

# Network Management

## Lecture 9

### Telecommunications Management Network

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# Objectives

- Telecommunications Management Network, TMN
- Concept of Operations Support System, OSS
- TMN conceptual model includes:
  - Customers
  - Service providers
  - Network
  - Operations support systems, OSSs
  - System operators
- TMN standards and documentation
- TMN architecture
  - Functional
  - Physical
  - Informational
- TMN service management architecture
  - Network element
  - Element management
  - Network management
  - Service management
  - Business management
- TMN service management
  - Operations, Administration, Maintenance, Provisioning; OAMP
- TMN implementation methodologies
  - OMNIPoint
  - eTOM

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# TMN

- Necessity for interoperability basis for TMN
- Need for management of more than just the network components
- Networks / subnetworks need to be managed
- Services - internal and external need management
- Business management needs to be addressed
- TMN joint effort by ITU-T and ISO

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## Notes

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# OS: Trunk Testing System

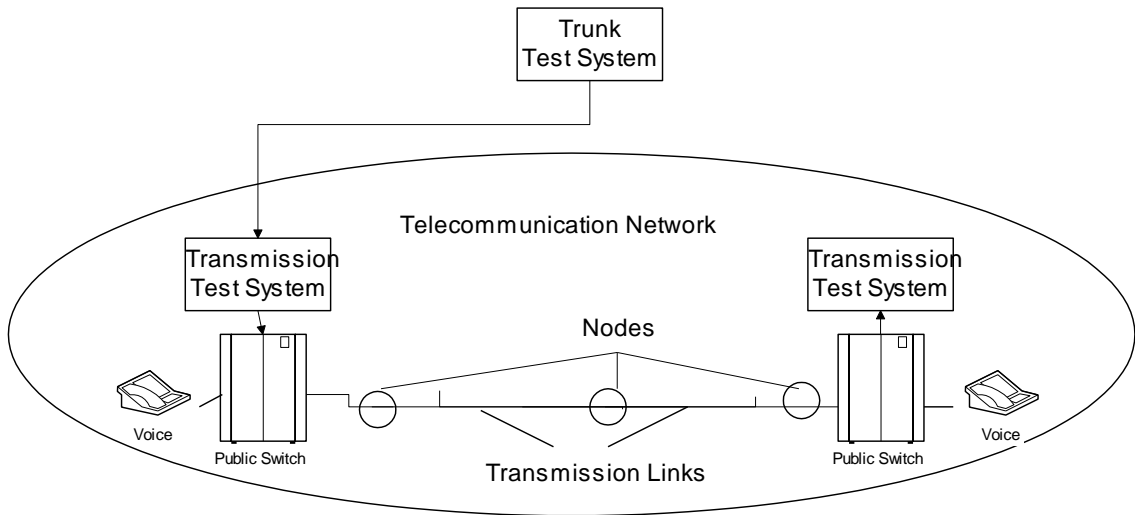


Figure 10.1 Operations Support System for Network Transmission

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## Notes

- Trunk is a logical connection between two switching nodes
- Periodic measurement of loss and S/N of all trunks
- Failing threshold set for QoS; failing trunks removed out of service before the customer complains

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# OS: Telephone Switch Traffic

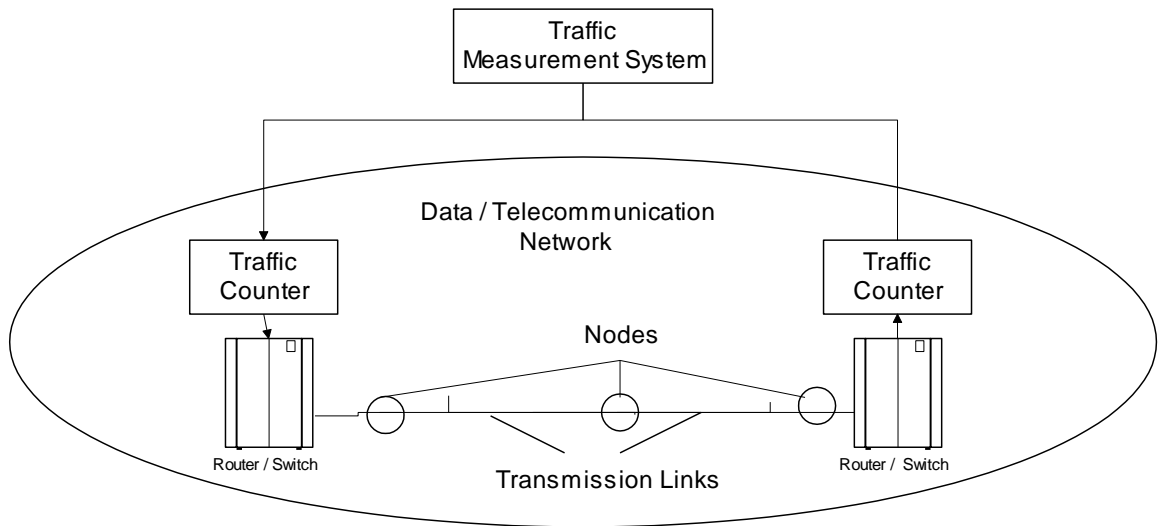


Figure 10.2 Operations Support System for Traffic Measurement

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## Notes

- Traffic monitored at switch appearance
- Call-blocking statistics obtained
- Traffic and call-blocking statistics provide data for planning
- Importance of Operations, Administration, Maintenance, and Provisioning

