NetHarmonix as an OEM Component

NetHarmonix (NHX) technology and design make it well suited for integrated and stand-alone OEM applications. The key problem NHX technology solves is to close the gaps between operations and the network, and among multiple technology domains. NHX core element is a soft programmable logic device that can be configured to fulfill many functions. Designed like firmware, this technology gives NHX a significant advantage in interfacing with and assimilating network devices and providing sophisticated element management functionality. It can ensure that OSS and EMS software are never the limiting factor in an equipment sale.

As an OEM component, NHX can play several potential roles. The technology is suitable for application as an on-board device agent, as part or all of an EMS platform, and for various end-to-end OSS solutions. Some examples of OEM applications for NetHarmonix include:

- Complete multi-vendor EMS and/or inter-domain manager
- Protocol translation component for EMS interfaces (TL1 to SNMP for example)
- On-board, multi-protocol, intelligent network device agent
- Multi-vendor discovery, provisioning, capacity, and event management suite
- Multi-technology flow-through provisioning solution
- Topology management and visualization application

NetHarmonix Technology Assimilation and Management

NHX can assimilate, support, and manage new technologies at least 400 percent faster than its closest competition, with far less effort and cost. The level of network and device detail NHX is able to discover is far more granular and complete than its competitors, who are often unable to discover or leverage highly specific device features or understand where a device resides in a multi-technology network. What gives NHX its advantages are its loader and builder technologies.

Loaders

Loaders provide a standardized means of accessing many different network elements. There are three elements that fall into the loader category: loaders, listeners, and provisioners. Each of these will have direct access to network functionality, connecting to an EMS, a database, or directly to a device.

Loaders allow NHX to read information off of a device regarding its state, configuration, and capabilities. Listeners listen for network events, and are designed to support fault, performance, and event management capabilities. Provisioners enable southbound communications to devices, allowing for capabilities such as activation and flow-through provisioning. Any of these elements can be programmed in precise ways, or can utilize defined rules, to fulfill specific and sophisticated requirements

Builders

The builders are the basis for modeling and correlating information in and about the network. The builder reads a standard meta-representation of each specific device presented to it by each device loader. This meta-representation allows a builder to look at similar devices from different vendors in a consistent way. The builder can then read and populate each device's information into the NHX unified physical-logical-topological network model, which is based on CIM, TINA-C, and ITU G.805. In this process loaders do not eliminate device- or vendor-specific data attributes or functionality. In the end, the device is fully manageable as the manufacturer intended.

NetHarmonix Unified Network Model

NHX application capabilities are drawn largely from their ability to model networks. As NHX constructs its in-memory management information model through its discovery capabilities, it identifies and describes the physical-to-logical-to-topological relationships and interdependencies in the network. NHX can see the specific capabilities and configuration of each network device, visualize where it resides in the network's topology, and understand how they connect and where capacity is available.

NHX uses a model based on ITU G.805 and TINA-C to represent network topology and a CIM-like model to specify physical and logical network components. NHX can then describe and characterize any discovered object using meta-data. Meta-data descriptions allow NHX to define:

- Managed object states and attributes
- Managed object events that an object instance can receive, process, and emit;
- Business objects for performance, fault, capacity, accounting and security computations

The ability to build technology-independent class models allows NHX to use object instance classes and object relationship definitions like "supported by", "is connected to", and "affected by." This allows the platform to understand relationships within the network, inherently correlate events that change the state of the network, and associated network components that offer a "class of service" and/or deliver a specific service.

In the end, the information model provides a source for visualizing devices, networks, sub-networks, all of the interconnections, how they correlate, and how they impact the services running over them. This understanding of the network, coupled with the network interfacing capabilities of NH' loader technologies, enables a broad range of functional OSS applications.

Computational Engines for Application Functionality

NHX provides sets of computational engines that provide specific OSS functionality. These engines utilize NHX core loader, builder, and unified model technologies and the information they capture and maintain. NHX computational engines are designed for a range of point or end-to-end solutions. Examples of NetHarmonix OSS applications include:

- Multi-vendor network and service discovery and reconciliation
- Topology visualization and management
- Network event correlation and root-cause analysis
- Flow-through provisioning for dynamic services on any underlying technology
- High volume provisioning engine for circuit turn-up and managed services
- Mobile data content provisioning and service management
- Capacity management and planning

Integration with other OSSs

NHX plays well with other OSS applications and network systems. It is designed as an open system and employs robust XML interfaces to provide for its data exchanges. The ability to provide protocol translation and to map disparate technologies together gives the NHX platform an inherent ability to excel in heterogeneous network and operational environments. NHX is capable of running on multiple operating systems including variants of both Unix and Linux, and can be deployed in a scaleable way using many different architectural and distribution approaches.