

**Telecommunications and Internet Protocol
Harmonization Over Networks (TIPHON) Release 3;
Requirements definition study;
Introduction to service and
network management**



Reference

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Foreword

This Technical Report (TR) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

1 Scope

The objective of ETSI Project TIPHON is the specification of interoperability mechanisms and related parameters to enable multimedia communications (particularly voice) to take place, to a defined quality of service, between switched circuit networks (SCN) and Internet Protocol (IP) based networks and their associated terminal equipment.

The present document presents an overview of the interactions between the Management Plane and the TIPHON Application Plane and TIPHON Transport Plane. It introduces the framework for the TIPHON Service and Network Management for ETSI TIPHON releases, capable of supporting TIPHON service capabilities.

The TIPHON network architecture [5] defines real-time operations associated with service control. The management plane must be capable of managing these services. The framework is based on the TMN model (ITU-T Recommendation M.3010 [1]) and upon the TeleManagement Forum's Business Process Model for Telecom Operations. This model includes the well-known "FCAPS" processes - Fault, Configuration, Accounting, Performance, and Security, structuring them into a form commonly used by service providers.

2 References

For the purposes of this Technical Report (TR) the following references apply:

- [1] ITU-T Recommendation M.3010: "Principles for a Telecommunications management network".
- [2] ETSI TR 101 307: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Requirements for service interoperability; Phase 2".
- [3] ITU-T Recommendation M.3020: "TMN Interface Specification Methodology".
- [4] ITU-T Recommendation M.3013: "Considerations for a telecommunications management network".
- [5] ETSI TS 101 314: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Network architecture and reference configurations; TIPHON Release 2".
- [6] TS 101 329-3: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; End-to-End Quality of Service in TIPHON Systems; Part 3: Signalling and Control of end-to-end Quality of Service.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

administrative domain: network controlled by a single operator (it encompasses both network and management domains)

management domain: collection of one or more management systems, and zero or more managed systems and management sub domains that is administered by a single operator

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BML	Business Management Layer
CMIP	Common Management Information Protocol
CMISE	Common Management Information Service Element
EML	Element Management Layer
IP	Internet Protocol
NE	Network Element
NML	Network Management Layer
OMG	Object Management Group
QoS	Quality of Service
SCN	Switched Circuit Networks
SML	Service Management Layer
TNM	Tiphon Network Management
UML	Unified Modelling Language

4 Objectives and roadmap

Given the broad scope of the service and network management framework, a roadmap is needed to show the sequence of deliverables and their content for the TIPHON releases. For TIPHON release 4, this roadmap indicates objectives for TIPHON Network Management (TNM) Framework.

