



Citrix Network Manager (NM) Overview

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Document Overview

Citrix Network Manager (NM) is a component of the Citrix MetaFrame XP™e application server solution. NM allows administrators to monitor and manage Citrix MetaFrame server farms through third-party SNMP management consoles, including HP OpenView, Tivoli NetView, and CA Unicenter. Network Manager includes a Citrix agent on each MetaFrame server and a console plug-in on the management console that use the simple network management protocol (SNMP) to communicate and perform actions on the MetaFrame servers such as server reboots and session logoffs.

The purpose of this document is to describe the Citrix Network Manager (NM) architecture and how the Network Manager components interact with SNMP components, as well as the Citrix management console. Additionally, the document provides details on the benefits of Network Manager in an enterprise environment and how it complements other components of the Citrix infrastructure.

Network Manager Architecture

The Network Manager architecture is based on the SNMP protocol and the Microsoft SNMP Agent architecture built into Microsoft Windows 2000. This section first describes the basics of SNMP, followed by a description of the Network Manager integration.

Simple Network Management Protocol (SNMP)

The Simple Network Management Protocol is a component of the TCP/IP protocol suite that is used specifically for managing and monitoring network devices. SNMP communicates using UDP packets and therefore is a connectionless protocol that does not guarantee packet delivery. The SNMP architecture consists of three basic components:

- ✓ **Managed Device:** A managed device is any physical network component that contains an SNMP agent. Managed devices can be routers, hubs, switches, servers, workstations, and printers.
- ✓ **Agent:** The agent is the software component of the managed device that translates management information into SNMP format and then sends SNMP communications over the network so that they can be captured by the Network Management System.
- ✓ **Network Management System:** The Network Management System (NMS) is an application that captures SNMP communications and provides the user interface to this information for all managed devices that are being monitored.

The agent translates management information for a specific managed device into SNMP format using a hierarchically organized structure called the management information base (MIB). The MIB provides a standardized mechanism for communicating management information from any device using SNMP. The MIB must also be made available to the NMS in order for the NMS to interpret the SNMP messages received from the agent. Vendors of the managed devices provide the MIB for any managed device that contains an SNMP agent. The Citrix MIB is described in further detail later in this document.

SNMP is a distributed-management protocol, which means that the agent and NMS components do not depend on each other. While both components are necessary to properly manage a network, each component does not rely on the other to function properly. For example if an agent goes down, the NMS will still operate, and vice versa.

Agents and the NMS communicate with each other by using one of the following operations:

- ✓ **Read:** The NMS requests management information from the agent.
- ✓ **Write:** The NMS sends management information to be set by the agent on the managed device.
- ✓ **Trap:** An agent sends asynchronous alert notifications to the NMS based on events that occur on the managed device. These notifications are then reported by the NMS as alarms through the NMS application interface.

The SNMP agents receive and generally also send messages over port 161. The NMS receives traps over port 162. The following diagram depicts the SNMP architecture components and communication flow:

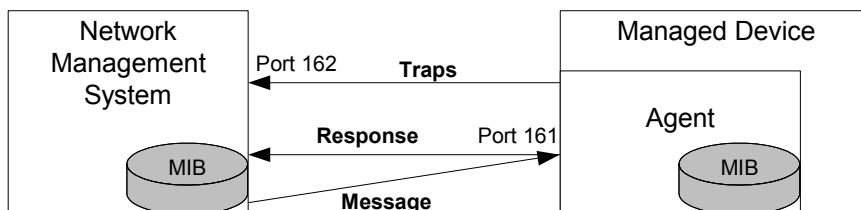


Figure 1 - SNMP Architecture

SNMP uses very simple authentication, which provides only some security. A community name is used to identify a group of agents that can communicate with each other and with the NMS. However, no password is required. Agents can be configured to only send SNMP messages to a specific NMS. However, if a community is set up to allow writes, there is a security risk that a foreign device will be able to set management information on managed devices if it knows the community name. To eliminate this security risk, the community can be configured as read-only so that the NMS cannot be used to set management information on managed devices. For Citrix MetaFrame servers, the Citrix Management Console (CMC) can be installed on the NMS and used to securely update MetaFrame data.

Network Manager Components

Citrix Network Manager (NM) provides the following components that integrate with the SNMP architecture:

- ✓ Network Manager Plug-In: NM provides plug-ins that integrate Citrix management components into popular third-party network management applications such as HP OpenView, Tivoli NetView and CA Unicenter.
- ✓ MFAgent: The MFAgent is the Citrix SNMP agent that acts as a gateway between the Citrix IMA infrastructure and the Microsoft SNMP Agent on each MetaFrame server.
- ✓ MetaFrame MIB: The MetaFrame MIB provides the information structure necessary to interpret Citrix management information sent over SNMP.

