNS reverse lookup, and even the manufacturer of the LAN card. Users can implement specialized actions on detection of these unauthorized accesses to include generating audible alarms, launching Advanced Logic Processing to initiate blocking of access, emailing details of the event to specific users or user groups, and generating SYSLOG messages to a security management system.

The screenshot shows a web-based interface for monitoring network events. The window title is "EPS FQL1/DBS - Alarm Chrono". The interface includes a menu bar (File, Edit, View, Tools, Help), a toolbar with various icons, and a filter dropdown set to "EPS". Below the toolbar is a row of colored buttons representing different sites: ATLNGA (red), SSTNMA (green), CHIGIL (green), CLGYAB (green), SSTNXY (green), RETTRA (green), SANFEA (green), SITLWA (green), TAMPEL (green), STRNTOX (green), VANCEE (green), and WINNMB (green). The main area contains a table with the following data:

Time/Date	Network Element	AID	Description	Condition	Site	Alarm Duration
04:39:05 15-APR-15	CLGYAB-ROUTER	ETH:1-3	Authorized Entity 04-22-4F-31-31-E2 - 10.75.1.3	Approved	CLGYAB	000-00:00:22
04:55:37 15-APR-15	ATLNGA-RADIO	ETH:4-1	Unauthorized Entity 24-77-03-4B-2E-E9 - 109.24.32.14	Detected	ATLNGA	000-00:01:05

At the bottom of the window, there is a status bar showing "FQL1 | TELENUMUSER | 2" on the left and "DBS" on the right.

CHAPTER 8: ADVANCED TELENUM FUNCTIONS

The screenshot displays the Telenium MegaSys Network Management Solutions interface. The main window is titled 'Home' and includes a navigation menu with options such as 'Search Telenium', 'Alarm List', 'Alphabetical List of Sites', 'Alphabetical List of Equipment', 'Alphabetical List of Customers', 'Retrieve Network Element Backup', and 'Upload File Manager'. Below the menu are buttons for 'Enter New Note', 'View Modifications', 'Home', and 'Back'. A 'You are logged' message is visible.

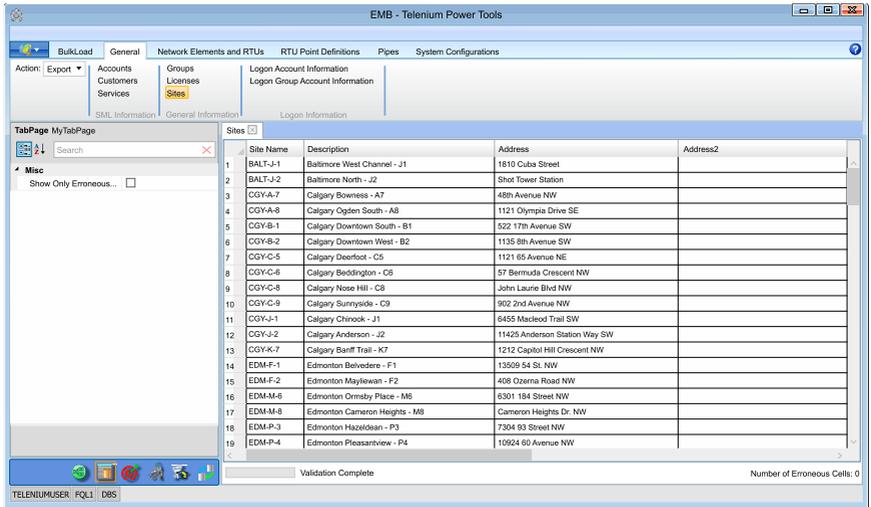
Overlaid on the main window is the 'System Configuration' window, which shows a network diagram with nodes and connections. A 'System Configuration' dialog box is also visible, showing a tree view of the configuration.

Another window, 'Network Element Backup Summary', displays a table of backup statistics for various network elements. The table has columns for 'Name', 'Last Backup Success', 'Backup Availability Last 30 Days', 'Backup Availability Last 60 Days', 'Backup Availability Last 90 Days', and 'Backup Availability Greater than 90 Days'. Below the table is a 3D bar chart titled 'Network Element Backup Summary' showing the distribution of backup success rates across different categories.

