



NNM 8i

Let's Get Down to Brass Tacks, How Much For the Ape?

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and Pankaj Shah, Gambit Communications
HP Software Universe, June 17th, 2008
Las Vegas, Nevada

Session Topics

- NNM 8i product roadmap and positioning
- Requirements
- Migration Considerations
- Product Architecture with details on:
 - Spiral Discovery
 - Network State Polling
 - Event Pipeline and Incidents
 - Causal Engine
 - Continuous Spiral Discovery
 - Performance SPI Features
 - Databases
- Assorted tips and tricks from the field
- MIMIC SNMP Simulator – NNM 8i migration tool
- Backup Slides

NNM 8i:

- Level 3 topology view

http://192.9.200.91 - HP Network Node Manager : santana2.gambitcomm.com - Mozilla Firefox

HP Network Node Manager

User Name : system
User Role : Administrator

File Tools Actions Help

Workspaces

Incidents
Monitoring
Troubleshooting

Layer 2 Neighbor View
Layer 3 Neighbor View
Path View

Layer 3 Neighbor View

Node or IP: 45.0.0.1 Number of Hops: 7

Quick View [Pinned]

MIMIC_sim5

Status: Normal
Hostname: 45.2.30.1
Management Address: 45.2.30.1
Node Management Mode: Managed
System Name: MIMIC_sim5
System Contact: eNet NOC
System Location: www.gambitcomm.com
Device Profile: extremeAlpine3804
Device Category: Switch
System Description: Alpine3804 - Version 6.2.1 (Build 20) by Release_Master 02/26/02 9:39:24
Status Last Modified: February 26, 2008 1:11:27 PM EST

MIMIC_sim26 MIMIC_sim6
MIMIC_sim27
45.2.0.0/16
MIMIC_sim25
MIMIC_sim1
45.2.30.1
MIMIC_sim5
MIMIC_sim22
MIMIC_sim23
MIMIC_sim24
MIMIC_sim14
MIMIC_sim18
MIMIC_sim21
MIMIC_sim11
MIMIC_sim7
MIMIC_sim9
sim28
MIMIC_sim4
45.121.20.0/24
MIMIC_sim8

21 Map Nodes

February 27, 2008 11:15:21 AM EST

Done

start /c:/cydrive/c... c:\Apps\Mi... C:\Apps\j... Microsoft E... gandalf - R... Firefox 11:20 AM

NNM 8i History

- NNMi 8.00 released 11/22/2007
 - Support for Windows and HP-UX only
 - NNMi 8.0 provided to existing NNM SE/AE customers on support free of charge
 - Entitlement for parallel deployment alongside NNM 7.x
- NNMi 8.01 released 2/13/2008
 - Support for Solaris, Linux added
 - NNM iSPI for Performance Support
 - *Many* feature enhancements over 8.00 (see relNotes)

Requirements

- **Windows**

- Windows Server 2003 Enterprise x64 w/ SP2 or R2
- Intel or AMD - Itanium Processor Family (IPF) **not** supported
- Windows 32-bit operating systems **not** supported
- Microsoft SNMP

- **HP-UX**

- HP-UX 11iv3 (11.23) IPF
- Mozilla Firefox 2.0.0.4 or later
- Embedded database (postgres) or remote Oracle 10.0.2.0
- Prerequisite OS & JAVA patches

- **Solaris**

- 2.10 SPARC, intel architecture not supported

- **Linux**

- RedHat Enterprise Server AS 4.0 or ES 4.0
- 64-bit libstdc++ library dependencies

- **All**

- Embedded database (postgres) local or remote Oracle 10.2.0.x
- Client browsers: IE 7.0.5730.11+ OR Mozilla Firefox 2.0.0.11+ (IE 6, Safari no good)

NNM 8i vs 7.x

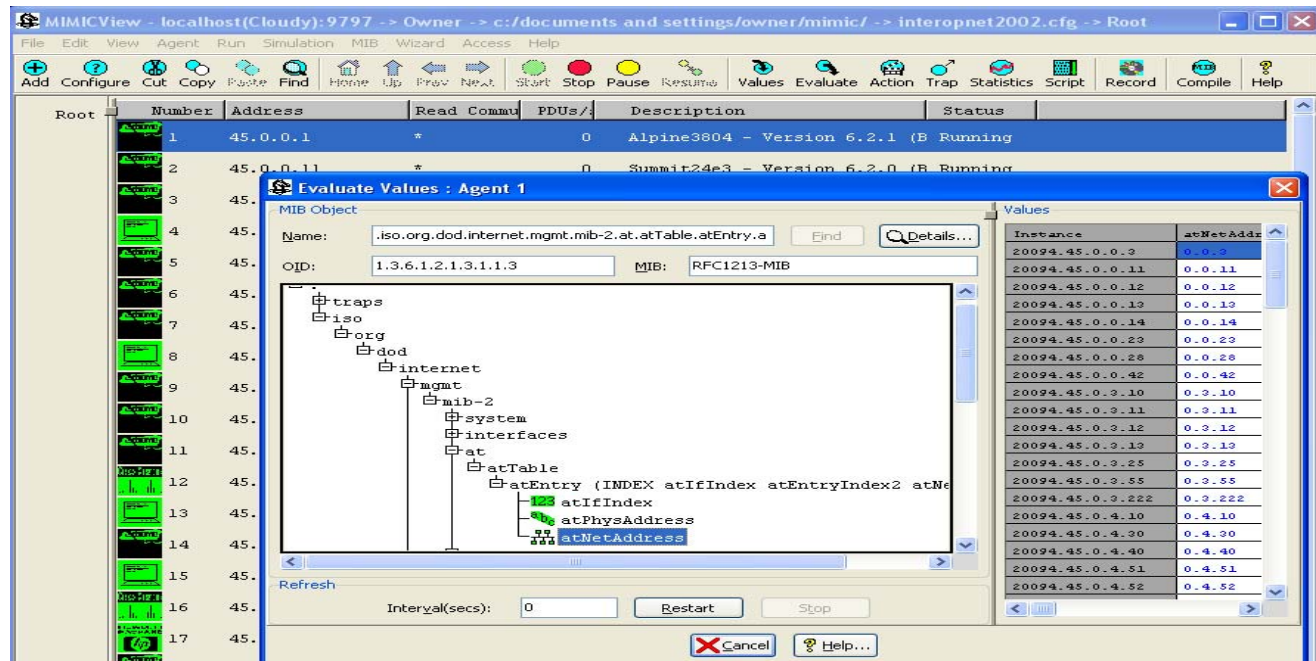
- NNM V1 through 7.x is OSI Level 3-centric
- NNM 8i is OSI Level 2-centric
- 8i is supported only on 64-bit hardware and OS
- Gone in 8i:
 - ipmap, ovw map, topology & object dbs
 - *netmon* and APA (7.x APA \neq 8i APA)
 - All *xnm** apps (mib browser, etc)
 - *snmpCollect* and reporting database
 - ECS-based event correlation (composer, manager)
- Retained in 8i:
 - Extended topology
 - Not all views available in 8.00, however
 - ovspmd
 - pmd (and ov_event subsystem)
 - Allows events to be forwarded to/from legacy nnm

```
C:\>ovstatus -c
Name
OUspMD
pmd
nnmtrapd
ovjboss
nmsdbmgr
ovet_dhhelpserv
ovet_dhshmp
ovet_discoA
ovet_discoC
ovet_bridge
ovet_daAlctelSw
ovet_daAlcTimSw
ovet_daAvayaSw
ovet_daBaySSw
ovet_daCDP
ovet_daCentSw
ovet_daCiscoSwS
ovet_daDetails
ovet_daEDP
ovet_daENDP
ovet_daEntSw
ovet_daExtSw
ovet_daFDP
ovet_daFoundrySw
ovet_daHwSw
ovet_daILMI
ovet_daIfDetail
ovet_daMcnAtm
ovet_daMcnLan
ovet_daNDP
ovet_daPassSw
ovet_daProSw
ovet_daProSwStkPP
ovet_daRstoneSw
ovet_daStdSw
ovet_daSS3ComSw
```

NNM 8i vs 7.x

- 8i features to come?

- Container and other ET views
- Configuration entry points (causal engine, etc)
- Distributed Poller, Syslog feature
- Command line fault analysis tools (rnetstat, netcheck, natping...)
- SNMP MIB Browser - MIMIC simulated agent MIB Browser:



6/7 – 8i Migration paths

- No upgrade direct migrations supported in 8.00
- HP recommends separate install/side by side evaluation
- HP plans to support 7.x at least through 2008
- Expect additional point versions of 7.x in '08
- “Migration tools to come”
 - Discovery options
 - SNMP configuration
 - SNMP events
 - Network polling
 - Device/Interface filters
 - Tools to migrate from 6.x/7.x

Architecture

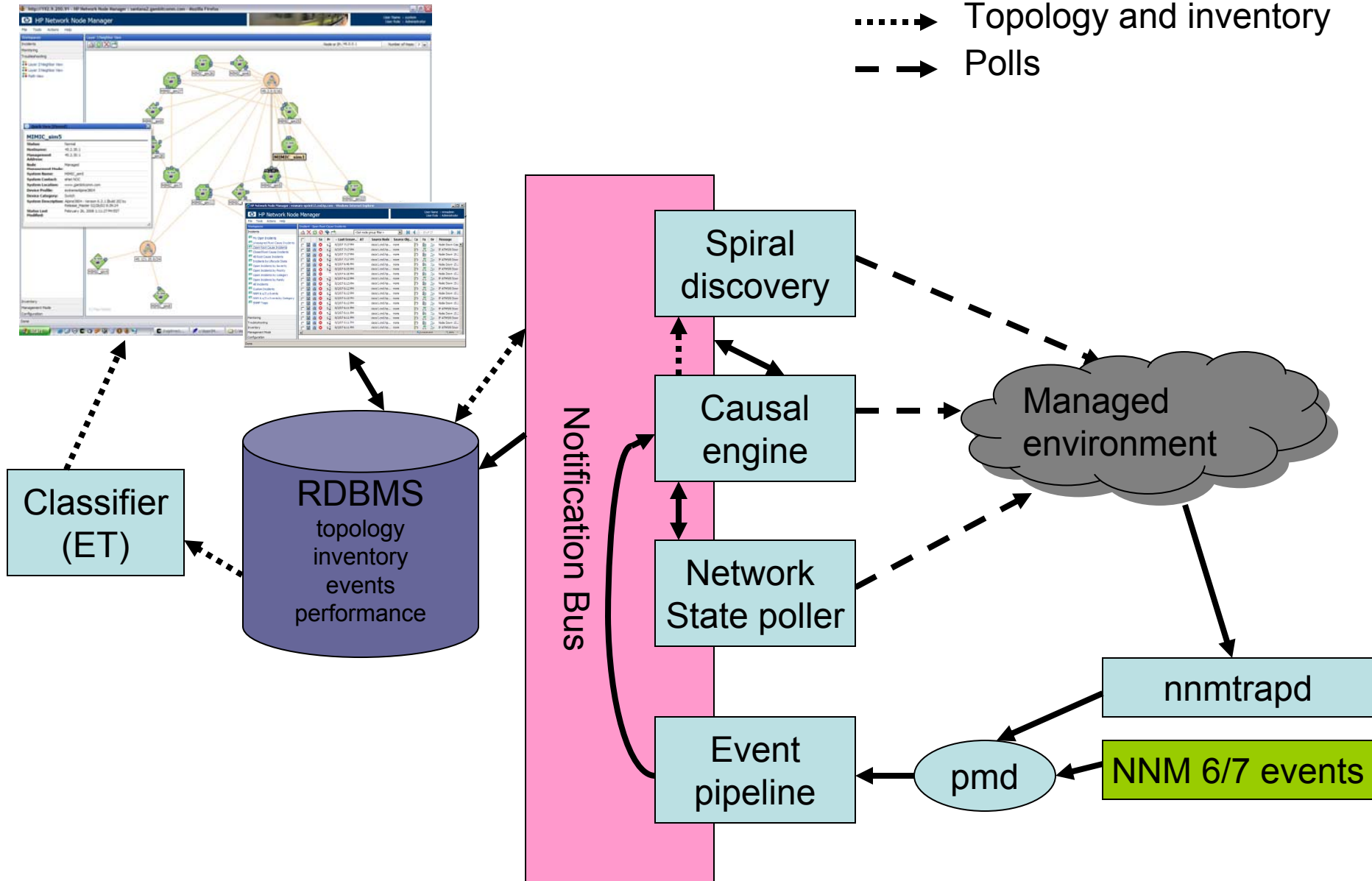
- Elements
 - Web UI
 - RDBMS - embedded=postgres or oracle
 - J2EE Application Server (jboss)
 - Web Services
 - Classifier
 - Notification Bus
 - Event Pipeline
 - Causal Engine
 - Network State Poller
 - Continuous Spiral Discovery
 - Communication Protocol Support (SNMP, ICMP)