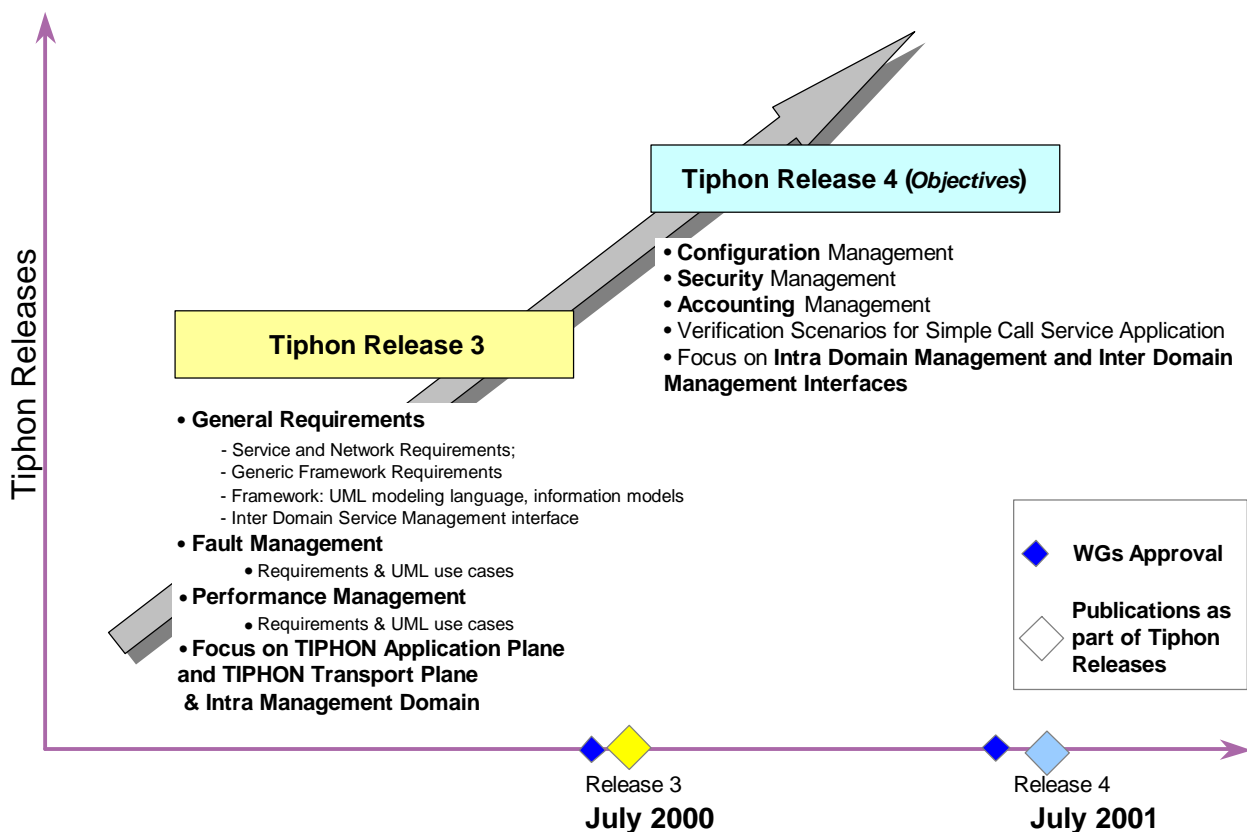


Figure 1: Tiphon network management roadmap

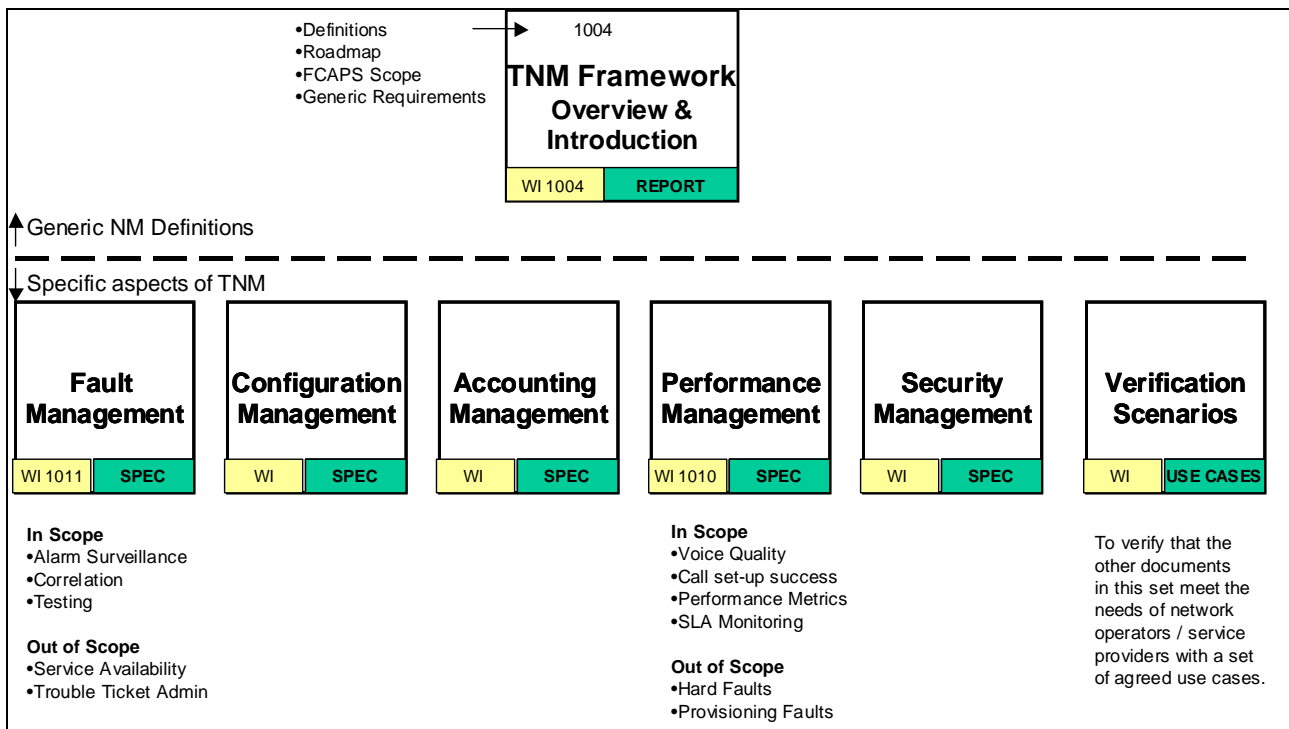


Figure 2: Tiphon network management document structure

5 Generic requirements

5.1 TNM framework

The architecture and functional decomposition of TIPHON Network Management shall be based on ITU-T Recommendation M.3010 [1]. The interface definition methodology for TIPHON management systems shall be based upon ITU-T Recommendations M.3020 [3] and M.3013 [4].

The TNM framework shall include:

- the TMN layer structure;
- FCAPS processes (Fault, Configuration, Accounting, Performance, Security);
- the definition of information flows between layers, functions and domains;
- the use of a formal methodology for modelling of the management information based upon the OMG's Unified Modelling Language (UML).

The TNM framework shall also include:

- the definition of information interfaces between TIPHON systems and management systems;
- the definition of Management Information Bases (MIB) based on the UML models.

It shall include:

- the use of Q interfaces unless considered inappropriate.

