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Training

ANSAwise - Telecommunications Network Management

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Abstract

The ITU's Telecommunications Management Network Architecture is the standard for solving the problems occurring within the telecommunications arena. Principally, these management problems are caused by having non-homogeneous management systems for the different components making up the telecommunications framework, namely mobile radio networks, data networks, and telephone networks. These are normally distributed, and so their management also raises problems that are commonly encountered in distributed systems.

The solution provided by the TMN standard architecture is homogeneous management for these heterogeneous networks, irrespective of details of location or platform. It is this architecture that is the subject of this module.

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Briefing Note

Distribution:
Supersedes:
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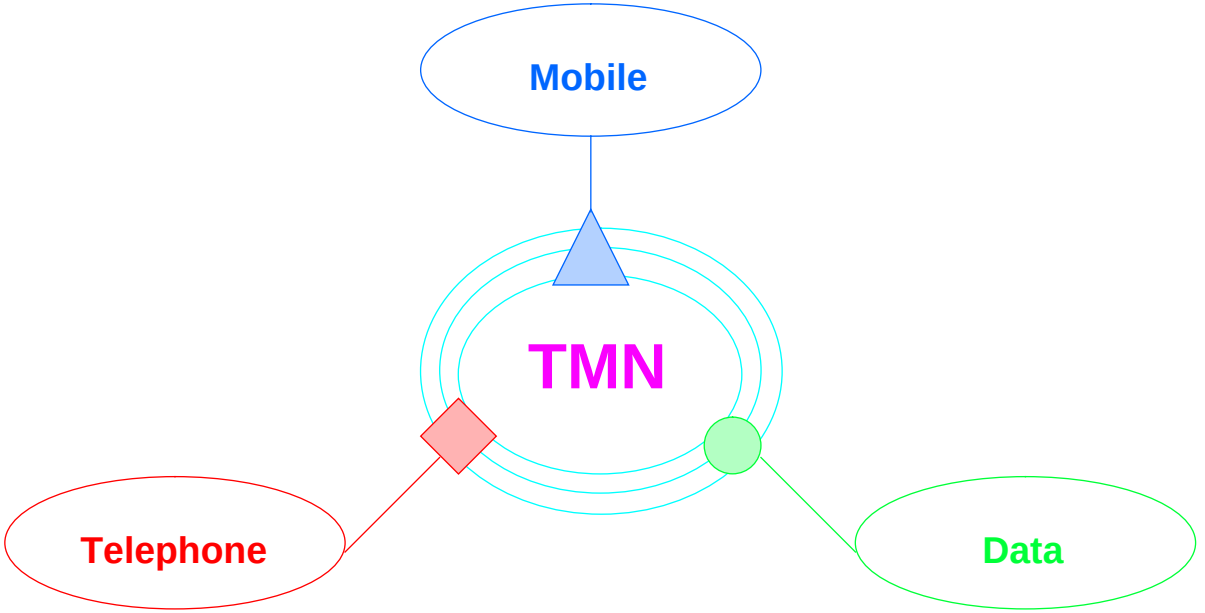
Telecommunications Management Network



