An Element Manager Software (EMS) manages one or more of a specific type of telecommunications network element (NE), for example a Router, Switch, Blade Server etc.

The commercial success of the EMS depends upon its superior element management functionality such as fault, configuration, accounting, performance, and security (FCAPS) for the managed device, in realistic environments. This involves effective testing of the EMS in real world conditions with the specific device type. However, in real life, the building and testing of an EMS involves the following challenges.

Challenges in Building and Testing EMS

• More often, the developers who design and program the device-management application and the quality-assurance personnel rely on a new device that is under development. Hence the actual device is not available for testing.
• Expensive third-party equipment must be purchased and the time to research, purchase and install the equipment consumes human resources and delays the time-to-market.
• Negative conditions and critical test scenarios such as device failures and agent crashes happen very infrequently and are hard to recreate.
• Trained people with technical expertise and knowledge on the technologies it supports are required in handling the specific device types.

Simulation Toolkit Solution

The solution is sophisticated simulation tools that shorten time-to-market while assuring EMS functionality. See how the in-built features in Simulation Toolkit can assure the required functionality to the EMS and at the same time shorten the time-to-market.

• In-built library of pre-configured devices like host, printers, cisco series routers and switches substitute the actual devices. The simulated devices contain realistic data of the specific device types and provide the required knowledge in designing a successful EMS. The devices support SNMP, TL1, TFTP and FTP protocols.
• The simulator precisely mirrors the MIB object values of both standard and device specific MIBs. To experiment with changes in the device values, any variation on this basic simulation can be easily created by configuring MIB values from the UI or through scripts.
• To duplicate any existing device in the network, the agent recorder can record the real SNMP devices. The recorded device provides testing needs during development. The recorded configuration can also be suitably modified to re-create problems or test configuration variations.
• To test the performance monitoring capabilities of the EMS, device values like CPU, Memory, Disk utilization, device interface traffic etc. can be made to vary or remain constant based on the simulation types configured. Simulation Toolkit supports Constant, Random, Linear, Wave, Exponential, Sine Wave simulation types based on the node syntax.
Simulation Toolkit in building and testing EMS

- Critical test scenarios can be setup using powerful script API to confirm that the EMS will perform the required functionality in all scenarios. For example, schedule network state that change SNMP variables, make addition and deletion to SNMP table rows dynamically for provisioning, change read-only and read-write variables, update node values, change interface status, start and shutdown devices etc. These simulations can be enabled dynamically without disrupting the simulation process.

- Trap Simulation feature enables testing the Fault Management functionality of the EMS like alarm handling, trouble-detection and correction. Configuration of SNMP traps with varbinds can be customized to be sent at different scenarios on a daily or periodical basis, at the specified time. For example, send link up/link down traps to update the interface status, send cold start/warm start traps at agent start up etc. Trap Recording wizard can record and replay SNMPv1 and v2c traps sent by real devices.

- Trap Storms can be generated to validate the effective load handling of the EMS for receiving any number of traps at the specified time interval or at the burst mode.
- SNMP request and response SNMP PDU can be customized to send garbled/invalid responses for testing the device managers’ robustness in the event of receiving bad packets. Error responses can be configured from the UI or through scripts.
- Negative conditions like device failures, agent crashes, delay in SNMP responses, make agents stop responding to SNMP requests etc. can be setup using powerful script APIs to verify if the EMS is capable of reacting to dynamic negative changes in the network device.

Key Benefits

Reduced capital cost

Simulation Toolkit allow EMS developers to design and test against virtual hardware. Since there is no need to buy expensive equipment and setup a lab, simulators reduce the initial capital costs of the equipment and lab. Less equipment also means less infrastructure and support professionals.

High Quality EMS

Testing the EMS applications in simulated network environments gives the developers an accurate appraisal of the software and confirm that the software will perform the required functionality in all scenarios. Simulators allow them to play "what if" games with their configuration to make sure the application can hold up firm against all positive and negative conditions. This results in a high quality EMS which eliminates post deployment troubleshooting, reduces calls to customer support and optimizes the end-user experience.

Shortened Time-to-market

Simulated devices substitutes for the actual hardware product being developed. Instead of waiting for the new device to exercise specialized functionality, the developers and testing departments can use the device simulations. This allows EMS development to progress concurrently with hardware development and shortens the time-to-market.