Name	Last Backup Success	Backup Availability Last 30 Days	Backup Availability Last 60 Days	Backup Availability Last 90 Days	Backup Availability Greater than 90 Days
1. HUB	100.00%	100.00%	100.00%	100.00%	100.00%
2. CS13000001	99.20%	99.88%	99.88%	99.14%	10.00%
3. CS13000002	96.00%	97.32%	97.32%	95.00%	0.00%
4. CS13000003	100.00%	100.00%	100.00%	100.00%	100.00%
5. CS13000004	99.20%	99.88%	99.88%	99.14%	10.00%
6. CS13000005	99.20%	99.88%	99.88%	99.14%	10.00%
7. CS13000006	99.20%	99.88%	99.88%	99.14%	10.00%
8. CS13000007	99.20%	99.88%	99.88%	99.14%	10.00%
9. CS13000008	99.20%	99.88%	99.88%	99.14%	10.00%
10. CS13000009	99.20%	99.88%	99.88%	99.14%	10.00%
11. CS13000010	99.20%	99.88%	99.88%	99.14%	10.00%
12. CS13000011	99.20%	99.88%	99.88%	99.14%	10.00%
13. CS13000012	99.20%	99.88%	99.88%	99.14%	10.00%
14. CS13000013	99.20%	99.88%	99.88%	99.14%	10.00%
15. CS13000014	99.20%	99.88%	99.88%	99.14%	10.00%
16. CS13000015	99.20%	99.88%	99.88%	99.14%	10.00%
17. CS13000016	99.20%	99.88%	99.88%	99.14%	10.00%
18. CS13000017	99.20%	99.88%	99.88%	99.14%	10.00%
19. CS13000018	99.20%	99.88%	99.88%	99.14%	10.00%
20. CS13000019	99.20%	99.88%	99.88%	99.14%	10.00%
21. CS13000020	99.20%	99.88%	99.88%	99.14%	10.00%
22. CS13000021	99.20%	99.88%	99.88%	99.14%	10.00%
23. CS13000022	99.20%	99.88%	99.88%	99.14%	10.00%
24. CS13000023	99.20%	99.88%	99.88%	99.14%	10.00%
25. CS13000024	99.20%	99.88%	99.88%	99.14%	10.00%
26. CS13000025	99.20%	99.88%	99.88%	99.14%	10.00%
27. CS13000026	99.20%	99.88%	99.88%	99.14%	10.00%
28. CS13000027	99.20%	99.88%	99.88%	99.14%	10.00%
29. CS13000028	99.20%	99.88%	99.88%	99.14%	10.00%
30. CS13000029	99.20%	99.88%	99.88%	99.14%	10.00%
31. CS13000030	99.20%	99.88%	99.88%	99.14%	10.00%
32. CS13000031	99.20%	99.88%	99.88%	99.14%	10.00%
33. CS13000032	99.20%	99.88%	99.88%	99.14%	10.00%
34. CS13000033	99.20%	99.88%	99.88%	99.14%	10.00%
35. CS13000034	99.20%	99.88%	99.88%	99.14%	10.00%
36. CS13000035	99.20%	99.88%	99.88%	99.14%	10.00%
37. CS13000036	99.20%	99.88%	99.88%	99.14%	10.00%
38. CS13000037	99.20%	99.88%	99.88%	99.14%	10.00%
39. CS13000038	99.20%	99.88%	99.88%	99.14%	10.00%
40. CS13000039	99.20%	99.88%	99.88%	99.14%	10.00%
41. CS13000040	99.20%	99.88%	99.88%	99.14%	10.00%
42. CS13000041	99.20%	99.88%	99.88%	99.14%	10.00%
43. CS13000042	99.20%	99.88%	99.88%	99.14%	10.00%
44. CS13000043	99.20%	99.88%	99.88%	99.14%	10.00%
45. CS13000044	99.20%	99.88%	99.88%	99.14%	10.00%
46. CS13000045	99.20%	99.88%	99.88%	99.14%	10.00%
47. CS13000046	99.20%	99.88%	99.88%	99.14%	10.00%
48. CS13000047	99.20%	99.88%	99.88%	99.14%	10.00%
49. CS13000048	99.20%	99.88%	99.88%	99.14%	10.00%
50. CS13000049	99.20%	99.88%	99.88%	99.14%	10.00%
51. CS13000050	99.20%	99.88%	99.88%	99.14%	10.00%
52. CS13000051	99.20%	99.88%	99.88%	99.14%	10.00%
53. CS13000052	99.20%	99.88%	99.88%	99.14%	10.00%
54. CS13000053	99.20%	99.88%	99.88%	99.14%	10.00%
55. CS13000054	99.20%	99.88%	99.88%	99.14%	10.00%
56. CS13000055	99.20%	99.88%	99.88%	99.14%	10.00%
57. CS13000056	99.20%	99.88%	99.88%	99.14%	10.00%
58. CS13000057	99.20%	99.88%	99.88%	99.14%	10.00%
59. CS13000058	99.20%	99.88%	99.88%	99.14%	10.00%
60. CS13000059	99.20%	99.88%	99.88%	99.14%	10.00%
61. CS13000060	99.20%	99.88%	99.88%	99.14%	10.00%
62. CS13000061	99.20%	99.88%	99.88%	99.14%	10.00%
63. CS13000062	99.20%	99.88%	99.88%	99.14%	10.00%
64. CS13000063	99.20%	99.88%	99.88%	99.14%	10.00%
65. CS13000064	99.20%	99.88%	99.88%	99.14%	10.00%
66. CS13000065	99.20%	99.88%	99.88%	99.14%	10.00%
67. CS13000066	99.20%	99.88%	99.88%	99.14%	10.00%
68. CS13000067	99.20%	99.88%	99.88%	99.14%	10.00%
69. CS13000068	99.20%	99.88%	99.88%	99.14%	10.00%
70. CS13000069	99.20%	99.88%	99.88%	99.14%	10.00%
71. CS13000070	99.20%	99.88%	99.88%	99.14%	10.00%
72. CS13000071	99.20%	99.88%	99.88%	99.14%	10.00%
73. CS13000072	99.20%	99.88%	99.88%	99.14%	10.00%
74. CS13000073	99.20%	99.88%	99.88%	99.14%	10.00%
75. CS13000074	99.20%	99.88%	99.88%	99.14%	10.00%
76. CS13000075	99.20%	99.88%	99.88%	99.14%	10.00%
77. CS13000076	99.20%	99.88%	99.88%	99.14%	10.00%
78. CS13000077	99.20%	99.88%	99.88%	99.14%	10.00%
79. CS13000078	99.20%	99.88%	99.88%	99.14%	10.00%
80. CS13000079	99.20%	99.88%	99.88%	99.14%	10.00%
81. CS13000080	99.20%	99.88%	99.88%	99.14%	10.00%
82. CS13000081	99.20%	99.88%	99.88%	99.14%	10.00%
83. CS13000082	99.20%	99.88%	99.88%	99.14%	10.00%
