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Contact: Leen Mak
Alcatel-Lucent
Germany

Tel: +31 35 687 4143
Email: lmak@alcatel-lucent.com

NGN Management Specification Roadmap

1. Purpose and Scope

The purpose of the Next Generation Network (NGN) Management Specification Roadmap document is to provide a comprehensive overview of network and service management for the NGN. This overview consists of an introduction to the NGN, an introduction to the specific characteristics of NGN management, more detailed discussions of NGN management requirements and principles and a repository of NGN management specifications.

The need for a specific approach to NGN management stems from the fundamental properties of its subject: the NGN, as specified by ITU-T SG13. The basic NGN architecture consists of a transport stratum and a service stratum, each of which are subdivided in a number of functional entities. This architecture has been set up to allow re-use of existing technologies and simultaneously introduction over time of new technologies. Another fundamental characteristic is the fact that the architecture is designed to be service-agnostic. This will allow the introduction of new services without the need to re-architect the underlying network.
The management of the NGN needs to take this flexibility into account. The solution is found in basing NGN management on the principles of a Service Oriented Architecture (SOA). These principles will allow the re-use of existing management solutions and, simultaneously, support the introduction of the management technologies which are required to manage new functions, technologies and services in the transport and service strata.

In the construction of this document, the NGNMFG has adopted a two-track approach which involves identifying today's available solutions with currently available technologies, while preparing for tomorrow's needs by identifying emerging computing and communication technologies that should be used to either evolve today's available solutions or to be applied to create new solutions.

This document is structured as follows:

Clause 2 first describes the NGN architecture according to ITU-T Rec. Y.2012, supplemented by examples of transport and service strata.

Clause 3 introduces the NGN Management requirements and their sources.

Clause 4 describes in more detail the principles and methodologies used in NGN Management specification, like the SOA approach, the NGN management architecture specification based on this approach and the business processes which make up NGN Management.

Clause 5 provides an introduction to the concept "Management Interface", and illustrates the way Management Interfaces are specified.

Clause 6 goes into some detail with respect to NGN Management interface scenarios. It addresses areas of management in the transport stratum (e.g. Ethernet management, RACF management and IP network management), in the service stratum (e.g. IMS management, Application management,

and Service support management), and general and common areas (e.g. trouble-ticket management, and subscription management).

Clause 7 addresses harmonization concerns. These exist because of the reuse of existing specifications which were not developed with the aim to fit in the NGN management framework. Details of these concerns are documented in Appendix IV.

Clause 8 is closely related to clause 6 in the sense that is addresses specification gaps. Details of the concerns in this area are documented in Appendix VI.

Clause 9, finally, comprises a number of subjects which require special attention. Examples are the convergence of the control and the management planes, and the convergence between telecom and IT management approaches.

Apart from the ones already mentioned, there are appendices, providing lists of specifications which are agreed to be applicable for NGN management, bibliographic information about these specifications, and a detailed overview of the NGN functional entities which require management support.

2. Overview of NGN and NGN Management

2.1 A short introduction to the NGN

A number or economic and technological developments have contributed to a thorough reconsideration of the very structure of the telecommunications network. For an introduction to these developments, the reader may consult the available literature [*editor's note: references are for further study*]. In the context of this document, it is sufficient to conclude that the reconsideration led to the advent of a new approach to the construction of telecommunications networks. This new approach has become known as "NGN", "Next Generation Networks".

ITU-T Rec. Y.2001 defines an NGN as "A packet-based network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users".

ITU-T Rec. Y.2001 lists the following items as fundamental characteristics of the NGN: "
- packet-based transfer;
- separation of control functions among bearer capabilities, call/session, and application/ service;
- decoupling of service provision from transport, and provision of open interfaces;
- support for a wide range of services, applications and mechanisms based on service building blocks (including real time/ streaming/ non-real time and multimedia services);
- broadband capabilities with end-to-end QoS (Quality of Service);
- interworking with legacy networks via open interfaces;
- generalized mobility;
- unrestricted access by users to different service providers;

– a variety of identification schemes;
– unified service characteristics for the same service as perceived by the user;
– converged services between fixed/mobile;
– independence of service-related functions from underlying transport technologies;
– support of multiple last mile technologies;
– compliant with all regulatory requirements, for example concerning emergency communications, security, privacy, lawful interception, etc."

From this list of characteristics, it is clear that the NGN is not just another network, which will be deployed and operated next to, and independent from the existing telecommunication network. Instead, over time, parts of the existing network will be replaced by NGN structures, and other parts of the existing network will be integrated into the NGN. For example: the existing 64 kbit/s circuit switched voice network (PSTN) will completely disappear over time. Its function will be absorbed by the universal packet transfer and routing capability of the NGN. This capability will support the routing of packet streams of widely varying capacity, carrying not only voice but also other numerous other forms of information. Actually, the architecture of the NGN supports the view that voice transport will rapidly become one of the smaller applications of the network. At the other hand, access networks based on xDSL technologies will probably not disappear but become an integral part of the NGN, next to other access wireline and wireless access technologies.

ITU-T Rec. Y.2012 describes a number of NGN concepts, and it provides the specification of the NGN components and the functional architecture. Figure 1 from Y.2012, NGN Architecture Overview is reproduced here.

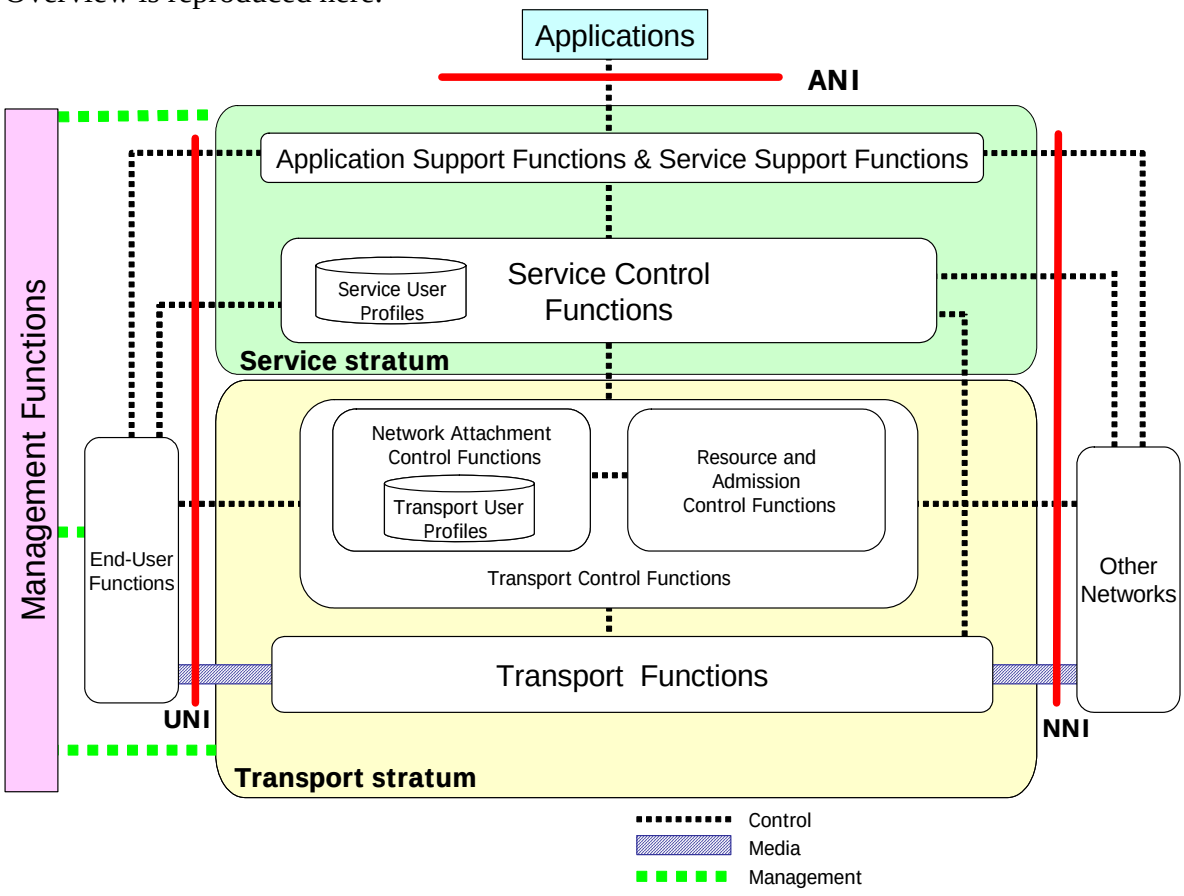

Figure 1: NGN Architecture Overview

Some main architectural aspects of the NGN (and its environment) which are shown in this figure are:

- the two separate strata which are the essential elements of an NGN, i.e. the Service Stratum and the Transport Stratum;
- the Applications, which reside outside the NGN;
- the End User Functions and the Other Networks to which the NGN is connected;
- the Management Functions which manage the NGN.

The NGN Service Stratum provides the functions that control and manage network services to enable the end-users services and applications. End-user services may be implemented by a recursion of multiple service strata within the network. Services may be related to voice, data or video applications, arranged separately or in some combination in the case of multimedia applications.

The NGN Transport Stratum is concerned with the transfer of information between peer entities. For the purposes of such transfers dynamic or static associations may be established to control the information transfer between such entities. Associations may be of durations that are extremely short, medium term (minutes), or long term (hours, days, or longer).

The main purpose of the separation of applications, the transport stratum and the service stratum is to allow independent evolution of the technologies used in these strata. For example: in the current view, the IP Multimedia Subsystem (IMS), specified by the 3rd Generation Partnership Project (3GPP) is an important candidate for the service control functions. If ever a newer technology would replace IMS, the separation of the strata should allow this evolution without affecting the transport stratum. Conversely, the same is true for the other strata: one of the technologies for the transport stratum is T-MPLS over SDH. Again, this technology may be replaced by others without affecting the service control layer, or the applications supported by the network.

2.2 The role of Management in an NGN

Figure 1 provides a very high level view of the role of Management with respect to the NGN. In this picture, it is a block without any details, connected to both strata and to the end user functions block. In reality, Management for the NGN comprises a highly complex set of functions which are taking care of tasks ranging from the set up of individual functional entities in the strata, to the overall orchestration of aspects of the behaviour of the network. (It should be noted that a lot of the behaviour of especially the service control function and of the transport control function is governed by the control protocols. Clause 8 of this document provides more detail on this issue).

Some of the basic philosophical and architectural properties of the NGN have a direct impact on the architecture of NGN Management. For example: the modular approach with strict separation between the service stratum and the transport stratum should be reflected in the management architecture. This implies that management of these strata should not be implemented as a single, monolitic, function block. Changes inside a stratum caused by technological evolution should be supported by flexibility in the management solution. Yet, at the other hand, NGN management should not leave the creation of an integrated view on the network to the operator: to the latter the NGN should be presented as an integrated machine.
Another particular property of (the introduction of) the NGN is the fact that there is in most cases no clearly defined point in time when an existing network will be decommissioned and the NGN

taken into operation. Usually there will be a period of time in which the legacy network and the NGN will exist together and the Management should be able to support that.
A third particular aspect of the NGN is the requirement that it should support a radically different approach to providing end user services. The trend in the market is from a relatively small set of end user services (measured in 10s), which are consumed by very large groups of customers (measured in tens of millions) and which are offered during relatively long time frames (years) towards a much wider variety of end user services (measured in 100s or 1000s), with a much shorter lifetime (measured in weeks or months), and which are aimed at much smaller customer groups (measured in 1000s or 10.000s). Next to this change, there is the trend that service building blocks will be offered by an increasing number of market players, many of whom are not traditional telecomms vendors. These trends taken together require a fundamental change in the approach to service design and deployment. The NGN should support automatic composition of services, from service components from within the network operators organization as well as from 3rd party vendors. This composition, and the other phases of the service lifecycle should be supported by a management structure and functionality which will allow the network provider to operate successfully under very dynamic market conditions.