It shall not include:

- the use of TMN management communication services and protocols based on CMIP/CMISE unless considered appropriate.

The TNM will exploit wherever possible:

- the business and service processes as defined by the Telecommunications Management Forum;
- the management communication protocols and information bases already defined by IETF and ITU-T.

5.2 Relationship between TNM and Tiphon architecture

The TIPHON network architecture and reference configurations specification [5] identifies 4 functional planes. The Management plane contains the service and network management functionality as defined in TMN M.3000 documents. This clause shows the interactions between the management plane and the functional layers with the TIPHON Application Plane and the TIPHON Transport Plane (figure 4).

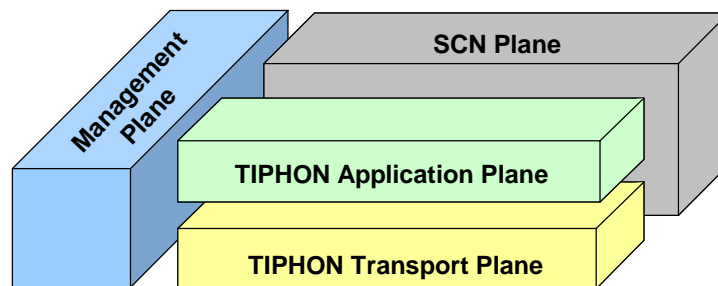


Figure 3: Tiphon Planes

The information flows represented by the A reference points in figure 4 are aligned with the A reference points shown in figure 8. The content of the information flows exchanged at each reference point depends on the primitives within the functional layers.