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# TMN Conceptual Model

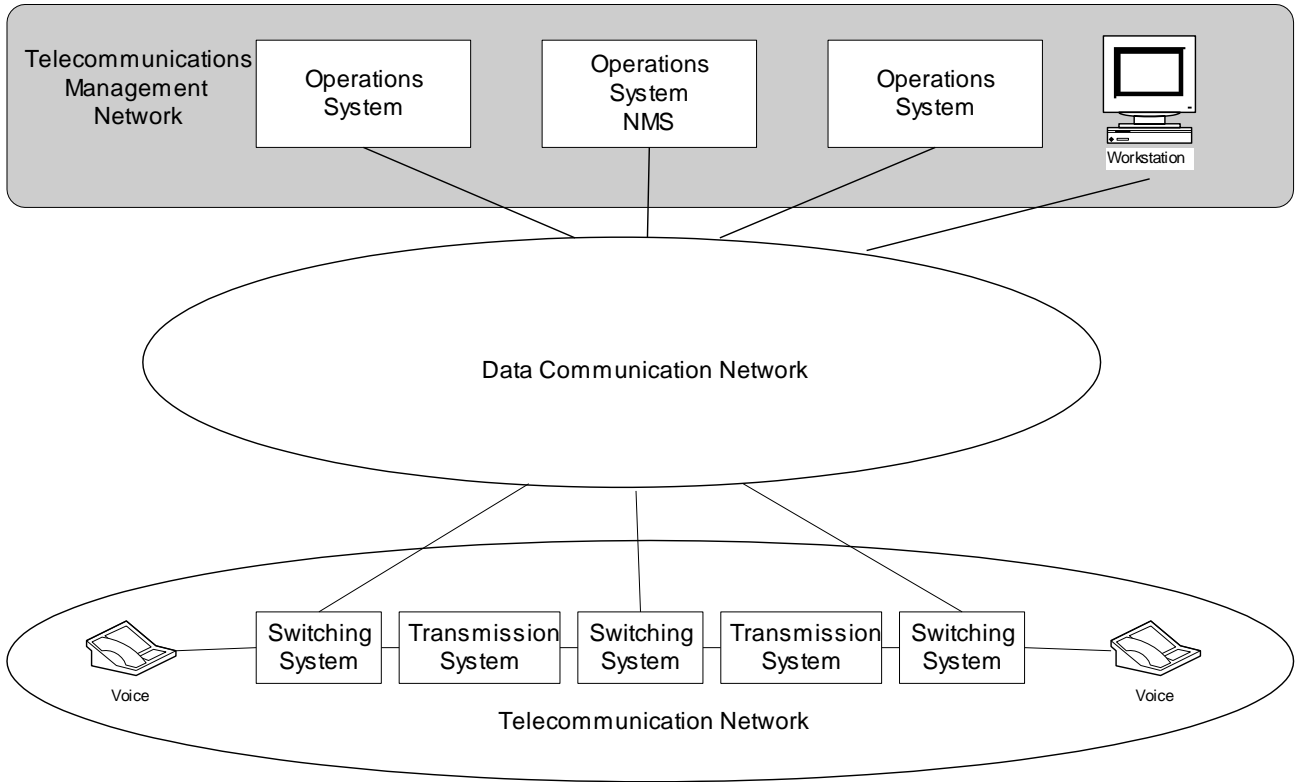


Figure 10.3 TMN Relationship to Data and Telecommunication Networks

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## Notes

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# TMN Conceptual Model (cont.)