Appendices to Y.2012 provide examples of NGN network configurations, and transport-stratum access network scenarios. These configurations and scenarios will be used by this document to illustrate the role of management in the set-up and operation of an NGN.

It should be noted that ITU-T is not the only body active in NGN standardization. Also the European Telecommunications Standards Institute (ETSI) has issued NGN specifications. 3GPP is responsible for the specifications of some fundamental NGN functional entities, like the IMS. The approach taken in this documents is that building blocks stemming from these organizations should be able to interwork and that the management functions will be able to manage the building blocks independent from their origin.

2.3 NGN Management Functionality

NGN Management functionality is based on the ITU-T Rec. M.3050 series, Enhanced Telecom Operations Map (eTOM). Originated by the TMForum, the eTOM identifies the processes required to run a telecoms network. In successive analytical steps, the identified processes are split up into subprocesses, until a level of detail is obtained which is sufficient to enable a meaningful exchange of views between management product vendors and network operators. The outcome of the second step is reflected in an set of so called Level 1 processes. Figure 2 shows these processes in the context of the overall map.

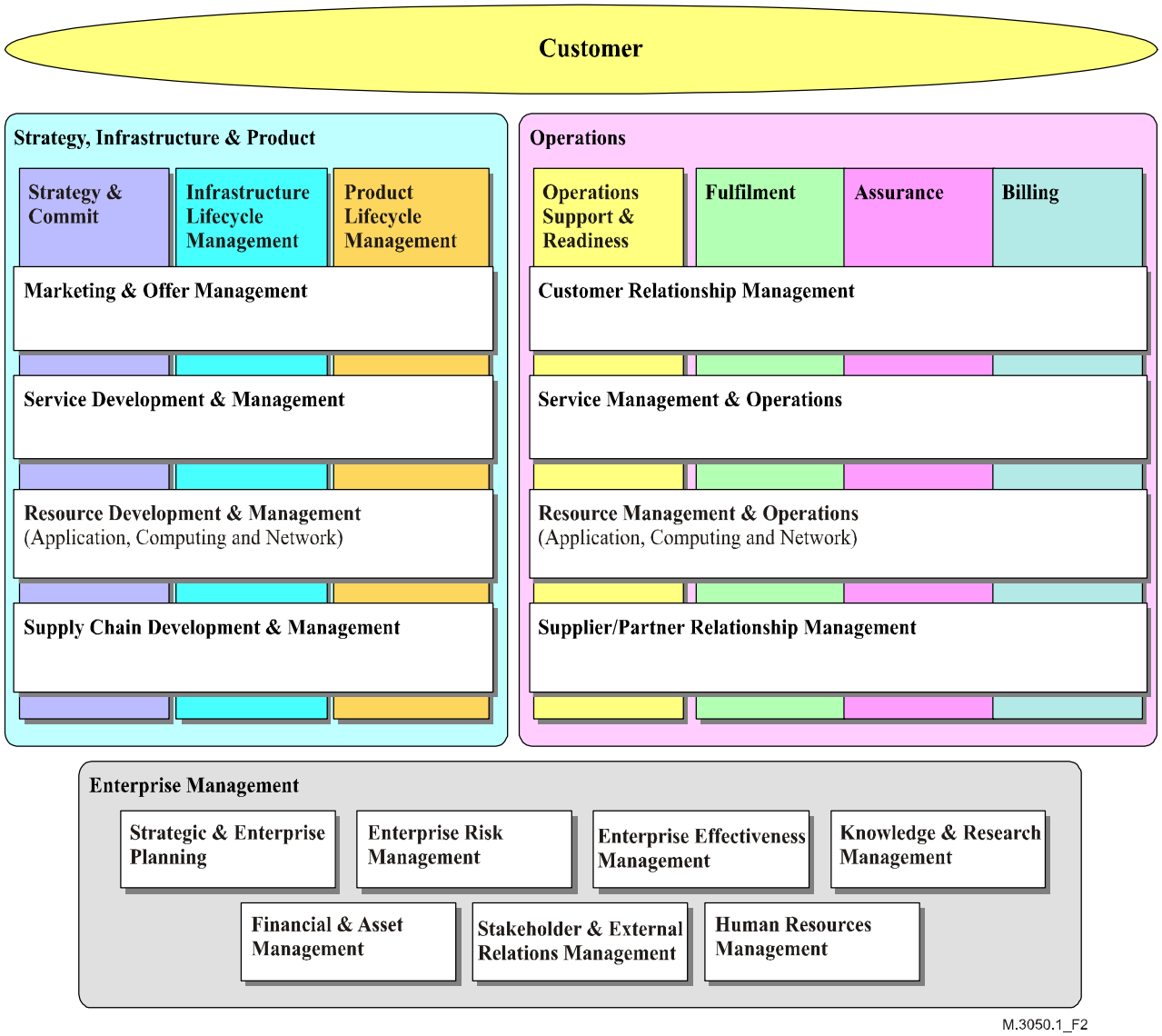

Figure 2: eTOM business process framework – Level 1 processes

This document is confined to management processes belonging to the Operations process group, and to the Infrastructure Lifecycle Management and the Product Lifecycle Management process groups. The Strategy and Commit process group, and the Enterprise Management process group are outside its scope. Refer to clause 4 of this document for a more detailed discussion of the eTOM and its application in the field of NGN Management.

The process taxonomy as developed in the eTOM does not necessarily lead to a meaningful physical management systems architecture. Some of the processes may be implemented by human resources and other may be spread out of a number of systems. Yet, the identification of relatively self contained processes helps in identifying functional interfaces. This is an important aspect as it allows the NGN management functionality to be specified and implemented based on the principles of a Service Oriented Architecture (SOA). Clause 4 provides further information on this subject.

Management functionality may also be defined in terms of the descriptions of what are termed function sets in support of Element, Network, Service, and Business Management defined in ITU-T Rec. M.3400. These function set descriptions are categorized according to fault, configuration,

accounting, performance, and security (FCAPS) management and populated with functional descriptions that mirror the traditional division of telecom management functionality into Operations, Administration, Maintenance, and Provisioning (OAM&P).

The relation between the traditional FCAPS management functions and the eTOM processes is described in Supplement 3 to ITU-T Rec. 3050.

3. NGN Management Requirements

For further study.

Editor's note: proposed contents:
- *summary of RAT, including list of requirements documents*
- *inclusion of RAT as annex or reference out*

4. NGN Management Principles

The primary NGN management principles emphasized by this document may be summarized as follows:

- "future-proof" architectures supportive of distributed management and independent of any particular communications technology

- protocol-neutral information models supportive of an interoperable, multi-protocol environment

- use of concepts and implementation technologies strongly supported by the IT and computer industries

It should be noted however that many of the specifications recommended in this document are based on current techniques and technologies; where appropriate, recommendations to migrate them to the preferred techniques and technologies are made.

4.1 Service-Oriented Architecture (SOA)

One of the architectural principles behind the management architecture for Next Generation Networks is that of being a Service-Oriented Architecture (SOA).

A Service-Oriented Architecture (SOA) is a software architecture of services, policies, practices and frameworks in which components can be reused and repurposed rapidly in order to achieve shared and new functionality. This enables rapid and economical implementation in response to new requirements thus ensuring that services respond to perceived user needs.
SOA uses the object-oriented principle of encapsulation in which entities are accessible only through interfaces and where those entities are connected by well-defined interface agreements or contracts.
Major goals of an SOA in comparison with other architectures used in the past are to enable:

- rapid adaptation to changing business needs;

- cost reduction in the integration of new services, as well as in the maintenance of existing services.

SOA supports the generation of open and agile business solutions that can be rapidly extended or changed on demand. This will enable NGN Management to support the rapid creation of new NGN services and changes in NGN technology.

The main features of SOA are:

- it is loosely-coupled, location-independent, and supports reusable services;

- any given service may assume a consumer and provider role with respect to another service, depending on the situation;

- the "find-bind-execute" paradigm for the communication between services;

- published contract-based, platform and technology-neutral service interfaces. This means that the interface of a service is independent of its implementation;

- encapsulating the lifecycle of the entities involved in a business transaction; and exposing a coarser granularity of interfaces than an Object-Oriented Architecture.

For more information, see OASIS SOA-RM (OASIS Reference Model for Service Oriented Architecture v1.0)

4.2 Management Architectures

SOA-based NGN management architectures are described in

- ITU-T M.3060: Principles of Management of Next Generation Networks

- ETSI TS 188 001: NGN OSS Architecture Release 1

Also see TMF053 (NGOSS Technology-Neutral Architecture).

(*Editor's note: The addition of more details is for further study.)*

4.3 Business Processes

Business processes supportive of NGN management are described in M.3050.

(*Editor's note: The addition of more details is for further study.)*

4.4 Protocol-neutral information modeling

NGN management standardization supports the reusability of standardized information definitions to reduce the overall standardization effort. Where information is expected to be utilized in conjunction with more than one management paradigm, the information should first be defined in a

paradigm-neutral manner utilizing industry-recognized techniques after which it would then be mapped onto paradigm-specific formats.

5. NGN Management Interfaces and Specifications

Management of a NGN telecommunications environment is an information processing application. To effectively manage complex networks and support network operator/service provider business processes, it is necessary for management applications to interact by directing/performing actions and exchanging information implemented in multiple consumer and provider entities. Thus telecommunication management is a distributed application.

In order to promote interoperability, NGN management is based on standardized, open management paradigms that support the standardized modeling of the information to be communicated across interfaces between consumer entities and provider entities. Management standardization activities generally do not develop a specific management paradigm but build upon industry-recognized solutions, focusing primarily on object-oriented and service-oriented techniques. Specific management paradigms and information architectural principles may be applied in management standards when judged to be adequate.

Figure 3 identifies the basic elements of an interface as defined in this document.

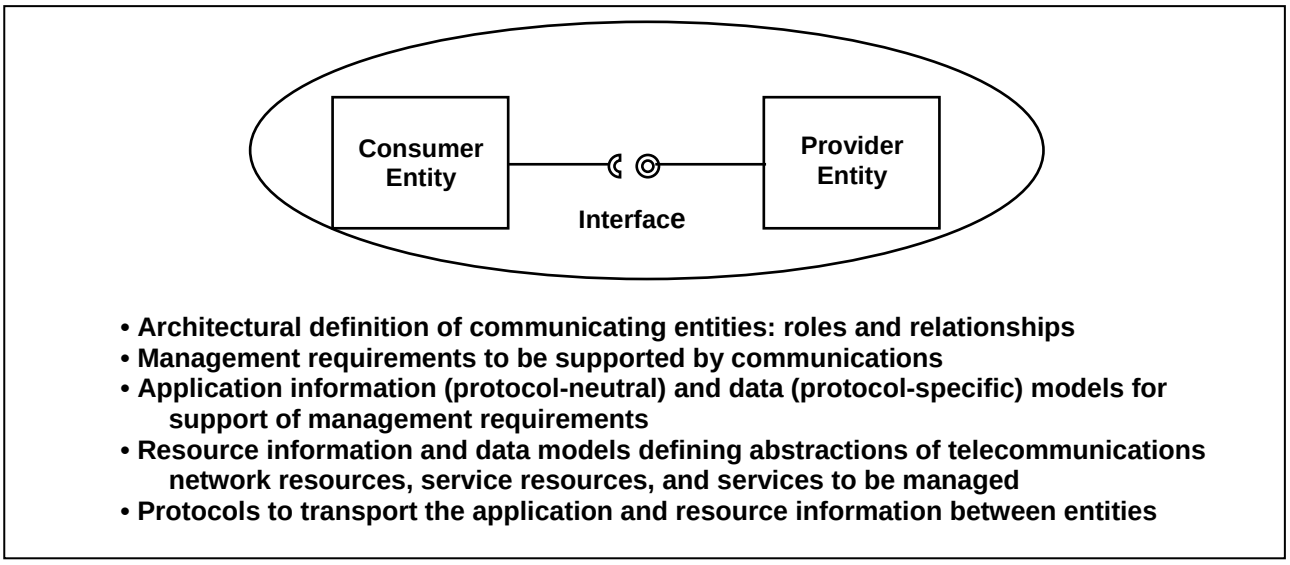

Figure 3: Elements of an Interface

In general, the management requirements for the solution need to be stated in business terms and to be decomposed to identify application interactions in business terms sufficient to drive the definition of information models and interface operations; the information model details must be traceable to requirement details; information must be specified independent of implementation technology, i.e., in a protocol-neutral form using industrial strength methods and tools, and also specified in a protocol-specific form traceable to the protocol-neutral form; and communicated using standardized transport mechanisms.