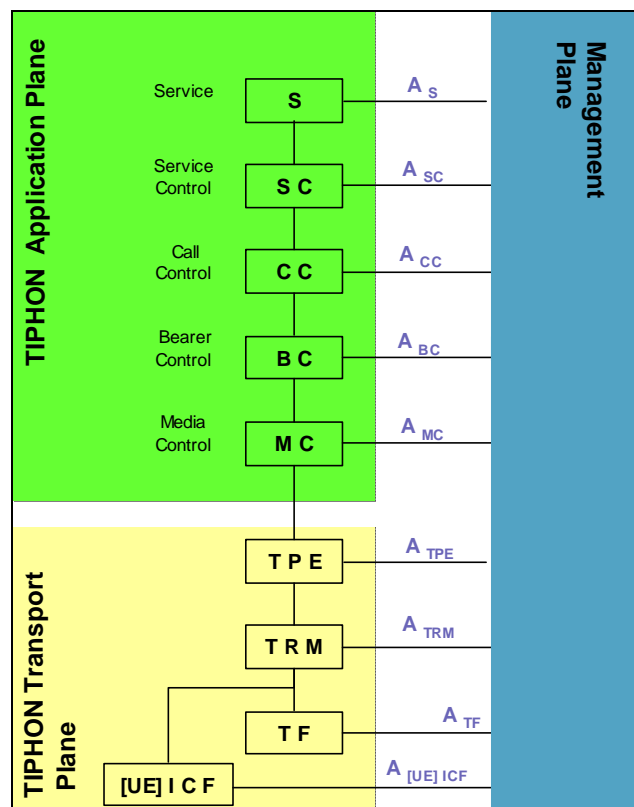


Figure 4: TNM Reference Points

5.3 Relationship between TNM and Tiphon functional entities

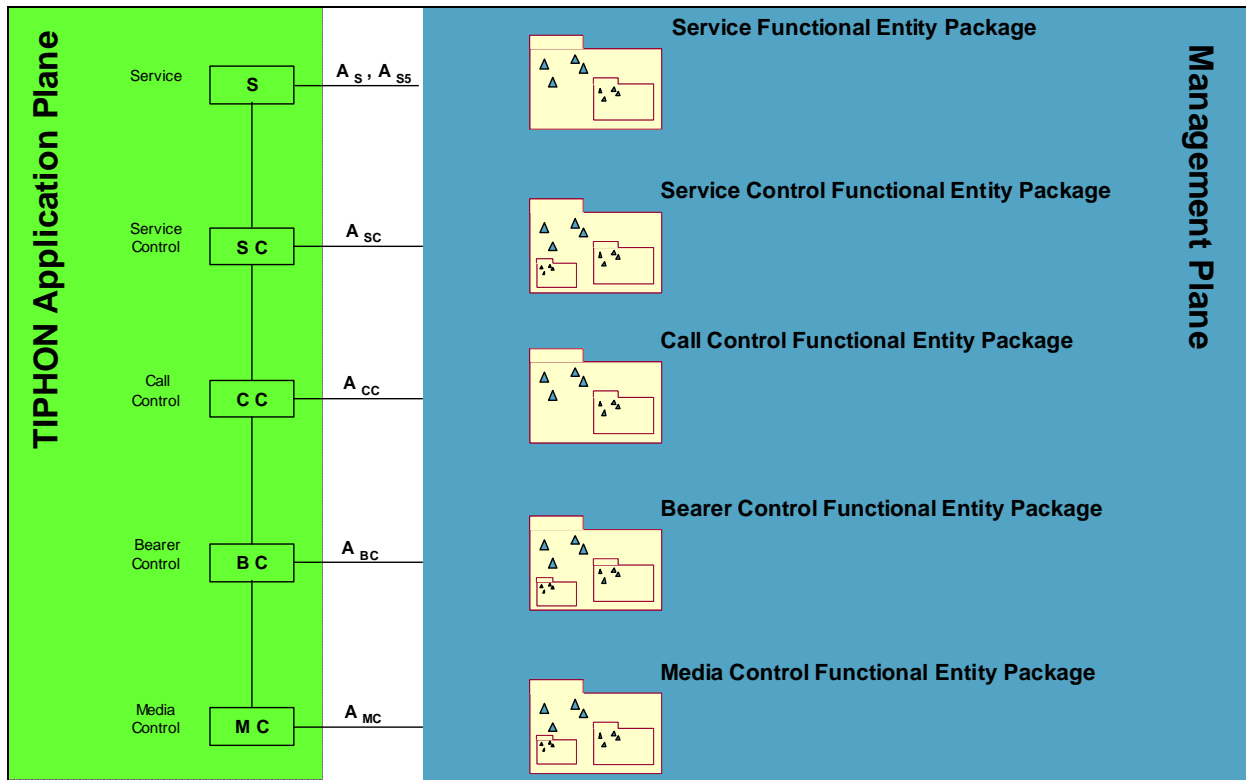


Figure 5: TNM packages

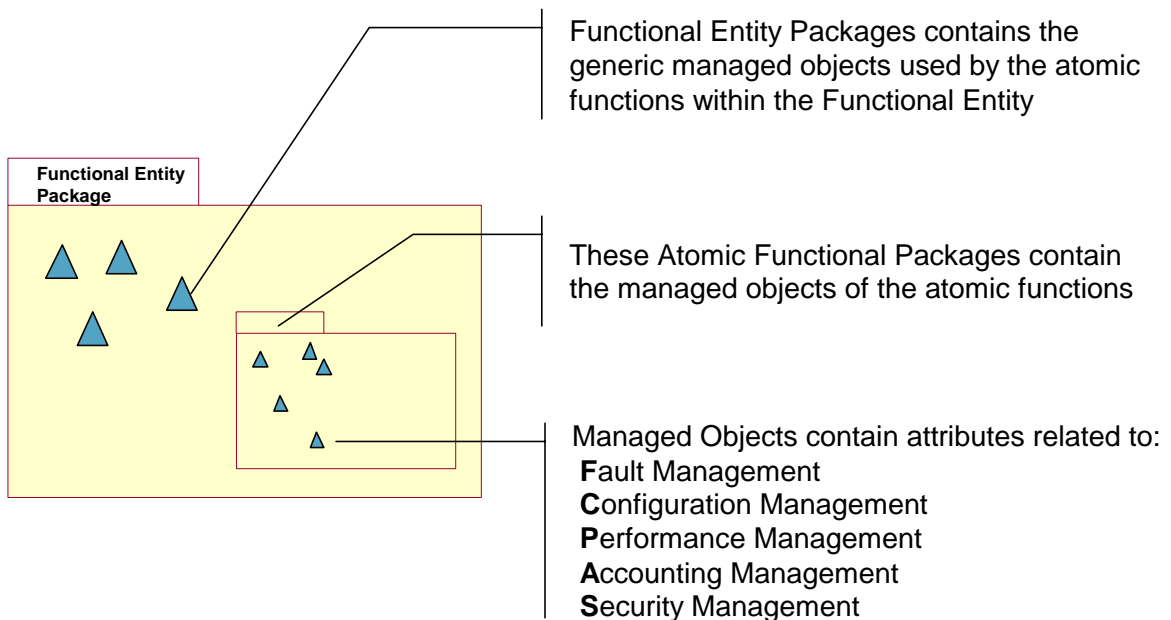


Figure 6: TNM package decomposition

5.4 Worked example for the service functional layer

The Functional Entity Package contains:

- those generic objects of Service Functional Layer. These generic managed objects may relate to the state of the functional entity, the current functions started, etc.;
- the atomic functional packages derived from the atomic functions defined within the Service Functional Layer. In particular, the atomic Service Profile Functional Package will contain the objects of the service profile atomic function. One of those objects may be related to registration information.

5.5 Relationship between TNM and tiphon service capabilities

A Service Application comprises of both service capabilities and a collection of managed objects. Service Capabilities and managed objects are combined in the definition of Service Applications, which inherit their functionality and attributes.

The managed objects are derived from the service capability attributes. The process of derivation is realized by identifying the information required for the FCAPS processes.