In this session

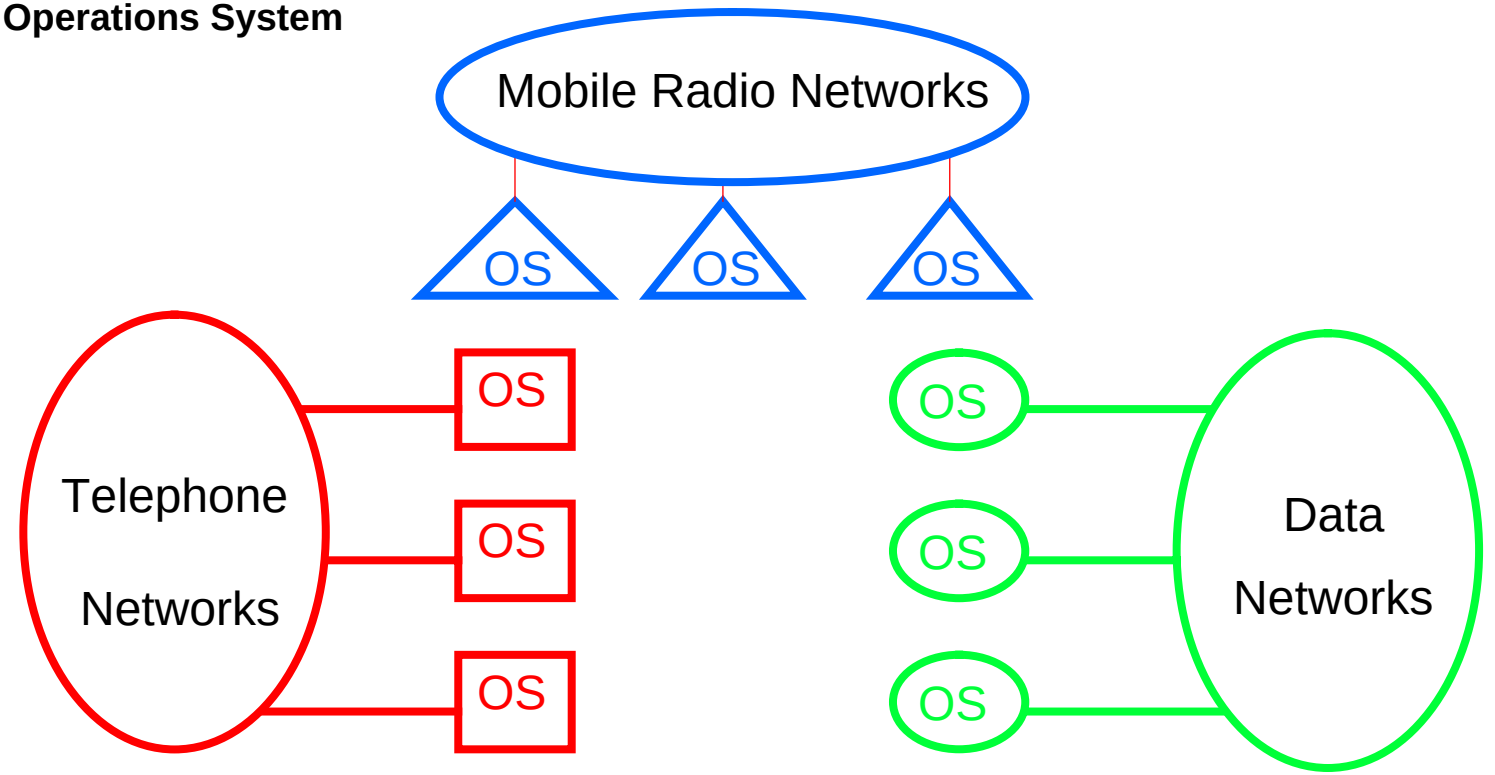
- **Explain the motivations for TMN**
- **Show the form of the TMN architecture**
- **Discuss the components of TMN**
- **Show how distributed systems contribute to TMN**

Motivation for TMN

- **Problem: non-homogeneous management systems for**
  - **different networks**
  - **different elements of networks**