Based on the above perspective, the following types of specifications have been identified to define each interface supporting a particular area of management in clause 5:

- Architecture
- Requirements
- Information models (protocol-neutral)
- Data models (protocol-specific)
- Protocols

It might be noted that in some forums, two forms of information models and data models are documented separately, one to specify the interface operations and another to specify the managed resources.

In addition, the following supporting specifications have been identified:

- Interface specification methodologies: M.3020, TS 32.150 series, TMF 402-404
- Languages to define protocol-neutral information models: initial focus on OMG Universal Modeling Language (UML)
- Languages to define data models for a specific interface paradigm: initial focus on CORBA, XML-based, Web services, and SNMP environments
- Rules for using the above languages
- Network architectures to support the abstraction of network resources: G.800, G.805, G.809.

6. NGN Management Interface Scenarios

The NGN management is categorized in this document in terms of Areas of Management based on the NGN architecture summarized in clause 2.1 above and on identified NGN-supporting network technologies where relevant:

- Transport stratum areas of management, including
    - Transport functions
        1. ethernet management
        2. SDH/SONET management
        3. DSL management
        4. PON management
        5. ASON management
        6. IP network management
        7. T-MPLS management
    - Transport control functions (including signaling)
        1. RACF management
        2. NACF management
        3. ASON management
        4. IP network management
        5. T-MPLS management
    - Other transport stratum management
- Service stratum management
    - IMS management
    - PSTN/SDN emulation service management
    - Application function support management
    - Service support management
    - Application management

  - Service management
  - Other service stratum management
- General/common management
  - Trouble-ticket management
  - Subscription management
  - Other general/common management

For each Area of Management, one or more interface scenarios are described using the following template:

- Area of management name
- Area of management description
- Managed resources description
- Management interface architectural description
- Management interface requirements
- Management interface information models (protocol-neutral)
- Management interface data models (protocol-specific)
- Management interface protocols
- Management interface sets*
- Management interface supporting specifications (including methodology, languages, analysis and design rules)
- Major management interface specification gaps, overlaps, and inconsistencies.

* A management interface set typically includes two or more of the following specifications: requirements, protocol-neutral information model, protocol-specific data models, protocols, and file definitions focused on specifying a single management interface topic

6.1 Interface scenario: Ethernet Management

Area of management name	**Ethernet management**
Area of management description	TBD
Managed resources description	EoT: G.8021, G.8051 Metro Ethernet: EPON:
Management interface architectural description	Entities: TBD
Management interface requirements	SG4: Q.840.1 MEF 7
Management interface information models (protocol-neutral)	EML-NML - SG4: Q.840.1 - MEF 7
Management interface data models (protocol-specific)	NE interfaces - IEEE 802.1 MIBs: AB, AD, ag, D, Q - IETF MIBs : EFMCu MIB, RFCs 3621, 3635, 3637

Area of management name	**Ethernet management**
Management interface protocols	NE interfaces: IETF SNMPv3 EML-NML interfaces: TMF 814
Management interface sets	EML-NML interfaces: TMF MTNM (513, 608, 814, 814A)
Management interface supporting specifications (including methodology, languages, analysis and design rules)	methodology: IETF SMIv2, TMF 402-404, M.3020 network architectures: G.809
Major management interface specification gaps, overlaps, and inconsistencies	see clause D.8, TBD

6.2 Interface scenario: IMS Management

Area of management name	**IMS management**
Area of management description	TBD
Managed resources description	3GPP TS 23.002, 23.228
Management interface architectural description	3GPP TS 32.102, 32.240 3GPP2 X.S0013-007-A
Management interface requirements	3GPP TS 32.409
Management interface information models (protocol-neutral)	
Management interface data models (protocol-specific)	
Management interface protocols	3GPP 32.101 (CORBA, XML) 3GPP2 X.S0013-008-A
Management interface sets	- 3GPP TS 32.111-x, 32.30x, 32.31x, 32.60x, 32.62x, 32.66x, 32.67x, 32.73x - 3GPP charging (TS 32.260, 32.296, 32.297, 32.298, 32.299) - 3GPP2 S.S0028-001-C - OAM&P for cdma2000 (3GPP R6 Delta Specification, 3GPP2 Generic NRM IRP, 3GPP2 Core NRM IRP) - ETSI TS 188 005-x
Management interface supporting specifications (including methodology, languages, analysis and design rules)	methodology: 3GPP TS 32.15x
Major management interface specification gaps, overlaps, and inconsistencies	see claus D.10, TBD

7. Harmonization Concerns

During the development of the NGN Management Specification Roadmap document, a number of areas were identified where non-consistent (partially) overlapping specifications exist, originated by different SDOs and/or fora. Appendix IV lists those areas and provides an overview of the efforts aimed at harmonising these specifications.

8. Gap Analysis

For further study.

Editor's note: proposed contents:
- *RAT gaps not covered above*
- *details in Appendix VI*

9. Other Concerns

For further study.

Editor's note: proposed contents:
- *Control and management convergence*
- *Service creation and management relationship*
- *IT and telecom management convergence*
    - *Driven by NGN*

Appendices

Appendix I - Specifications and Descriptions of NGN Managed Entities

The following documents contain specifications and descriptions of the entities from which an NGN is composed and which need to be managed.

Identification	Title	Notes
3GPP 23.002	Network architecture	
3GPP 23.228	IP Multimedia Subsystem (IMS); Stage 2	
3GPP2 S.R0037-B v.1.0	IP Network Architecture Model for cdma2000 Spread Spectrum Systems	
ITU-T Y.2001	General overview of NGN	
ITU-T Y.2011	General principles and general reference model for Next Generation Networks	
ITU-T Y.2012	Functional Requirements and Architecture of the NGN	
ITU-T Y.2021	IMS for Next Generation Networks	
ITU-T Y.2111	Resource and admission control functions in Next Generation Networks	

Editor's note: All specs identified in the scenario section should be listed in this table.

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Appendix II - Requirements Analysis and Traceability

For further study.

Editor's note: proposed contents:

- *RAT*

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Appendix III - Specifications applicable to the management of NGNs

This annex lists all specifications deemed applicable to the management of NGNs. The table provides all specifications in a structured way, thereafter follows an alphabetically sorted list with bibliographic data for all specifications.

Appendix III.1 - Structured list of specifications

This table lists all specifications which are identified as being applicable to NGN Management. The specifications are grouped together, based on the following set of areas:

1. Management Requirements
2. Management Architecture
3. Generic Management Specifications and Models
4. Interface Specification Methodology
5. Interface Definition Language
6. Protocol Specifications
7. Fault Management
8. Accounting Management
9. Security Management
10. Service Management
11. Transport Stratum Management
12. Access Transport Function Management
13. Service Stratum Management
14. IMS Management
15. Interdomain Management

The areas 1 - 6 comprise generic areas, the areas 7 - 10 address specific management functional areas, the areas 11 - 15 address the management of the functional components which make up an NGN.

Area	**Document ID**	**Title**	**Notes/Issues**
Requirements	ETSI TS 188 003	OSS Requirements	requirements specifications should be checked for possible harmonisation issues
	ETSI TS 188 004	NGN Management; OSS Vision	
	ITU-T M.3060, clause 7	Management of Next Generation Networks	
	ITU-T Y.2001, clause 8.5	General overview of NGN	
	ITU-T Y.2011, clauses 7.1, 8.0, 8.1, 8.2	General principles and general reference model for Next Generation Networks	

Area	Document ID	Title	Notes/Issues
	ITU-T Y.2012, clauses 7.4, 8.5	Functional requirements and architecture of the NGN	
	ITU-T Y.2201, clauses 5.9.6, 5.17, 5.20	NGN Release 1 Requirements	
	ITU-T Y.2701, clauses 6.3, 7.1, 8.1	Security Requirements for NGN Release 1	
	ITU-T E.41NGN&S	Framework for operation requirements of Next Generation Networks and Services	
	ITU-T Y.1543, clause 9	Measurements in IP networks for Inter-Domain Performance Assessment	
	ITU-T Y.mpm, clauses 7.1-7.4, 9, 10.2	Management of performance measurement for NGN	
	NGNMFG-OD-025-R1	Report of SP/NO event -- 24 - 26 October 2006	
	ITU-T E.480	Framework for service management operational requirements – Service management	
	IETF RFC 3535, section 3	Overview of the 2002 IAB Network Management Workshop	
Management Architecture	ITU-T M.3060	Management of Next Generation Networks	harmonization issue with ETSI TS 188 001 (see section 6.1)
	ETSI TS 188 001	NGN Management; OSS Architecture	harmonization issue with ITU-T M.3060 (see section 6.1)
Generic Management Specifications and Models	ITU-T M.3050 series	Enhanced Telecom Operations Map (eTOM)	1) Equal to TMF eTOM v4 GB921 2) NGN relationship explained in M.3060 and in TS 188 001
	TMF 053B, C, D, and F	NGOSS Technology-Neutral Architecture v4.5	
	TMF GB922	Shared Information/Data Model (SID)	harmonization issue with CIM, X.alarm-neutral, and MTNM

Area	Document ID	Title	Notes/Issues
	DMTF CIM	Common Information Model	harmonization issue with SID
	ITU-T M.3017	Framework for the integrated management of hybrid circuit/packet networks	
	OASIS SOA	Reference Model for Service Oriented Architecture v1.0	
Interface Specification Methodology	ITU-T M.3020	Management interface specification methodology	
	3GPP 32.150	Telecommunication management; Integration Reference Point (IRP) Concept and definitions	
	IETF RFC 3444	On the Difference between Information Models and Data Models	
Interface definition language	IETF STD 58	Structure of Management Information version 2	to support SNMP; recommended MIBs are for further study
	W3C WSDL	Web Services Description Language	
	OASIS BPEL	Web Services Business Process Execution Language	role to be studied
Protocol Specifications	IETF Netconf	NETCONF configuration protocol	for interfaces to the NE, for configuration
	IETF STD 62	Simple Network Management Protocol version 3	for interfaces to the NE, primarily monitoring (including event reporting)
	OASIS WSDM MUWS	WSDM Management Using Web Services (WSDM-MUWS) v1.1	for non-NE interfaces
	DMTF WBEM	Web-Based Enterprise Management	for CIM only
Fault Management	ITU-T X.alarm-neutral	Protocol-Neutral UML Description of the Alarm Reporting Function	harmonisation issue with SID, MTNM, and 32.111 (see sect. 6.2)
	ITU-T M.3343	Requirements and analysis for NGN trouble administration across B2B and C2B interface	Ed. note: NGN specific