84. CS13000083	99.20%	99.88%	99.88%	99.14%	10.00%
85. CS13000084	99.20%	99.88%	99.88%	99.14%	10.00%
86. CS13000085	99.20%	99.88%	99.88%	99.14%	10.00%
87. CS13000086	99.20%	99.88%	99.88%	99.14%	10.00%
88. CS13000087	99.20%	99.88%	99.88%	99.14%	10.00%
89. CS13000088	99.20%	99.88%	99.88%	99.14%	10.00%
90. CS13000089	99.20%	99.88%	99.88%	99.14%	10.00%
91. CS13000090	99.20%	99.88%	99.88%	99.14%	10.00%
92. CS13000091	99.20%	99.88%	99.88%	99.14%	10.00%
93. CS13000092	99.20%	99.88%	99.88%	99.14%	10.00%
94. CS13000093	99.20%	99.88%	99.88%	99.14%	10.00%
95. CS13000094	99.20%	99.88%	99.88%	99.14%	10.00%
96. CS13000095	99.20%	99.88%	99.88%	99.14%	10.00%
97. CS13000096	99.20%	99.88%	99.88%	99.14%	10.00%
98. CS13000097	99.20%	99.88%	99.88%	99.14%	10.00%
99. CS13000098	99.20%	99.88%	99.88%	99.14%	10.00%
100. CS13000099	99.20%	99.88%	99.88%	99.14%	10.00%
101. CS13000100	99.20%	99.88%	99.88%	99.14%	10.00%
102. CS13000101	99.20%	99.88%	99.88%	99.14%	10.00%
103. CS13000102	99.20%	99.88%	99.88%	99.14%	10.00%
104. CS13000103	99.20%	99.88%	99.88%	99.14%	10.00%
105. CS13000104	99.20%	99.88%	99.88%	99.14%	10.00%
106. CS13000105	99.20%	99.88%	99.88%	99.14%	10.00%
107. CS13000106	99.20%	99.88%	99.88%	99.14%	10.00%
108. CS13000107	99.20%	99.88%	99.88%	99.14%	10.00%
109. CS13000108	99.20%	99.88%	99.88%	99.14%	10.00%
110. CS13000109	99.20%	99.88%	99.88%	99.14%	10.00%
111. CS13000110	99.20%	99.88%	99.88%	99.14%	10.00%
112. CS13000111	99.20%	99.88%	99.88%	99.14%	10.00%
113. CS13000112	99.20%	99.88%	99.88%	99.14%	10.00%
114. CS13000113	99.20%	99.88%	99.88%	99.14%	10.00%
115. CS13000114	99.20%	99.88%	99.88%	99.14%	10.00%
116. CS13000115	99.20%	99.88%	99.88%	99.14%	10.00%
117. CS13000116	99.20%	99.88%	99.88%	99.14%	10.00%
118. CS13000117	99.20%	99.88%	99.88%	99.14%	10.00%
119. CS13000118	99.20%	99.88%	99.88%	99.14%	10.00%
120. CS13000119	99.20%	99.88%	99.88%	99.14%	10.00%
121. CS13000120	99.20%	99.88%	99.88%	99.14%	10.00%
122. CS13000121	99.20%	99.88%	99.88%	99.14%	10.00%
123. CS13000122	99.20%	99.88%	99.88%	99.14%	10.00%
124. CS13000123	99.20%	99.88%	99.88%	99.14%	10.00%
125. CS13000124	99.20%	99.88%	99.88%	99.14%	10.00%
126. CS13000125	99.20%	99.88%	99.88%	99.14%	10.00%
127. CS13000126	99.20%	99.88%	99.88%	99.14%	10.00%
128. CS13000127	99.20%	99.88%	99.88%	99.14%	10.00%
129. CS13000128	99.20%	99.88%	99.88%	99.14%	10.00%
130. CS13000129	99.20%	99.88%	99.88%	99.14%	10.00%
131. CS13000130	99.20%	99.88%	99.88%	99.14%	10.00%
132. CS13000131	99.20%	99.88%	99.88%	99.14%	10.00%
133. CS13000132	99.20%	99.88%	99.88%	99.14%	10.00%
134. CS13000133	99.20%	99.88%	99.88%	99.14%	10.00%
135. CS13000134	99.20%	99.88%	99.88%	99.14%	10.00%
136. CS13000135	99.20%	99.88%	99.88%	99.14%	10.00%
137. CS13000136	99.20%	99.88%	99.88%	99.14%	10.00%
138. CS13000137	99.20%	99.88%	99.88%	99.14%	10.00%
139. CS13000138	99.20%	99.88%	99.88%	99.14%	10.00%
140. CS13000139	99.20%	99.88%	99.88%	99.14%	10.00%
141. CS13000140	99.20%	99.88%	99.88%	99.14%	10.00%
142. CS13000141	99.20%	99.88%	99.88%	99.14%	10.00%
143. CS13000142	99.20%	99.88%	99.88%	99.14%	10.00%
144. CS13000143	99.20%	99.88%	99.88%	99.14%	10.00%
145. CS13000144	99.20%	99.88%	99.88%	99.14%	10.00%
146. CS13000145	99.20%	99.88%	99.88%	99.14%	10.00%
147. CS13000146	99.20%	99.88%	99.88%	99.14%	10.00%
148. CS13000147	99.20%	99.88%	99.88%	99.14%	10.00%
149. CS13000148	99.20%	99.88%	99.88%	99.14%	10.00%
150. CS13000149	99.20%	99.88%	99.88%	99.14%	10.00%
151. CS13000150	99.20%	99.88%	99.88%	99.14%	10.00%
152. CS13000151	99.20%	99.88%	99.88%	99.14%	10.00%
153. CS13000152	99.20%	99.88%	99.88%	99.14%	10.00%
154. CS13000153	99.20%	99.88%	99.88%	99.14%	10.00%
155. CS13000154	99.20%	99.88%	99.88%	99.14%	10.00%
156. CS13000155	99.20%	99.88%	99.88%	99.14%	10.00%
157. CS13000156	99.20%	99.88%	99.88%	99.14%	10.00%
158. CS13000157	99.20%	99.88%	99.88%	99.14%	10.00%
159. CS13000158	99.20%	99.88%	99.88%	99.14%	10.00%
160. CS13000159	99.20%	99.88%	99.88%	99.14%	10.00%
161. CS13000160	99.20%	99.88%	99.88%	99.14%	10.00%
162. CS13000161	99.20%	99.88%	99.88%	99.14%	10.00%
163. CS13000162	99.20%	99.88%	99.88%	99.14%	10.00%
164. CS13000163	99.20%	99.88%	99.88%	99.14%	10.00%
165. CS13000164	99.20%	99.88%	99.88%	99.14%	10.00%
166. CS13000165	99.20%	99.88%	99.88%	99.14%	10.00%
167. CS13000166	99.20%	99.88%	99.88%	99.14%</	