Non-homogeneous Management Systems

OS = Operations System



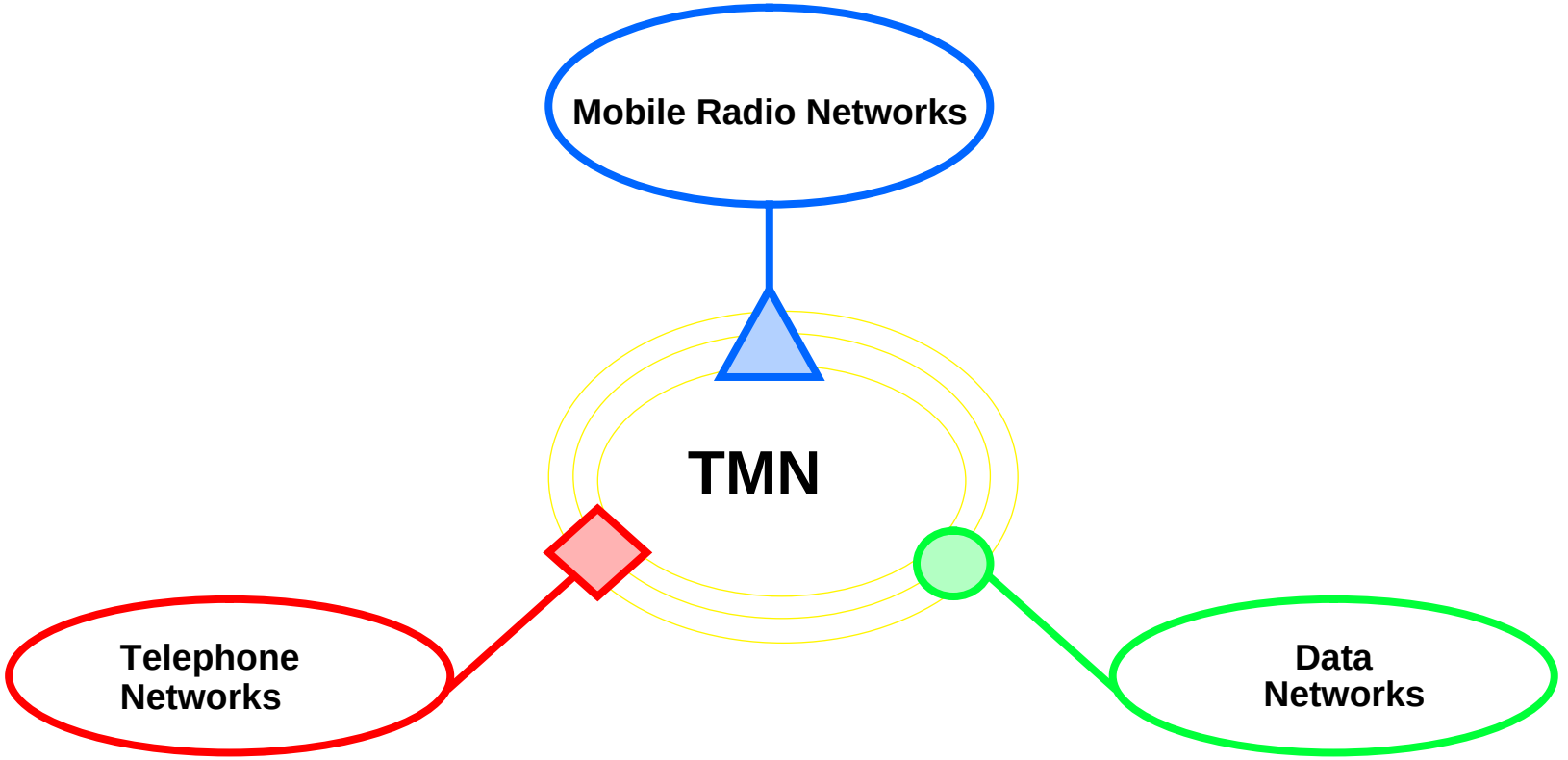
The Solution

- **Homogeneous network management**
  - **for heterogeneous networks**
  - **based on architecture for interoperation between management functions**
- **TMN provides all this**
  - **by using distributed systems techniques to implement the necessary functionality**

What is TMN?

- **Management architecture defined by CCITT**
  - **public data networks are incorporated as objects**
  - **these objects are managed by carriers**
- **PTT view breaks up network management**
  - **operations**
  - **administration**
  - **maintenance**