Architecture

- More details
 - SOA (service-oriented architecture) based integration interface
 - Classifier provides for automatic containerization and grouping (extended topology manager)
 - Notification bus ensures accurate and real-time updates
 - Event Pipeline provides high performance event correlation
 - Causal Engine provides advanced deterministic RCA
 - Network state poller with aggressive polling intervals
 - Continuous spiral discovery delivers hyper-accurate topology in dynamic environments

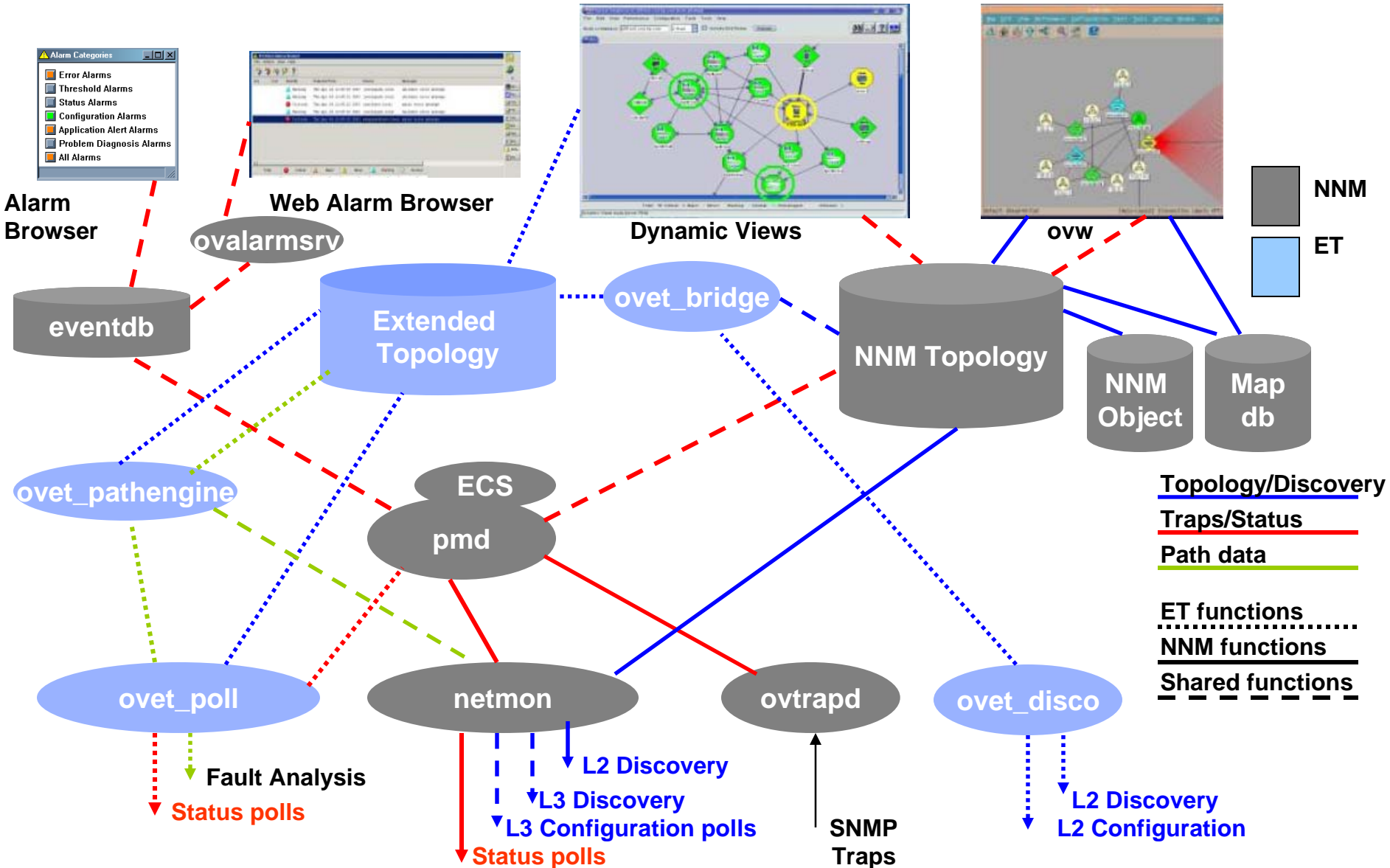
8i Architecture

- Events
- ⋯ Topology and inventory
- - - Polls

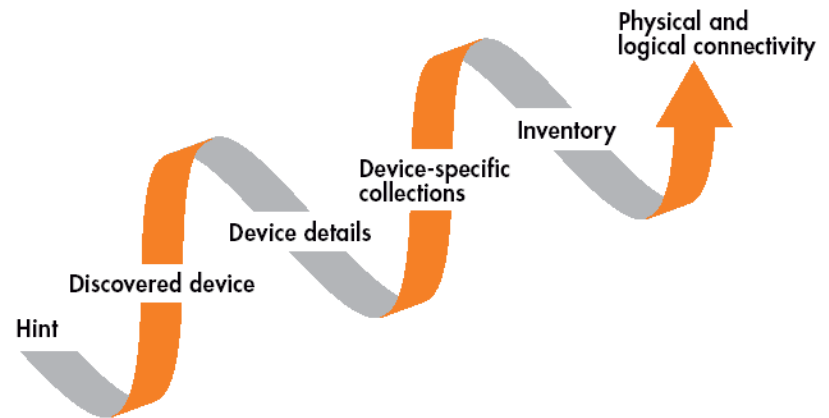


7.X Architecture

For comparison



Architecture



- Continuous Spiral Discovery
 - Topology aware
 - Staged discovery
 - Proprietary MIB's modeled
 - Level 2 and 3, Vlan, VPM, MPLS aware
- Network State Polling
 - Collects and correlates fault and performance data
 - Monitoring policies based on categorizations
 - Highly threaded and optimized (getbulk)
- Causal Engine
 - Topology and inventory aware
 - Actively re-polls to get tunnel-down and more global state data
 - Determines overall status and clears problems

Architecture

- Event Pipeline

- Comprised of plug and play independent functions (stages):

- Incident Receiver: Takes input from Causal Engine
 - Type Enforcement: Populates config'd incident, trap or event fields
 - Resolver: Checks topology for source node
 - Store Bulk: Logs incident to DB
 - Notification: Passes incidents to bus to inform NNM processes
 - Pairwise: Performs configured pairwise correlations
 - Rate: Performs configured rate count correlations
 - De-dup: Performs configured dedup correlations
 - Relate: Cancels incidents correlated by the Causal Engine
 - Actions: Performs configured actions

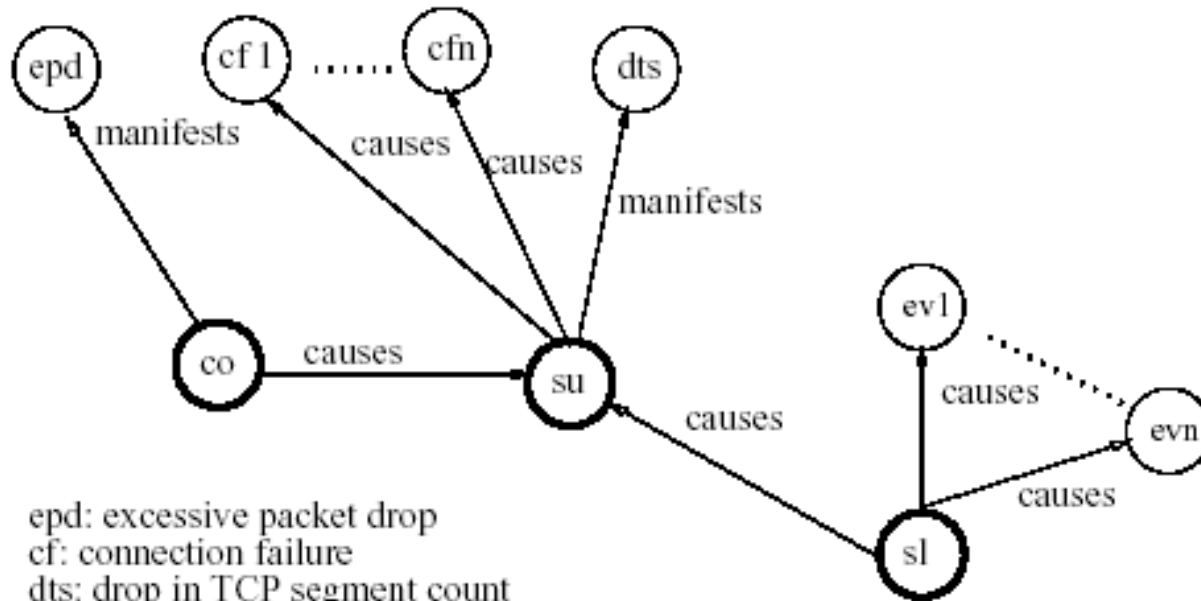
- Event Pipeline receives events and supplies *state* to the Causal Engine

Architecture

- Causal Engine
 - Causality relationships/scenarios
 - Causality graphs define common network problems
 - Defined in a language file
 - Causality is heavily dependent on SysObjectID
 - Incident Reports
 - Outputs Incident Description; health of object; likely causes
 - Configuration Interface
 - Unexposed in 8.00 and 8.01