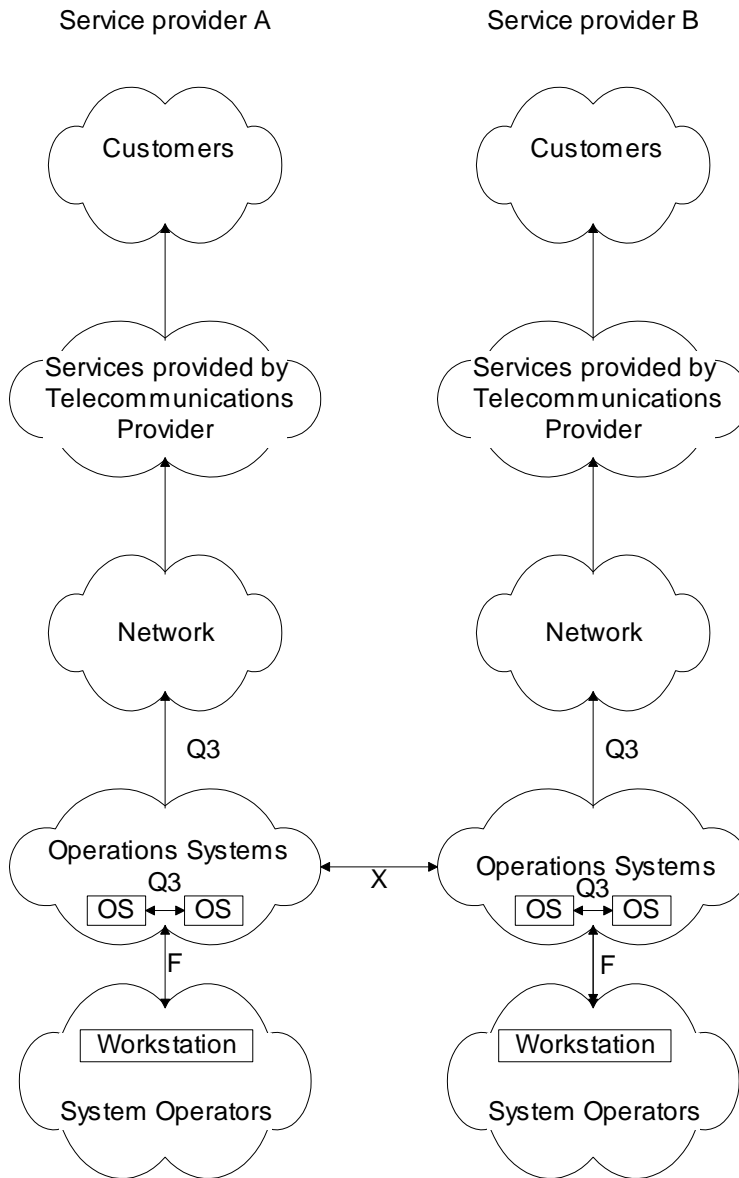


Figure 10.4 TMN Conceptual Model

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## Notes

- Components
- Interfaces

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# TMN Architecture

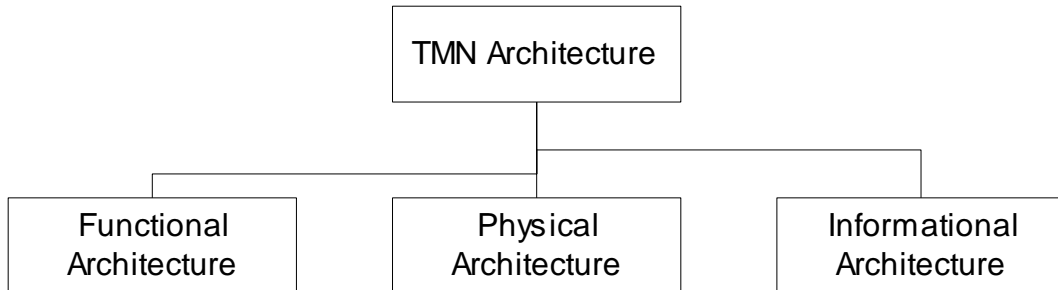


Figure 10.6 TMN Architecture

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## Notes

- Functional architecture:
  - Functional modules or blocks
  - Reference points between modules
- Physical architecture:
  - Physical blocks
  - Physical interfaces between the blocks
- Informational architecture:
  - Information exchange between entities
  - Object oriented



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# Functional Architecture

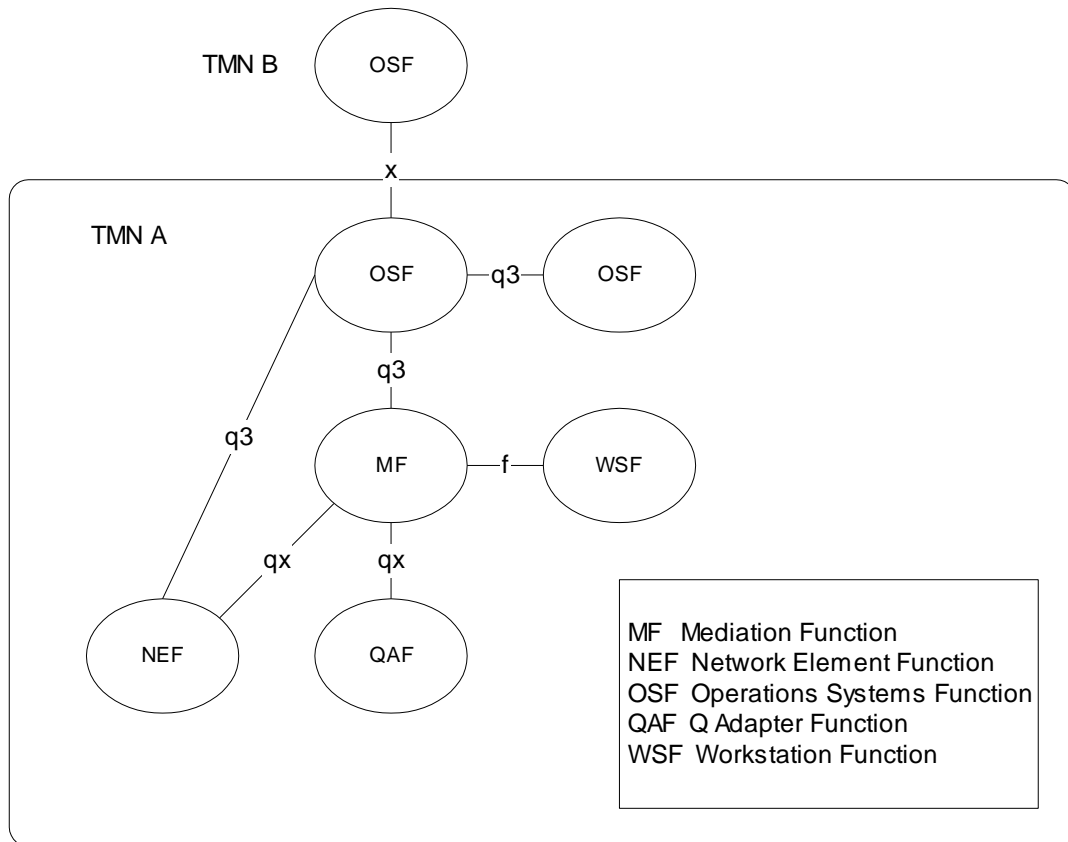


Figure 10.7 TMN Functional Architecture

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## Notes

- OSF: Functions performed by Operations systems: e.g., NMS, testing, accounting, trouble tracking
- NEF: Functions needed to support network elements; network elements themselves are not part of TMN: e.g., NM agent, MIB, collision rate

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# Functional Architecture (cont.)