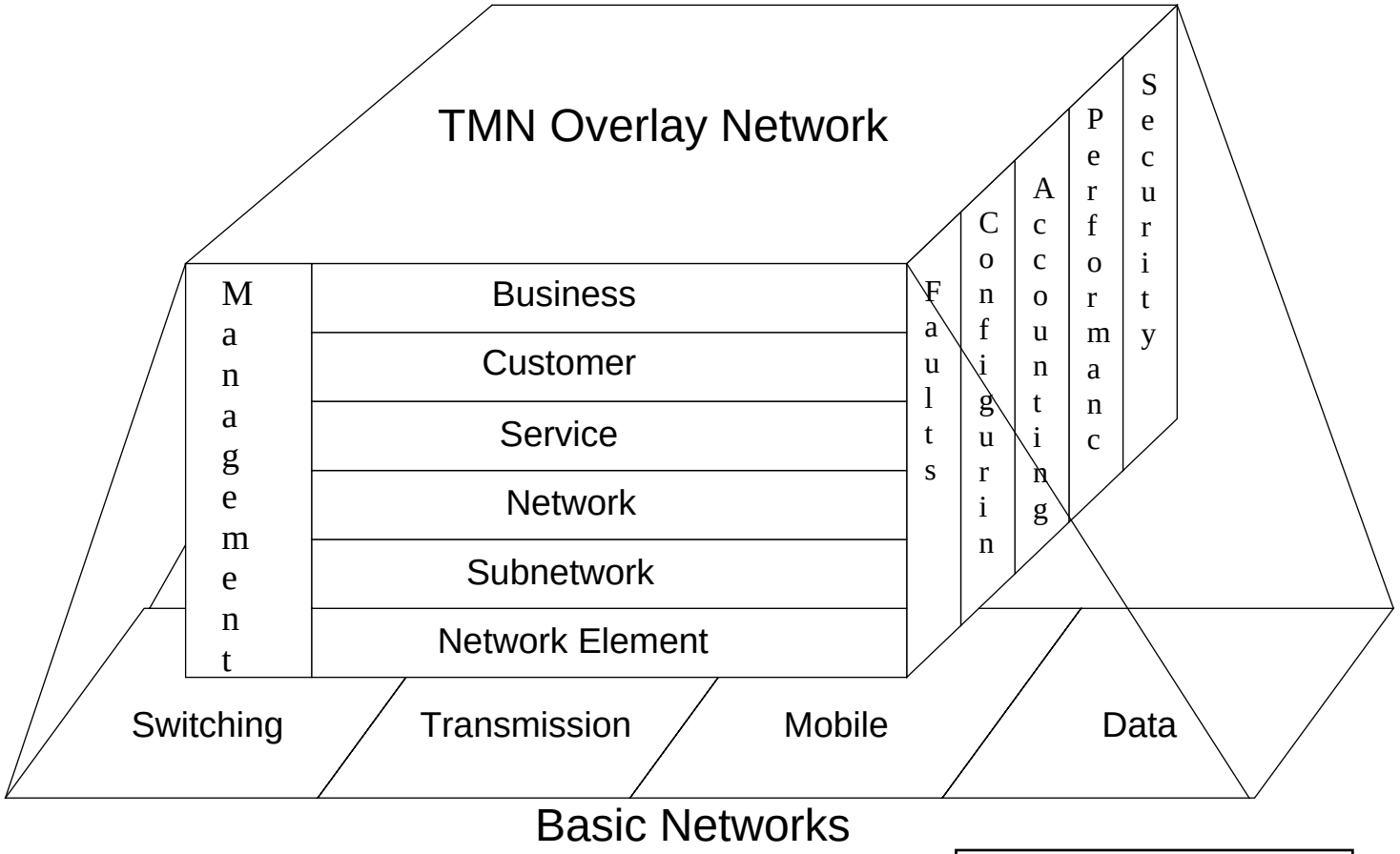
Homogeneous Management System



Service Integration with TMN

- **Integrated management should provide**
  - **management of different basic networks with a single management network**
  - **control and supervision of carrier networks and services**
  - **user management and network maintenance**
  - **cooperation between manufacturer-specific aspects of operations, administration, and maintenance (OAM)**
- **These aspects are referred to as the TMN management dimensions**

TMN Management Dimension Diagram



TMN Reference Model

- Specified in CCITT recommendation M.3010
- Provides a separate management network consisting of
  - telecommunications network
  - network element
  - operations system
  - mediation device
  - workstation
  - data communications network

Telecommunications Network

- **Comprises individual subnetworks provided by a single carrier**
  - **telephone network**
  - **ISDN**
  - **X.25 network**
  - **mobile-radio network**
  - **videotext network**
  - **videoconferencing network**

Network Element

- **Supports Network Element Function (NEF)**
  - **makes respective network functionality/services of TN available to the user**
  - **switching network nodes**
  - **multiplexers**
  - **cross connects**

Operations System

- **Provides Operations System Function (OSF)**
  - **processes the management information**
  - **controls and monitors TNs**
  - **handles data analysis and global control**

Mediation Device

- **Supports Mediation Function (MF)**
  - **acts as a management gateway**
  - **forwards information between NE/NEF and OS/OSF**
- **Supports management functions like**
  - **data collection and switching**
  - **data preparation and concentration**
  - **forwarding discrimination and network component identification**
  - **protocol conversion**

