

NETWORK MANAGEMENT

FCAPS

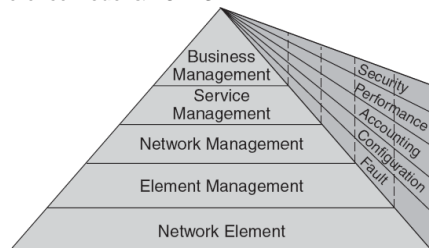
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NETWORK MANAGEMENT

- TMN (Telecommunication Management Network) Reference Model & FCAPS



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NETWORK MANAGEMENT

- TMN Reference Model & FCAPS

*FCAPS have different tasks at each Layer

SML(Service Management Layer):
Manage the services offered to the customers e.g., meeting customer service levels, service quality, cost and time-to-market objectives.

EML(Element Management Layer):
Manage the elements comprising the networks and systems.



TMN Five Layered Architecture

BML(Business Management Layer):
Manage the overall business, e.g., achieving return of investment, market share, employee satisfaction, community and government goals.

NML(Network Management Layer):
Manage the network and systems that deliver those services, e.g., capacity, diversity, and congestion.

NEL(Network Element Layer):
Switches, transmission, distribution systems, etc...

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TMN Reference Model & FCAPS
Important layers.

Element Management Layer (EMS)

The element management layer is concerned with managing the **individual devices** in the network and keeping them running.

This includes functions to view and change a network element's configuration, to monitor alarms and events send from elements, and instructing network elements to run self-tests. Note, that the element management layer does not cover functions that deal with ensuring overall network integrity.

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TMN Reference Model & FCAPS
Important layers.

Network Management Layer (NMS)

The network management layer involves managing relationships and dependencies between network elements, generally required to maintain end-to-end connectivity of the network. This layer is concerned with keeping the **network running as a whole**.

In this cases, the network management layer involves ensuring that data flows across the network and reaches its destination with acceptable throughput and delay.

a network management task is the management of a network connection as a whole—for instance, setting it up and monitoring it..

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TMN Reference Model & FCAPS
Important layers.

Service Management Layer

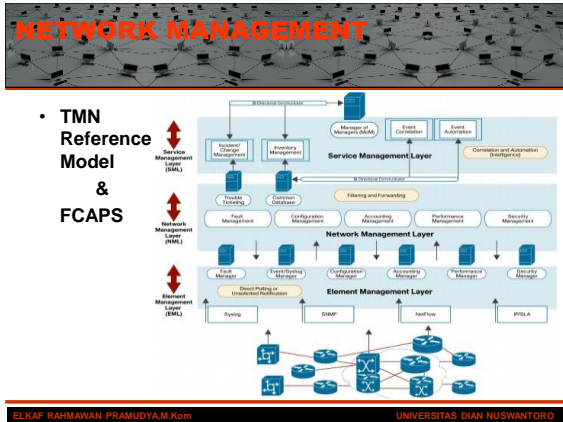
Service management is concerned with **managing the services** that the network provides and ensuring that those services are running and functioning as intended.

For example, when a customer orders a *phone service*, the service needs to be activated and be managed. For activating a phone service, this may require a number of operations that need to be carried out across the network so that the service is activated: A phone number must be allocated. The company directory must be updated etc. Later, the user might call the service help desk and complain that the service is not working properly. Troubleshooting the service will then be required to identify the root cause of the problem and solve it.

These service-related tasks build on the functionality that is provided by the network management layer.

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F-Fault

The goal

early fault recognition, isolate of negative effect, correct and log faults that occur in the network to assist improvement

- faults that occur in the network, (equipment or software failures, communication services)
- concerned with monitoring the network to ensure that everything is running smoothly and reacting when this is not the case.



F-Fault

includes following:

- Network monitoring, including basic alarm management as well as more advanced alarm processing functions
- Fault diagnosis, root cause analysis, and troubleshooting
- Maintaining historical alarm logs
- Trouble ticketing
- Proactive fault management

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C - Configuration

functionality to perform operations that will deliver and modify configuration settings to equipment in the network.

The goals :

- to gather and store configurations from network devices (this can be done locally or remotely).
- to simplify the configuration of the device
- to track changes that are made to the configuration
- to configure ('provision') circuits or paths through non-switched networks
- to plan for future expansion and scaling

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C - Configuration

cover the following topics:

- Configuring managed resources, (whether they are network equipment or services running over the network)
- Auditing the network and discovering what's in it
- Synchronizing management information in the network with management information in management applications
- Backing up network configuration and restoring it in case of failures
- Managing software images running on network equipment

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A - Accounting

Accounting management is all about the functions that allow organizations to collect revenue and get credit for the communication services they provide, and to keep track of their use. It is hence at the core of the economics of providing communications services.

this involves collecting such network user data as link utilization, disk drive or data storage usage, and CPU processing time.

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Accounting for Communication Service Consumption

In general, usage data is based on volume, duration, and/or quality. Examples of accounting measures are megabytes of data traffic, minutes of phone calls, number of service transactions, and use of premium or guaranteed services versus best-effort services.

Accounting Management as a Service Feature

Flexibility in accounting management can lead to very sophisticated service offerings, such as having different charges for "family and friends" or different charges for calls that are made between customers on the same network versus to customers on other networks (on-net and offnet calls), to name a few examples.

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P - Performance

In view of investments made to set up the network, this examines and monitors the current network efficiency and plans ahead for future changes or upgrades.

While constantly monitoring the health of the network and searching for trends, network parameters are tracked and logged include data transmission rate (throughput), error rates, downtime/uptime, use-time percentages and response time to user and automated inputs or requests

Performance Metrics

▪ Throughput

measured by a number of units of communication performed per unit of time.

▪ Delay

measured in a unit of time

▪ Quality

in many ways also performance related and can be measured differently, depending on the networking service

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• S - Security

authenticated and authorized access to the network as well as encryption of data, i.e. controlling all access and securing all data. securing your network from threats, such as hacker attacks, the spread of worms and viruses, and malicious intrusion attempts.

security of management

Security of management deals with ensuring that management operations themselves are secure.

A big part of this concerns ensuring that access to management is restricted to authorized users.

Management of Security

Management of security involves managing security of the network itself, as opposed to security of its management.

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