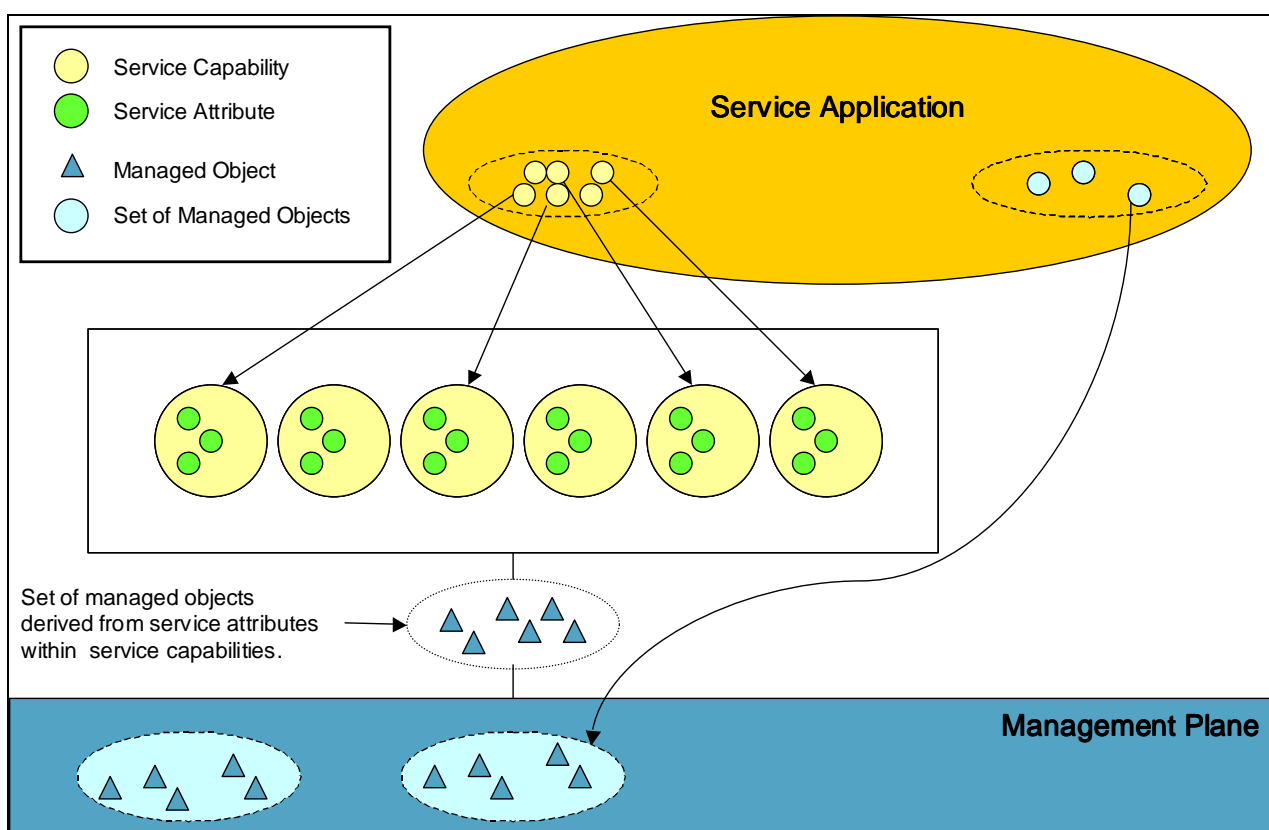


Figure 7: Service application and managed objects relationship

5.6 Management layers, ownership domains and management interfaces

In the TMN model, the design of management domains allows the partitioning of systems or element management into manageable subsets. A collection of similar managed objects is named a management domain. In the present document two additional types of domain are used. TIPHON defines 3 network domains, which correspond to: SCN Plane, TIPHON Application Plane and the TIPHON Transport Plane. We also define Ownership domains, which separate the operations of one service provider from the operations of another.

Figure 8 shows the management information flows between the management domains and their interfaces. These flows require mapping with the TIPHON network architecture to add the network management requirements to the existing reference points as defined in the TS 101 314 [5].

For TIPHON release 3, the network management framework shall support the service capabilities and higher order of service application as defined in TS 101 314 [5].