Architecture

- Causal Engine
 - Hypothetical Causality Graph



epd: excessive packet drop
cf: connection failure
dts: drop in TCP segment count
co: congestion
su: server underutilization
sl: Ethernet segment load
ev1, ..., evn: various symptom events

Communication Configuration

– SNMP/ICMP Timeouts and retries

- 1st retry is 100% of timeout, 2nd thru nth is 150% of previous value
- If V2 & V1 supported, pollers will try V2 then V1
- V1: 10 Sec + 4 retries = 2.2 min
- V2: 10 Sec + 4 retries = 4.4 min

– Example:

- 1st poll: NNM waits 100% (10 seconds)
- 1st retry: NNM waits 150% of 10 seconds (15 seconds)
- 2nd retry: NNM waits 150% of 15 seconds (22.5 seconds)
- 3rd retry: NNM waits 150% of 22.5 seconds (33.75 seconds)
- 4th retry: NNM waits 150% of 33.75 seconds (50.625 seconds)
- $50.625 + 33.75 + 22.5 + 15 + 10 = 131.875$ (2.2 min)

Communication Configuration

- Network Regions (Regions tab)
 - Specify Comm. Config for a subset of devices
 - By IP Address ranges (required)
 - Optionally specify SNMP Community strings
 - Optionally specify host name wildcards
- Specific Nodes (Specifics tab)
 - Specify Target Hostname and Preferred SNMP Address

Communication Configuration

– nnmcommload.ovpl

- Reads NNM communication config data for nodes
 - -proto SNMP|ICMP –host <hostname>
- Writes config data from a file
 - -file <filename>
 - File contains Target, Community String, Preferred Address
 - <hostname>,,
 - <hostname>,<READ-ONLY string>,,
 - <hostname>,,<node address>
 - <hostname>,<READ-ONLY string>,<node address>

Discovery

•Discovery Policies

– Discover Everything

- Set an autodiscovery rule as follows:

- Ordering 500 (HP recommendation);

- » Higher numbers = higher precedence wrt other rules

- Enable auto-discovery; enable discover any SNMP device

- Enable discovery any Non-SNMP device

- Create at least one IP Address Range

- Do not add OID ranges; Add at least one discovery seed

– Limit auto discovery

- Set rules that use SNMP OID's

- Set rules that use limited IP address ranges

- Set rules that disable auto-discovery for certain IP ranges

- Equivalent of netmon.noDiscover

– Do not use auto discovery

- Do not set any auto-discovery rules (default)

Discovery

•General notes

- Configure Communication Configuration
 - SNMP community not set to public by default
 - Verify using `nnmsnmpwalk -c <string> >node<`
- Re-Discovery interval 24 hrs by default
 - Adjust via Control Group – rediscovery Interval
 - Minimum is 1 hour
- Seeding
 - At least one seed is required
 - Optionally use `nnmloadseeds.ovpl` to externally load from a file
- Name Resolution – 3-level hierarchy
 - Choose among these choices:
 - Short Name DNS (1st default)
 - FQDN
 - Short SNMP `sysName` (2nd default)
 - Full SNMP `sysName`
 - IP Address (3rd default)
 - `$(DataDir)/shared/nnm/conf/hostNoLookup.conf` – stops reverse lookups for hosts
 - `$(DataDir)/shared/nnm/conf/ipNoLookup.conf` - stops fwd lookups for IP addresses

Discovery

- Subnet connection rules allow NNM to connect interfaces on devices which do not run Layer 2 Discovery protocols, such as CDP.

- WPA: Widest Prefix Allowed

Maximum Prefix

Specify the prefix for the subnet for which you want to create Layer 2 connections. Possible prefix values are described in the following table:

Valid Maximum Prefix Values

Valid Maximum Prefix Value	Number of Usable IPv4 Addresses
28	14 (16-2=14)*
29	6 (8-2=6)*
30	2 (4-2=2)*
31	2

Auto-Discovery Rules Subnet Connection Rules Discovery Seeds

NNM can create Layer 2 Connections for subnets at the edge of subnetworks that are directly connected via Wide Area Networks (WANs). Define rules to control which subnets and interfaces NNM uses to create additional Layer 2 connections. See Help → Using the Discovery Configuration form.

1 - 13 of 13

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	▲ Name	En	WPA	IfType	IfName	IfDesc	IfAlias
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Asynchronous Transfer Mode (ATM)	✓	28	atm	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Digital Signal 0 (DS-0 or 64 kbit/s)	✓	28	ds0	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Digital Signal 1 (DS-1 or 1.544 Mbit/s T1)	✓	28	ds1	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Digital Signal 3 (DS-3 or 44.736 Mbit/s T3)	✓	28	ds3	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Digital Subscriber Loop over ISDN	✓	28	idsl	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Frame Relay Interfaces	✓	28	frameRelay	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Integrated Services Digital Network	✓	28	isdn	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Multiprotocol Label Switching	✓	28	mpls	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Point to Point	✓	28	ppp	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Serial Line Internet Protocol	✓	28	slip	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Serial Point to Point	✓	28	propPointT	*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Small Subnets	✓	30		*	*	*
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Synchronous Optical Networking (SONET)	✓	28	sonet	*	*	*

Discovery

- Verify/validate discovery
 - Global discovery status:
 - Help – About Network Node Manager
 - Node discovery status
 - Discovery state in node form: 3 values:
 - Newly Created (discovered, but polling not complete)
 - Discovery Completed
 - Re-discovery In Process (discovery actively polling node)
 - Seed discovery status
 - Discovery status column in discovery seeds tab
 - View results
 - View IP Addresses view or Nodes View
 - View Layer 2 Neighbors from Nodes view
 - Force a configuration poll
 - Can be done from GUI or using `nnmconfigpoll.ovpl`

Discovery

- Configuration Poll

Configuration Poll of 45.2.0.1

Connecting to server for configuration poll.

09:07:37 **** Starting configuration poll of node 45.2.0.1 ****

09:07:38 Supports SNMP V2C

09:07:38 Get NodeInfo. Found entries:1

09:07:38 Get MigratableAddresses retrieved no data because this device does not support a way of collecting data.

09:07:38 Get Addresses. Found entries:24

09:07:38 Get AddressesIFType. Found entries:23

09:07:43 0 IP Addresses created, 0 IP Addresses deleted

09:07:43 0 IP Addresses changed, 23 IP Addresses unchanged 1 IP Addresses skipped

09:07:58 Supports SNMP V2C

09:07:58 Get Interfaces. Found entries:123

09:07:58 Created 0 new Interfaces deleted 0 interfaces, 123 interfaces unchanged

09:07:58 BasicNodeAnalyzer has Completed

09:07:58 ArpCacheAnalyzer is working on node: MIMIC_sim1

09:07:58 XdpAnalyzer is working on node: MIMIC_sim1

09:07:58 Get XDP. Found entries:6

09:07:58 XdpAnalyzer has Completed

09:07:59 Get ArpCache. Found entries:101

09:07:59 SubnetAnalyzer has Completed

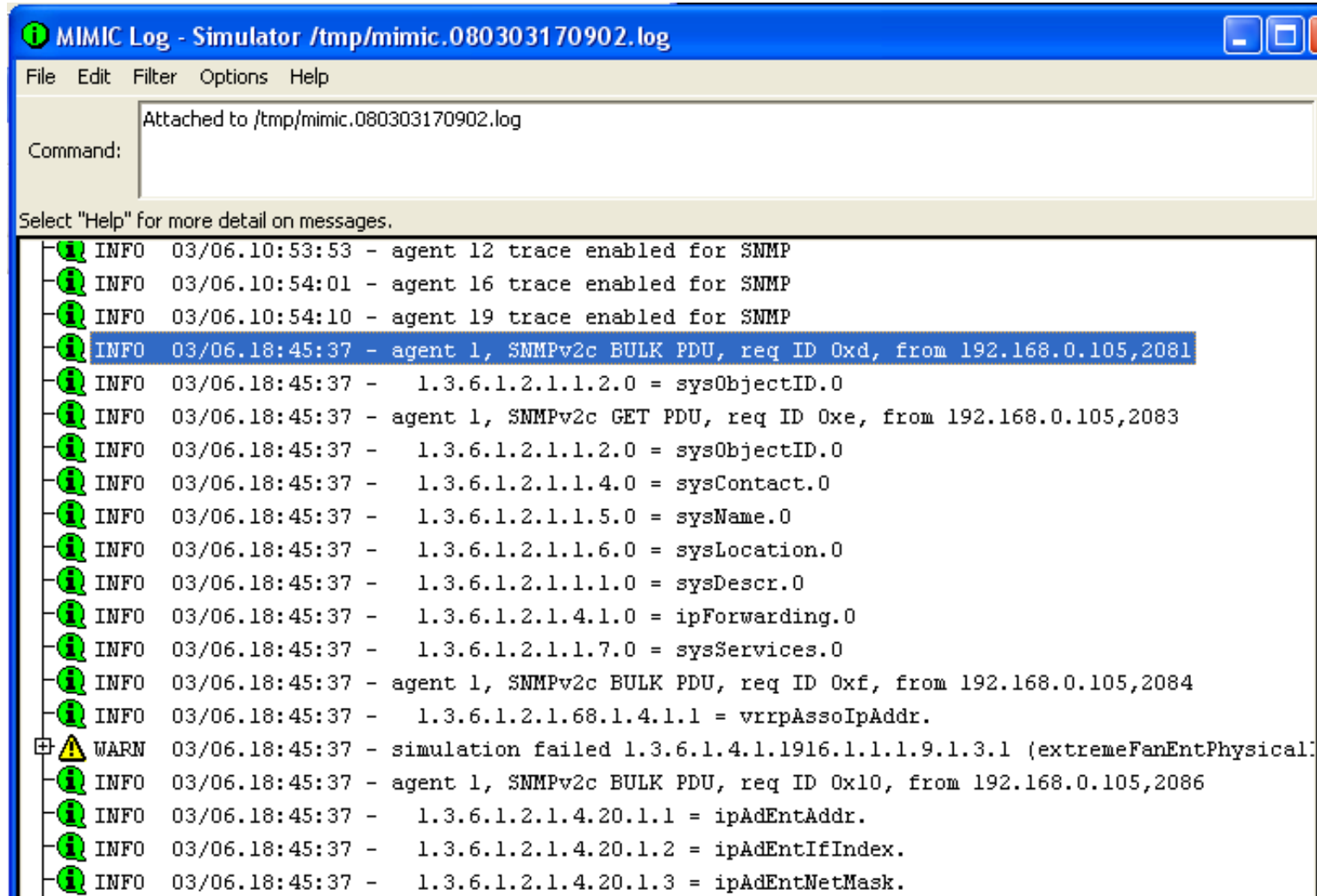
09:07:59 ArpCacheAnalyzer has Completed

09:07:59 **** End of configuration poll for node 45.2.0.1 ****

Discovery

- Discovery trace (MIMIC)