Area	Document ID	Title	Notes/Issues
Accounting Management	ATIS-0300075-2005 and ATIS-0300075.1-2005	Usage Data Management for Packet-Based Services - Service-Neutral Architecture and Protocol Requirements - Service-Neutral Protocol Specification for Billing Applications	harmonization issue with 3GPP IMS Charging specifications (see section 6.3)
Security Management	ITU-T M.3016 series	Security of the management plane	NGN relationship explained in M.3060
	ITU-T M.SMSreq	Guidelines and Requirements for Security Management Systems	
Service Management	ITU-T M.3341	QoS/SLA management service requirements	
	ITU-T M.3342	Guidelines for the definition of SLA representation template	*Ed. note: NGN specific*
	ITU-T M.3350	Emergency Telecommunication Service (ETS) management service requirements	
Transport Stratum Management	ETSI TS 188 005-1	NGN NRM Requirements	for ETSI equivalents of NACF, RACF, etc
	ETSI TS 188 005-2	NGN NRM Information Service	
	ITU-T G.7718/Y.1709	Framework for ASON Management	
	ITU-T G.7718.1/Y.1709.1	Protocol-neutral management information model for the control plane view	
	TMF 513	MTNM Business Agreement (part of TMF MTNM Solution Suite)	1) Equal to ITU-T M.3170 series) 2) harmonisation issues with: • SID, X.alarm-neutral, and 32.111 (see section 6.2) • SID and 32.671-675 (see section 6.4) • MEF 7 and Q.840.1
	TMF 608	MTNM Information Agreement (part of TMF MTNM Solution Suite)	
	TMF 814	MTNM Solution Set in CORBA IDL with Supporting Documentation (part of TMF MTNM Solution Suite)	

Area	Document ID	Title	Notes/Issues
	TMF 814A	MTNM Implementation Statement Templates for CORBA (part of TMF MTNM Solution Suite)	(see section 6.7)
	Q.840.1	Requirements and Analysis for NMS-EMS Management Interface of Ethernet over Transport and Metro Ethernet Network (EoT/MEN)	harmonization issue with MTNM Solution Suite (see section 6.7)
	MEF 15	Requirements for Management of Metro Ethernet Phase 1 Network Elements	
	MEF 7	EMS-NMS Information Model (for Metro Ethernet Network)	harmonization issue with IEEE802.1 and MTNM Solution Suite (see section 6.7) *editor's note: needs investigation*
	IEEE 802.1AB	Standard for Local and metropolitan area networks Station and Media Access Control Connectivity Discovery	for interfaces to the NE possible harmonization issue with MEF7 and MTNM Solution Suite (see section 6.7) *editor's note: needs investigation*
	IEEE 802.1ad	IEEE Standard for Local and metropolitan area networks - Virtual Bridged Local Area Networks - Revision - Amendment 4: Provider Bridges	
	IEEE 802.1ag	Connectivity Fault Management	
	IEEE 802.1D	Standard for Local and Metropolitan Area Networks - Media access control (MAC) Bridges	
	IEEE 802.1Q	Standard for Local and Metropolitan Area Network - Virtual Bridged Local Area Networks	
Access	TMF MTNM Solutions Suite (see Core Transport Functions)		

Area	Document ID	Title	Notes/Issues
Transport Function Management	Q.838.1	Requirements and analysis for the management interface of Ethernet passive optical networks (EPON)	
	IETF EPON MIB	Managed Objects of EPON	possible harmonization issue, see section 6.7
	IETF EFMCu MIB	Ethernet in the First Mile Copper (EFMCu) Interfaces MIB	
	IETF Ethernet OAM MIB	Definitions and Managed Objects for OAM Functions on Ethernet Like Interfaces	
	IETF RFC3621	Power Ethernet MIB	
	IETF RFC3635	Definitions of Managed Objects for the Ethernet-like Interface Types	
	IETF RFC3636	Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)	
	IETF RFC3637	Definitions of Managed Objects for the Ethernet WAN Interface Sublayer	
Service Stratum General Management	ETSI TS 188 002-1	NGN Subscription Management; Part 1: Requirements	
	ETSI TS 188 002-2	NGN Subscription Management; Part 2: Information Model	
	ETSI TS 188 005-1	NGN NRM; Part 1: Requirements	IMS related part imported unchanged from 3GPP 32.73x
	ETSI TS 188 005-2	NGN NRM; Part 1: Information Service	
IMS Management	3GPP TS 32.111-1 to -4	Fault Management IRP	harmonization issue with TMF MTNM Solution Suite, SID, and X.alarm-neutral (see section 6.2)
	3GPP TS 32.240, 32.260, 32.296-299	IMS Charging Management	harmonization issue with TMOC Usage Data Management specifications (see section 6.3)

Area	Document ID	Title	Notes/Issues
	3GPP TS 32.301-304	Notification IRP	
	3GPP TS 32.311-314	Generic IRP	
	3GPP TS 32.409	IMS Performance Measurements	
	3GPP TS 32.601-604	Basic CM IRP	
	3GPP TS 32.621-625	Generic NRM IRP	
	3GPP TS 32.661-664	Kernel CM IRP	
	3GPP TS 32.671-675	State Management IRP	possible harmonization issue with TMF MTNM Solution Suite and SID (see section 6.4)
	3GPP TS 32.731-735	IMS Network Resource Model IRP	
	3GPP2 S.S0028-001-C	OAM&P for cdma2000 (3GPP R6 Delta Specification)	Describes reuse of 3GPP SA5 R6 specifications.
	3GPP2 S.S0028-002-C	OAM&P for cdma2000 (3GPP2 Generic NRM IRP)	
	3GPP2 S.S0028-003-C	OAM&P for cdma2000 (3GPP2 Core NRM IRP)	Working with 3GPP SA5 on management harmonization of IMS object models
	3GPP2 X.S0013-007-A	All-IP Core Network Multimedia Domain - IMS Charging Architecture	Working with 3GPP SA5 on IMS charging harmonization
	3GPP2 X.S0013-008-A	All-IP Core Network Multimedia Domain - IMS - Offline Accounting Information Flows and Protocol	
Interdomain Management	3GPP 32.806	Application guide for use of Integration Reference Points (IRPs) on peer-to-peer (p2p) interface	*Editor's note: these are tentative entries, contributions and bibliographic data are required*
	TMF CO~OP		
	TMF MTOSI		

Appendix III.2 - Alphabetic list of specifications with bibliographic data

Contents of Appendix III.2

3GPP TS 32.111-1 / 32.111-2 / 32.111-3 / 32.111-5: Alarm IRP

Title: 32.111-x series (4 specifications) Alarm IRP (Requirements; Information Service; CORBA Solution Set. XML Definition)
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche
Type: management interface (protocol-neutral and protocol-specific)
Role: generic
Release 1 application: Generic management interface (Interface IRP) applicable to alarm management within NGN systems
Traceability:
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.240: Charging architecture and principles

Title: 3GPP Telecommunication management; charging management; charging architecture and principles
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche (Alain Bibas)
Type: architecture (functional and physical)
Role: technology-specific
Release 1 application: IMS charging management
Traceability: TS 22.115 **,** 23.815, 32.815
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.260: IP Multimedia Subsystem (IMS) charging

Title: 3GPP Telecommunication management; charging management; IP Multimedia Subsystem (IMS) charging
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche (Alain Bibas)
Type: functional requirements, interface (protocol-neutral, protocol-specific)
Role: technology-specific
Release 1 application: IMS charging management
Traceability: TS 22.115, 23.815 and 32.240
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.296: Online Charging System (OCS)

Title: 3GPP Telecommunication management; charging management; Online Charging System (OCS): applications and interfaces
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche (Alain Bibas)
Type: interface (protocol-neutral, protocol-specific)

Role: technology-specific
Release 1 application: IMS charging management
Traceability: TS 23.815 and 32.240
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.297: CDR file format and transfer

Title: 3GPP Telecommunication management; charging management; charging data record (CDR) file format and transfer
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche (Alain Bibas)
Type: interface (protocol-neutral), protocol
Role: technology-specific
Release 1 application: IMS charging management
Traceability: TS 23.815 and 32.240
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.298: CDR parameter description

Title: 3GPP Telecommunication management; charging management; charging data record (CDR) parameter description
Status: Release 7 - 3GPP approval expected 2Q05
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche (Alain Bibas)
Type: interface (protocol-neutral)
Role: technology-specific
Release 1 application: IMS charging management
Traceability: TS 23.815 and 32.240
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.299: Diameter charging applications

Title: 3GPP Telecommunication management; charging management; charging architecture and principles
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche
Type: protocol
Role: technology-specific
Release 1 application: IMS charging management
Traceability: TS 23.815, 32.240
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks: an application of the Diameter base and credit control protocols

3GPP TS 32.301 / 32.302 / 32.303 / 32.305: Notification IRP

Title: 32.30x series (4 specifications) Notification IRP (Requirements; Information Service; CORBA Solution Set, XML Definition)
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche
Type: management interface (protocol-neutral and protocol-specific)
Role: generic
Release 1 application: Generic management interface (Interface IRP) applicable to notification subscription management within NGN systems
Traceability:
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.311 / 32.312 / 32.313 : Generic IRP

Title: 32.31x series (3 specifications) Generic IRP (Requirements; Information Service; CORBA Solution Set)
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche
Type: management interface (protocol-neutral and protocol-specific)
Role: generic
Release 1 application: Generic management interface (Interface IRP) providing generic interface IRP functions within NGN systems
Traceability:
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.409: IMS Performance Measurements

Title: 32.409: Performance measurements - IP Multimedia Subsystem (IMS)
Status: Release 7 – 3GPP approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche
Type: functional requirements
Role: technology-specific & NGN-specific
Release 1 application: management of IMS entities
Traceability:
Location of text: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.601 / 32.602 / 32.603: Basic Configuration Management IRP

Title: 32.60x series (3 specifications) Basic CM IRP (Requirements; Information Service; CORBA Solution Set)
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche
Type: management interface (protocol-neutral and protocol-specific)
Role: generic

Release 1 application: Generic management interface (Interface IRP) applicable to active configuration management / provisioning within NGN systems
Traceability:
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.621 / 32.622 / 32.623 / 32.625: Generic NRM IRP

Title: 32.62x series (4 specifications) Generic Network Resources IRP (Requirements; Information Service; CORBA Solution Set, XML File Format Definition)
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche
Type: information model (protocol-neutral and protocol-specific)
Role: generic and technology-specific
Release 1 application: Generic Network Resource Model (NRM) applicable to management of all NGN entities
Traceability:
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.661 / 32.662 / 32.663 / 32.665: Kernel CM IRP

Title: 32.66x series (4 specifications) Kernel CM IRP (Requirements; Information Service; CORBA Solution Set, XML File Format Definition)
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche
Type: management interface (protocol-neutral and protocol-specific)
Role: generic
Release 1 application: Generic management interface (Interface IRP) providing configuration management notifications within NGN systems
Traceability:
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.671 / 32.672 / 32.673 / 32.675: State Management IRP

Title: 32.67x series (4 specifications) State Management IRP (Data Definition IRP - Requirements; Information Service; CORBA Solution Set, XML File Format Definition)
Status: Release 7 - 3GPP Approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche
Type: information model (protocol-neutral and protocol-specific)
Role: generic
Release 1 application: State management data definitions applicable to management of all NGN entities.
Traceability:
Location: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP TS 32.731/32.732/32.733 / 32.735: IMS Network Resource Model IRP