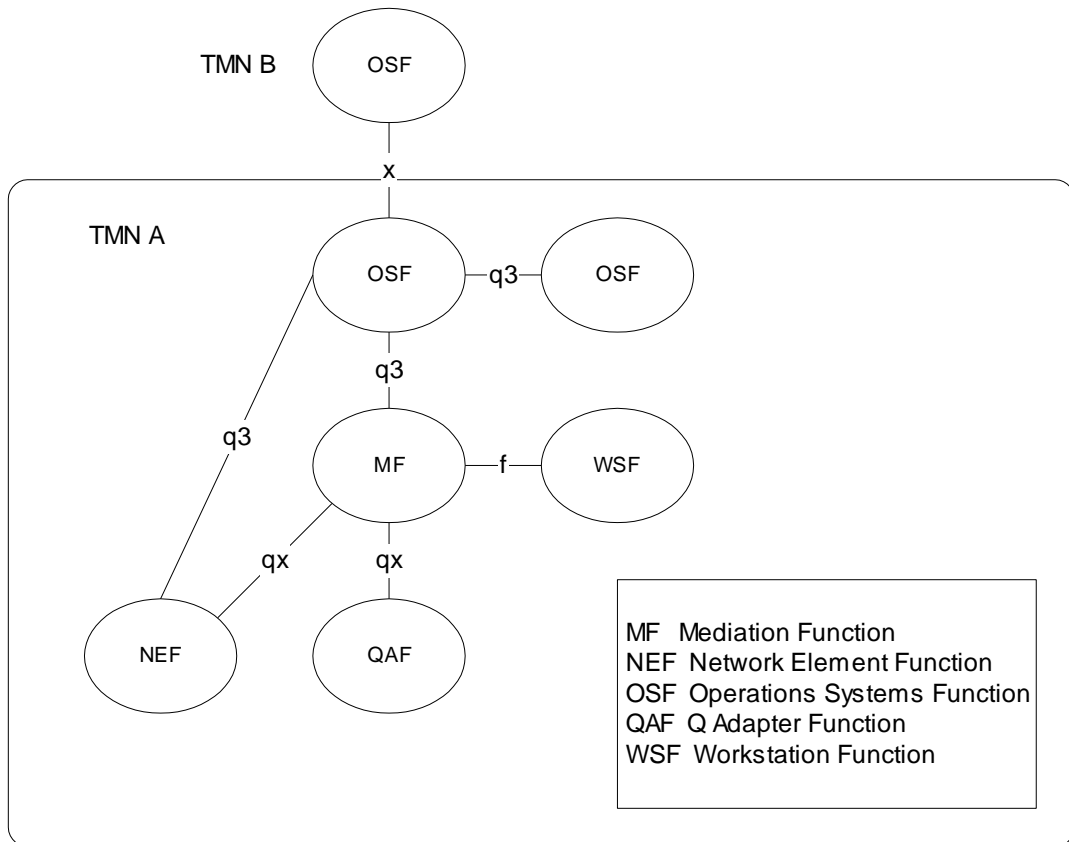


Figure 10.7 TMN Functional Architecture

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## Notes

- MF: Operations on the information between network elements; e.g., filtering, protocol conversion
- MF can be shared between multiple OSSs; e.g., RMON
- WSF: Human-TMN activities interface; e.g., GUI
- QAF: Adapter function to accommodate non-TMN entities; e.g., proxy server, SNMP-to-CMIP

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# TMN Reference Point

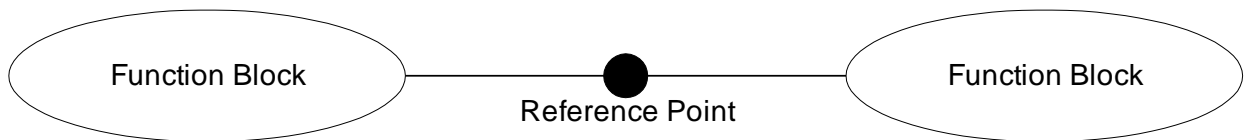


Figure 10.8 TMN Reference Point

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## Notes

- Function blocks connected by conceptual interfaces, called *reference point*
- Designated by lower case letters (upper case letter for physical interfaces)
- x: Interface between operations systems that belong to different domains; e.g., interface between two NMSs belonging to two different domains
- q3: Interface between two OSFs in the same domain
- qx: Interface between mediation function such as RMON and agent in the network element
- f: Interface to the workstation