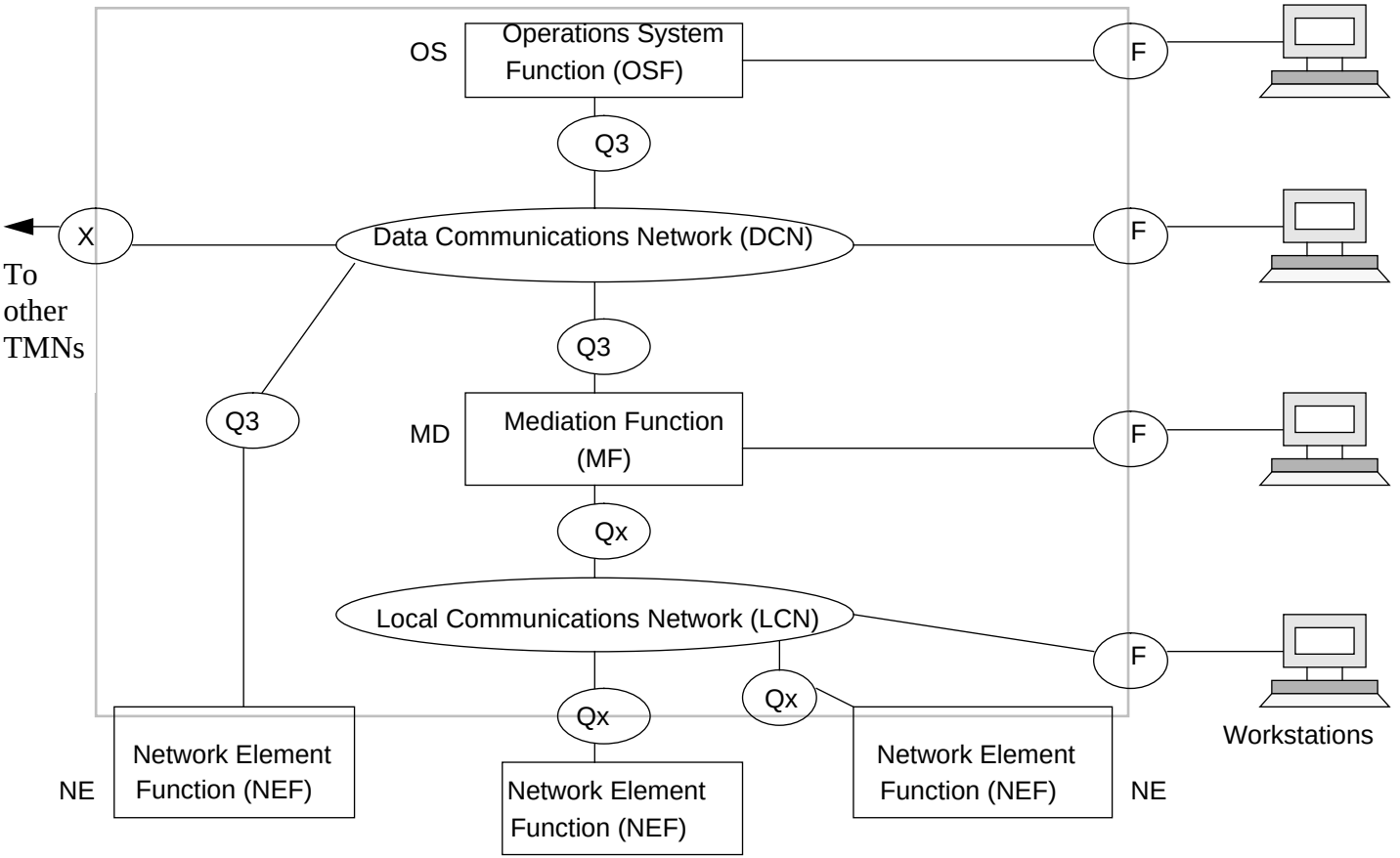
Workstation

- **Provides Workstation Function (WSF)**
- **Enables human users to access TMN**
- **Always a leaf component of the network**

Data Communications Network

- **Supports Data Communication Function (DCF)**
- **Also responsible for Local Communication Network (LCN)**
- **Provides for communication between other TMN units**