Title: 32.73x series (4 specifications) IMS NRM IRP (Requirements; Information Service; CORBA Solution Set; XML File Format Definition)
Status: Release 7 – 3GPP approved
Organization (group): 3GPP TSG SA WG5
Organization leader (group leader): Christian Toche
Type: information model (protocol-neutral and protocol-specific)
Role: technology-specific & NGN-specific
Release 1 application: Network resource model applicable to management of IP Multimedia System (IMS) entities
Traceability:
Location of text: http://www.3gpp.org/ftp/Specs/html-info/TSG-WG--S5.htm
Remarks:

3GPP2 S.S0028-001-C: 3GPP R6 Delta Specification

Title: 3GPP2 S.S0028-001-C - OAM&P for cdma2000 (3GPP R6 Delta Specification)
Status: second version published
Organization (group): 3GPP2 TSG-S WG2 (Architecture and OAM&P)
Organization contact (group leader): Randall J. Scheer
Type: architecture (functional, physical), information model (protocol-neutral, protocol-specific)
Role: technology-specific
Release 1 application: Network Resource Model
Traceability:
Location of text:
http://www.3gpp2.org/Public_html/specs/tsgs.cfm
Remarks:
3GPP2 IMS Architecture specified in S.R0037-B v.1.0, IP Network Architecture Model for cdma2000 Spread Spectrum Systems
3GPP2 TSG-S WG5 Revision C specifications reuse 3GPP SA5 R6 specifications
Network Resource Model based on 3GPP2 Architecture as mentioned in ITU-T Y.2021

3GPP2 S.S0028-002-C: 3GPP2 Generic NRM IRP

Title: 3GPP2 S.S0028-002-C - OAM&P for cdma2000 (3GPP2 Generic NRM IRP)
Status: second version published
Organization (group): 3GPP2 TSG-S WG2 (Architecture and OAM&P)
Organization contact (group leader): Randall J. Scheer
Type: architecture (functional, physical), information model (protocol-neutral, protocol-specific)
Role: technology-specific
Release 1 application: Network Resource Model
Traceability:
Location of text:
http://www.3gpp2.org/Public_html/specs/tsgs.cfm
Remarks:

3GPP2 IMS Architecture specified in S.R0037-B v.1.0, IP Network Architecture Model for cdma2000 Spread Spectrum Systems
3GPP2 TSG-S WG5 Revision C specifications reuse 3GPP SA5 R6 specifications
Network Resource Model based on 3GPP2 Architecture as mentioned in ITU-T Y.2021

3GPP2 S.S0028-003-C: 3GPP2 Core NRM IRP

Title: 3GPP2 S.S0028-003-C - OAM&P for cdma2000 (3GPP2 Core NRM IRP)
Status: second version published
Organization (group): 3GPP2 TSG-S WG2 (Architecture and OAM&P)
Organization contact (group leader): Randall J. Scheer
Type: architecture (functional, physical), information model (protocol-neutral, protocol-specific)
Role: technology-specific
Release 1 application: Network Resource Model
Traceability: Location of text:
http://www.3gpp2.org/Public_html/specs/tsgs.cfm

Remarks:
3GPP2 IMS Architecture specified in S.R0037-B v.1.0, IP Network Architecture Model for cdma2000 Spread Spectrum Systems
3GPP2 TSG-S WG5 Revision C specifications reuse 3GPP SA5 R6 specifications
Network Resource Model based on 3GPP2 Architecture as mentioned in ITU-T Y.2021

3GPP2 X.S0013-007-A : IMS Charging Architecture

Title: 3GPP2 X.S0013-007-A - All-IP Core Network Multimedia Domain - IP Multimedia Subsystem - Charging Architecture
Status: first version approved, second version draft (B versions)
Organization (group): 3GPP2 TSG-X WG3 (Charging)
Organization contact (group leader): Randall J. Scheer
Type: Charging, Conformance
Role: technology-specific
Release 1 application: Charging
Traceability: TBD
Location of text:
http://www.3gpp2.org/Public_html/specs/tsgx.cfm
Remarks:
Actively working on harmonizing the 3GPP2 TSG-X WG3 and 3GPP SA5 R7 IMS charging

3GPP2 X.S0013-008-A: IMS - Offline Accounting Information Flows and Protocol

Title: 3GPP2 X.S0013-008-A - All-IP Core Network Multimedia Domain - IP Multimedia Subsystem - Offline Accounting Information Flows and Protocol
Status: first version approved, second version draft (B versions)
Organization (group): 3GPP2 TSG-X WG3 (Charging)
Organization contact (group leader): Randall J. Scheer
Type: Charging, Conformance
Role: technology-specific

Release 1 application: Charging
Traceability: TBD
Location of text:
http://www.3gpp2.org/Public_html/specs/tsgx.cfm
Remarks:
Actively working on harmonizing the 3GPP2 TSG-X WG3 and 3GPP SA5 R7 IMS charging

ATIS-TMOC 0300075-2005:Usage Data Management

Title: Usage Data Management for Packet-Based Services
Service-Neutral Architecture and Protocol Requirements
Service-Neutral Protocol Specification for Billing Applications
Status: approved
Organization (group): ATIS TMOC
Organization (group) leader: Mike Fargano (TMOC Chair), Amit Kleinmann (TMOC-AccMgt TF Chair)
Type: functional requirements, functional architecture, protocol and protocol-neutral information model
Role: generic
Release 1 application: service-neutral architecture, protocol, and information model for usage data management of NGN billing applications
Traceability: ATIS-0300075 and ATIS-0300075.1-2006
Location of text: See TMOC Liaison TMOC-051-2005 (July 21, 2005)
Remarks: American National Standard for Telecommunications

DMTF Common Information Model (CIM)

Title: Common Information Model (CIM)
Status: Approved
Organization (group): Distributed Management Task Force
Organization (group) leader: Jeff Hilland (VP-Technology),
Alex Zhdankin (DMTF Representative)
Type: Information model (logical and physical, protocol-neutral)
Role: generic (multi-technology) with the focus in IT resource management (Systems, Storage, Applications) and IP Networks
Release 1 application: FCAPS management model, applicable to management of NGN transport stratum and certain entities of service stratum
Traceability: CIM is defined graphically (UML) and textually (MOF and XML)
Location of model definition: http://www.dmtf.org/standards/cim/cim_schema_v21
Remarks: Defines abstractions for hardware/software asset management, notification support, model-based configuration of resources, performance and statistical management, and security and policy-based management.

DMTF Web-based Enterprise Management

Title: Web-based Enterprise Management (WBEM, WS-Management, WSDM, CLP)
Status: Approved
Organization (group): Distributed Management Task Force
Organization (group) leader: Jeff Hilland (VP-Technology),

Alex Zhdankin (DMTF Representative)
Type: Suite of Management Protocols
Role: Generic
Release 1 application: Network and element management interfaces, IT infrastructure management
Traceability: XML schema and DTD
Location of text: All specifications referenced and available from: http://www.dmtf.org/standards/wbem
Remarks: WBEM Defines an HTTP binding and XML encoding to read/write/create/update/delete/query CIM classes and instances. WS-Management and WSDM enables CIM-based management of Enterprise Resources via Web services

ETSI TS 188 001: NGN OSS Architecture Release 1

Title: NGN OSS Architecture Release 1
Status: Approved
Organization (group): ETSI TISPAN (WG8)
Organization leader (group leader): Rainer Muench (Enrico Ronco)
Type: functional architecture
Role: NGN-specific
Release 1 application:
Traceability: OSS Interface Requirements and Vision for NGN OSS
Location of text: http://pda.etsi.org/pda/queryform.asp
Remarks:

ETSI TS 188 002-1: SuM Requirements

Title: TISPAN NGN Subscription Management Part 1: Requirements
Status: approved (March 2007)
Organization (group): ETSI TISPAN (WG8)
Organization leader (group leader): R. Muench (E. Ronco)
Type: functional requirements
Role: NGN-specific
Release 1 application: Management of NGN Subscriptions
Traceability: OSS Interface Requirements and Vision for NGN OSS
Location of text:
http://portal.etsi.org/docbox/tispan/open/NGN_LATEST_DRAFTS/RELEASE2/08015-1v0010.pdf
Remarks: part 1 of a 3 part series
Note about relation to 3GPP to be added

ETSI TS 188 002-2: SuM Information Model

Title: TISPAN NGN Subscription Management, Part 2: Information Model
Status: approved (October 2007)
Organization (group): ETSI TISPAN (WG8)
Organization leader (group leader): R. Muench (E. Ronco)
Type: protocol neutral model
Role: NGN-specific
Release 1 application: Management of NGN Subscriptions
Traceability: TISPAN NGN Subscription Management Part 1: Requirements

Location of text: http://pda.etsi.org/pda/queryform.asp
Remarks: part 2 of a 3 part series

ETSI TS 188 003: NGN OSS requirements

Title: OSS definition of requirements and priorities for further network management specifications
Status: Approved
Organization (group): ETSI TISPAN (WG8)
Organization leader (group leader): Rainer Muench (Enrico Ronco)
Type: Requirements
Role: NGN-specific
Release 1 application: Release independent
Traceability: ETSI TR 188 004, Vision for NGN OSS
Location of text: http://pda.etsi.org/pda/queryform.asp
Remarks:

ETSI TS 188 004: NGN OSS Vision

Title: Vision for NGN OSS
Status: Approved
Organization (group): ETSI TISPAN (WG8)
Organization leader (group leader): Rainer Muench (Enrico Ronco)
Type: functional requirements
Role: NGN-specific
Release 1 application: release independent specification
Traceability: Network & Service provider requirements and TISPAN NGN definition
Location of text: http://pda.etsi.org/pda/queryform.asp
Remarks:

ETSI TS 188 005-1: NRM Requirements

Title: TISPAN NGN Network Resource Model (NRM), Part 1: Requirements
Status: approved (November 2006)
Organization (group): ETSI TISPAN (WG8)
Organization leader (group leader): R. Muench (E. Ronco)
Type: functional requirements
Role: NGN-specific
Release 1 application: Network Resource model applicable to management of the NGN
Traceability: OSS Interface Requirements and Vision for NGN OSS
Location of text: http://pda.etsi.org/pda/queryform.asp
Remarks: part 1 of a 3 part series
Note about relation to 3GPP to be added

ETSI TS 188 005-2: NRM Information Service

Title: TISPAN NGN Network Resource Model (NRM), Part 2: Information Service
Status: approved (October 2007)
Organization (group): ETSI TISPAN (WG8)
Organization leader (group leader): R. Muench (E. Ronco)
Type: protocol neutral model
Role: NGN-specific

Release 1 application: Network Resource model applicable to management of the NGN
Traceability: TISPAN NGN Network Resource Model (NRM), Part 1: Requirements
Location of text: http://pda.etsi.org/pda/queryform.asp
Remarks: part 2 of a 3 part series

IEEE 802.1AB

Title: IEEE 802.1AB – IEEE Standard for Local and metropolitan area networks Station and Media Access Control Connectivity Discovery
Status: Approved IEEE Standard
Organization (group): IEEE 802.1 Working Group
Organization leader (group leader): Tony Jeffree
Type: information model (protocol-independent and protocol- specific SMIv2 MIB
Role: technology-specific data model for topology management
Release 1 application: management of network topology in layer 2 bridged networks
Traceability: none
Location of text: http://standards.ieee.org/getieee802/download/802.1AB-2005.pdf
Remarks: alternative name Link Layer Discovery Protocol (LLDP) / modular framework, allows for extensions to be built atop – e.g. TIA-1057 (LLDP-MED)