- Note GetBulk calls



MIMIC Log - Simulator /tmp/mimic.080303170902.log

File Edit Filter Options Help

Attached to /tmp/mimic.080303170902.log

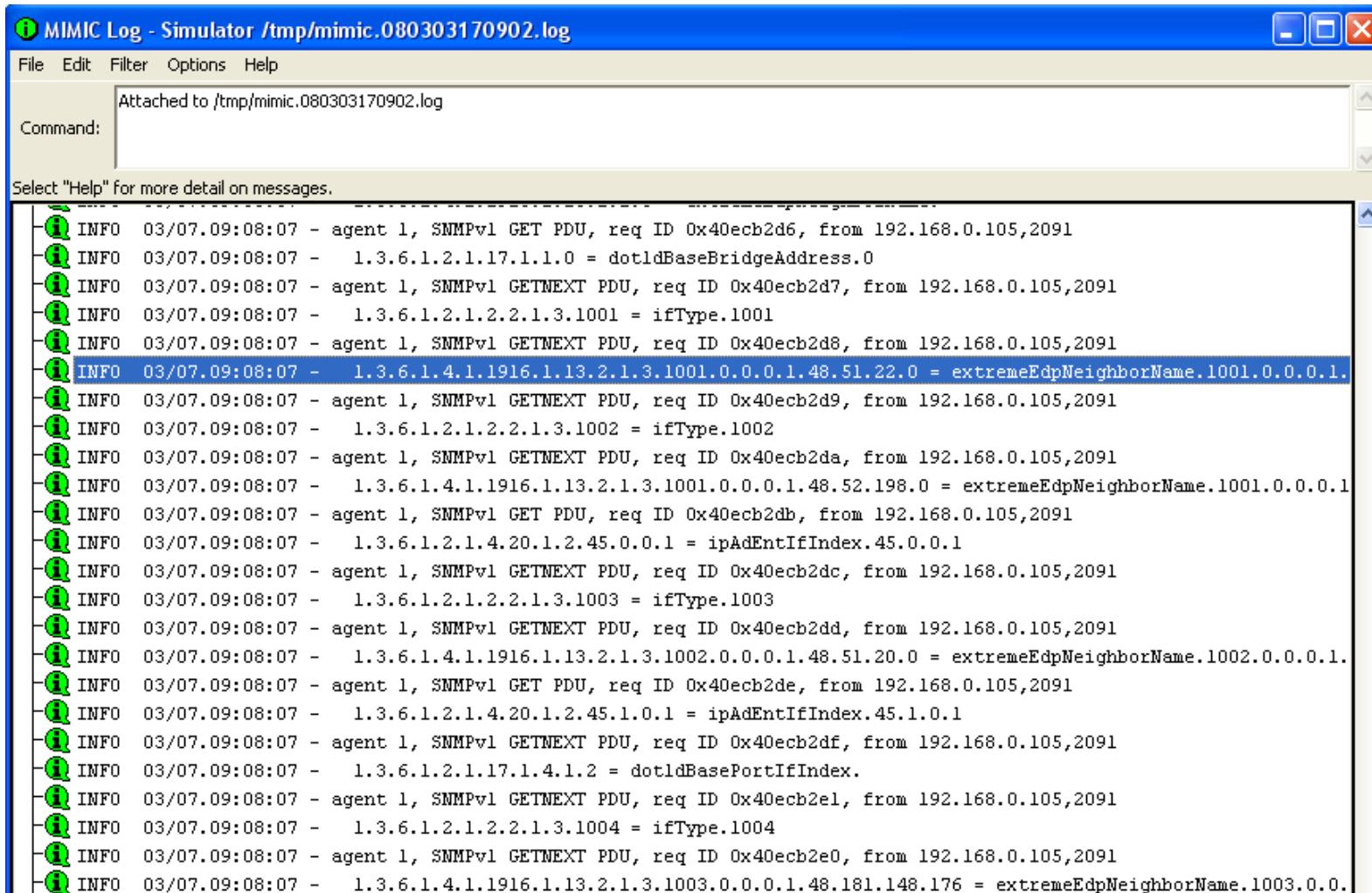
Command:

Select "Help" for more detail on messages.

```
INFO 03/06.10:53:53 - agent 12 trace enabled for SNMP
INFO 03/06.10:54:01 - agent 16 trace enabled for SNMP
INFO 03/06.10:54:10 - agent 19 trace enabled for SNMP
INFO 03/06.18:45:37 - agent 1, SNMPv2c BULK PDU, req ID 0xd, from 192.168.0.105,2081
INFO 03/06.18:45:37 - 1.3.6.1.2.1.1.2.0 = sysObjectID.0
INFO 03/06.18:45:37 - agent 1, SNMPv2c GET PDU, req ID 0xe, from 192.168.0.105,2083
INFO 03/06.18:45:37 - 1.3.6.1.2.1.1.2.0 = sysObjectID.0
INFO 03/06.18:45:37 - 1.3.6.1.2.1.1.4.0 = sysContact.0
INFO 03/06.18:45:37 - 1.3.6.1.2.1.1.5.0 = sysName.0
INFO 03/06.18:45:37 - 1.3.6.1.2.1.1.6.0 = sysLocation.0
INFO 03/06.18:45:37 - 1.3.6.1.2.1.1.1.0 = sysDescr.0
INFO 03/06.18:45:37 - 1.3.6.1.2.1.4.1.0 = ipForwarding.0
INFO 03/06.18:45:37 - 1.3.6.1.2.1.1.7.0 = sysServices.0
INFO 03/06.18:45:37 - agent 1, SNMPv2c BULK PDU, req ID 0xf, from 192.168.0.105,2084
INFO 03/06.18:45:37 - 1.3.6.1.2.1.68.1.4.1.1 = vrrpAssoIpAddr.
WARN 03/06.18:45:37 - simulation failed 1.3.6.1.4.1.1916.1.1.1.9.1.3.1 (extremeFanEntPhysical:
INFO 03/06.18:45:37 - agent 1, SNMPv2c BULK PDU, req ID 0x10, from 192.168.0.105,2086
INFO 03/06.18:45:37 - 1.3.6.1.2.1.4.20.1.1 = ipAdEntAddr.
INFO 03/06.18:45:37 - 1.3.6.1.2.1.4.20.1.2 = ipAdEntIfIndex.
INFO 03/06.18:45:37 - 1.3.6.1.2.1.4.20.1.3 = ipAdEntNetMask.
```

Discovery

- Discovery trace (MIMIC)
 - Agent-specific SNMP gets via ovet_daExtSw



MIMIC Log - Simulator /tmp/mimic.080303170902.log

File Edit Filter Options Help

Attached to /tmp/mimic.080303170902.log

Command:

Select "Help" for more detail on messages.

```
INFO 03/07.09:08:07 - agent 1, SNMPv1 GET PDU, req ID 0x40ech2d6, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.2.1.17.1.1.0 = dot1dBaseBridgeAddress.0
INFO 03/07.09:08:07 - agent 1, SNMPv1 GETNEXT PDU, req ID 0x40ech2d7, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.2.1.2.2.1.3.1001 = ifType.1001
INFO 03/07.09:08:07 - agent 1, SNMPv1 GETNEXT PDU, req ID 0x40ech2d8, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.4.1.1916.1.13.2.1.3.1001.0.0.0.1.48.51.22.0 = extremeEdpNeighborName.1001.0.0.0.1.
INFO 03/07.09:08:07 - agent 1, SNMPv1 GETNEXT PDU, req ID 0x40ech2d9, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.2.1.2.2.1.3.1002 = ifType.1002
INFO 03/07.09:08:07 - agent 1, SNMPv1 GETNEXT PDU, req ID 0x40ech2da, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.4.1.1916.1.13.2.1.3.1001.0.0.0.1.48.52.198.0 = extremeEdpNeighborName.1001.0.0.0.1.
INFO 03/07.09:08:07 - agent 1, SNMPv1 GET PDU, req ID 0x40ech2db, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.2.1.4.20.1.2.45.0.0.1 = ipAdEntIfIndex.45.0.0.1
INFO 03/07.09:08:07 - agent 1, SNMPv1 GETNEXT PDU, req ID 0x40ech2dc, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.2.1.2.2.1.3.1003 = ifType.1003
INFO 03/07.09:08:07 - agent 1, SNMPv1 GETNEXT PDU, req ID 0x40ech2dd, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.4.1.1916.1.13.2.1.3.1002.0.0.0.1.48.51.20.0 = extremeEdpNeighborName.1002.0.0.0.1.
INFO 03/07.09:08:07 - agent 1, SNMPv1 GET PDU, req ID 0x40ech2de, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.2.1.4.20.1.2.45.1.0.1 = ipAdEntIfIndex.45.1.0.1
INFO 03/07.09:08:07 - agent 1, SNMPv1 GETNEXT PDU, req ID 0x40ech2df, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.2.1.17.1.4.1.2 = dot1dBasePortIfIndex.
INFO 03/07.09:08:07 - agent 1, SNMPv1 GETNEXT PDU, req ID 0x40ech2e1, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.2.1.2.2.1.3.1004 = ifType.1004
INFO 03/07.09:08:07 - agent 1, SNMPv1 GETNEXT PDU, req ID 0x40ech2e0, from 192.168.0.105,2091
INFO 03/07.09:08:07 - 1.3.6.1.4.1.1916.1.13.2.1.3.1003.0.0.0.1.48.181.148.176 = extremeEdpNeighborName.1003.0.0.
```

State/Status Polling

- Modules

- State Poller determines **State**

- Pings IPv4 addresses
 - Checks each SNMP agent for responsiveness
 - Checks ifAdminStatus and ifOperStatus
 - Extendible to monitor unconnected interfaces (default=off)
 - States: Responding; Not Responding; Unset; Not Polled

- Causal Engine determines **Status**

- Inputs from State Poller, Discovery and incidents
 - Condition Listener – collect symptoms
 - Hypothesis Engine – Analysis to determine relationships
 - Blackboard – updates status and posts incidents

State/Status Polling

- *Status* is reflected in topology, not *State*

http://smog - Layer 3 Neighbor View - Mozilla Firefox

File View Tools Actions Help

Layer 3 Neighbor View

Node or IP: 45.0.0.1 Number of Hops: 8

Quick View Tooltip













45.2.30.1








State:	Not Responding
Status:	Critical
Interface Status:	No Status
Node Status:	Minor
In Interface:	rif1(45.2.30.1)
Hosted On Node:	MIMIC_sim5
In Subnet:	45.2.0.0/16
Prefix Length:	16
Management Mode:	Managed
Direct Management Mode:	Inherited
Virtual:	false
Status Last Modified:	March 7, 2008 4:55:54 PM EST

MIMIC_sim23, MIMIC_sim22, MIMIC_sim1, MIMIC_sim25, MIMIC_sim6, MIMIC_sim26, MIMIC_sim5, MIMIC_sim16, MIMIC_sim14, MIMIC_sim24, MIMIC_sim18, MIMIC_sim21, MIMIC_sim28, sim9, 45.2.0.0/16

