

OSI Model for Network Management Systems (NMS)

By Hector Velasco

A growing number of organizations depend significantly on their networks and on the capacity of taking decision based on the status of their networks. This require them to have the means to manage and monitor such networks. An interruption of service in a network can cost hundreds of thousands of dollars to the enterprise that owns the network. Same applies for satellite networks that carry voice, data and television content. When every second of time network counts (\$3 million for 30 seconds in the Super Bowl), the system must be monitored continuously.

The International Standards Organization (OSI) has created a model for network management. The model consists of 5 functional areas, sometimes referred as FCAPS.

- Fault management
- Configuration management
- Accounting management
- Performance management
- Security management

Fault - This function is what first comes to mind when thinking of managing a network. The objective is to detect, log and alert of any issues that may affect the network and ultimately the service. A proper NMS should analyze trends and using statistical tools should be able to predict problems.

When a problem occurs in a component connected to the network, a message is sent to the operator over the network often using a protocol such as SNMP. Such message should trigger either a manual or automatic action. For example a low C/N message at a remote site in a satellite network could trigger an increment in power output.

Fault logs should be further analyzed with statistical tools in order to determine the service level of the network or a sub-network. Also useful to determine performance of specific components in the network.

Configuration – The goal of the configuration function is to track and store the versions of hardware and software in the network. Also responsible for provisioning circuits in a non-switched network. The configuration of different components could be done locally or remotely, but ultimately must be tracked and stored by the NMS.

Accounting - The main purpose of this function is the billing of the services offered, whether they are to internal or external customers in the organization. It also gathers statistics for the usage of the network resources i.e. power, bandwidth, circuits and other resources.

Performance – This is a very important part of the network since its goal is to maximize the resources in the network so it runs in a more efficient way. The NMS has to monitor, assess and adjust the resources available so level agreements can be met. Customers want to minimize costs, minimize manual intervention, increase reliability and efficiency.

Security - Deals with the access control to resources and alerting if the access is compromised. Some NMS can even call authorities when a problem arises or when intrusion is detected, even physical intrusion.

Satellite communications are no longer independent from other technologies and indeed several technologies are now converging and all of them need to be used in order to monitor and control a network. Nowadays most networks are connected via TCP/IP protocol over a LAN/WAN, even when in some cases alarms are generated by dry contacts.

Due to the advances in technology and services, current satellite NMS need to handle Multi Protocol Switching (MPLS), protocols oriented towards HDTV such as H.264 and MPEG-4. Further, interoperability between satellite NMS and terrestrial networks are increasingly critical not just in the commercial environment but in government applications such as the ones for DoD.

Satellite network managers can not afford to seek solutions that are targeted purely to satellite networks because a true NMS is meant to cross boundaries.