# Physical Architecture

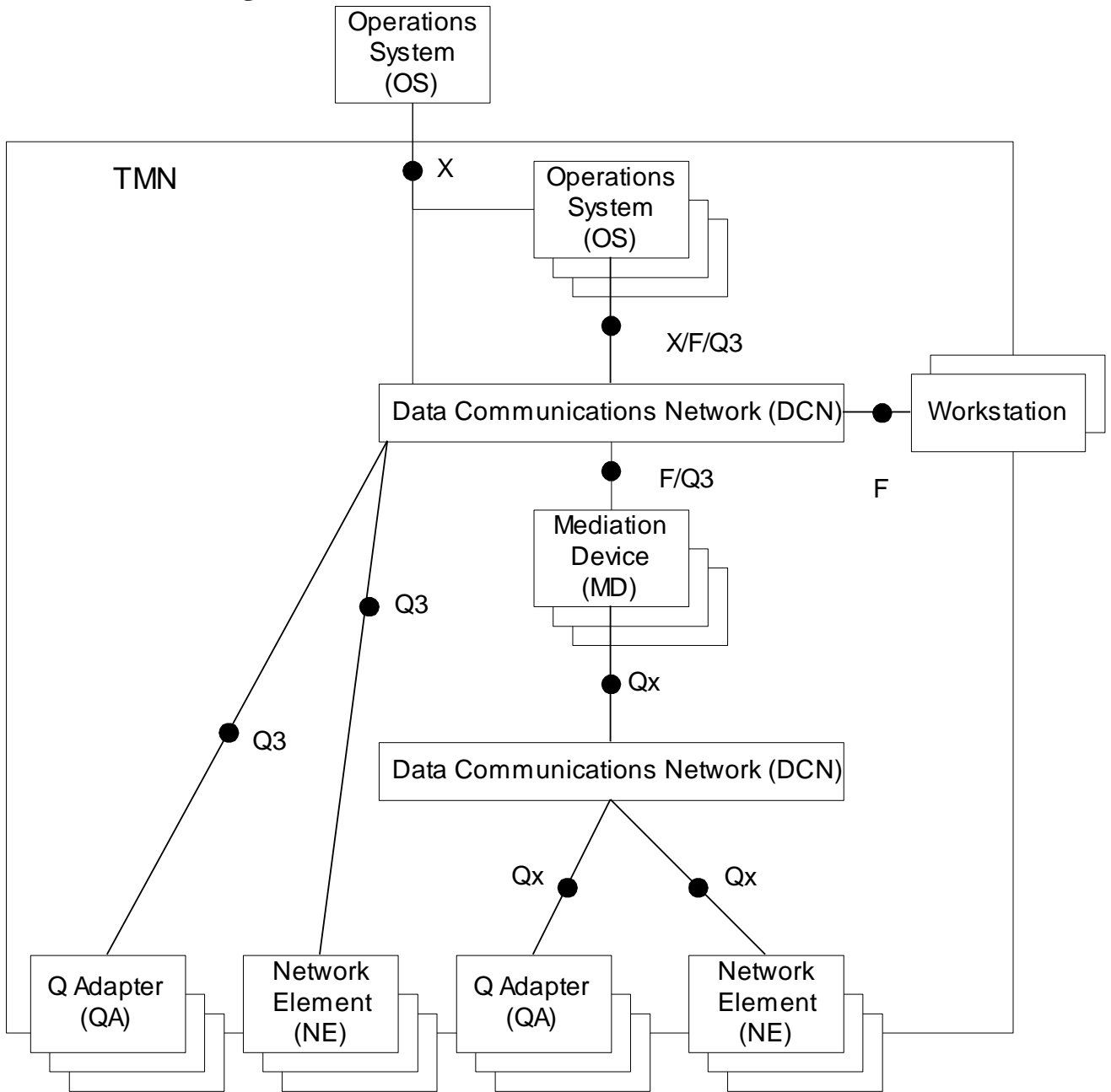
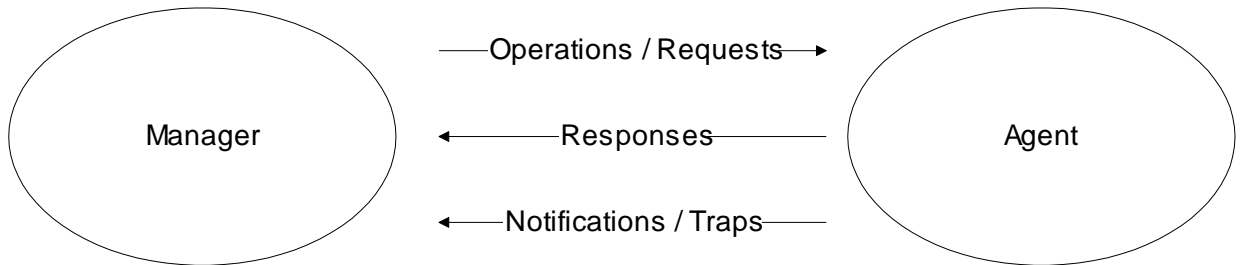


