TMN

(Telecom Management Network) - Standard

TMN Definition

- The TMN provides a framework
  - Achieving interconnectivity and communication across heterogeneous operating systems and Telecomm networks.
  - TMN was developed by the ITU

Motivation

- The telecom industry is seeing rapid and ongoing change.
- With emerging technologies, deregulation, and increased consumer demand, companies are presented with wide range of opportunities and challenges.
  - As companies unify their networks and systems, they must merge new technologies and legacy systems
    - This is not an easy task, as companies works with analog and digital systems, multiple vendor equipment's, different types of subnetworks and varied management protocols.

TMN Standard

- TMN is defined in the ITU, M.3000 recommendation series.
  - When telecom networks implement the TMN definitions, they become interoperable, even when interacting with the networks and equipment of other telecom service providers.
    - Interoperability can be achieved across all managed networks.
    - TMN uses Object Oriented principles and standard interfaces to define communication b/w managed entities in a network.
    - The standard management interface for TMN is called Q3 interface.

TMN Architecture and interfaces

- These are defined in ITU M.3000 recommendation series build on existing OSI standards. The standard includes,
  - CMIP (common management information protocol)
    - Defines management services exchanged between peer entities.
  - GDMO(guideline for definition of managed objects)
    - Provides templates for classifying and describing managed resources.
  - ASN.1 (Abstract Syntax Notation One)
    - Provides rules for data types.
  - OSI reference Model
    - Defines 7 layers of OSI reference Model.

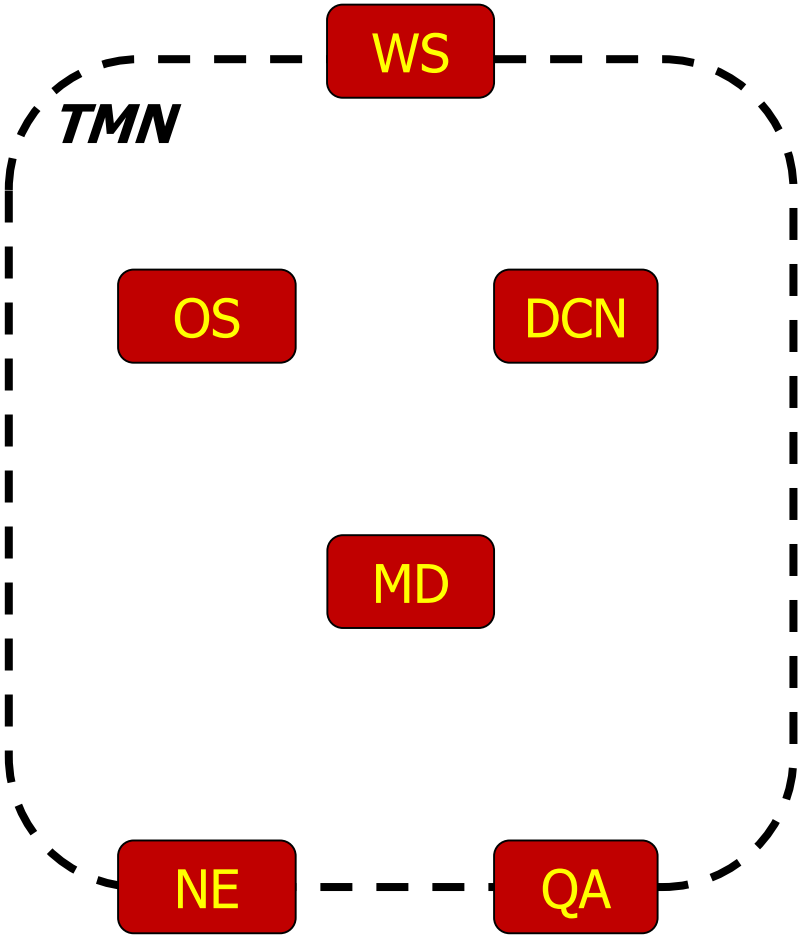
TMN, OSI and Management

- TMN is based on the OSI management framework and uses an object oriented approach,
  - With managed information in network resources modeled as attributes in managed objects.
  - Management functions are performed through CMIS primitives.
  - MIB contains the management information database about the management objects of network resources.
  - Processes that manage the information are called management entities (manager or agent).