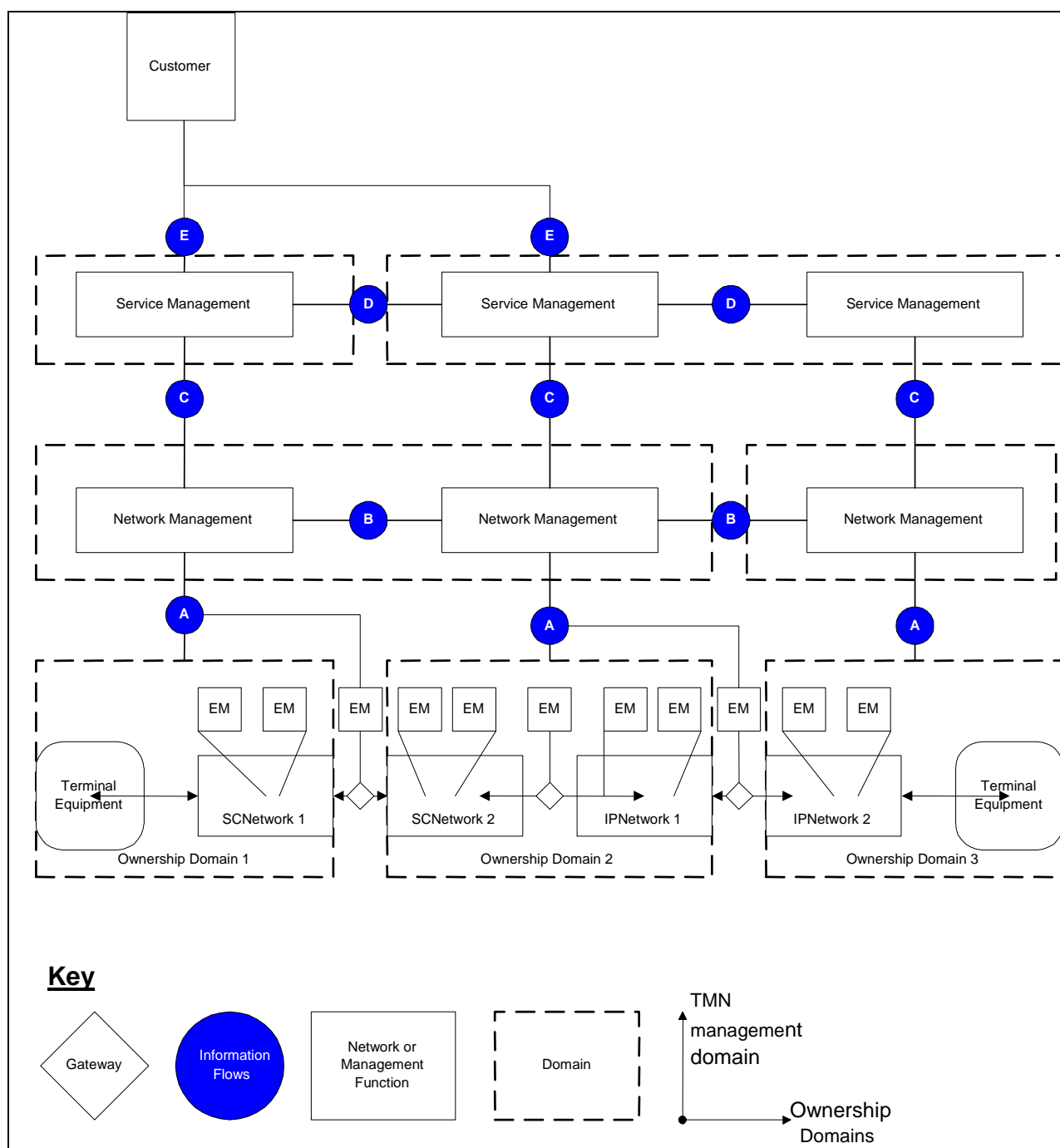


Figure 8: Management domains and interfaces

The TMN management requirements and functions defined in the present document are applicable to the TIPHON planes (TIPHON Application Plane, TIPHON Transport Plane). Information flows are defined to exist between TMN management domains (layers) and between ownership domains.

The Tiphon Network Management framework focuses on the A reference points shown in figure 8 which represent the information flows between the Management Plane and the TIPHON Application Plane and TIPHON Transport Plane. It is not the intent of this framework to prescribe a network management architecture within the Management Plane as the TIPHON management framework has adopted the TMN model to provide such an architecture. However in order to support the service capabilities defined for service applications (simple call for release 3), it will be necessary to visit the interfaces defined above (A to D).

NOTE: The information flows between the network element manager and the network element is out of scope of Tiphon release 3. It may be based on an open or a proprietary interface.

6 Fault Management

Fault management shall allow the detection and isolation of abnormal conditions affecting TIPHON services and TIPHON compliant systems.

For the present document, it includes the following function sets:

- **Alarm Surveillance:** real-time monitoring of network element (NE) data through NE polling, notifications. This includes alarm reporting, log control, alarm correlations, and so on;
- **Fault Localization:** including fault correlation & diagnostics;
- **Testing:** service and network element tests, self-tests and so on.

For the present document, it does not include:

- **Fault Correction.**
- **Reliability, Availability Quality Assurance:** goal setting, service availability, reporting for service outage, network outage and network element outage, and so on;
- **Trouble Administration:** (trouble reports generated by end users or by network elements for e.g.): trouble reporting policy, trouble information query and administration.

TIPHON compliant systems shall allow fault management in all network domains and in particular in the IP Telephony area.