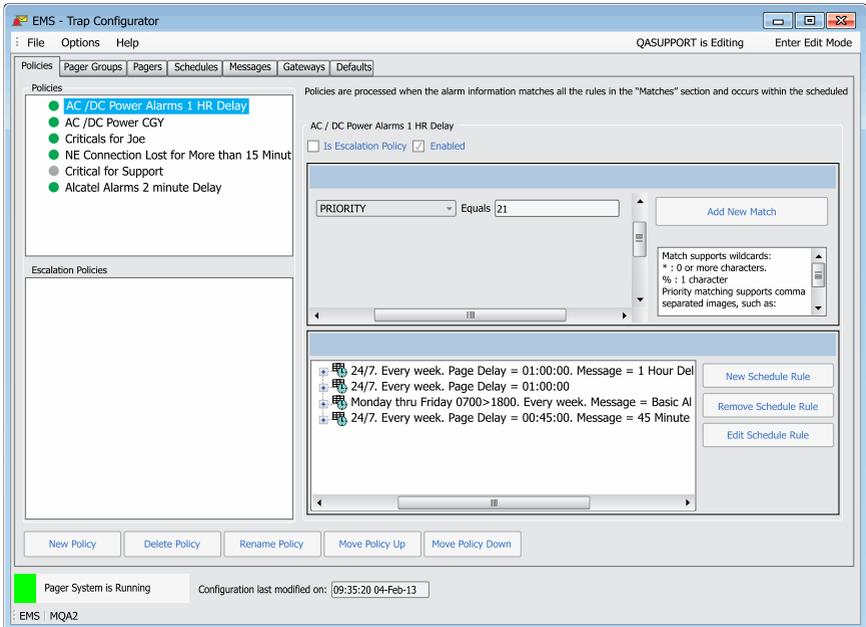
BULK IMPORT/EXPORT

Import and export network information in a database using Microsoft Excel spreadsheets. This configuration management feature also allows you to make backups of a database, see what information is contained within your database(s), and input new data into the database from one simple tool.



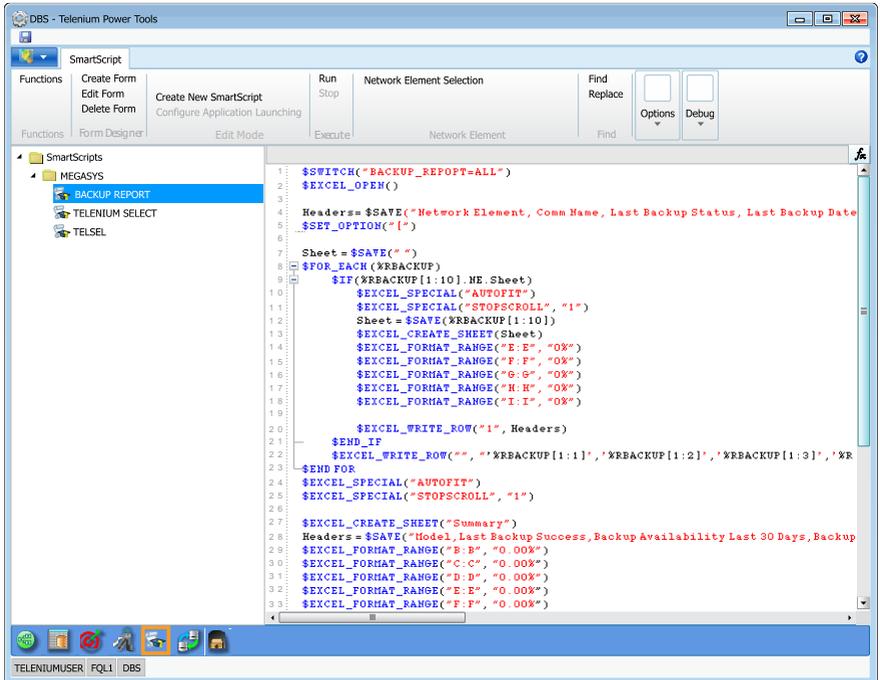
EMAIL AND ESCALATION MANAGER

Telenio will send email notifications to selected recipients. Emails and escalations are triggered by the occurrence of a configured policy based on specific alarm conditions.

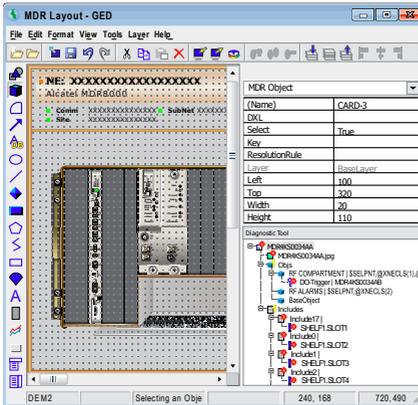


SMART SCRIPT MANAGER

Smart Script is the scripting language that interfaces with the Telenium database and with local and network applications such as Microsoft Excel, Access and SQL databases, enabling the user to write and execute complex queries and commands through a GUI interface.



GRAPHICAL EDITOR (GED)

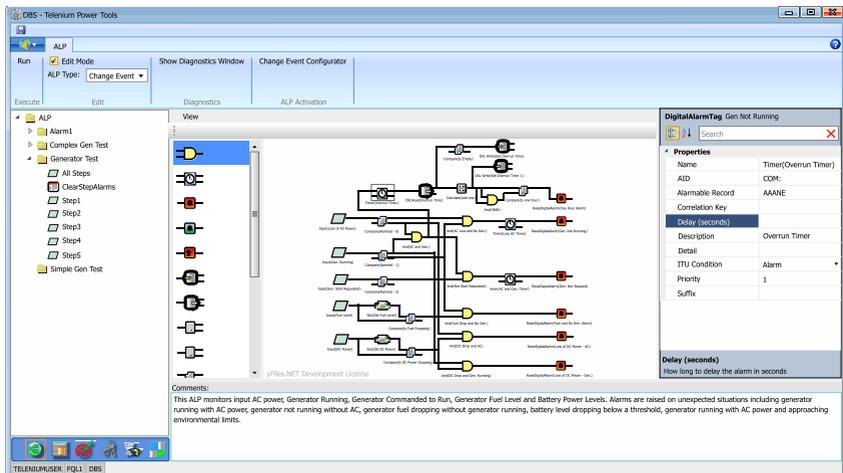


GED is a Telenium module that provides a development environment for creating maps and equipment displays, enabling users to create custom graphics based on their needs.

ADVANCED LOGIC PROCESSOR



Advanced Logic Processor is a new application to the Telenium suite that enables the designing of logic procedures (ALPs) that trigger based on any combination of events, including detection of alarms, changes to database fields, expiration of timers, and ON/OFF indicators. Activation of the ALP can generate alarms, modify database fields, execute scripts, or perform complex correlations.



TICKET MANAGER

Ticket Manager works with Alarm Chrono to provide dynamic ticket generation for network elements managed by the database. Create, edit, view, and report on alarms and trouble resolutions with Telenuim tickets.