Figure 10.9 TMN Physical Architecture

## Notes

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# Information Architecture



**Figure 10.10 TMN Information Architecture**

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## Notes

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# Service Architecture

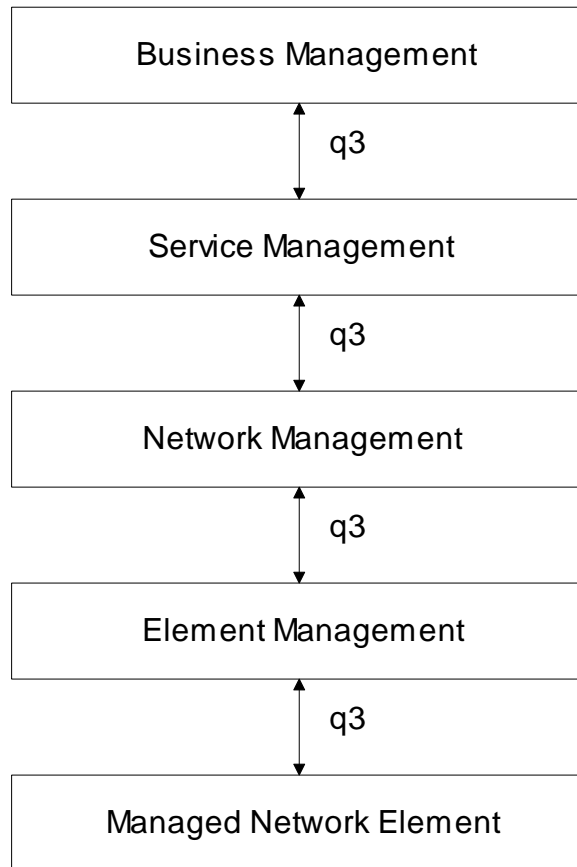


Figure 10.11 TMN Service Architecture

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## Notes

# TMN Services & Functions

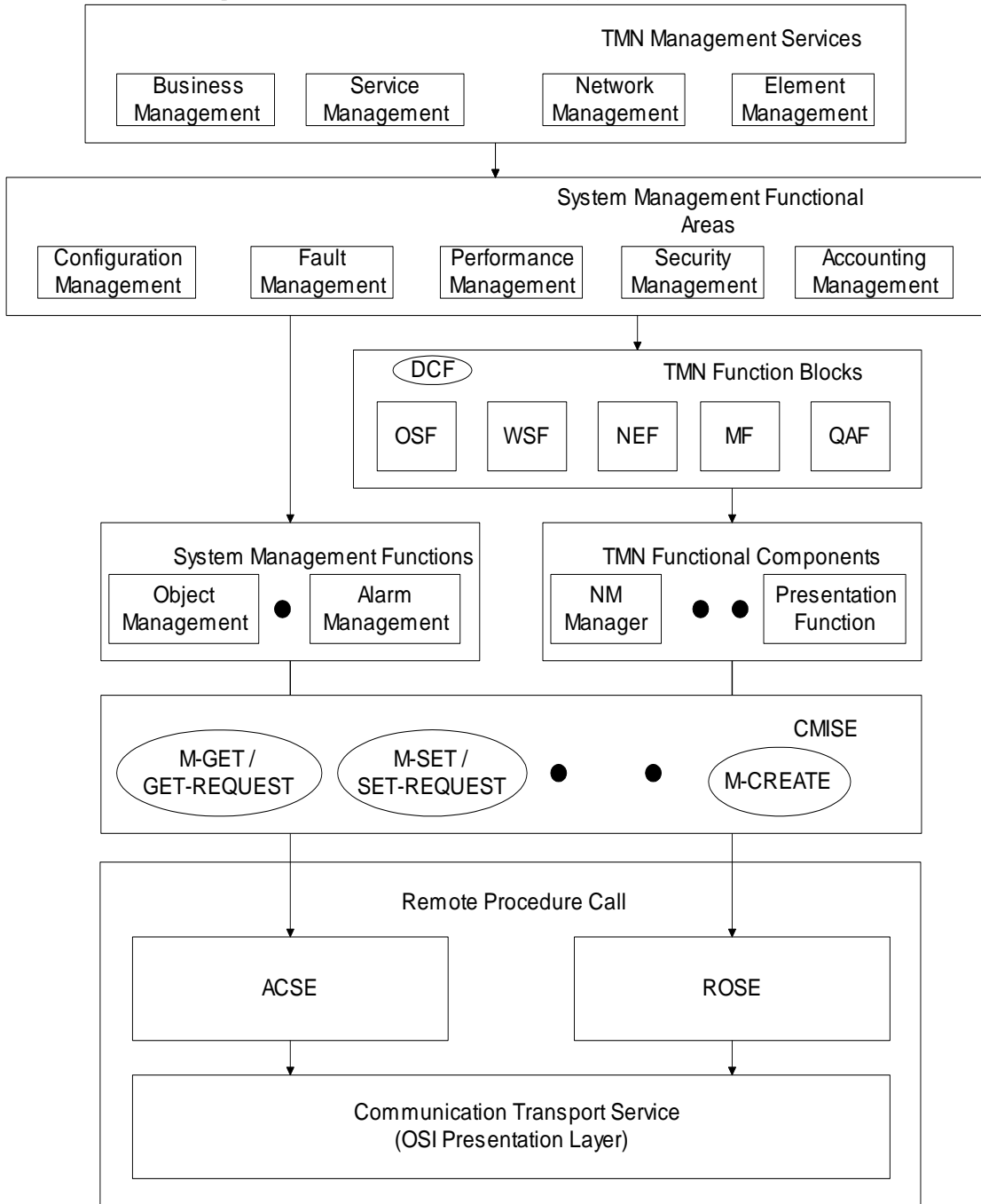


Figure 10.13 TMN Services and Functions

