Top-Down Network Design

Chapter Nine

Developing Network Management Strategies

1

Network Management

- Helps an organization achieve availability, performance, and security goals

- Helps an organization measure how well design goals are being met and adjust network parameters if they are not being met

- Facilitates scalability

  - Helps an organization analyze current network behavior, apply upgrades appropriately, and troubleshoot any problems with upgrades

Network Management Design

- Consider scalability, traffic patterns, data formats, cost/benefit tradeoffs
- Determine which resources should be monitored
- Determine metrics for measuring performance
- Determine which and how much data to collect

Proactive Network Management

- Plan to check the health of the network during normal operation, not just when there are problems

- Recognize potential problems as they develop

- Optimize performance

- Plan upgrades appropriately

Network Management Processes According to the ISO

- Fault management

- Configuration management

- Accounting management

- Performance management

- Security management

Fault Management

- Detect, isolate, diagnose, and correct problems
- Report status to end users and managers
- Track trends related to problems

Configuration Management

- Keep track of network devices and their configurations

- Maintain an inventory of network assets

- Log versions of operating systems and applications

Accounting Management

- Keep track of network usage by departments or individuals

- Facilitate usage-based billing

- Find abusers who use more resources than they should

Performance Management

- Monitor end-to-end performance

- Also monitor component performance (individual links and devices)

- Test reachability

- Measure response times

- Measure traffic flow and volume

- Record route changes

Security Management

- Maintain and distribute user names and passwords

- Generate, distribute, and store encryption keys

- Analyze router, switch, and server configurations for compliance with security policies and procedures

- Collect, store, and examine security audit logs

Network Management Components

- A managed device is a network node that collects and stores management information

- An agent is network-management software that resides in a managed device

- A network-management system (NMS) runs applications to display management data, monitor and control managed devices, and communicate with agents

Network Management Architecture

NMS

Agent

Agent

Agent

Management Database

Management Database

Management Database

Managed Devices
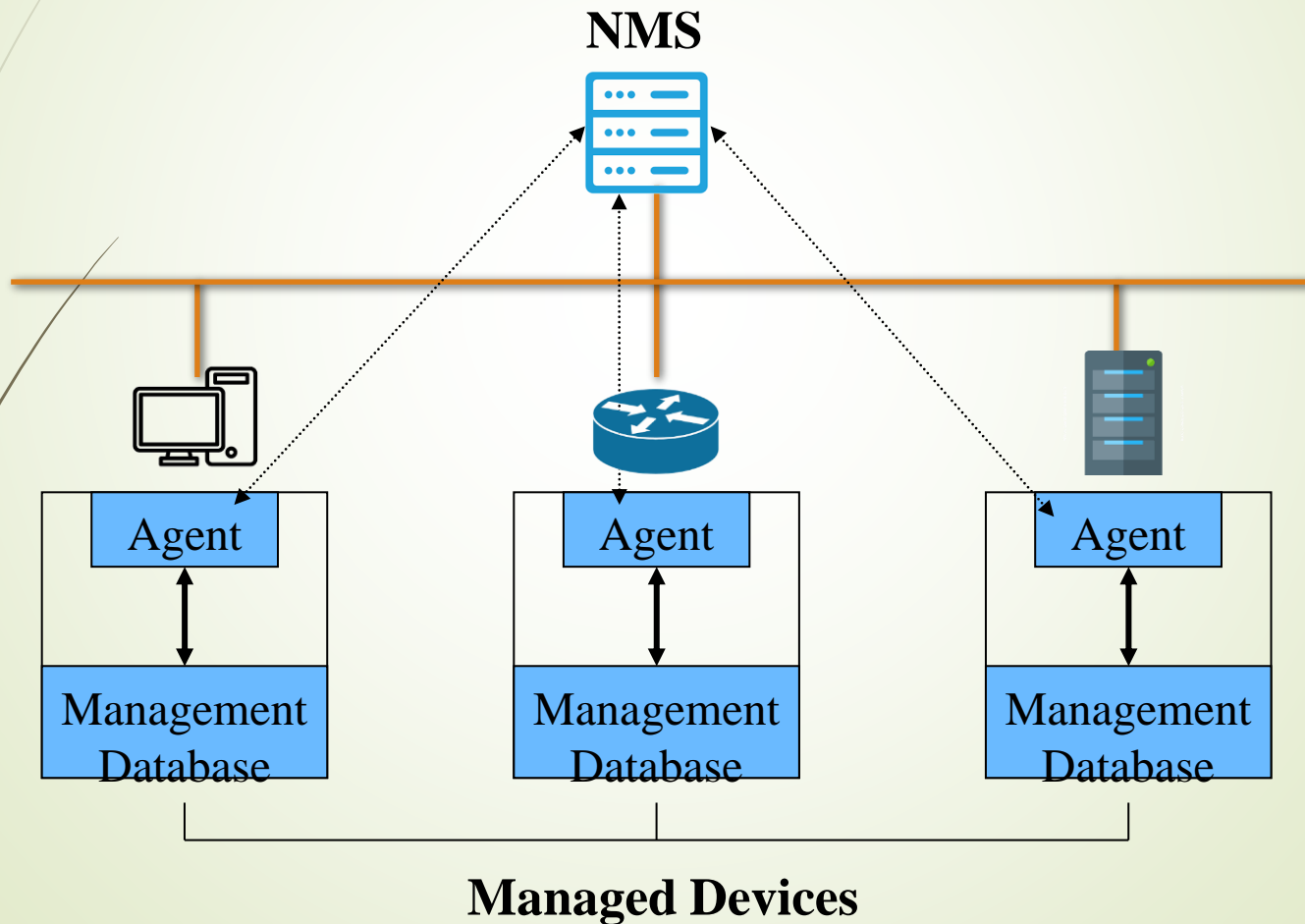
Architecture Concerns

- In-band versus out-of-band monitoring
  - In-band is easier to develop, but results in management data being impacted by network problems
- Centralized versus distributed monitoring
  - Centralized management is simpler to develop and maintain, but may require huge amounts of information to travel back to a centralized network operations center (NOC)

Simple Network Management Protocol (SNMP)

- Most popular network management protocol
  - SNMPv3 should gradually supplant versions 1 and 2 because it offers better authentication
  - SNMP works with Management Information Bases (MIBs)

Remote Monitoring (RMON)

- Developed by the IETF in the early 1990s to address shortcomings in standard MIBs

  - Provides information on data link and physical layer parameters

  - Nine groups of data for Ethernet

  - The statistics group tracks packets, octets, packet-size distribution, broadcasts, collisions, dropped packets, fragments, CRC and alignment errors, jabbers, and undersized and oversized packets

Cisco Tools

- Cisco Discovery Protocol

  - With the show cdp neighbors detail command, you can display detailed information about neighboring routers and switches, including which protocols are enabled, network addresses for enabled protocols, the number and types of interfaces, the type of platform and its capabilities, and the version of Cisco IOS Software running on the neighbor.

- NetFlow Accounting

  - An integral part of Cisco IOS Software that collects and measures data as it enters router or switch interfaces

Summary

- Determine which resources to monitor, which data about these resources to collect, and how to interpret that data

- Develop processes that address performance, fault, configuration, security, and accounting management

- Develop a network management architecture

- Select management protocols and tools

Review Questions

➧ Why is network management design important?

➧ Define the five types of network management processes according to the ISO.

➧ What are some advantages and disadvantages of using in-band network management versus out-of-band network management?

➧ What are some advantages and disadvantages of using centralized network management versus distributed network management?