NETWORK MANAGEMENT

The main purpose of network management is to monitor, manage, and control a network. A network can be structured with many links, routers, servers, and other physical-layer devices, which can be equipped with many network protocols that coordinate them. Imagine when thousands of such devices or protocols are tied together by an ISP and how drastic their management can become to avoid any interruptions in routine services. In this context the purpose of network management is to monitor, test, and analyze the hardware, software, and human elements of a network and then to configure and control those elements to meet the operational performance requirements of the network.

Figure 5.10 illustrates a simple network management scenario in which LANs connect to the Internet. LAN 1 is dedicated to the network administrator facilities. The network administrator can periodically send management packets to communicate with a certain network entity. A malfunctioning component in a network can also initiate communication of its problem to the network administrator.

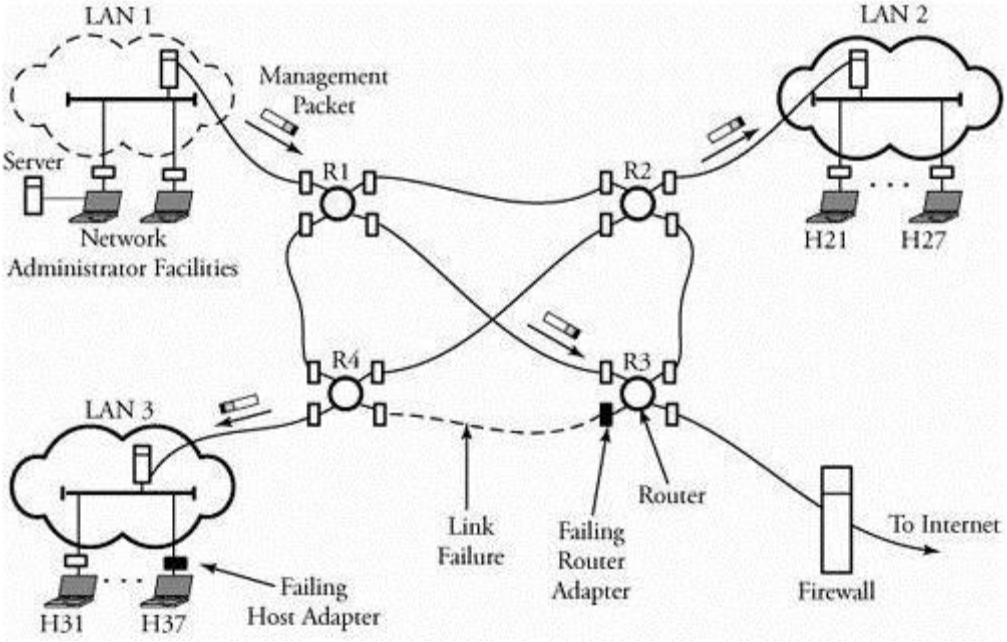

Figure 5.10. Simple network management in a scenario of LANs connecting to the Internet

Network management tasks can be characterized as follows:

- QoS and performance management. A network administrator periodically monitors and analyzes routers, hosts, and utilization of links and then redirect traffic flow to avoid any overloaded spots. Certain tools are available to detect rapid changes in traffic flow.
- Network failure management. Any fault in a network, such as link, host, or router hardware or software outages, must be detected, located, and responded to by the network. Typically, increased checksum errors in frames

is an indication of possible error. Figure 5.10 shows adapter failures at router R3 and host H37; these failures can be detected through network management.

- Configuration management. This task involves tracking all the devices under management and ensuring that all devices are connected and operate properly. If there is an unexpected change in routing tables, a network administrator wants to discover the misconfigured spot and reconfigure the network before the error affects the network substantially.
- Security management. A network administrator is responsible for the security of its network. This task is handled mainly through firewalls. A firewall can monitor and control access points. In such cases, the network administrator wants to know about any intrusion from a suspicious source to the network. For example, a host in a network can be attacked by receiving a large number of SYN packets.
- Billing and accounting management. The network administrator specifies user access or restrictions to network resources and issues all billing and charges, if any, to users.

Locating a failing point, such as an adapter failure at a host or a router, can be done by appropriate network management tools. Normally, a standard packet format is specified for network management.

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