State/Status Polling

- Status

Color	Meaning	Color	Meaning	Color	Meaning	Color	Meaning
	Unknown		Minor		Disabled or Unset		Unmanaged*
	Normal		Major		No Status		Restricted*
	Warning		Critical		Informational		Testing*

Color	Meaning	Description
	Unknown	<p>Indicates one of the following:</p> <ul style="list-style-type: none"> • The node has just been added to the NNM database and the Causal Engine has not yet calculated its health status. • The node is unreachable and cannot be polled.
	Disabled or Unset	<p>Indicates the object has an administrative status of "disabled" or "unset". This status prevents the device from being polled. As a result, the node appears on maps, but is not monitored. When Spiral Discovery detects a change in administrative status, monitoring resumes.</p> <p>Administrative status is the current value stored in MIB II ifAdminStatus.</p>
	No Status	<p>Indicates that NNM's current configuration excludes this device from monitoring so the Status is not calculated because the device is set to Unmanaged/Out Of Service.</p>
	Informational	<p>Indicates the object has an administrative status of "unmanaged".</p> <p>Administrative status is the current value stored in MIB II ifAdminStatus.</p>
	Unmanaged*	<p>Indicates the object has an administrative status of "unmanaged".</p> <p>Administrative status is the current value stored in MIB II ifAdminStatus.</p>
	Restricted*	<p>Indicates the object has an administrative status of "restricted".</p> <p>Administrative status is the current value stored in MIB II ifAdminStatus.</p>
	Testing*	<p>Indicates the object has an administrative status of "testing".</p> <p>Administrative status is the current value stored in MIB II ifAdminStatus.</p>

State/Status Polling

• Management Events - Status

Incident Configuration Name	Description
AddressNotResponding	Address is not responding to ICMP
ConnectionDown	Both (or all) ends of a connection not responding to SNMP
ConnectionPartiallyUnresponsive	Connection partially unresponsive. undiscovered device down
ImportantNodeorConnectionDown	Node not responding to ICMP or SNMP. Also: only one neighbor is down so NNM can't determine if node or connection is down.
ImportantNodeUnmanageable	Node not responding to SNMP.
InterfaceDisabled	Interface explicitly disabled.
InterfaceDown	Interface is not responding to SNMP/ICMP polls.
ModifiedConnectionDown	Connection disconnected and/or moved and is not responding to SNMP.
NodeDown	NNM's APA has determined the node is down based on : 100% of the addresses assigned to this node are unreachable The SNMP agent installed on this machine is not responding At least 2 neighbors have problems with connectivity to node
NodeOrConnectionDown	Not responding to ICMP or SNMP. Also: only one neighbor is down
NonSNMPNodeUnresponsive	Node down, or undiscovered device between node and NNM is down.
WANEdgeRouterUnresponsive	Router down, or undiscovered device between router and NNM down.
RateCorrelation	Template to measure number of incoming incidents within period.
DuplicateCorrelation	Template to configure deduplication attributes

State/Status Polling

• Management Events – Performance and other

Incident Configuration Name	Description
InterfacePerformanceCritical	Interface performance has reached a Critical severity.
InterfacePerformanceWarning	Interface performance has reached a Warning severity.
InterfaceInputDiscardRateHigh	Indicates a high input discard rate percentage.
InterfaceInputErrorRateHigh	Indicates a high input error rate percentage.
InterfaceInputUtilizationHigh	Indicates a high input utilization percentage.
InterfaceInputUtilizationLow	Indicates a low input utilization percentage.
InterfaceOutputDiscardRateHigh	Indicates a high output discard rate percentage.
InterfaceOutputErrorRateHigh	Indicates a high output error rate percentage.
InterfaceOutputUtilizationHigh	Indicates a high output utilization percentage.
InterfaceOutputUtilizationLow	Indicates a low output utilization percentage.
LicenseExpired	NNM license has reached expiration.
LicenseMismatch	License capacity doesn't match Perf SPI license capacity.
LicenseNodeCountExceeded	# of discovered nodes exceeds the licensed managed node count.

State/Status Polling

- Set default monitoring rules attributes:
 - Interval, Enable ICMP, Enable SNMP
 - Poll unconnected interfaces (disabled by default)
 - Poll Interfaces hosting IP Addresses
 - Enabled by default for “Routers” node group
 - Any unconnected interface that addresses associated with it
 - Any unconnected If with ifAdminStatus and ifOperStatus set
 - (PerfSPI): Enable performance monitoring
 - Performance polling interval
- Set Interface and Node monitoring rules
 - Same set of attributes above
 - Added attributes for Node|Interface Group & Ordering
 - Ordering precedence: Interface – Node – Default
- Ad-hoc status poll from command line:
 - `nmstatuspoll.ovpl –node <name|IP> -t <sec> -v`

Monitoring Configuration

•Interface Group Configuration

– Column Headings:

- Or: Order
- EIPAFP: Enable ICMP Ping Addr Fault Polling
- ESAaIFP: Enable SNMP Agent & Interface Fault Polling
- PUI: Poll Unconnected Interfaces
- PIHIA: Poll Interfaces Hosting IP Addresses
- ESIPP: Enable SNMP Interface Performance Polling

– Default monitoring configuration settings:

When multiple settings are defined, NNM applies them according to the Ordering number (lowest number first).

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	▲ Or	EIPAFP	ESAaIFP	PUI	PIHIA	ESIPP	Name	Notes
<input type="checkbox"/>			100	-	✓	-	-	-	ISDN Interfaces	ISDN Interfaces as identified by interface types. ISDN Interf
<input type="checkbox"/>			200	-	✓	-	-	-	Point to Point Interfaces	Point to Point Interfaces are usually associated with dial-up,
<input type="checkbox"/>			300	-	✓	-	-	-	VLAN Interfaces	VLAN interfaces do not return reliable performance metrics. E

Monitoring Configuration

•Node Group Configuration





– Column headings:









- Or: Order
- EIPAFP: Enable ICMP Ping Addr Fault Polling
- ESAaIFP: Enable SNMP Agent & Interface Fault Polling
- PUI: Poll Unconnected Interfaces
- PIHIA: Poll Interfaces Hosting IP Addresses
- ESIPP: Enable SNMP Interface Performance Polling

– Default monitoring configuration settings:

Interface Settings | **Node Settings** | Default Settings

When multiple settings are defined, NNM applies them according to the Ordering number (lowest number first).

<input type="checkbox"/>			▲ Or	EIPAFP	ESAaIFP	PUI	PIHIA	ESIPP	Name	Notes
<input type="checkbox"/>			100	-	✓	-	✓	✓	Routers	Includes nodes which do routing. For route
<input type="checkbox"/>			200	-	✓	-	-	✓	Networking Infrastructure Devices	Includes those device categories that are t
<input type="checkbox"/>			300	-	✓	-	-	-	Microsoft Windows Systems	Any system running Microsoft Windows, inc
<input type="checkbox"/>			400	✓	✓	-	-	-	Non-SNMP Devices	Nodes which have never responded to SNM

Filters

- Old Old filters (nnm 7.x and Earlier):
 - \$OV_CONF/C/filters file
- Old filters (NNM 7.x only)
 - \$OV_CONF/nnmet/topology/filter/TopoFilters.xml
 - \$OV_CONF/nnmet/paConfig.xml
- New filters
 - In DB – configured only through GUI
 - Defaults: Management stations; Node groups; Interface Groups

View Filter Possibilities

Filter	View: Object Type			
	Incident	Node	Interface	IPv4 Address
NNM 6.x/7.x Management Stations "View NNM 6.x and 7.x Management Stations "	X			
Node Groups "Node Group Filters"	X	X	X	X
Interface Groups "Interface Group Filters"			X	X

Filters

- Filter Config:

Basics

Name:

Status:

Add to View Filter List:

Notes:

Includes those device categories that are typically considered networking infrastructure devices. This group is typically used with monitoring configuration to adjust polling settings for high priority devices.

NNM iSPI for Performance

Add to Filter List:

- Device profiles:

Device Filters: Hostname Wildcards Additional Nodes Status Conclusions

1 - 8 of 8

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Device Category	Device Vendor	Device Family	Device Model
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ATM Switch			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chassis			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Firewall			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gateway			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Router			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Switch			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Switch-Router			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Voice Gateway			

Device Profile - Device Profiles

312 - 335 of 335

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Device Model	SNMP Object ID	Device Family	Device Vendor	Device Category	OU	Description
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	RT140p	.1.3.6.1.4.1.1182.1.9	Yamaha RT Series Remot	Yamaha	Router	00A0DE	Yamaha RT140p
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Agere Systems Ger	.1.3.6.1.4.1.11898	Agere Systems	Agere Systems	Network Appli		No Device Profile found for this device. The
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	avayaWirelessAP	.1.3.6.1.4.1.11898.2.4.10	Avaya Wireless	Avaya	Wireless Acce		Avaya Wireless AP-4 AP-5 AP-6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	proximAP-2500	.1.3.6.1.4.1.11898.2.4.11	Proxim	Proxim	Wireless Acce		Proxim AP-2500 Bridge
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	agereAP2000	.1.3.6.1.4.1.11898.2.4.6	Agere Systems	Agere Systems	Wireless Acce		Agere Systems Wireless LAN Access Point
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NEC Generic	.1.3.6.1.4.1.119	NEC	NEC	Other		No Device Profile found for this device. The
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	nec800010G	.1.3.6.1.4.1.119.1.14.12	NEC BlueFire	NEC	ATM Switch		NEC BlueFire 8000 Series 10G ATM Switch
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	nec80002.5G	.1.3.6.1.4.1.119.1.14.8	NEC BlueFire	NEC	ATM Switch		NEC BlueFire 8000 Series 2.5G ATM Switch

Filters

- Device Profiles

- OID dependent
- Force Device to: Router; Switch; Switch & router; End Node;
- Interface reindexing Type:
 - Choose which attribute indicates change:
 - ifIndex; ifName; ifDescr; ifAlias; ifName & ifDescr

Basics

Device Model: avayaWirelessAP

SNMP Object ID: .1.3.6.1.4.1.11898.2.4.10

Description: Avaya Wireless AP-4 AP-5 AP-6

Device Family: Avaya Wireless

Device Vendor: Avaya

Device Category: Wireless Access Point

OUI:

Author: HP Network Node Manager

Advanced

Use of SNMP sysName for Node Name Resolution

Never Use sysName:

Do not Use sysName Starting With:

Device Behaviors

Force Device: Do not force

Interface Reindexing Type: ifIndex

Incidents

- Incident sources

- Causal Engine

- Origin = Management Software

- NNM events

- Forwarded from NNM 6.x and 7.x

- SNMP Traps



Incidents

- Incident Form

– Severity; Priority; Lifecycle; Assigned To; Source Node/Object; Category; Family; Origin

The screenshot shows the HP Network Node Manager interface. The main window displays a table of incidents. The table has the following columns: Se (Severity), Pr (Priority), LS (Lifecycle State), Last Occurrer (Last Occurrence), AT (Assigned To), Source Node, Source Object, Ca (Category), Fa (Family), Or (Origin), CN (Correlation Notes), Message, Notes, Name, DC (Dup Count), RA (RCA Active), Correlation Notes, First Occur (First Occurrence), Origin Occur (Origin Occurrence), Created, and Last Modified. The table contains several rows of incident data, including details like 'Non-SNMP Node Unresponsive' and 'Address Not Responding'.