## Notes

# Example (NMF)

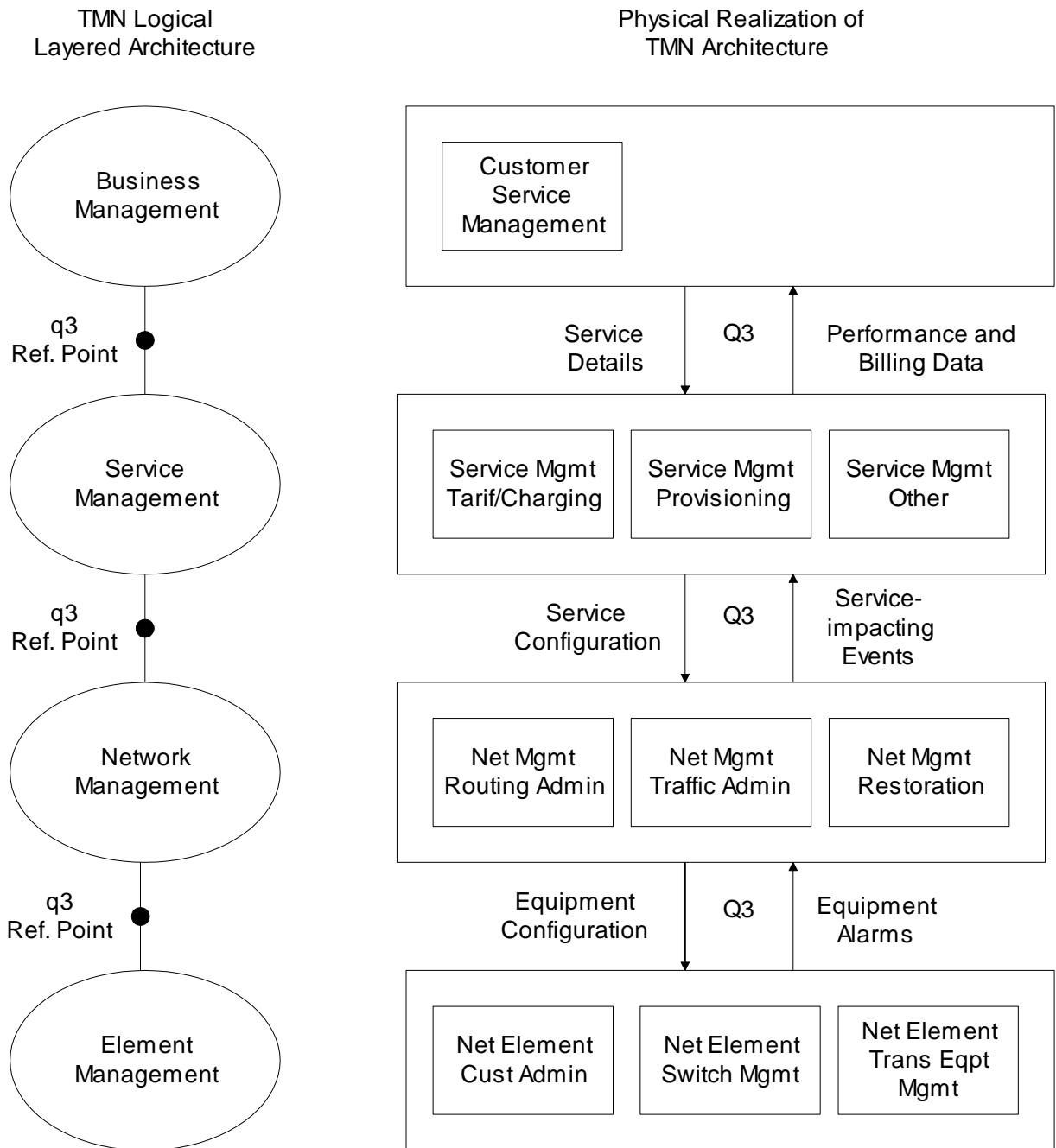
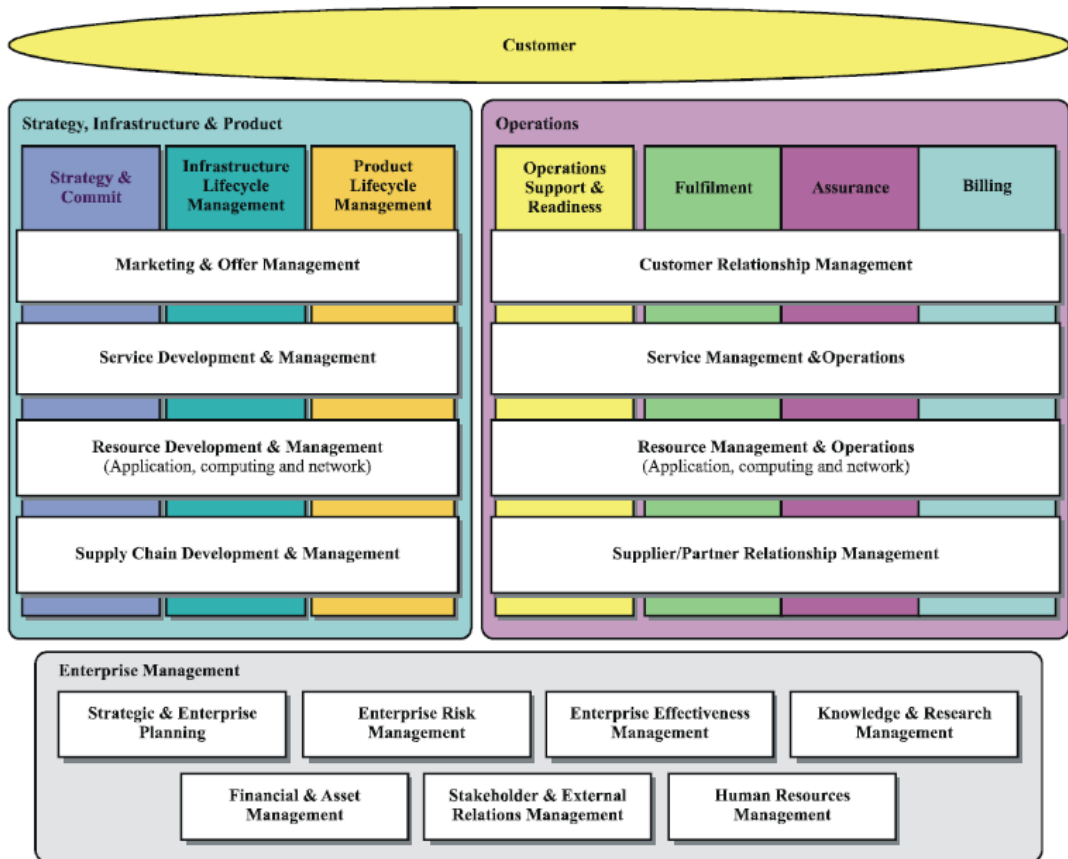


Figure 10.14 TMN Realization Example (NMF)



# eTOM



M.3050SUPP.3\_F02

Figure 10.15 eTOM Business Process Framework – Level 0 processes

## Notes

- TM Forum top-down implementation approach of TMN (ITU-T)
- eTOM (enhanced Telecom Operations)
  - Framework to automate delivery of “information, communication, and entertainment services”
  - Addresses business processes end-to-end
  - Multiple levels (0, 1, 2, and 3) based on details