TMN Functional Model

- The TMN enables telecom service providers to achieve interconnectivity and communication across operating systems and telecom networks.
  - Interconnectivity is achieved via standard interfaces that view all managed resources as objects.

TMN Building Blocks



WS – Workstation
OS – Operating System
DCN – Data Comm Neworks
MD – Mediation Device
NE – Network Element
QA – Q Adapters

Functional Components

Component	Description
OS	• Performs operations system functions • Operations monitoring • Controlling telecom management function • Mediation task • Q-Adaption • WS-Function
MD	• Performs mediation between local TMN interfaces and the OS information Model. • It ensures that information, scope and functionality are presented in the exact way that the OS expects.
QA	• The QA enables the TMN to manage NEs that have non TMN interfaces. • The QA translates b/w TMN and non-TMN interfaces. • QA translates b/w SNMP and CMIP.

Cont…

Component	Description
NE	• NE contains manageable information that is monitored and controlled by an OS. • In the scope of TMN, an NE must have a standard TMN interface. • If an NE does not have a standard NE interface, its managed through QA. • As a building block, the accrual NE can also contain its own OS function, as well as QA function, MD function.
WS	• WSs translate information b/w TMN format and a displayable format for the user.
DCN	• It's a communication network within a TMN. • The DCN represents OSI layer1 to 3.

OSI functionality in TMN

- Stack Support
  - TMN defines a message communication function (MCF).
  - All building blocks with physical interfaces need to have an MCF.
  - It provides the protocol layers necessary to connect a block to a DCN.
  - An MCF can provide all seven OSI layers,
    - also provides protocol convergence functions for interfaces that use some layer configurations.