Se	Pr	LS	Last Occurrer	AT	Source Node	Source Object	Ca	Fa	Or	CN	Message	Notes	Name	DC	RA	Correlation Notes	First Occur	Origin Occur	Created	Last Modified
	5	U	2/20/08 12:01 PM		MISTY-OLD	MISTY-OLD					Non-SNMP Node Unresponsive		NonSNMPN 0	0	✓		Feb 20, 2008	Feb 20, 2008 1	Feb 20, 2008 1	Feb 20, 2008 1
	5	U	2/20/08 12:05 PM		MISTY-OLD	192.168.0.106					Address Not Responding		AddressNo 0	0	✓		Feb 20, 2008	Feb 20, 2008 1	Feb 20, 2008 1	Feb 20, 2008 1
	5	U	2/21/08 1:02 AM		192.168.0.1	192.168.0.1					Non-SNMP Node Unresponsive		NonSNMPN 0	0	-	Incident cancelled by	Feb 21, 2008	Feb 21, 2008 1	Feb 21, 2008 1	Feb 21, 2008 1
	5	U	2/21/08 1:06 AM		192.168.0.1	192.168.0.1					Address Not Responding		AddressNo 0	0	-	Incident cancelled by	Feb 21, 2008	Feb 21, 2008 1	Feb 21, 2008 1	Feb 21, 2008 1
	5	U	2/22/08 9:30 AM		CLOUDY	CLOUDY					Non-SNMP Node Unresponsive		NonSNMPN 0	0	-	Incident cancelled by	Feb 22, 2008	Feb 22, 2008 9	Feb 22, 2008 9	Feb 22, 2008 9
	5	U	2/22/08 9:34 AM		CLOUDY	192.168.0.103					Address Not Responding		AddressNo 0	0	-	Incident cancelled by	Feb 22, 2008	Feb 22, 2008 9	Feb 22, 2008 9	Feb 22, 2008 9

– Correlation; Message; Notes; Name; Dup Count; RCA Active; Corr Notes; 5 time stamps

– View ALL Incidents: Select Custom View; ALL filter

Incidents

- **Severity**

- Normal, Warning, Minor, Major, Critical



- **Lifecycle States:**

- Registered, In-progress, Completed, Closed



- **Priority States:**

- None (5), Low (4), Medium (3), High (2), Top (1)



- **Category:**

- Accounting*, App Status, Config, Fault, Perf, Security, Status



- **Family:**

- Addr, Agg Port, Board, Connection, Corr, HSRP, IF, Node, OSPF



- **Origin:**

- Mgmt Software, Manual, Remote, SNMP, Syslog



- **Correlation Nature:**

- Root, Secondary, Symptom (trap), Stream (dedup, rate or pairwise)



* = not used by NNM

Incidents

- Management Events

- Faults



- Performance



DuplicateCorrelation	✓	Warning	Correlation
InterfaceInputDiscardRateHigh	-	Critical	Interface
InterfaceInputErrorRateHigh	-	Critical	Interface
InterfaceInputUtilizationHigh	-	Critical	Interface
InterfaceInputUtilizationLow	-	Minor	Interface
InterfaceInputUtilizationNone	-	Minor	Interface
InterfaceOutputDiscardRateHigh	-	Critical	Interface
InterfaceOutputErrorRateHigh	-	Critical	Interface
InterfaceOutputUtilizationHigh	-	Critical	Interface
InterfaceOutputUtilizationLow	-	Minor	Interface
InterfaceOutputUtilizationNone	-	Minor	Interface
InterfacePerformanceCritical	✓	Critical	Interface
InterfacePerformanceWarning	✓	Warning	Interface
RateCorrelation	✓	Warning	Correlation

AddressNotResponding	✓	Critical	Address
ConnectionDown	✓	Critical	Connection
ConnectionPartiallyUnresponsive	✓	Critical	Connection
ModifiedConnectionDown	✓	Critical	Connection
ImportantNodeOrConnectionDown	✓	Critical	Node
ImportantNodeUnmanageable	✓	Critical	Node
InterfaceDisabled	✓	Critical	Interface
InterfaceDown	✓	Critical	Interface
NodeDown	✓	Critical	Node
NodeOrConnectionDown	✓	Critical	Node
NonSNMPNodeUnresponsive	✓	Critical	Node

Incidents

• Management Events - faults

Name	En	Severity	Ca	Family
AddressNotResponding	✓	✗ Critical	✗	Address
ConnectionDown	✓	✗ Critical	✗	Connection
ConnectionPartiallyUnresponsive	✓	✗ Critical	✗	Connection
ModifiedConnectionDown	✓	✗ Critical	✗	Connection
ImportantNodeOrConnectionDown	✓	✗ Critical	✗	Node
ImportantNodeUnmanageable	✓	✗ Critical	✗	Node
InterfaceDisabled	✓	✗ Critical	✗	Interface
InterfaceDown	✓	✗ Critical	✗	Interface
NodeDown	✓	✗ Critical	✗	Node
NodeOrConnectionDown	✓	✗ Critical	✗	Node
NonSNMPNodeUnresponsive	✓	✗ Critical	✗	Node

- Address fails ICMP
- Both ends fail SNMP
- Undiscovered device in connection down
- Connection fails SNMP or was moved
- Fails ICMP & SNMP & 1 neighbor down
- Fails SNMP
- ifAdmin status = disabled
- Fails SNMP and/or ICMP
- All Ifs & Mgmt Addr down & >1 neighbors
- All Ifs & Mgmt down & only 1 neighbor
- Node down or undiscovered device down

Incidents

- Example: LinkDown

– Source: SNMP Trap, Category: Fault; Family: Interface

	Se	LS	Last Occurrence	Source Node	Source Object	Ca	Fa	CN	Message
<input type="checkbox"/>		LS	3/7/08 4:55 PM	MIMIC_sim5	none				Agent Interface Down (linkDown Trap) on interface 0

– Severity: Critical; Lifecycle: Registered; Correlation Nature: Symptom

Incidents

- Example:
 - Node Down
 - Details:

Category=Fault; Family=Node; Origin=Mgmt Software

Incident - Root Cause Incidents

	Se	Pr	LS	Last Occurrence	AT	Source Node	Source Object	Ca	Fa	Or	Message
	Critical	None	Closed	3/7/08 4:56 PM		MIMIC_sim5	MIMIC_sim5	Fault	Node	Mgmt Software	Node Down

Annotations: Arrows point from the text 'Category=Fault; Family=Node; Origin=Mgmt Software' to the Ca, Fa, and Or columns respectively. Another arrow points from 'Severity=Critical; Priority=None; Lifecycle=Closed;' to the Se, Pr, and LS columns.

http://smog - Incident : "NodeDown" - Mozilla Firefox

File View Tools Actions Help

Save and Close Delete Incident

Incident

Basics

Message
Node Down

Severity: Critical
Priority: None
Lifecycle State: Registered

Source Node: MIMIC_sim18
Source Object: MIMIC_sim18
Assigned To:

Notes

General Correlated Parents Correlated Children Custom Attributes

Registration

	Se	Last Occurrence	Type	Message	Sour
	Critical	3/7/08 4:02 PM	APA Correlator	Address Not Re	MIMIC

Quick View [Pinned]

APA Correlation

Type: APA Correlation
Severity: Critical
Priority: None
Message: Node Down
Source Node: MIMIC_sim18
Source Object: MIMIC_sim18
Severity: Critical
Priority: None
Message: Address Not Responding
Source Node: MIMIC_sim18
Source Object: 45.123.34.34

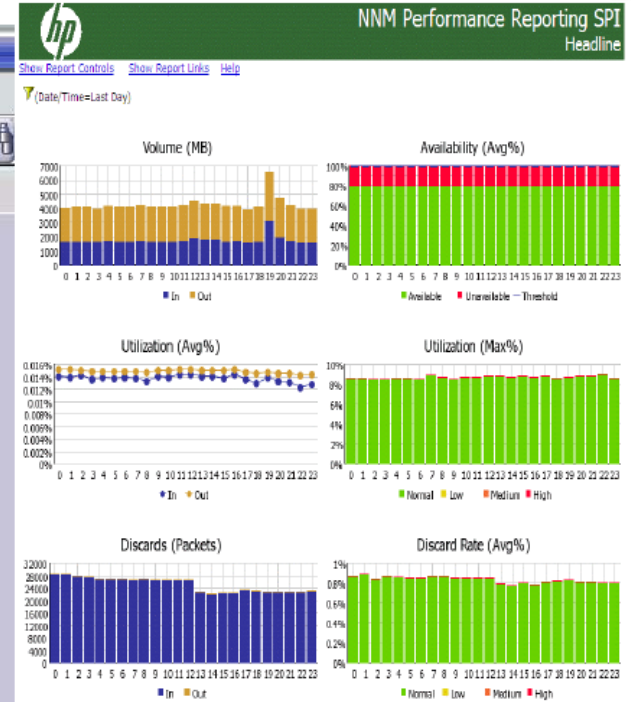
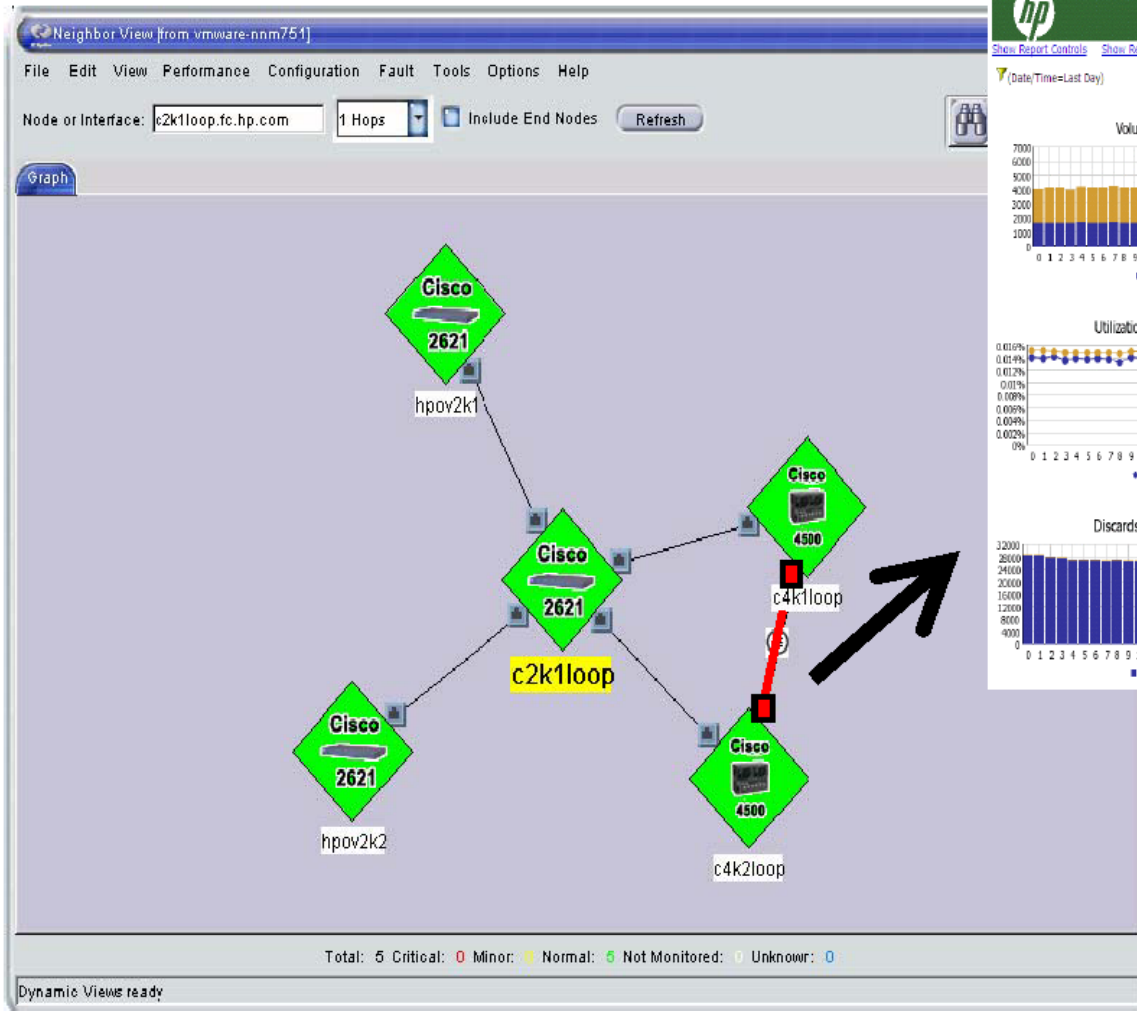
Incidents