The screenshot displays the 'MCT - Ticket Manager' application window. The main area contains a table of tickets with columns for Layout, Logon, Logon Group, Type, Number, State, Severity, Title, Assigned To, Created By, Created Date/Time, Closed By, and Closed Date/Time. A 'Create Ticket' dialog box is open in the foreground, showing fields for Type (FACILITYALARM), Title, Site, Network Element, Assignment (TELENIUMUSER), and Severity (High @ Low @ Medium @ Normal). The dialog also includes a 'Note' field and 'OK' and 'Cancel' buttons.

Layout	Logon	Logon Group	Type	Number	State	Severity	Title	Assigned To	Created By	Created Date/Time	Closed By	Closed Date/Time
GV13039			TMSALARM	TT000190	OPEN	High	ED422 - Comm. Failed	GIKONES	TELENIUMUSER	3/26/2016 6:53:12 AM		3/27/2016 6:53:12 AM
GV13173			TMSALARM	TT000188	OPEN	Normal	EQT4ADDDM-AN - Modern Ad Equipment	VWALTERS	TELENIUMUSER	3/24/2016 9:30:07 AM		3/25/2016 9:50:04 AM
GV15184			GENERIC	TT000187	CLOSED	High	Cisco Router	VWALTERS	TELENIUMUSER	3/23/2016 5:41:11 PM	VWALTERS	3/24/2016 5:01:01 PM
GV15242			GENERIC	TT000186	CLOSED	Normal	BC D51-1	AJANSON	TELENIUMUSER	3/23/2016 4:49:11 PM	AJANSON	3/24/2016 4:49:40 AM
GV15390			RELAXMETER	TT000185	CLOSED	High	Comm Major Alarm	DMARCY	TELENIUMUSER	3/23/2016 4:10:13 PM	DMARCY	3/24/2016 4:10:03 AM
GV16873			TMSALARM	TT000184	CLOSED	High	RTU LETH - Comm. Failed	DMARCY	TELENIUMUSER	3/23/2016 4:02:16 PM	DMARCY	3/24/2016 4:02:02 AM
GV16922			TMSALARM	TT000183	CLOSED	High	BUVI - Comm. Failed	AJANSON	TELENIUMUSER	3/23/2016 3:50:20 PM	AJANSON	3/24/2016 3:50:01 AM
GV17193			FIELDSUP	TT000182	OPEN	Normal	Bridge 14 CPX line S150 noise	AJANSON	TELENIUMUSER	3/19/2016 4:53:26 PM		3/20/2016 4:53:26 PM
GV18694			RTU	TT000181	CLOSED	Normal	RTU failure	BSMITH	TELENIUMUSER	3/19/2016 1:17:24 PM	BSMITH	3/20/2015 11:17:24 AM
GV19922			GENERIC	TT000180	OPEN	Normal	Fire Alarm System	AJANSON	TELENIUMUSER	3/19/2016 9:12:49 AM		3/18/2016 9:12:49 AM
GV20270			RTU	TT000179	CLOSED	Normal	RTU failure	DSHANON	TELENIUMUSER	3/15/2016 6:48:59 AM	DSHANON	3/14/2016 6:48:59 AM
GV20300			TMSALARM	TT000178	CLOSED	Normal	LTHBQSD3C301 - COM-SHELF - Loss of Timing Ref.	HWILKES	TELENIUMUSER	3/14/2016 1:30:44 PM	HWILKES	3/13/2016 1:30:44 PM
GV20348			SNSALARM	TT000177	CLOSED	Normal	GENDFLLS_CISCD1 - Pair2 - Rectifier Minor	AJANSON	TELENIUMUSER	3/13/2016 2:36:53 PM	AJANSON	3/12/2016 2:36:53 PM
GV22138			RTU	TT000175	OPEN	Normal	Switch RTU failure	AJANSON	TELENIUMUSER	3/10/2016 5:56:23 PM		3/9/2016 5:56:23 PM
GV24672			GENERIC	TT000174	CLOSED	Normal	Kensington West Line Microzone Failure	GIKONES	TELENIUMUSER	3/10/2016 8:34:52 PM	GIKONES	3/9/2016 8:34:52 PM
GV24961			TMSALARM	TT000173	OPEN	Normal	CONPOT1102 - EQPTNN - Storage System Failure	GIKONES	TELENIUMUSER	3/6/2016 1:51:40 PM		3/7/2016 1:51:40 PM
GV25949			TMSALARM	TT000172	CLOSED	Normal	EDTNWESTD801 - ENV-External Alarm	DSHANON	TELENIUMUSER	3/7/2016 10:54:30 AM	DSHANON	3/6/2016 10:54:30 AM
GV26478			TMSALARM	TT000171	CLOSED	Normal	HGRVRCOM01 - EQPT-EXTINPUT2 AC Power Failed	AJANSON	TELENIUMUSER	3/6/2016 3:57:57 PM	AJANSON	3/9/2016 3:57:57 PM
GV26591			GENERIC	TT000170	CLOSED	High	Partner Support 30pp	HWILKES	TELENIUMUSER	3/6/2016 9:55:03 AM	HWILKES	3/5/2016 9:56:01 AM
GV26923			GENERIC	TT000169	CLOSED	Normal	Glenmore Pipe Antenna	HWILKES	TELENIUMUSER	3/5/2016 8:27:53 AM	HWILKES	3/4/2016 8:27:53 AM
GV27784			RTU	TT000168	CLOSED	Normal	Summersville RTU failure	CSHAW	TELENIUMUSER	3/3/2016 12:28:53 PM	CSHAW	3/2/2016 12:28:53 PM
GV27859			TMSALARM	TT000167	CLOSED	Normal	8BIBORX01H09 - R4C3-INCAD	CSHAW	TELENIUMUSER	2/28/2016 5:26:53 PM	CSHAW	2/27/2016 5:26:53 PM
GV28154			TMSALARM	TT000176	CLOSED	Normal	LTHBQSD5C3 - EQPT-RAC30-1 - Bx path failure	HWILKES	TELENIUMUSER	2/28/2016 2:55:26 PM	HWILKES	2/27/2016 2:55:26 PM
GV29377			RELAXMETER	TT000174	OPEN	High	Bridglands/Memorial Relay Comm Alarm	CSHAW	TELENIUMUSER	2/27/2016 1:28:49 AM		2/26/2016 1:28:49 AM
GV31012			RELAXMETER	TT000173	CLOSED	Low	Burnaby	TELENIUMUSER				2/25/2016 1:28:49 AM
GV31099			TMSALARM	TT000172	CLOSED	Low	VICTOR485391 - OC3-1-L	TELENIUMUSER				2/24/2016 9:31:54 AM
GV31206			TMSALARM	TT000171	CLOSED	Normal	LTHBQ465001 - OC3-1-L	TELENIUMUSER				2/24/2016 3:38:12 AM
GV31485			TMSALARM	TT000171	CLOSED	Normal	LTHBQ465001 - OC3-1-L	TELENIUMUSER				2/24/2016 3:38:12 AM