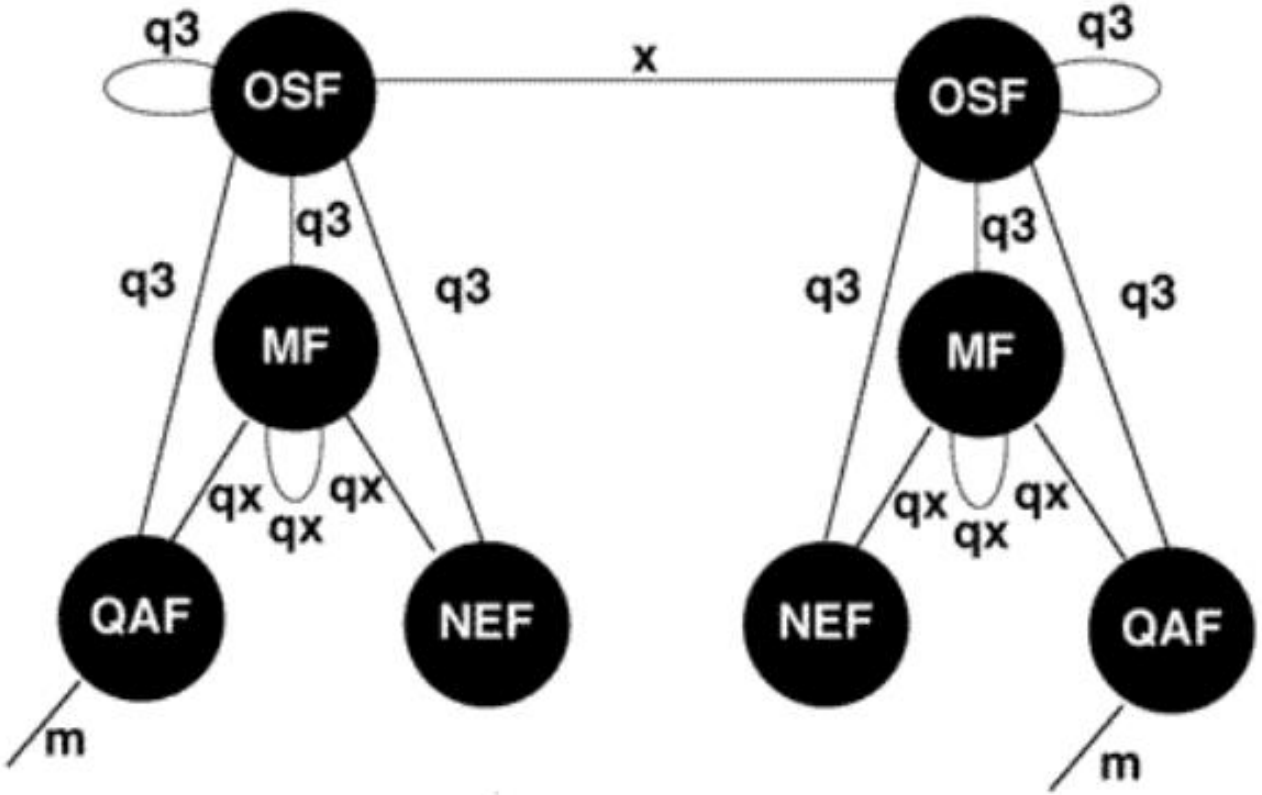
Manager and Agent Roles

- TMN function blocks can act in the role of a manager and/or agent.
  - A manager process issues directives and receives notifications.
  - Agent process carries out directives, sends responses and emits events and alarms.

The standard interfaces

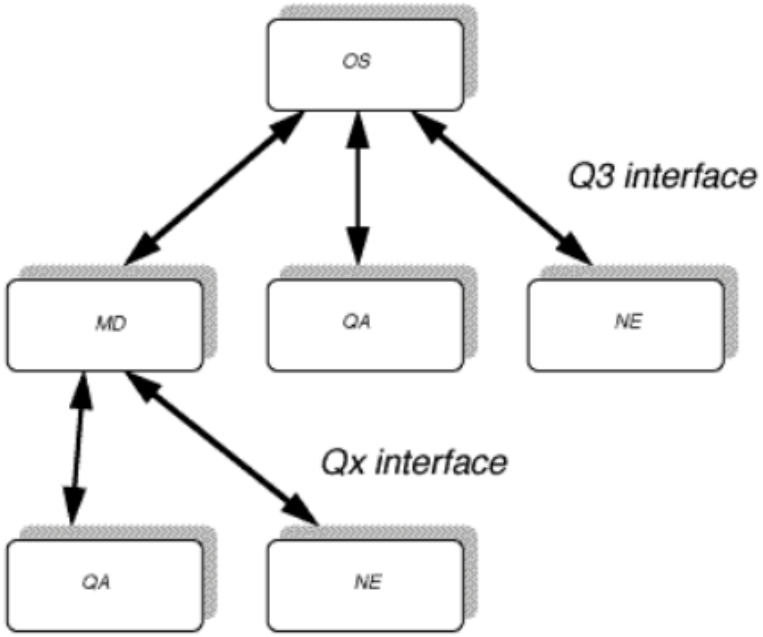
Q	The Q interface exists between two TMN–conformant functional blocks that are within the same TMN domain. The Qx carries information that is shared between the MD and the NEs that it supports. The Qx interface exists between the NE and MD; QA and MD; and MD and MD. The Q3 interface is the OS= interface. Any functional component that interfaces directly to the OS uses the Q3 interface. In other words, the Q3 interface is between the NE and OS; QA and OS; MD and OS; and OS and OS
F	The F interface exists between a WS and OS, and between a WS and MD
X	The X interface exists between two TMN–conformant OSs in two separate domains, or between a TMN–conformant OS and another OS in a non–TMN network.

Standard interfaces between TMN components



More about the Q interfaces

- There are two classes of Q interfaces: Q3 and Qx.
  - Following figure shows which blocks can communicate via which Q interface.



Q3 Interface

- The Q3 interface is the lifeline to the operations system.
  - Q3 is the only interface that QAs, MDs, or NEs may use to communicate directly with the OS.
  - If a QA or NE does not use the Q3 interface, it cannot communicate directly with the OS: instead it must communicate via an MD.

Qx Interface

- The Qx interface always operates with a MD.
  - It never takes the place of a Q3 interface
  - The MD can interpret between local management information provided by a Qx interface and the OS information provided by a Q3 interface.

Thanks