IEEE 802.1AD

Title: IEEE 802.1AD - IEEE Standard for Local and metropolitan area networks—Virtual Bridged Local Area Networks—Revision—Amendment 4: Provider Bridges
Status: Approved IEEE Standard
Organization (group): IEEE 802.1 Working Group
Organization leader (group leader): Tony Jeffree
Type: information model (protocol-independent and protocol- specific SMIv2 MIB
Role: technology-specific data model for management of bridged provider networks
Release 1 application: management of management of bridged provider networks
Traceability: none
Location of text: http://standards.ieee.org/getieee802/download/802.1ad-2005.pdf
Remarks:

IEEE 802.1ag

Title: IEEE 802.1ag – Connectivity Fault Management
Status: approved
Organization (group): IEEE 802.1 Working Group
Organization leader (group leader): Tony Jeffree
Type: OAM protocol and information model (protocol-independent and protocol- specific SMIv2 MIB
Role: technology-specific for bridged layer-2 networks, including Ethernet and provider networks
Release 1 application: management of bridged layer-2 networks, including Ethernet and provider networks
Traceability: none
Location of text: http://www.ieee802.org/1/pages/802.1ag.html
Remarks:

IEEE 802.1D

Title: IEEE 802.1D - IEEE standard for local and metropolitan area networks--Media access control (MAC) Bridges
Status: Approved IEEE Standard
Organization (group): IEEE 802.1 Working Group
Organization leader (group leader): Tony Jeffree
Type: information model (protocol-independent)
Role: technology-specific – protocol independent data model for management of Layer 2 bridged networks (including Ethernet)
Release 1 application: management of bridged networks
Traceability: none
Location of text: http://standards.ieee.org/getieee802/download/802.1D-2004.pdf
Remarks: protocol specific data models are being defined in other standards from the IETF Bridge MIB WG or IEEE 802.1 WG

IEEE 802.1Q

Title: IEEE 802.1Q - IEEE Standard for Local and Metropolitan Area Networks—Virtual Bridged Local Area Networks
Status: Approved IEEE Standard
Organization (group): IEEE 802.1 Working Group
Organization leader (group leader): Tony Jeffree
Type: information model (protocol-specific)
Role: technology-specific – protocol independent data model for management of Layer 2 bridged and networks (including Ethernet) and Virtual LANs (VLAN)
Release 1 application: management of bridged networks (including Ethernet)
Traceability: none
Location of text: http://standards.ieee.org/getieee802/download/802.1Q-2005.pdf
Remarks: protocol specific data models are being defined in other standards from the IETF Bridge MIB WG or IEEE 802.1 WG

IETF EFMCu MIB

Title: Ethernet in the First Mile Copper (EFMCu) Interfaces MIB
Status: Approved Proposed Standard (waiting for publication as RFC)
Organization (group): IETF Ethernet Interfaces and Hub MIB WG
Organization leader (group leader): Dan Romascanu (Bert Wijnen)
Type: information model (protocol-specific)
Role: technology-specific – Ethernet Management Information Base module
Release 1 application: Management of EFMCu interfaces and devices
Traceability: IEEE Std 802.3ah-2004, "Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications - Amendment: Media Access Control Parameters, Physical Layers and Management Parameters for Subscriber Access Networks", October 2004
Location of text: http://www.ietf.org/internet-drafts/draft-ietf-hubmib-efm-cu-mib-08.txt
Remarks: defines an extension to the Ethernet-like Interfaces MIB and MAU MIB modules with a set of objects for managing an Ethernet in the First Mile Copper (EFMCu) interfaces 10PASS-TS and 2BASE-TL, defined in IEEE Std 802.3ah-2004

IETF RFC 2578-2580: SMIv2

Title: Structure of Management Information version 2
Status: approved IETF Standard STD 58
Organization (group): IETF (SNMPv2 WG)
Organization contact: Dan Romascanu
Type: information modeling language plus conformance
Role: generic
Release 1 application: support for SNMPv3
Traceability:
Location of text: IETF STD 58 (RFC 2578, 2579, 2580)
Remarks: The information modeling language for the Internet-Standard Management Framework (see RFC 3410), SMIv2 is widely used, and is the modeling language used for hundreds of industry-standard and proprietary management information modules in common usage.

IETF RFC 3411-3417: SNMPv3

Title: Simple Network Management Protocol version 3
Status: approved IETF standard STD 62
Organization (group): IETF (SNMPv3 WG)
Organization leader (group leader): Dave Harrington
Type: protocol plus conformance
Role: generic
Release 1 application: primarily for monitoring (including event reporting) purposes for NE interfaces
Traceability:
Location of text: IETF STD 62 (rfc 3411, 3412, 3413, 3414, 3415, 3416, 3417)
Remarks: The primary standard for the Internet-Standards Management Framework (see RFC 3410), SNMP is widely used, and has hundreds of industry-standard and proprietary management information modules in common usage with an architecture applicable to management of all NGN entities, especially element management. Depends on IETF STD 58, SMIv2 (RFC 2578, 2579, 2580).

IETF RFC 3444: Difference between Information Models and Data Models

Title: On the Difference between Information Models and Data Models
Status: RFC (approved as Informational RFC, Jan 2003)
Organization (group): IRTF/IETF (NMRG)
Organization (group) leader: Aiko Pras (Juergen Schoenwaelder)
Type: background information/considerations
Role: generic
Release 1 application: not sure yet
Traceability: fixed/approved document
Location of text: http://www.ietf.org/rfc/rfc3444.txt
Remarks:

good considerations for Information And Data modeling efforts
submitted by Bert Wijnen

IETF RFC 3535: Overview of the 2002 IAB Network Management Workshop

Title: Overview of the 2002 IAB Network Management Workshop

Status: approved Informational RFC (May 2003)
Organization (group): IETF (IAB)
Organization (group) leader: Juergen Schoenwaelder (Bert Wijnen)
Type: Operational considerations and requirements
Role: generic
Release 1 application: operational requirements
Traceability: fixed document
Location of text: http://www.ietf.org/rfc/rfc3535.txt
Remarks:

Good overview of operational aspects and requirements for IP network management
Submitted by Bert Wijnen

IETF RFC 3621: Power Ethernet MIB

Title: Power Ethernet MIB
Status: approved IETF Proposed Standard
Organization (group): IETF Ethernet Interfaces and Hub MIB WG
Organization leader (group leader): Dan Romascanu (Bert Wijnen)
Type: information model (protocol-specific)
Role: technology-specific – Ethernet Management Information Base module
Release 1 application: management of Power Ethernet ports and devices
Traceability: IEEE Std 802.3af-2003 – "Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI)", July 2003**.**
Location of text: http://www.ietf.org/rfc/rfc3621.txt
Remarks: proposes an extension to the Ethernet-like Interfaces MIB with a set of objects for managing Power Sourcing Equipment (PSE).

IETF RFC 3635: Ethernet-like Interfaces MIB

Title: Definitions of Managed Objects for the Ethernet-like Interface Types
Status: approved IETF Proposed Standard
Organization (group): IETF Ethernet Interfaces and Hub MIB WG
Organization leader (group leader): Dan Romascanu (Bert Wijnen)
Type: information model (protocol-specific)
Role: technology-specific – Ethernet Management Information Base module
Release 1 application: management of Ethernet Interfaces (ports) on Network devices
Traceability: IEEE Std 802.3, 2002 Edition: "Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications", March 2002
Location of text: http://www.ietf.org/rfc/rfc3635.txt
Remarks: defines objects for managing Ethernet-like interfaces

IETF RFC 3637: Ethernet WAN MIB

Title: Definitions of Managed Objects for the Ethernet WAN Interface Sublayer
Status: approved IETF Proposed Standard
Organization (group): IETF Ethernet Interfaces and Hub MIB WG
Organization leader (group leader): Dan Romascanu (Bert Wijnen)
Type: information model (protocol-specific)
Role: technology-specific – Ethernet Management Information Base module
Release 1 application: management of Ethernet WAN Interface Sublayer

Traceability: IEEE Std 802.3ae-2002, "IEEE Standard for Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications - Media Access Control (MAC) Parameters, Physical Layer and Management Parameters for 10 Gb/s Operation, August 2002
Location of text: http://www.ietf.org/rfc/rfc3637.txt
Remarks: defines objects for managing the Ethernet Wide Area Network (WAN) Interface Sublayer (WIS).

IETF RFC 4741-4742: NETCONF Protocol

Title: NETCONF Configuration Protocol
Status: approved IETF Proposed Standard
Organization (group): IETF
Organization leader (group leader): Dan Romascanu (Andy Bierman, Simon Leinen)
Type: protocol
Role: generic
Release 1 application: network element Interface
Traceability:
Location of text:
http://www.ietf.org/rfc/rfc4741.txt
http://www.ietf.org/rfc/rfc4742.txt
Remarks: Charter - http://www.ietf.org/html.charters/netconf-charter.html

IETF RFC 4836: MAU MIB

Title: Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)
Status: approved IETF Proposed Standard
Organization (group): IETF Ethernet Interfaces and Hub MIB WG
Organization leader (group leader): Dan Romascanu (Bert Wijnen)
Type: information model (protocol-specific)
Role: technology-specific – Ethernet Management Information Base module
Release 1 application: Management of Ethernet Media Attachment Units (MAU)
Traceability: IEEE Std 802.3, 2002 Edition: "Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications", March 2002
Location of text: http://www.ietf.org/rfc/rfc4836.txt
Remarks: defines objects for managing IEEE 802.3 Medium Attachment Units (MAUs).

IETF RFC 4837: EPON MIB

Title: Managed Objects of EPON
Status: approved IETF Proposed Standard (2007)
Organization (group): IETF Ethernet Interfaces and Hub MIB WG
Organization leader (group leader): Dan Romascanu (Bert Wijnen)
Type: information model (protocol-specific)
Role: technology-specific – Ethernet Management Information Base module
Release 1 application: management of EPON devices and Interfaces
Traceability: IEEE Std 802.3ah-2004, "Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications - Amendment: Media Access Control Parameters, Physical Layers and Management Parameters for Subscriber Access Networks", October 2004

Location of text: http://www.ietf.org/rfc/rfc4837.txt
Remarks: defines objects for managing interfaces that conform to the Ethernet Passive Optical Networks (EPON) standard as defined in IEEE 802.3ah

IETF RFC 4878: Ethernet OAM MIB

Title: Definitions and Managed Objects for OAM Functions on Ethernet Like Interfaces
Status: approved IETF Proposed Standard
Organization (group): IETF Ethernet Interfaces and Hub MIB WG
Organization leader (group leader): Dan Romascanu
Type: information model (protocol-specific)
Role: technology-specific – Ethernet Management Information Base module
Release 1 application: management of Ethernet OAM protocol as defined by IEEE 802.1ah
Traceability: IEEE Std 802.3ah-2004, "Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications - Amendment: Media Access Control Parameters, Physical Layers and Management Parameters for Subscriber Access Networks", October 2004
Location of text: http://www.ietf.org/rfc/rfc4878.txt
Remarks: defines objects for managing Operations, Administration, and Maintenance (OAM) capabilities on Ethernet like interfaces conformant to the Ethernet OAM functionality defined in IEEE 802.3ah.