- **nnmincidentcfg.ovpl**
 - Equivalent of xnmevents –load (trap macros from MIB)
 - `nnmincidentcfg.ovpl -loadTraps "C:\Cisco Mibs\CISCO-VTP-MIB.my"`
- **nnmloadmib**
 - Equivalent of xnmloadlib (Load MIBs for all SNMP apps)
- **nnmconfigexport –e incident**
 - Backup/export incident configuration to xml schema
- **nnmincidentcfg.ovpl**
 - Equivalent of xnmevents –load (trap macros from MIB)
- **nnmdumpevents**
 - dump contents of event db (equivalent of ovdumpevents)
 - usage: `[-f <filename>] [-t] [-l <minutes>][-c | -s <streamName>]`
`[-d <database pathName>]`

Incidents

- nnmtrapd
 - Equivalent to ovtrapd in previous versions
 - `-W -b 2000 -r 30` suppresses subsequent traps if more than 2000 are received within 30s
- nnmtrapd.conf
 - Block traps from sources via ip range or OID
- pmd
 -

Performance SPI



Performance SPI

Perf SPI

- Fixed collection – network only
- Limited report changes
- Retention 9 weeks only
- Specialized cube storage
- 1 min polling – can enhance PI's collection
- Feeds PI – *integration in 1.0*

PI

- Customizable collection – cross domain
- Full report authoring
- Long retention
- Full data warehouse
- 5 min polling (for now)
- Can consolidate multiple Perf SPIs

Performance SPI

• Report Types

- Dashboard
- Headline
- Monthly Heat Chart
- Calendar
- Top Ten
- Most Changed
- Data Explorer

NNM Performance Reporting SPI
Top 10 Interfaces by Utilization (Avg%) - Live

Interface	Downs (Avg%)	Errors (Avg%)	Utilization (Avg%) (Std 10)
10.10.10.10	0.07%	0.00%	0.00% (0.000)
10.10.10.10	4.17%	0.00%	0.00% (0.000)
10.10.10.10	0.00%	0.00%	0.00% (0.000)
10.10.10.10	0.00%	0.00%	0.00% (0.000)
10.10.10.10	0.00%	0.00%	0.00% (0.000)
10.10.10.10	0.00%	0.00%	0.00% (0.000)
10.10.10.10	0.00%	0.00%	0.00% (0.000)
10.10.10.10	0.00%	0.00%	0.00% (0.000)
10.10.10.10	0.00%	0.00%	0.00% (0.000)
10.10.10.10	0.00%	0.00%	0.00% (0.000)

Speeds
J Minutes
iscards (%) Response Time (msec) Availability (%)
0.00% 284.95 85.00%

Utilization (Avg%)
Response Time (msec) (Avg) (Std 10)

NNM Performance Reporting SPI
Data Explorer Live

Crossstab Color Legend: 10:01 20:22 30:39 40:49 50:59 60:46 70:78 80:80 90:3

Utilization (Avg%)	10:01	20:22	30:39	40:49	50:59	60:46	70:78	80:80	90:3
10:01	0.02	0.02	0.03						
20:22	0.02	0.02	0.02						
30:39	0.02	0.02	0.02						
40:49	0.02	0.02	0.02						
50:59	0.02	0.02	0.02						
60:46	0.02	0.02	0.02						
70:78	0.02	0.02	0.02						
80:80	0.02	0.02	0.02						
90:3	0.02	0.02	0.02						

Utilization (Avg%)
Element
Time Period

NNM Performance Reporting SPI
Dashboard Live

Availability Exceptions (% samples) Utilization Exceptions (% samples) Discard Rate Exceptions (% samples) Error Rate Exceptions (% samples)

Top 5 Interfaces by Utilization Exceptions

Interface	Exceptions
10.10.10.10	0
10.10.10.10	0
10.10.10.10	0
10.10.10.10	0
10.10.10.10	0

Top 5 Interfaces by Availability Exceptions

Interface	Exceptions
10.10.10.10	21
10.10.10.10	21
10.10.10.10	21
10.10.10.10	21
10.10.10.10	21

Top 5 Interfaces by Discard Exceptions with 2hr Heat Chart

Top Interfaces	Discard Exceptions	Discards (Avg%)
10.10.10.10	21	
10.10.10.10	21	
10.10.10.10	21	
10.10.10.10	21	
10.10.10.10	17	

Performance SPI

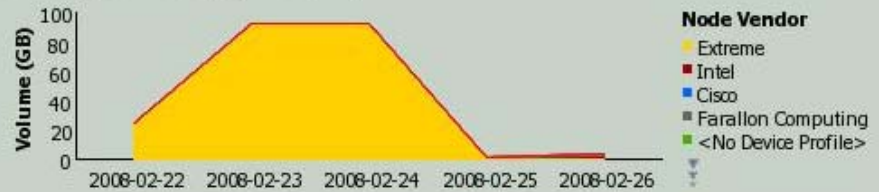


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Top 5 Node Vendors by Volume (Last Day)

Node Vendor (#Nodes/#Interfaces)	Volume (Packets)
Extreme (28 / 130)	16471709
Cisco (3 / 8)	2524563
Intel (3 / 4)	2488465
Farallon Computing (2 / 4)	468753
Alcatel-Lucent (2 / 14)	0

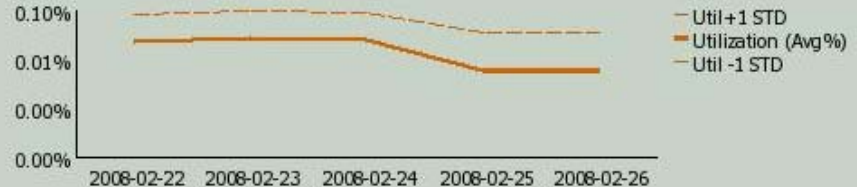
30-Day Volume (by Vendor)



Top 5 Nodes by Utilization Exceptions (Last Day)

Node	Utilization Exceptions
MIMIC Sim agent 22	0
MIMIC Sim agent 25	0
MIMIC Sim agent 28	0
MIMIC Sim agent 31	0
MIMIC Sim agent 35	0

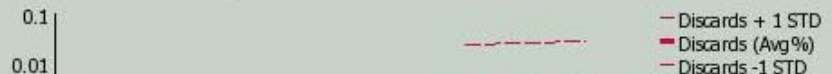
30-Day Utilization (All Interfaces)



Top 5 Nodes by Discard Exceptions (Last Day)

Node	Discard Exceptions
MIMIC Sim agent 22	0

30-Day Discard Rate (All Interfaces)



Performance SPI

•Report Types

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[Headline](#)



[Calendar](#)



[Heat Chart](#)



[Most Changed](#)



[Top N](#)

[Live](#)
[Summary](#) [Archive](#)



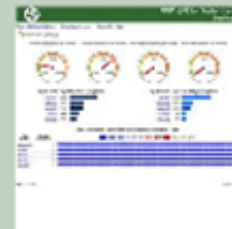
[Data Explorer](#)

[Live](#)
[Summary](#) [Archive](#)



[Dashboard](#)

[Live](#)
[Summary](#)



[Chart Detail](#)

[Live](#)
[Archive](#)



Web Interface

- Primary URL: https://server_name/nnm
- Ports used:
 - jboss.http.port=80
 - jboss.http.port=8004
 - jboss.jnp.port=1099
 - jboss.https.port=443
 - jboss.rmi.port=1098
 - jboss.jrmp.port=4444
 - jboss.pooled.port=4445
 - jboss.socket.port=4446
 - jboss.bisocket.port=4457
 - jboss.ws.port=8083
 - jboss.ejb3.port=3873
- Port Configuration:
 - `$OV_DATA_DIR/shared/nnm/conf/nnm.ports.properties`

Web Interface

- JBOSS Troubleshooting

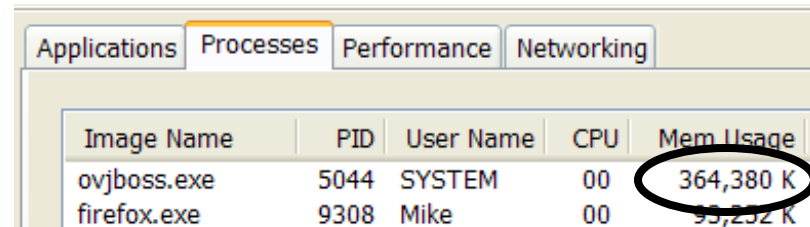
- Footprint/heap size - Config files:

`%INSTALLED_DIR%\shared\nnm\conf\ovjboss`

`Ovjboss.jvm/properties (2GB XP Pro):`

```
# JVM Memory parameters
# -Xms: Initial Java Heap Size
# -Xmx: Maximum Java Heap Size
#
-Xms25m
-Xmx1024m

#
# Permanent Generation JVM heap parameters - default to a fixed
# size of 128 MB
#
-XX:PermSize=56m
-XX:MaxPermSize=100m
```



The screenshot shows the Windows Task Manager interface with the 'Processes' tab selected. A table lists running processes. The 'ovjboss.exe' process is highlighted, and its memory usage of 364,380 K is circled in red.