TMN Reference Model Diagram



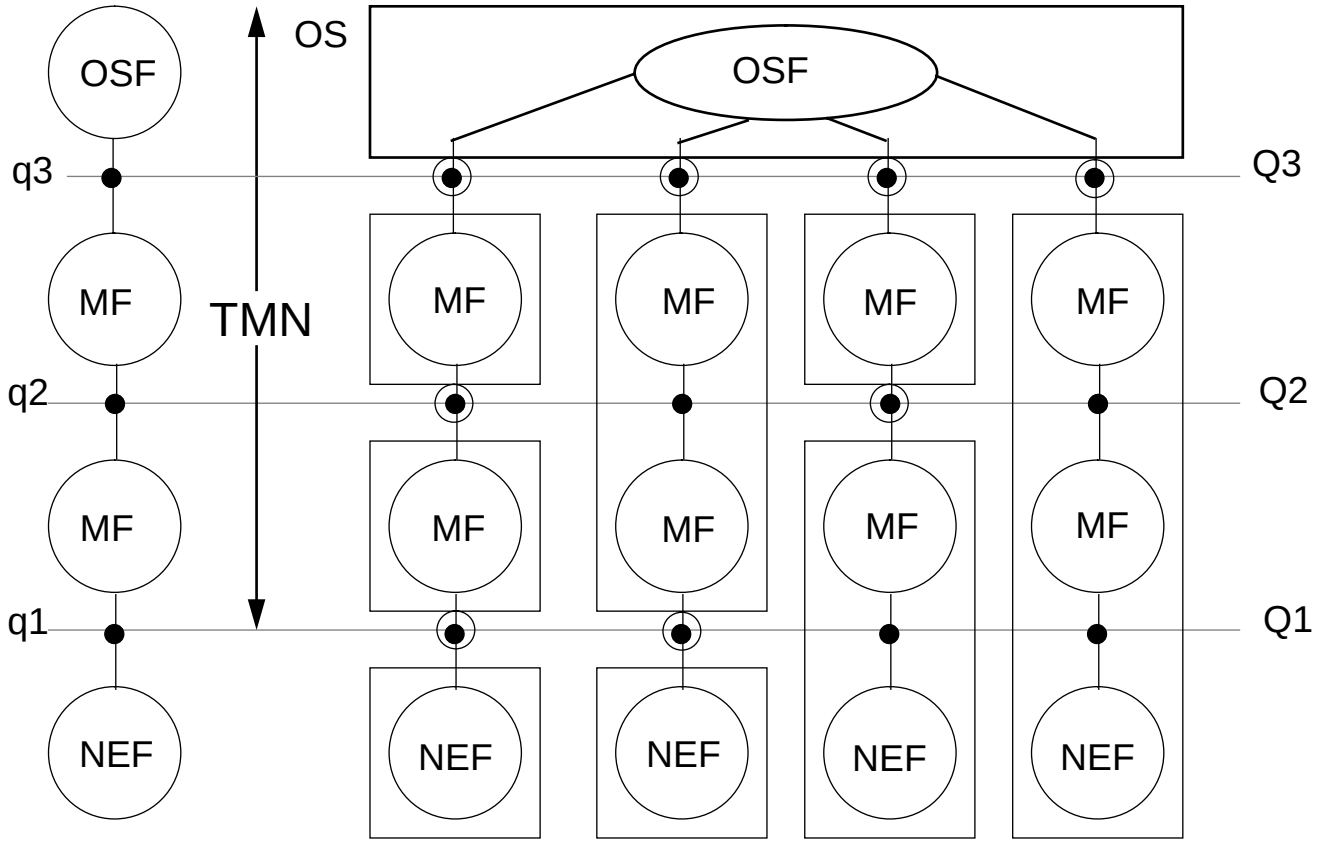
Legend

F	Interface to workstations
Q3/ Qx	Standardized interface to operations system functions
X	Interface to other TMNs
-0-	Reference point

Reference Points

- The TMN reference model also contains a number of reference points
- These are interfaces between TMN entities that are specified by services or protocols
  - F: interface to WS
  - X: interface to other TMNs
  - Qx, Q1, Q2: interfaces for connecting simple transmission and switching equipment
  - Q3: interface for connecting more complex equipment or entire switching nodes. Follows CCITT recommendation G.513.

TMN Component Function Assignments



Legend

- Physical element (component)
- Function block
- Reference point (q)
- Interface (Q) and reference point (q)

Implementing TMN

- **Implementation of TMN proceeds in stages**
  - **connection of existing network elements (NE) to existing OS systems via mediation functions (MF)**
  - **installation of TMN systems for system-independent operation**
  - **introduction of communicating TMN systems**

TMN Applications Development

- **Similar to standard management application development processes**
  - **definition of TMN object class library**
  - **uniform design of user interface**
  - **object-oriented design and programming**
  - **common development environment**
  - **increasing platform functionality**
  - **integration of new TMN applications**

Summary

- TMN is a standard management architecture
- TMN is based on OSI management concepts
- TMN draws heavily on distributed systems technologies
- TMN provides for homogeneous management of heterogeneous systems
- TMN Reference Model describes how management components relate to each other

More information?

- **TMN Reference Model: CCITT Recommendation M.3010.**
- **TMN and Intelligent Networking: see *TMN and New Network Architectures* by Catherine Pontailler, IEEE Communications Magazine, April 1993, pp83-88**
- **For more on TMN-related subjects:**
  - **general management of networks and systems, see *Integrated Network and System Management* by Heinz-Gerd Hegering & Sebastian Abeck (Addison-Wesley, 1994)**