7 Configuration Management

To be added in a later release of the Tiphon Network Management framework.

8 Accounting Management

To be added in a later release of the Tiphon Network Management framework.

9 Performance Management

Performance management shall allow the measurement, detection and correction of degrading services.

For this ETSI Tiphon release, it includes the following function sets:

- **Metrics:** call set-up & teardown related metrics, voice quality metrics (as defined in application and transport levels of TS 101 329-3 [6]);
- **Communication Failures** (for e.g. abnormal call termination, call degradation, criticality);
- **Multiple call degradation** (e.g. systems, routing, etc.);
- **SLA monitoring.**

For this ETSI Tiphon release, it does not include:

- **Hard faults;**
- **Provisioning faults.**

10 Security Management

To be added in a later release of the Tiphon Network Management framework.

11 Information at Management Interfaces

We recognize that service providers wish to understand how to manage both intra-domain and inter-domain services:

- 1) We consider that electronic interconnection of network management systems between service providers is complex and will be considered later.
- 2) Therefore inter-domain work will initially concentrate on the service information to be exchanged while the intra-domain work will concentrate on the network management information models and systems.

Exchange of information between different ownership domains (inter-domain) is important for an administration to be able to handle provisioning, trouble resolution, following the status and performance delivered services, inter-administration accounting.

The following requirements cover only the information to be exchanged that is additional to that which would be needed for conventional SCN based delivery, or that which becomes unusually important for IP telephony.

(The TeleManagement Forum provides much valuable guidance on management processes in SCN).

The decision on specific items for exchange between administrations is subject to bilateral/multilateral agreement during Service Design and Development.

Annex A: The purpose of the TMN layers

A.1 Element management layer (EML)

The EML manages each network element on an individual basis and supports an abstraction of the functions provided by the NE layer. The element management layer has a set of element managers that are individually responsible, on a devolved basis from the network management layer, for some subset of network elements.

Each element manager has the following three principle roles:

- to control and coordinate a subset of network elements;
- to provide a gateway (mediation) function to permit the network management layer to interact with network elements;
- to maintain statistical, log and other data about elements.

A.2 Network management layer (NML)

The NML has the responsibility for the management of all the Nes, as presented by the EML, both individually and as a set. It is not concerned with how a particular element provides services internally. Functions addressing the management of a wide geographical area are located at this layer. Complete visibility of the whole network is typical and a vendor independent view will need to be maintained. The network management layer has three principle roles:

- the control and coordination of the network view of all network elements within its scope or domain;
- the provision, cessation or modification of network capabilities for the support of service to customers;
- interact with the service management layer on performance, usage, availability etc.

Thus, the NML provides the functionality to manage a network by coordinating activity across the network and supports the "networking" demands made by the service management layer.

A.3 Service management layer (SML)

Service management is concerned with, and responsible for, the contractual aspects of services that are being provided to customers or available to potential new customers. It has five main roles:

- customer facing (providing the basic point of contact with customers for all service transactions) and interfacing with other administration domains;
- interaction with service providers;
- interaction with the network management layer and the business management layer;
- maintaining statistical data (e.g. QoS);
- interaction between services.

A.4 Business management layer (BML)

The business management layer has responsibility for the total enterprise and is the layer at which agreements between operators are made. This layer normally carries out goal setting tasks rather than goal achievement but can become the focal point for action in cases where executive action is called for. This layer is part of the overall management of the enterprise and many interactions are necessary with other management systems.

Annex B: Bibliography

ITU-T Recommendation M.3200: "TMN management services and telecommunications managed areas: overview".

ITU-T Recommendation M.3400: "TMN management functions".

ETSI TR 101 308: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Requirements for service interoperability; Scenario 3".

SMART TMN™: "Telecom Operations Map GB910".

Proposal for a European Parliament and Council Directive on the application of open network provision (ONP) to voice telephony and on universal service for telecommunications in a competitive environment (replacing European Parliament and Council Directive 95/62/EC).

ETSI ETR 138: "Network Aspects (NA); Quality of service indicators for Open Network Provision (ONP) of voice telephony and Integrated Services Digital Network (ISDN)".

ETSI SR 001 262: "ETSI drafting rules".

ETSI TR 101 877: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Requirements Definition Study; Simple call".

History

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