Image Name	PID	User Name	CPU	Mem Usage
ovjboss.exe	5044	SYSTEM	00	364,380 K
firefox.exe	9308	Mike	00	93,232 K

- Logfiles: `\log\nnm\jbossServer.log`, `ovjboss.log`

Web Interface

- Jboss Memory footprint:
 - Shown: 32 Bit, XP Pro, 2GB
 - 32 nodes, 2000 interfaces (sim)
 - Win 2003 Ent x64 SP2
 - 926 managed nodes (sim)
 - ovjboss takes 1.2G memory

Image Name	PID	User Name	CPU	Mem Usage
nmsdbmgr.exe	2088	SYSTEM	00	5,280 K
nnmtrapd.exe	4220	SYSTEM	00	4,228 K
ovet_agent.exe	228	SYSTEM	00	7,796 K
ovet_agent.exe	648	SYSTEM	00	7,772 K
ovet_agent.exe	748	SYSTEM	00	7,792 K
ovet_agent.exe	856	SYSTEM	00	7,832 K
ovet_agent.exe	1112	SYSTEM	00	7,920 K
ovet_agent.exe	1764	SYSTEM	00	7,780 K
ovet_agent.exe	1960	SYSTEM	00	7,788 K
ovet_agent.exe	2124	SYSTEM	00	7,792 K
ovet_agent.exe	2224	SYSTEM	00	7,796 K
ovet_agent.exe	2340	SYSTEM	00	7,788 K
ovet_agent.exe	2616	SYSTEM	00	7,772 K
ovet_agent.exe	2776	SYSTEM	00	7,808 K
ovet_agent.exe	2892	SYSTEM	00	7,808 K
ovet_agent.exe	3012	SYSTEM	00	7,820 K
ovet_agent.exe	3144	SYSTEM	00	7,812 K
ovet_agent.exe	3272	SYSTEM	00	7,804 K
ovet_agent.exe	3280	SYSTEM	00	7,812 K
ovet_agent.exe	3748	SYSTEM	00	7,796 K
ovet_agent.exe	3856	SYSTEM	00	7,808 K
ovet_agent.exe	3956	SYSTEM	00	7,772 K
ovet_agent.exe	3968	SYSTEM	00	7,808 K
ovet_agent.exe	4068	SYSTEM	00	7,828 K
ovet_agent.exe	4092	SYSTEM	00	7,808 K
ovet_agent.exe	5936	SYSTEM	00	8,112 K
ovet_agent.exe	6128	SYSTEM	00	7,804 K
ovet_agent.exe	6140	SYSTEM	00	7,804 K
ovet_bridge.exe	4872	SYSTEM	00	6,252 K
ovet_dhshmp.e...	5164	SYSTEM	00	41,740 K
ovet_discoA.exe	5004	SYSTEM	00	13,536 K
ovet_discoC.exe	5176	SYSTEM	00	12,372 K
ovet_helpserv....	4992	SYSTEM	00	7,996 K
ovjboss.exe	2208	SYSTEM	01	385,724 K
ovspmd.exe	860	SYSTEM	00	4,756 K
pmd.exe	3476	SYSTEM	00	6,132 K
postgres.exe	2656	nmsdbmgr	00	8,788 K
postgres.exe	3208	nmsdbmgr	00	2,172 K
postgres.exe	3764	nmsdbmgr	00	5,148 K
postgres.exe	3776	nmsdbmgr	00	2,412 K
postgres.exe	5360	nmsdbmgr	00	5,084 K
postgres.exe	5400	nmsdbmgr	00	3,376 K
postgres.exe	7476	nmsdbmgr	00	5,668 K
postgres.exe	9884	nmsdbmgr	00	3,840 K

Troubleshooting

- Process Log files
 - %INSTALL_DIR%\Data\Log
 - nmsdbmgr.log, ovjboss.log, ovspmd.log, etc

```
jvmArgs[25]: -XX:+HeapDumpOnCtrlBreak
jvmArgs[26]: -XX:+HeapDumpOnOutOfMemoryError
jvmArgs[27]: -XX:HeapDumpPath=nnm.hprof
jvmArgs[28]: -Dsun.rmi.dgc.client.gcInterval=3600000
jvmArgs[29]: -Dsun.rmi.dgc.server.gcInterval=3600000
jvmArgs[30]: -Dpython.verbose=error
jvmArgs[31]: -Djboss.http.port=80
jvmArgs[32]: -Djboss.jnp.port=1099
jvmArgs[33]: -Djboss.https.port=443
jvmArgs[34]: -Djboss.rmi.port=1098
jvmArgs[35]: -Djboss.jrmp.port=4444
jvmArgs[36]: -Djboss.pooled.port=4445
jvmArgs[37]: -Djboss.socket.port=4446
jvmArgs[38]: -Djboss.bisocket.port=4457
jvmArgs[39]: -Djboss.ws.port=8083
jvmArgs[40]: -Djboss.ejb3.port=3873
appArgs[0]: -c
appArgs[1]: nms
appArgs[2]: -b
appArgs[3]: 0.0.0.0
/DE/COMMON/util_libs/src/ovutil/ExecJava.cpp:355 Can't create Java Virtual Machine: JNI_CreateJavaVM()
returned -4
```

Troubleshooting

- Windows ovpl output to a file:
 - Use complete path to perl and program to work around this:
C:\Program Files\HP
OpenView\support>"%NnmInstallDir%\nonOV\perl\bin\perl.exe"
"%NnmInstallDir%\support\dumpstatepollerjmx.ovpl" -all >a.txt
- nnmprintcounts.ovpl (support dir)
 - Equivalent of legacy ovtopodump -L
- nnmcapture.ovpl (support\mibcapture dir)
 - Captures agents responses to SNMP OID's in oids.txt file for nodes in hosts.txt file
-

MIMIC SNMP Simulator

- 20,000 SNMP agents in one workstation
- Easy to compare / migrate from NNM 7 to NNM 8i
- SNMPv1, v2 and v3, RMON 2, IPv6
- Cisco/IOS, TL1, IPMI, TFTP, DHCP, ToD, Telnet, SSH
- Network recording tools
- Platforms – Windows, Solaris and Linux
 - 32 and 64 bit support
- Languages – Java, Tcl/Tk, Perl, C++

MIMIC Simulator

Control/populate SNMP agent data

Discover/model existing agents

MIMICView - localhost:9797 -> uwe -> d:/mimic/priv320.interop/ -> ovforum2.cfg -> Interop 98 LV

File Edit View Agent Run Simulation MIB Wizard Help

Number	Address	Read Commun	PDUs/s	Description	Status
161	45.118.0.1	public	53	Cisco Internetwork Operating System Software ..IOS (tm) RSP Software (RSP-JSV-M), Experime	Running
162	45.118.0.2	public	46	Image: dev/amyb/13.10/29 Created on Wed Sep 9 10:43:35 EDT 1998. - sim-45.118.0.2, 1	Running
163	45.120.0.1	public	51	Cisco Internetwork Operating System Software ..IOS (tm) RSP Software (RSP-JSV-M), Experime	Running
164	45.120.0.2	public	14	Image: dev/amyb/13.10/29 Created on Wed Sep 9 10:43:35 EDT 1998. - sim-45.120.0.2, 1	Running
165	45.122.0.1	public	13	Model: CoreBuilder 3500, h/w rev: 0.0, s/w rev: 02-00-00-C2 - sim-45.122.0.1, 1	Running
166	45.122.0.11	public	0	Model: CoreBuilder 3500, h/w rev: 02, s/w rev: 01-02-00-C2 - sim-45.122.0.11, 1	Halted
167	45.122.0.2	public	0	Cisco Internetwork Operating System Software ..IOS (tm) RSP Software (RSP-JSV-M), Experime	Halted
168	45.128.0.1	public	26	Accelar-1200 (1.3.0) - sim-45.128.0.1, 1	Running
169	45.128.0.2	public	44	Image: dev/fax/12.10/ Created on Mon Mar 16 14:58:57 EST 1998. - sim-45.128.0.2, 1	Running
170	45.130.0.1	public	3	Image: dev/fax/12.10/ Created on Mon Mar 16 15:11:54 EST 1998. - sim-45.130.0.1, 1	Paused
171	45.130.0.2	public	0	Cisco Internetwork Operating System Software ..IOS (tm) C5RSM Software (C5RSM-JSV-M), Exi	Paused
172	45.132.0.1	public	0	Accelar-1200 (1.3.0) - sim-45.132.0.1, 1	Paused
173	45.132.0.2	public	0	Image: dev/fax/12.10/ Created on Mon Mar 16 14:58:57 EST 1998. - sim-45.132.0.2, 1	Paused
174	45.134.0.1	public	0	Image: dev/fax/12.10/ Created on Mon Mar 16 14:58:57 EST 1998. - sim-45.134.0.1, 1	Running
175	45.134.0.2	public	0	Cisco Internetwork Operating System Software ..IOS (tm) C5RSM Software (C5RSM-JSV-M), Exi	Stopped
176	45.136.0.11	public	0	FORE Power Hub - sim-45.136.0.11, 1	Stopped
177	45.136.0.2	public	0	Cisco Internetwork Operating System Software ..IOS (tm) C5RSM Software (C5RSM-JSV-M), Exi	Stopped

277 PDUs/sec

Start Exploring - D:\mimic\400... Windows NT Task Mana... MIMICView Log /tmp/mi... Cygwin32 Beta 19 MIMICView - localho... 1:37 PM

Summary

- Features/functionality - will trickle in over time
- Migration - we'll miss you *ovw*
- Performance SPI - vast improvements but its an add-on
- Scalability/Distribution – mostly good news
- SOA – let's all get on the Service Bus
- jboss – popular, good DB citizen, open, but footprint?
- MIMIC Simulator – a big help in migration

- Thanks for attending!

www.fognet.com

www.gambitcomm.com

Backup Slides

NNM 8i Licensing

NNM v7.x

Product Licensing

- Advanced Edition + Standard Edition
- 250, 1000, 5000, Unlimited Node Packs (by monitored device)
- SPIs: varies (lump sum, phone packs)

Example

- 1 each NNM AE 1000 Node Pack LTU
- 1 each NNM AE 250 Node Pack LTU

NNMi

Core Product Licensing

- NNMi (today), NNMiadv (future)
- 50 node pack with quantity breaks (by discovered device)
- Unlimited license (7.x update and CSL only)
- i SPIs: 50 node packs

Example

- 25 each NNMi 50 Node Pack LTU

Backup Slides:

- Directories on Windows:

- Base:

- C:\Program Files\HP OpenView\

- C:\Program Files (x86)\HP Openview\

- Online Documentation Web URL:

- Program Files/HP OpenView/nonOV/jboss/nms/server/nms/tmp/
deploy/tmp51831nmDocs_en-exp.war/index.html

- 32 Bit Installation:

- Touch %TEMP%\bypass64check

- Consider C:\Program Files\HP OpenView\contrib\source\pthreads.zip