To better understand how these components interact, the following diagram shows the relationships between each of these components:

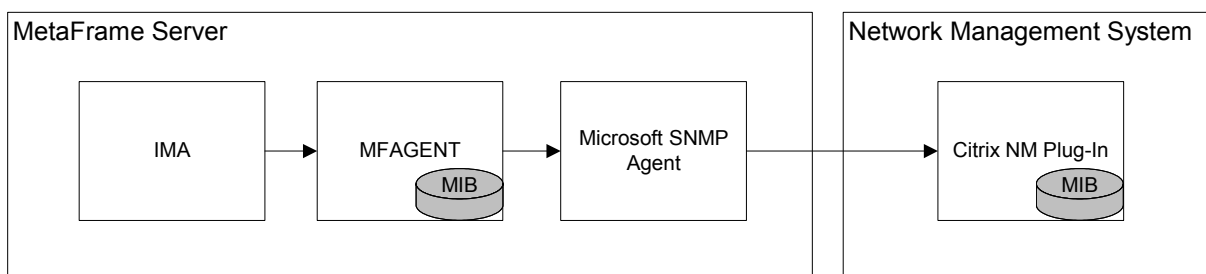


Figure 2 - Network Manager SNMP Integration

The Citrix IMA system loads the MFAgent component during startup. When information is requested by the NMS over SNMP, NMS sends the request to the Microsoft SNMP Agent on the MetaFrame server. The MFAgent interprets the request from the Microsoft SNMP Agent, gathers the information from IMA, and translates the information into SNMP. The MFAgent then sends the SNMP response back through the Microsoft SNMP Agent to the NMS.

An SNMP trap is formed and sent by the MetaFrame server in the opposite direction as follows:

1. IMA monitors the MetaFrame server and forwards any alerts to the MFAgent.
2. The MFAgent translates the alert information from IMA format to SNMP and sends it on to the Microsoft SNMP Agent as a trap for delivery to the NMS.
3. The Citrix NM Plug-In within the NMS captures the SNMP message and displays the alert appropriately within the NMS.

The MetaFrame MIB is the structure that defines how MetaFrame traps are sent to the NMS and what the NMS can set on each MetaFrame server. The MetaFrame MIB is loaded into the NMS when the NM Plug-In is installed. The NMS also contains a MIB browser that allows the user to traverse MIB hierarchies. By default, only the standard Internet MIBs are loaded into the MIB browser. All other MIBs including the MetaFrame MIB must first be loaded into the MIB browser before it can be viewed. The MIB browser also allows the user to set values exposed through the MIB on the managed device. An example of a MIB browser with the MetaFrame MIB loaded is shown below.