DIAGNOSTIC AND RESOLUTION TOOL (DART)



DART is a suite of advanced Telenium tools designed to assist operators and technicians with detecting, diagnosing, and resolving network connectivity issues. DART also provides a real-time view of communication outages for NERC/CIP compliance to site isolation events and generates additional alarms should more than a specific percentage of network elements at a site become unreachable or unresponsive.

The screenshot displays the DART interface, which is divided into several sections:

- Site Status Dashboard:** A grid of colored boxes representing the status of various sites. Each box shows the site ID and a percentage of network elements that are unreachable or unresponsive.

Site ID	Percentage
BARRIE03X001	100.00%
BELLEVO1B002	100.00%
BRAMP05T001	100.00%
BRANTO1X003	12.50%
BURLIN01S008	1.15%
CAMBRI23H001	10.00%
CORNW08G013	100.00%
GRSUD04X002	100.00%
GUELPH01B007	11.11%
HAMILT03G001	50.00%
KITCHEO7J003	100.00%
- Site List:** A scrollable list of site IDs on the left side of the dashboard.
- Network Element Status Alarms:** A detailed view of alarms for a selected network element (mdu_cs001_01). It lists various alarm types and their current status.

Alarm Type	Status
Port 1 Communications	Restored
Port 2 Communications	Enabled
Network Element Communications	Restored
Network element Viability	Enabled
Port 1 Login Sequence	Success
Port 2 Login Sequence	Success
Uploads Abort/Cancelled	Cleared
Unprocessed Alarm Messages	Cleared
Alarm Sequence Error	Cleared
Database Change (DRMCG)	Cleared
Set Network Element Time	Success
License RAK not found	Cleared
Autodiscovery	Success
Network Element	Mounted
Software Download	Completed
Unprocessed PM Messages	Cleared
Upload Failure	Cleared
Processor Error (SSTP, SABB, SARB)	Cleared
Upload Failure (Timeout)	Cleared
Upload Failure (Wrong TID - IITA)	Cleared
Autodiscovery recommended (ADRs)	Cleared
Upload Failure (Master/Slave Port)	Cleared
NE Association is down (Normal)	Cleared
- COHM Status Alarms:** A section showing COHM (Communication Outage) status alarms.

Alarm Type	Status
Telenium Port B Physical Assignment	Alarm
Telenium Port B Physical Assignment	Normal
Telenium Port A Virtual Connection	Normal
Telenium Port B Virtual Connection	Normal
Network Element Autodiscover Reruning	Complete
- Network Element Details:** A window showing details for the selected network element, including IP addresses, ports, and status cards.
- Diagnosis:** A section with a ping count graph and a refresh button.

AUTO LOGON



Login to network elements' management interfaces via SSH, Telnet, http/https or even by launching the manufacturer's own application. User account and passwords are automatically passed to the management application and protected from the operator's view.

The screenshot displays the MCT - Telenum Power Tools application interface. The main window is titled "MCT - Telenum Power Tools" and contains several tabs: "Spreadsheet Management", "Run Password Management", "Run SNMP Management", "Run Firmware Management", "Run Custom", and "Procedures". The "Procedures" tab is active, showing a list of procedures on the left and configuration details on the right.

The configuration details for the "Auto Login - App" procedure include:

- Procedure Name: Auto Login - App
- Procedure Type: AutoLogin
- Procedure Protocol: Application
- Description: (empty)
- Port: 0
- Application Location: %userdirectories%\Users\Telenumuser\Desktop\NETSMART 500.lnk
- Window Name: NETSMART 500 Dashboard
- Test Environment: (empty)
- Network Element Name: (empty)
- Variable Name: (empty)
- Value: (empty)
- Username: (empty)
- Password: (empty)
- Buttons: Add Column, Remove Column

The "Routine" section shows a list of actions:

Action	Values
StartMacro	Height="525", Width="525"
Mouse	X="99", Y="64"
Mouse	X="118", Y="64"
Wait	Period="1"
Keyboard	Value="{EXIT}"
Keyboard	KeyCode="Tab", KeyValue="9"
Keyboard	Value="{TELENUMUSER}"
Keyboard	KeyCode="Tab", KeyValue="9"
Keyboard	Value="{TELENUMUSER}"
Keyboard	KeyCode="Tab", KeyValue="9"
Keyboard	Value="{EXIT}"
Keyboard	KeyCode="Tab", KeyValue="9"
Keyboard	Value="{%ipaddress%}"
Keyboard	KeyCode="Tab", KeyValue="9"
Keyboard	Value="{%port%}"
EndMacro	

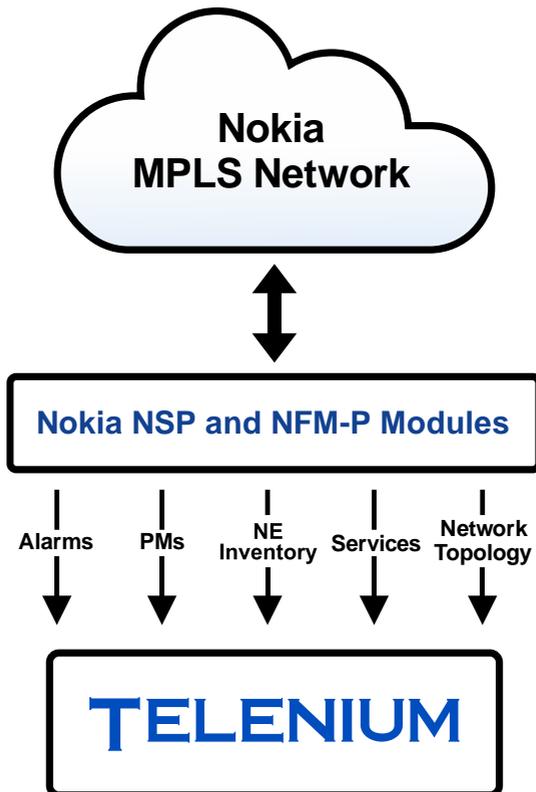
Buttons: Save, Save As, Cancel

An inset window titled "NETSMART 500 Dashboard" is shown, displaying the "NE Logon" dialog box. The dialog box contains the following fields:

- NE ID: CGYFW4100E5
- User ID: telenumuser
- Password: (masked with asterisks)
- Connection Mode: TCP/IP
- Connection Settings:
 - IP Address: 10.1.1.23
 - Port: 23
- Buttons: Logon, Close

TELENIO NOKIA NSP/NFM-P INTERFACE AND SUBDRIVER

The Telenio Nokia NSP/NFM-P application is an interface developed with cooperation from Nokia to provide Nokia equipment representations within the Telenio database using the NSP Rest Interface. The Telenio database is populated with current values from the NFM-P solution, including network elements, pipes, services, PM data, and alarms. New devices are automatically created in Telenio, ensuring up-to-date representation of the network and reducing Telenio Administrator efforts. Dynamic changes in MPLS network traffic flow are recorded in Telenio, ensuring an accurate depiction in Telenio of the current state of your Nokia network.



CHAPTER 9:

EXPERIENCE THE TELENUM ADVANTAGE

Telenium offers a comprehensive solution to organizations that demand a flexible, scalable, and reliable network management system.

SUPERIOR SERVICE MANAGEMENT

Telenium automatically determines how your circuits are routed through your network. Having a real-time accurate view of the circuit routing provides a significant cost and service advantage.

Alarms are automatically correlated to circuits, facilities, and customers; services and accounts are interrelated with customers; and all services are linked and displayed on the appropriate equipment and facilities.

The Telenium Traffic Manager can also assist with the design of new circuits by locating available bandwidth based on the circuit requirements.

SYSTEM SCALABILITY

Telenio will continue to deliver comprehensive network surveillance, configuration, and management as your system grows. National and international telecommunications networks with tens of thousands of managed devices use the same baseline Telenio software as smaller regional installations.

PRODUCT VERSATILITY

Telenio is fully configurable to address the specific requirements of your business processes and your users. Menus, alarm colors, graphics screens, alarm priorities, user privileges, notification escalations, and many other features are completely customizable to suit your network management processes.

MULTI-VENDOR COMPATIBILITY

Telenio supports a broad range of network element vendors, devices, and protocols. We are continually adding to our inventory of supported network elements to fulfill our customers' requirements.

3COM	AT&T	Cerent
4RF Communications	Austron	Ceterus
Accedian	Avaya	Charles Industries
Acme Packet	Aviat	Ciena
ADC Telecommunications	Avttec	Cisco
ADTRAN, Inc.	Badger	CNT
ADVA	Bard	Coastcom
Advantech Wireless	Bay Networks	Compatible Systems Corp
Airspan	Bayly	COMSAT
Alcatel	Best Power	Comtech
Alcatel/Lucent	Bestlink	Cordell
Alcatel/Newbridge	Brocade	Coriant
Allied Telesyn	BTI Systems	Corvis
Alpha Technologies	C&D Technologies	CXR Larus
AMETEK	Cabletron Systems	Cyan
APC	CalAmp	Dantel
Apcon	Calient	Datum
Appian Communications	Calix	Dedicated Networks Partners
Applied Innovation Inc.	Cambium Networks	DELL
Argus	Carrier Access	Digi
Asentria	Ceragon	Digital Link

Digital Solar Technologies	Lortec	RADwin
DMC Stratex	Lucent	Radyne
DPS Telecom	Lumentum	RBNI
DSC	MAHI	Redback
Dymec-Dynastar	Marconi	Redline
Eastern Research Inc.	MetaSwitch	RFL
Eaton	Metro-Optix	Rockwell
ECI Tel	Microwave Data Systems	RuggedCom
EFDATA	Microwave Networks	Safetran
Ekinops	Milgo	SEL
Electrospace	Mitsubishi	Sensatronics
Eltel-Valere	Moseley	Sensus
Emerson Networks	Motorola	Sentinel
Encore	Movaz	ServerTech
Ericsson	MRV	Servo
ETS	Multitech	Sherrex
Exalt	NEC	Siemens
EXFO	Netgear	Silver Spring Networks
Extreme Networks	Nicad	SixNET
Fial	NICE	Sorrento
Fore	Nokia	Spectrum
Fujitsu	Noran Tel	Sycamore Networks
GarrettCom	Nortel	Symmetricom
GE	Occam	Tadiran ECI
Generix	Ocular Networks	Tait Communications
GRC	Omnitron	TC Communications
Haliplex	Omnitronics	Technostrobe
Harris	OneAC	Tekron
IBM	ONI Systems	Telco Systems
Infinera	Optelian	Telect
Intelect	Optisphere	Telectronic
ION Networks	Oscilloquartz	Telica
Ipitek	OSICOM	Tellabs
IRIS	Perle	Telmar
ITL	Phoenix Broadband	Timeplex
JPS Communications	Pirelli	Transmode
Juniper Networks	PowerAgent	Turin Networks
Landis+Gyr	PowerTrunk	Varian
Larscom	Premisys	Voyant
Larus	Proxim Wireless	Westronic
LightPointe	Puregas	Xel Communications, Inc
Lineage Power	Racal	Zhone Technologies
Loop Telecom	RAD Data Communications	

Don't see your network element manufacturer on our list?

Contact us at (403) 295-0511 or sales@megasys.com as we are continually adding supported vendors to the Telenium suite.

