Network Management and Troubleshooting—a Guide for Administrators and Users
Presentation Contents

- Network Planning and Management
- Network Environmental Considerations
- Network Troubleshooting
Network Planning and Management

- **Physical Layer Planning**
  - Create physical and logical maps of LAN/MAN/WAN
  - Drop cables down walls, install wallplates
  - Map out where all cables start and end
  - Map out location of all network equipment
Network Planning and Management

- Planning ahead
  - Allow for ports on hubs for every network interface card, use expandable multimedia hubs with redundant power supplies
  - Be sure to order the proper interface, router, and software
  - Recommend stocking 10% of critical network components as spares
SNMP—What is it?

- A protocol for Internet network management services.
- Formally specified in a series of related RFC documents.
SNMPv2

- SNMPv2 is a revised protocol which includes improvements to SNMP in the areas of:
  - Performance
  - Security
  - Confidentiality
  - Manager-to-manager communications.
SNMP Data

- Stored as a Management Information Base (MIB)
- A MIB is a collection of objects which describe an SNMP manageable entity, eg router
- MIB-I was the first SNMP MIB accepted as standard
SNMP Data

- MIB-II added some much-needed objects, and has become the standard SNMP MIB
- SNMPv2 expands upon MIB-II with new groups and objects, and is therefore not MIB-II but includes MIB-II
SNMP Data Structures

- MIB structure must meet 2 objectives:
  - The object or objects used to represent a particular resource must be the same at each node
  - A common scheme for representation must be used to support interoperability

- Met by a common Structure of Management Information (SMI)
Enterprise MIB’s

- A MIB created by an enterprise [company] to define a set of objects that are related to some product[s] from this enterprise
- The enterprise agrees to make the MIB public so that network managers can use it to manage products from this enterprise.
Network Management Model

- **SNMP**: Simple Network Management Protocol
- **MN**: Managed Node (SNMP agent)
- **NMS**: Network Management Station
- **NMP**: Network Management Protocol
Network Management Model

The SNMP agent is responsible for the following duties:

- Collecting and maintaining information about itself and its local environment
- Responding to manager commands to alter the local configuration or operating parameters
SNMP Architecture

Network Management Station
Text-based
User Interface

SNMX
(snmp application)

SNMP Agent

MIB

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Network Planning and Management

- Factors to consider with Network Management
  - Cost (hardware and software)
  - Integration (will it work with existing system/network?)
  - Modular Design (all in 1 box, what about failures?)
  - Monitoring - what will this package do? limitations?
  - Enhancement - will more staff be required/additional training
Network Planning and Management

- **Products Available**
  - Cable Plant Management Systems
  - Help Desk Software
  - Network Data Collection Software, eg SNMP
  - Network Monitoring Hardware, eg Sniffer, LanAlyzer
Environmental Considerations

- **Uninterruptable Power Supply (UPS)**
  - Allow time for orderly shutdown in case of utility failure
  - Advisable for most important servers and network equipment
  - Sufficient power for all hosts - allow 50% ceiling over estimated requirements
  - Put each server on different circuit to minimize impact of failure
Environmental Considerations

- **Standby Power Supply (SBS)**
  - Protect smaller network equipment from surges, brownouts and short failures.
  - Advisable for bridges, smaller routers and servers

- **Surge Protectors**
  - Provide some protection against power spikes
  - Advisable for anything plugged into wall socket
Environmental Considerations

- **Dust**
  - Can clog cooling vents and cause overheating
  - Control by vacuuming regularly

- **Temperature**
  - Avoid extremes, particularly heat
  - Computer rooms should be temperature controlled
Environmental Considerations

- **Moisture**
  - Keep cables away from likely areas of water accumulation (basements, conduit)
  - Excessive dampness/humidity will corrode connectors

- **Electro Magnetic Interference (EMI)**
  - Keep equipment away from copier rooms, elevator/electrical shafts
  - Route cables away from fluorescent light fixtures, particularly unshielded cabling
Environmental Considerations

- Stability
  - How often do people move?
  - Does network design allow new users to be up and running quickly
  - Will unplugging users bring whole LAN down
Environmental Considerations

- Dispersion
  - Consider MAN/WAN options for widely dispersed users

- Distribution
  - How are users grouped - can the LAN be bridged or routed according to distribution of workload?
Environmental Considerations

- Security/Physical Integrity
  - Are cable runs protected from accidental breakage during construction periods
  - Does network topology allow easy connection/disconnection of users
  - Use tie wraps to secure trunk and AUI cables
  - Cables should not be bent too much - generally between 4 and 20 times cable outside diameter
Environmental Considerations

- **Conduits**
  - Will existing conduit support expansion of the cabling
  - Is conduit water proof
  - Does it meet local building codes?

- **Fire Codes**
  - Use Plenum rated cable for ducts or risers

- **Accessibility**
  - Can technicians access cables
Network Troubleshooting — Thick Ethernet Cables

- Check that the transceiver (AUI) cable is securely attached at both ends
- Make sure the transceiver is tapped to the trunk cable
- Check that the cable is properly terminated at both ends
- Inspect the trunk for twists or bends
Network Troubleshooting — Thin Ethernet Cables

- Check all BNC and T-Connectors
- Check both terminators
- T connectors should be directly connected to NIC’s
- Inspect and check all 10 Base T cables for opens/shorts
Network Troubleshooting — Twisted Pair Cables

- Check link LED on hub port
- Inspect RJ45 connectors for correct pinouts and wire connections
- Check trunk port for activity
- Switch cable to different port
- Does port activity LED on Hub flash when machine tries to transmit?
Network Troubleshooting — NIC Testing

- Power off machine, remove power cable
- Disconnect all cables from card
- Open case to allow access to card
- Check for proper installation of the card in the expansion slot
- Inspect the card for proper dip/jumper settings, if applicable
Network Troubleshooting — NIC Testing

- Ensure that all card settings (INT, Base I/O) match driver settings
- Reinstall card and cables
- Boot PC and run diagnostics, including external loop back diagnostics, check all settings
- Swap NIC for one known to work
- Remove all other expansion cards