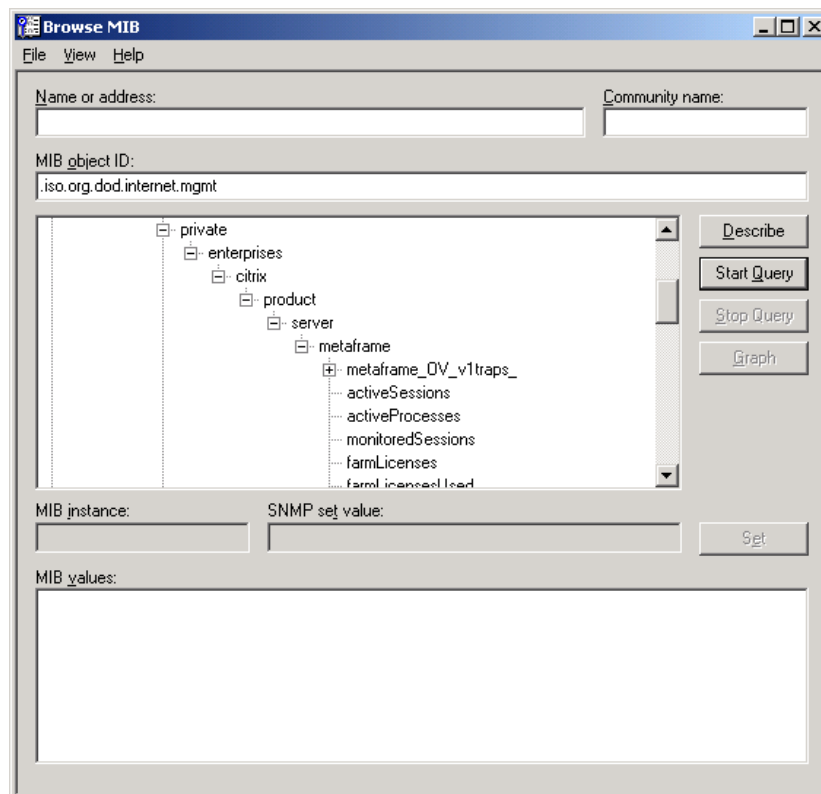


Figure 3 - MIB Browser with MetaFrame MIB Loaded

Network Manager Benefits

For a company that already utilizes a network management solution for managing their network devices, Network Manager provides an integrated solution for managing their MetaFrame server farm through the same interface. The Network Manager Plug-In is configured to also provide access to the Citrix Management Console (CMC) from the NMS, if the CMC has been installed on the NMS server.

Using the CMC, MetaFrame servers can be configured to send traps for the following MetaFrame events:

- ✓ Session Logon/Logoff: A trap can be configured for every user logon and logoff that occurs in the farm.
- ✓ Session Disconnect: A trap can be sent whenever a session is disconnected.
- ✓ Session Threshold Exceeded: A trap can be sent when the number of sessions exceeds a configurable limit.
- ✓ License Notification: A trap can alert administrators when the number of available connection licenses falls below a configurable percentage. A trap can also be sent when the number of available connection licenses returns above a configurable percentage.

Note: License notification can only be set at the farm level. All other traps can be configured at both the farm and the server level. These traps are configured from the SNMP tab in the server farm properties window of the CMC as shown below:

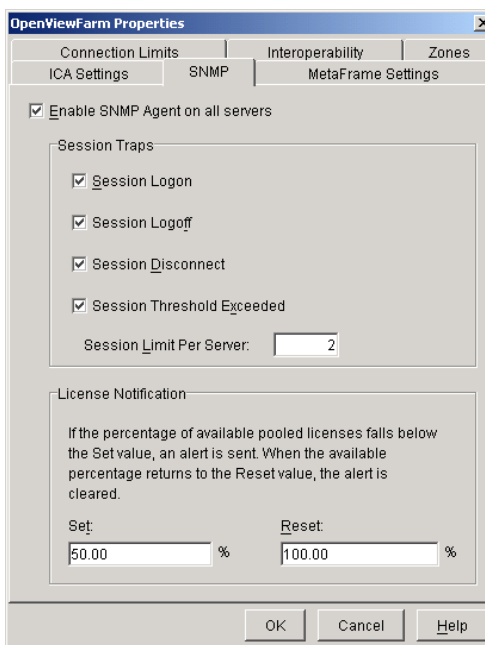


Figure 4 - SNMP Trap Configuration in the CMC

The Network Manager Plug-In also provides access to set the following information on MetaFrame servers when the community name is configured for Read-Write access:

- ✓ Terminate running processes.
- ✓ Logoff, disconnect, or reset a user's session.
- ✓ Send messages to logged-on users.
- ✓ Reboot MetaFrame servers.

Network Manager's alerts and monitoring capabilities complement Citrix Resource Manager's long-term data captures to provide information for both immediate and long-term needs. Network Manager collects and reports on a history of exception points, such as logons/logoffs and disconnects that can be used for issue tracking and prevention. Resource Manager records and tracks all specified data captured on the MetaFrame servers, not just exception points. Data from Resource Manager can be analyzed to determine usage trends and server utilization for future planning and expansion needs. Together, Resource Manager and Network Manager provide a complete, integrated management and monitoring solution for an enterprise MetaFrame server farm.

Summary

Citrix Network Manager uses the standard SNMP protocol to communicate information from servers in a MetaFrame farm back to third-party network management software solutions. Network Manager provides the ability to:

- ✓ Set specific information on MetaFrame servers from the NMS.
- ✓ Receive traps from MetaFrame servers and capture the alerts within the NMS.
- ✓ Manage the MetaFrame farm from an integrated user interface for enterprise customers that already use a third-party network management tool and would like to integrate Citrix farm management into this tool.

Network management using SNMP should be carefully planned in the scope of the enterprise. Too much monitoring can flood the network with unnecessary traffic. However, too little monitoring can lead to servers down too long after encountering a problem. MetaFrame server farm management with Network Manager provides a valuable component for accurately monitoring and managing a MetaFrame server farm as part of an enterprise network management solution.



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