RELIABILITY

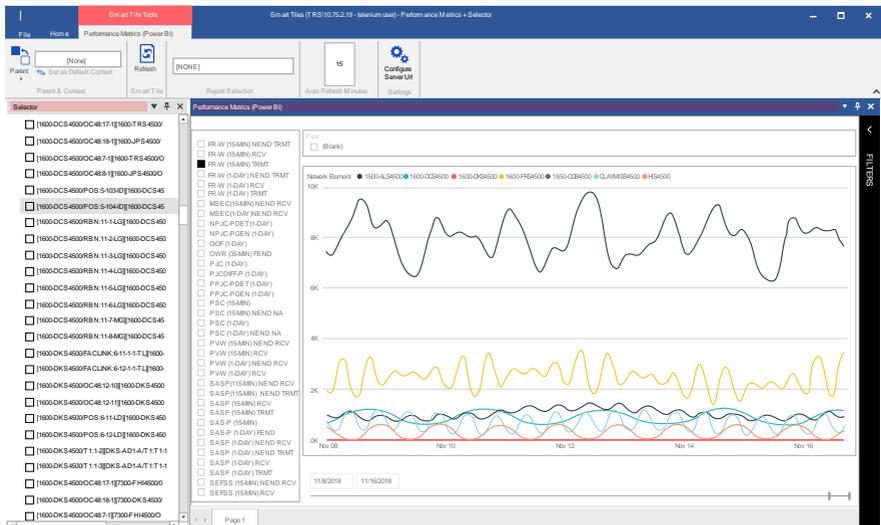
In network management, reliability is vital. Telenium addresses this requirement by implementing numerous strategies:

- Appliances are configured with hardware fault tolerance including RAIDed disks and redundant hot-swappable power supplies.
- The Telenium software monitors the appliance for disk errors and excessive system loading.
- The integrated Telenium watchdog ensures all key Telenium applications are operating properly.
- Escalation of alarms ensures round-the-clock management of your network, and quality of service configuration and reporting identifies potential issues with service level agreement commitments.
- Critical geographical fault tolerance is achieved with Telenium's database synchronization. All cooperating Telenium appliances are always current, and in the case of a malfunction, failover and subsequent resynchronization is automatically achieved.

TELENIUM PERFORMANCE METRICS

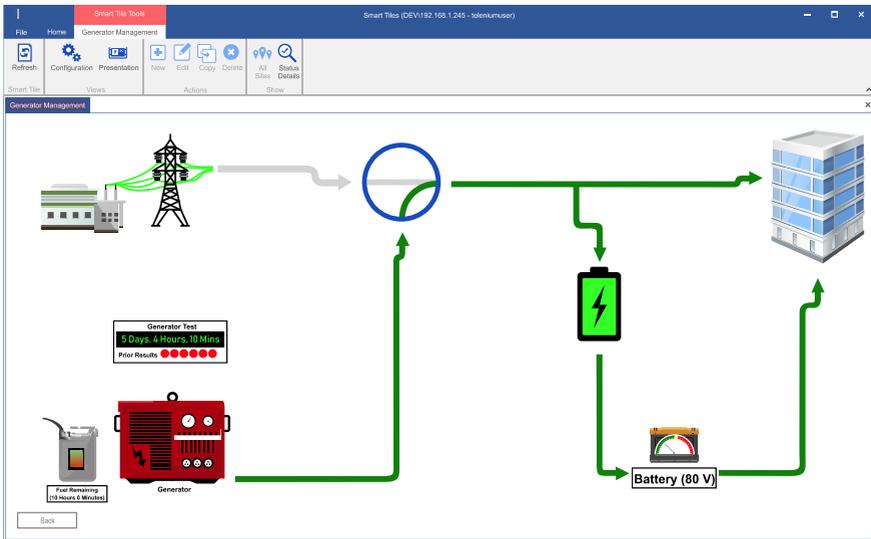
The utility industry is requiring increasingly high network performance and quality of service. Telenium collects performance data and defined KPIs from multiple vendor devices across the network and stores the information in a format that can be digested by analytics engines for the consumption of IT, OT, corporate users, and other utility stakeholders. Error rates, receive signal levels, latency, jitter, network availability: these statistics and more are used for strategic network management, SLA compliance, and network diagnostics.

Telenium Power PM offers configurable alarm thresholds to ensure that performance data outside acceptable ranges alert the appropriate operations centers for proactive diagnosis and resolution of potential network issues or to alert when service level agreement parameters are approaching.



TELENIO GENERATOR MANAGEMENT

The Telenio Generator Management Smart Tile has been developed to profile and manage all the various components related to site power availability. This includes profiling the generator, fuel source, transfer switch, and battery chargers as well as DC power plant and AC power availability. This profiling technology allows the Telenio system to proactively monitor weekly generator testing, determine fuel availability, and validate that the entire power recovery components are working as required.



Sophisticated logic processes analyze all available data along with operator provided information to generate alarms in the Telenium dashboard for any number of events including:

- Generator running with no AC power failure outside of the gen-test period.
- Generator fuel levels and calculation of run-time remaining.
- Fuel levels declining unexpectedly such as when the generator is not running.
- Failed weekly generator tests such as a test that did not run, ran too short, or ran too long.
- Battery chargers not showing that the battery array is in a charge mode rather than a discharge mode.
- Transfer switches not switching to the generator when AC power is lost and the generator is running.
- Automatic RICE report generation.

History of all power related system events is maintained in the Telenium database for post analysis and historical analysis requirements.

MULTIPLE LANGUAGE SUPPORT

The Telenium system supports 8 bit Unicode Transformation Format data encoding so that information can be stored and displayed in multiple languages.

EXTENDED SUPPORT

MegaSys offers a variety of Telenium Extended Support Services (ESS) options that provide long-term sustainability and enhance the operation of the Telenium system. ESS benefits include:

- Software Upgrades – All licensed product upgrades including access to multiple versions of your network element models and the latest Telenium suite.
- Telenium LAB License – ESS subscribers can assess and test any Telenium product in a non-production environment.
- Documentation – MegaSys provides extensive documentation and computer-based training describing how to use and manage your Telenium system. This information is available in both hard copy and online formats.
- Technical Support – Our skilled support MegaSys staff is available to assist you with mission critical problems 24 hours a day. Trouble tickets can be submitted via e-mail, fax, phone, or our web based trouble ticketing system.
- Web Support – Access the latest software and documentation updates from our web support page. You can also enter or review current and past trouble tickets.

Contact us today to discover how you can experience the Telenium advantage.

**E-mail general.inquiries@megasys.com,
or reach us by phone at (403) 295-0511.**