# TMN & eTOM

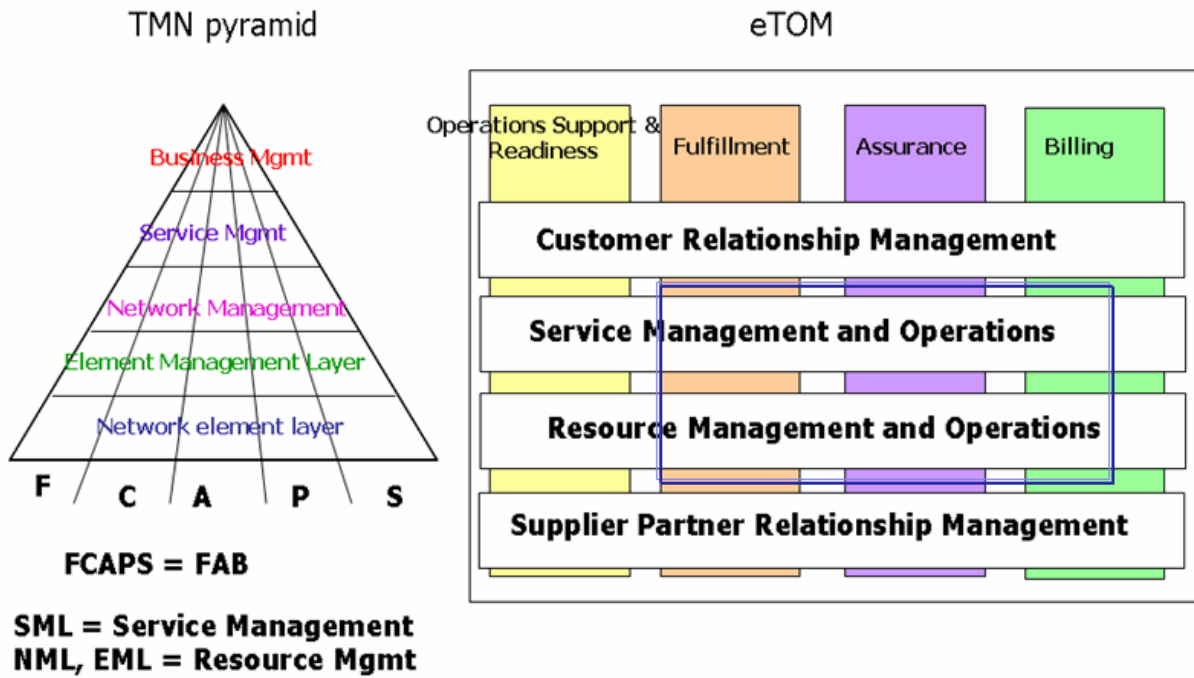


Figure 10.16 eTOM-to-TMN Model

## Notes

- eTOM-to-TMN mapping of functions
  - Fulfillment                      Configuration
  - Assurance                         Fault
  - Performance
  - Billing                                Accounting
- Equivalent NMS application functions in both TMN and eTOM

# eTOM-to-TMN

## M.3400 (Level 2) Processes

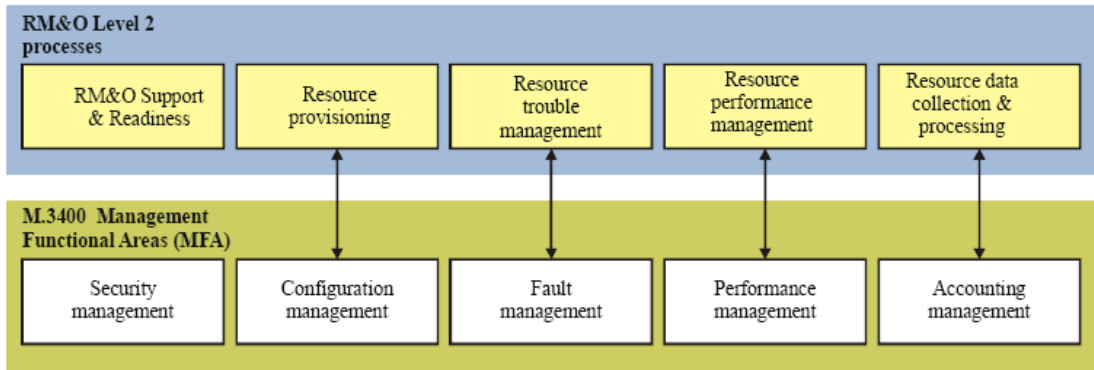


Figure 10.17 eTOM Level 2 processes-to-M.3400 function set groups

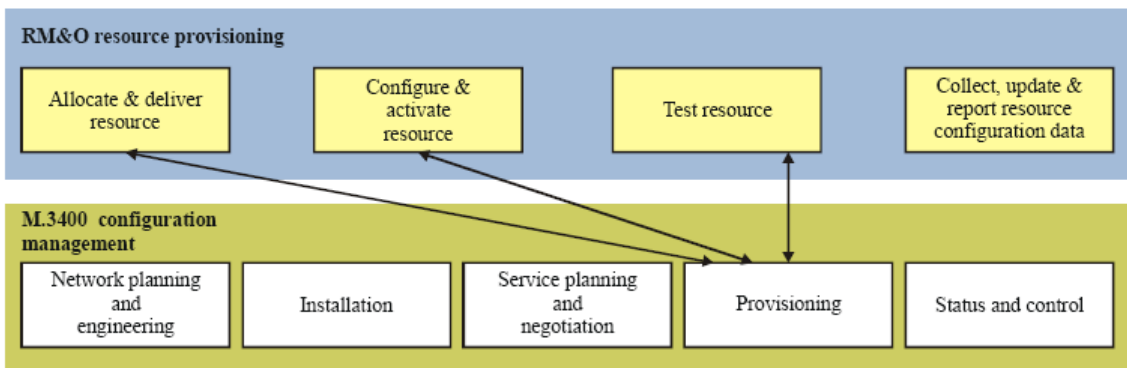


Figure 10.18 eTOM Level 2 processes-to-M.3400 Configuration function

## Notes