ITU-T E.41NG&S: Operations Requirements of NGNs and Services

Title: Framework for Operations requirements of Next Generation Networks and Services
Status: draft (approval planned 2008)
Organization (group): ITU-T SG 2 (Q.5/2)
Organization (group) leader: M-T. Alajouanine (Mikael Åhman)
Type: functional requirements
Role: NGN specific
Release 1 application:
Traceability: NA
Location of text: see NGNMFG Reference Material directory
Remarks:

ITU-T E.480: Service management operational requirements

Title: Framework for service management operational requirements - Service management
Status: Approved Sept. 2006
Organization (group): ITU-T SG 2 (Q.5/2)
Organization (group) leader: M-T. Alajouanine (Mikael Åhman)
Type: functional requirements
Role: generic
Release 1 application:
Traceability: NA
Location of text: http://www.itu.int/rec/T-REC-E.480/en
Remarks:

ITU-T G.7718/Y.1709: Optical Control Plane Management Requirements

Title: Framework for ASON Management
Status: Approved on 2/2005
Organization (group): ITU-T SG 15 (Q.14/15)
Organization (group) leader: Maeda (Lam)
Type: architecture (framework and functional requirements)
Role: Transport control plane-specific
Release 1 application: FCAPS management requirements, applicable to management and control of NGN transport stratum, includes control plane management
Traceability: M.3010, G.8080/Y.1304, G.7710, G.7712, G.7713/Y.1704 series, G.7714/Y.1705 series, G.7715/Y.1706 series
Location of text: http://www.itu.int/rec/T-REC-G.7718/en
Remarks:

ITU-T G.7718.1/Y.1709.1: Optical Control Plane Management Info Model

Title: Protocol-neutral Management Information Model for the Control Plane View
Status: Approved December 2006
Organization (group): ITU-T SG 15 (Q.14/15)
Organization (group) leader: Maeda (Lam)
Type: Information model (protocol-neutral)
Role: Transport control plane-specific
Release 1 application: FCAPS management information model, applicable to management and control of NGN transport stratum, includes control plane management
Traceability: G.7718/Y.1709
Location of text: http://www.itu.int/rec/T-REC-G.7718.1-200612-P/en
Remarks: Focus on EML-NEL interface

ITU-T M.3016 series: Security for the Management Plane

Title: Security for the Management Plane
Status: Approved
Organization (group): ITU-T SG 4 (Q.11/4)
Organization (group) leader: Dave Sidor (Nobuo Fijii)
Type: functional requirements
Role: generic
Release 1 application: security requirements, services, and mechanisms for FCAPS interfaces and OSSs
Traceability: X.805
Location of text: http://www.itu.int/rec/T-REC-M/en
Remarks:

significant expansion of the requirements in M.3016-1997
provides a restructuring of T1.276

ITU-T M.3017: Management of hybrid circuit/packet networks

Title: Framework for the integrated management of hybrid circuit/packet networks
Status: approved (March 2006)
Organization (group): ITU-T SG 4 (Q.8/4)
Organization (group) leader: Sidor (Mak)
Type: architecture (physical)

Role: generic
Release 1 application: context for transport stratum management
Traceability: NA
Location of text: http://www.itu.int/rec/T-REC-M.3017/en
Remarks:
Clause on Network Environment provides useful overview of transport stratum architectures; clause on Management Environment is based on pre-SOA TMN approach

ITU-T M.3020: TMN Interface Specification Methodology

Title: TMN Interface Specification Methodology
Status: approved (2007)
Organization (group): ITU-T SG 4 (Q.9/4)
Organization (group) leader: Dave Sidor (Knut Johannessen)
Type: methodology
Role: generic
Release 1 application: release independent
Traceability: NA
Location of text: http://www.itu.int/rec/T-REC-M.3020/en
Remarks:
partially harmonised with 3GPP TS 32.150, 32.151 and 32.152

ITU-T M.3050 series: Enhanced Telecom Operations Map

Title: Enhanced Telecom Operations Map® (eTOM)
Status: M.3050 series approved, June 2004
Organization (group): ITU-T SG 4 (Q.6/4)
Organization leader (group leader): Dave Sidor (Zhao Ping)
Type: functional requirements
Role: generic
Release 1 application: Service provider process model guiding functional and architectural design for TMN
Traceability: NA
Location of text: http://www.itu.int/rec/T-REC-M/en
Remarks:
M.3050 series is based on, and reuses TMF GB921 V4.0 (= eTOM)
enhances TMN with detailed business process model; provides explicit mappings between eTOM and M.3400 TMN management functions

ITU-T M.3060/Y.2401: Management of Next Generation Networks

Title: Principles for the Management of Next Generation Networks
Status: approved
Organization (group): ITU-T SG 4 (Q.8/4)
Organization leader (group leader): Dave Sidor (Leen Mak)
Type: functional requirements, architecture
Role: generic
Release 1 application: release independent specification

Traceability: NA
Location of text: http://www.itu.int/rec/T-REC-M.3060/en
Remarks:

ITU-T M.3341: QoS/SLA Management Service

Title: Requirements for QoS/SLA management over the TMN X-Interface for IP-based Services
Status: approved 12/2003
Organization (group): ITU-T SG4 (Q.7/4)
Organization leader (group leader): Dave Sidor (Ken Smith)
Type: functional requirements
Role: technology-specific (IP technology)
Release 1 application: Service Management Function (B2C, C2B, B2B)
Traceability: M.3060/Y.2401
Location of text: http://www.itu.int/rec/T-REC-M.3341/en
Remarks: provides supporting services for ETS Management Service found in M.3350

ITU-T M.3342: SLA representation template

Title: Guidelines for the definition of SLA representation template
Status: approved (July 2006)
Organization (group): ITU-T SG 4 (Q.7/4)
Organization (group) leader: Sidor (Smith)
Type: functional requirements
Role: generic
Release 1 application:
Traceability: NA
Location of text: http://www.itu.int/rec/T-REC-M.3342/en
Remarks:

ITU-T M.3343: NGN trouble admin across B2B and C2B interface

Title: Requirements and analysis for NGN trouble administration across B2B and C2B interface
Status: approved (January 2007)
Organization (group): ITU-T SG 4 (Q.7/4)
Organization (group) leader: Sidor (Smith)
Type: functional requirements
Role: NGN-specific
Release 1 application:
Traceability: NA
Location of text: http://www.itu.int/rec/T-REC-M.3343/en
Remarks:

ITU-T M.3350: ETS Management Service

Title: TMN service management requirements for information interchange across the TMN X-interface to support provisioning of Emergency Telecommunication Service (ETS)
Status: approved 05/2004

Organization (group): ITU-T SG4 (Q.7/4)
Organization leader (group leader): Dave Sidor (Ken Smith)
Type: architecture functional requirements
Role: application-specific (ETS application**)**
Release 1 application: Service Management Function (B2C, C2B, B2B)
Traceability: M.3060/Y.2401
Location of text: http://www.itu.int/rec/T-REC-M.3350/en
Remarks: It is critical that ETS capabilities, including the ETS management service, be carried forward into NGN

ITU-T Q.838.1: EPON Management Requirements & Analysis

Title: Requirements and analysis for the management interface of Ethernet passive optical networks (EPON)
Status: Approved
Organization (group): ITU-T SG 4 (Q.10/4)
Organization leader (group leader): Dave Sidor (Wang Zhili)
Type: requirements & analysis, protocol-neutral information model
Role: technology-specific
Release 1 application: Ethernet management
Traceability: IEEE 802.3ah
Location of text: http://www.itu.int/rec/T-REC-Q.838.1/en
Remarks:

ITU-T Q.840.1: NMS-EMS Interface for Management of EoT and M EN

Title: Requirements and Analysis for NMS-EMS Management Interface of Ethernet over Transport and Metro Ethernet Network (EoT/MEN)
Status: approved
Organization (group): ITU-T SG 4 (Q.10/4)
Organization leader (group leader): Dave Sidor (Wang Zhili)
Type: requirements & analysis, protocol-neutral information model
Role: technology-specific
Release 1 application: Ethernet management
Traceability: IEEE 802.3
Location of text: http://www.itu.int/rec/T-REC-Q.840.1/en
Remarks:

ITU-T X.alarm-neutral: Protocol- neutral Alarm Reporting Function

Title: Protocol-neutral Alarm Reporting Function
Status: draft (consent planned 2008)
Organization (group): ITU-T SG 4 (Q.9/4)
Organization leader (group leader): Dave Sidor (Knut Johannessen)
Type: information model (protocol-neutral)
Role: generic
Release 1 application: Alarm Management
Traceability: X.733
Location of text: see NGNMFG Reference Material directory
Remarks:

ITU-T Y.1543: IP inter-domain performance assessment

Title: Measurements in IP networks for inter-domain performance assessment
Status: draft (approval planned 4Q2007)
Organization (group): ITU-T SG 12 (Q.12/17)
Organization leader (group leader): J-Y. Montfort (Al Morton)
Type: requirements
Role: technology-specific
Release 1 application:
Traceability: NA
Location of text: see NGNMFG Reference Material directory
Remarks:
ex Y.pm

ITU-T Y.2001: General overview of NGN

Title: General overview of NGN
Status: Approved
Organization (group): ITU-T SG 13
Organization leader (group leader): Brian Moore ()
Type: functional architecture
Role: NGN specific
Release 1 application:
Traceability:
Location of text: http://www.itu.int/rec/T-REC-Y.2001/en
Remarks:

ITU-T Y.2011: Principles and Reference Model for NGN

Title: General principles and general reference model for Next Generation Networks
Status: Approved
Organization (group): ITU-T SG 13
Organization leader (group leader): Brian Moore ()
Type: functional architecture
Role: NGN specific
Release 1 application:
Traceability: Y.2001
Location of text: http://www.itu.int/rec/T-REC-Y.2011/en
Remarks:

ITU-T Y.2012: Functional Reqs and Architecture of the NGN

Title: Functional requirements and architecture of the NGN
Status: Approved
Organization (group): ITU-T SG 13
Organization leader (group leader): Brian Moore ()
Type: functional requirements, architecture
Role: NGN specific
Release 1 application:

Traceability: Y.2001, Y.2011
Location of text: http://www.itu.int/rec/T-REC-Y.2012/en
Remarks:

ITU-T Y.2201: NGN release 1 requirements

Title: NGN release 1 requirements
Status: Approved
Organization (group): ITU-T SG 13
Organization leader (group leader): Brian Moore ()
Type: functional requirements
Role: NGN specific
Release 1 application:
Traceability: Y.2001, Y.2011
Location of text: http://www.itu.int/rec/T-REC-Y.2201/en
Remarks:

ITU-T Y.2701: Security requirements for NGN release 1

Title: Security requirements for NGN release 1
Status: Approved
Organization (group): ITU-T SG 13
Organization leader (group leader): Brian Moore ()
Type: functional requirements
Role: NGN specific
Release 1 application:
Traceability: Y.2001, Y.2011
Location of text: http://www.itu.int/rec/T-REC-Y.2701/en
Remarks:

ITU-T Y.mpm: Management of performance measurement for NGN

Title: Management of performance measurement for NGN
Status: draft
Organization (group): ITU-T SG 13 (Q.4/13)
Organization leader (group leader): Brian Moore (Hui-Lan Lu)
Type: functional requirements
Role: NGN specific
Release 1 application:
Traceability:
Location of text: see NGNMFG Reference Material directory
Remarks:

NGNMFG: Report of the Service Provider – Network Operator Event

Title: Report of the Service Provider – Network Operator Event
Status: approved (July 2006)
Organization (group): ITU-T NGNMFG (SP/NO Council)
Organization leader (group leader): Dave Sidor (Ken Smith)
Type: functional requirements

Role: NGN specific
Release 1 application:
Traceability: NA
Location of text: NGNMFG-OD-025R1
Remarks:

MEF MEF 7

Title: EMS-NMS Information Model (for Metro Ethernet Network)
Status: approved 10/2004
Organization (group): MEF (Metro Ethernet Forum) – Network Management Team
Organization leader (group leader): Nan Chen (Andy Mayer)
Type: Management interface information model (protocol-neutral)
Role: technology-specific (Ethernet technology)
Release 1 application: FCAPS management information model, applicable to management and control of NGN transport stratum.
Traceability: MEF 4, MEF 10, MEF 12, MEF 15
Location of text: http://www.metroethernetforum.org/TechSpec.htm
Remarks: Focus on NMS-EMS interface

MEF MEF 15

Title: Requirements for Management of Metro Ethernet Phase 1 Network Elements
Status: approved 11/2005
Organization (group): MEF (Metro Ethernet Forum) – Network Management Team
Organization leader (group leader): Nan Chen (Andy Mayer)
Type: Functional network management requirements
Role: technology-specific (Ethernet technology)
Release 1 application: FCAPS management, applicable to management and control of NGN transport stratum.
Traceability: MEF 4, MEF 10, MEF 12
Location of text: http://www.metroethernetforum.org/TechSpec.htm
Remarks: Focus on element layer functional management requirements

OASIS WSDM-MUWS v1.1

Title: Web Services Distributed Management: Management Using Web Services (WSDM-MUWS) v1.1
Status: Approved August 2006
Organization (group): Organization for the Advancement of Structured Information Standards (OASIS)
Organization leader (group leader): OASIS WSDM TC co-chairs
Heather Kreger, IBM (kreger@us.ibm.com)
Type: a profile of protocols with some specific usage and XML definitions
Role: generic
Release 1 application: basis for 3GPP SA 5 IRP Solution Sets using Web Services
Traceability: fixed document
Location: http://docs.oasis-open.org/wsdm/wsdm-muws1-1.1-spec-os-01.pdf

OASIS SOA-RM

Title: OASIS Reference Model for Service Oriented Architecture v1.0
Status: approved 8/2006
Organization (group): OASIS (SOA Reference Model TC)
Organization leader (group leader): Patrick Gannon (Duane Nickull)
Type: functional architecture
Role: generic
Release 1 application: release independent software architecture specification
Traceability: n.a.
Location of text: http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.doc
Remarks: Defines common terminology and model components that can be shared and understood between different SOA implementations

TM Forum SID Shared Information and Data Model GB922 and GB922 / Addenda 5PR and 5LR

Title: The Shared Information and Data Model (SID)
Status: TMF Member Evaluation
Organization (group): TM Forum (SID Team)
Organization (group) leader: Giuseppe Covino
Tony Richardson (TM Forum Liaison contact)
Type: Information Model
Role: Technology Neutral
Release 1 application: NGN Information Model Framework
Traceability: UML, various Industry Information Models
Location of text: http://www.tmforum.org/industrygroup/
(usercode = ngnlogin, password = c0llaborate)
Remarks: Provides an extensible framework for defining information and data (as well as incorporating information from other fora). First submission is limited to Concepts and Principles in Normative form, also Physical Resource, and Logical Resource specifications provided in Non-normative form at this stage (will also be supplied in Normative form when review cycle completed within TMF).

TM Forum TMF053 Main – V5.7.3

Title: The NGOSS Technology-Neutral Architecture (TNA)
Status: TMF Member Evaluation
Organization (group): TM Forum
Organization (group) leaders: Dave Raymer, Joel Fleck (Lifecycle Team),
Tony Richardson (TM Forum Staff contact)
Type: Architecture (logical and functional)
Role: Technology Neutral (Systems Architecture)
Release 1 application: NGN Systems Architecture
Traceability: DIOA – related specifications
Location of text: Location of text: http://www.tmforum.org/industrygroup/
(usercode = ngnlogin, password = c0llaborate)
Remarks:
In addition to previously submitted TMF 053 Addenda: TMF053B, TMF053C, TMF053D, TMF053F - The NGOSS Technology-Neutral Architecture v4.5

Provides basis of a distributed systems framework for NGN Management system services (SOA support etc.)

TM Forum TMF053b Contract Description R5.1.3

Title: The NGOSS Technology-Neutral Architecture (TNA)
Status: TMF Member Evaluation
Organization (group): TM Forum
Organization (group) leaders: Dave Raymer, Joel Fleck (Lifecycle Team), Tony Richardson (TM Forum Staff contact)
Type: Architecture (logical and functional)
Role: Technology Neutral (Systems Architecture)
Release 1 application: NGN Systems Architecture
Traceability: DIOA – related specifications
Location of text: Location of text: http://www.tmforum.org/industrygroup/ (usercode = ngnlogin, password = c0llaborate)
Remarks:
Major Revision from previously submitted R 4.5

TM Forum TMF513: Multi-Technology NM (MTNM) Business Agreement (BA)

Title: Multi-Technology Network Management, NML-EML Interface, Business Agreement
Status: TMF Approved (v3.5)
Organization (group): TM Forum (MTNM Team)
Organization (group) leader: Keith Dorking (Felix Flemisch) Tony Richardson (TM Forum Liaison contact)
Type: functional requirements
Role: network generic (multi-technology)
Release 1 application: FCAPS management interface requirements (M.3050-series) and use cases (Q.827.1, M.3020), applicable to management of NGN transport stratum (v3.0), includes control plane mgmt (v3.5)
Traceability: to customer market requirements, see also Remarks
Location of text: http://www.tmforum.org/industrygroup/ (usercode = ngnlogin, password = c0llaborate)
Remarks: NML-EML interface according to M.3010; based on G.805 and G.809 principles; related to M.3050, M.3x00, Y.2011, M.3060, et al.

TM Forum TMF608: MTNM Information Agreement (IA)

Title: Multi-Technology Network Management, NML-EML Interface, Information Agreement
Status: TMF Approved (v3.5)
Organization (group): TM Forum (MTNM Team)
Organization (group) leader: Keith Dorking (Felix Flemisch) Tony Richardson (TM Forum Liaison contact)
Type: analysis model (protocol-neutral information/data model)
Role: network generic (multi-technology)
Release 1 application: FCAPS management interface UML model (diagrams, dictionary, MDL file), applicable to management of NGN transport stratum (v3.0) including control plane (v3.5)

Traceability: to MTNM Business Agreement (BA) (TMF513)
Location of text: http://www.tmforum.org/industrygroup/
(usercode = ngnlogin, password = c0llaborate)
Remarks: see MTNM BA; related to M.3020-series and M.3100-series

TM Forum TMF814: MTNM Solution Set (SS) in CORBA IDL

Title: Multi-Technology Network Management, NML-EML Interface, Solution Set in CORBA IDL
Status: TMF Approved (v3.5)
Organization (group): TM Forum (MTNM Team)
Organization (group) leader: Keith Dorking (Felix Flemisch)
Tony Richardson (TM Forum Liaison contact)
Type: design model (protocol-specific information/data model)
Role: network generic (multi-technology)
Release 1 application: FCAPS management interface CORBA IDL specification (coarse-grained SOA), applicable to management of NGN transport stratum (v3.0) including control plane (v3.5)
Traceability: to MTNM Information Agreement (IA) (TMF608)
Location of text: http://www.tmforum.org/industrygroup/
(usercode = ngnlogin, password = c0llaborate)
Remarks: see MTNM BA; related to Q.816-series and X.780-series

TM Forum TMF814A: MTNM Implementation Statement (IS) Templates for CORBA

Title: Multi-Technology Network Management, NML-EML Interface, Implementation Statement Templates and Guideline
Status: TMF Approved (v3.5)
Organization (group): TM Forum (MTNM Team)
Organization (group) leader: Keith Dorking (Felix Flemisch)
Tony Richardson (TM Forum Liaison contact)
Type: conformance
Role: network generic (multi-technology)
Release 1 application: FCAPS management interface interoperability and feature descriptions for CORBA (Implementation Conformance Statement Proformas à la X.781), applicable to management of NGN transport stratum (v3.0) including control plane (v3.5)
Location of text: http://www.tmforum.org/industrygroup/
(usercode = ngnlogin, password = c0llaborate)
Traceability: to MTNM CORBA Solution Set (SS) (TMF814)
Remarks: see MTNM BA; related to X.781

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Appendix III.3 - Organizations owning the listed specifications

In this document, abbreviated names are used to identify the organizations which own the contributed specifications. This appendix lists the abbreviations, the full names, and the urls of the websites of the contributing organizations.

Acronym	**Full name**	**Website**
3GPP	3rd Generation Partnership Project	www.3gpp.org
3GPP2	3rd Generation Partnership Project 2	www.3gpp2.org
ATIS	Alliance for Telecommunications Industry Solutions	www.atis.org
DMTF	Distributed Management Task Force	www.dmtf.org
ETSI	European Telecommunications Standards Institute	www.etsi.org
IEEE	Institute of Electrical and Electronics Engineers	standards.ieee.org
IETF	Internet Engineering Task Force	www.ietf.org
ITU-T	International Telecommunication Union	www.itu.int/itu-t
MEF	Metro Ethernet Forum	www.metroethernetforum.org
OASIS	Organization for the Advancement of Structured Information Standards	www.oasis-open.org
TMF	TeleManagement Forum	www.tmforum.org

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Appendix IV - Harmonization Issues

This appendix contains discussions of a number of harmonisations issues

Appendix IV.1 - Management Architecture

ETSI TS 188 001 describes the ETSI TISPAN NGN Management Architecture. This architecture is based on Service Oriented Architecture principles. The document specifies the architecture, defining and using architectural concepts like NGN OSS Service, NGN OSS Service Interface, NGN OSS Service Interface Consumer, NGN OSS Operation, and NGN OSS Service Interface. It provides a mapping of the NGN OSS Functional/Information View, which is based on TMForum's eTOM, to Service Interface Groups.
ITU-T Recommendation M.3060 is titled Principles for the Management of Next Generation Networks. The architecture specified by this document is based on a number of concepts from the TMN Logical Layered Architecture. It refers also to Service Oriented Architecture principles.

More investigation is needed to show whether and how the SOA and the LLA based approaches to NGN Management Architecture can be properly unified.

Status: Inactive

Appendix IV.2 - Alarm Management

Alarm management is likely the most basic NGN management function and involves at a minimum alarm reporting with multiple severity levels; it may also include other functionality, such as alarm message routing and alarm message subscription. The following specifications include alarm management capabilities that have been identified for harmonization: TMF MTNM Solution Suite, TMF SID, 3GPP SA5 32.111, and ITU-T SG 4 X.alarm-neutral.

Status: Inactive

Appendix IV.3 - Accounting, Charging, Billing

3GPP SA5 and ATIS TMOC have reached an initial agreement regarding the harmonization of their specifications for charging, billing, and accounting management and have indicated their willingness to work with the NGNMFG and SG4 to "move this work forward." This agreement provides guidelines on how to utilize the work of both organizations to support the architecture and functional requirements in Y.2012.

Also ITU-T Q. 13/2 and ETSI TISPAN WGs 2 and 8 have been included in a group of bodies, cooperating on this subject. The current focus is on aligning on a single set of requirements which is being documented by Q.13/2.

Status: Active.

Appendix IV.4 - State Management

State management is another basic NGN management function. The following specifications include state management capabilities that have been identified for harmonization: TMF MTNM Solution Suite, TMF SID, and 3GPP SA5 32.671-675.

Status: Inactive

Appendix IV.5 - Model Harmonization

An initial face-to-face meeting began with the presentation of the model status and planning in the following organizations: ETSI TISPAN WG8, TeleManagement Forum, 3GPP SA5, Distributed Management Task Force, and ITU-T SG 4.

With the above background information, the meeting focused on how to achieve a "shared/common model" and led to a set of goals, status, agreements, and issues and a plan for going forward. The centerpiece of the meeting's agreements was a proposal for a Shared Information Architecture (SIA) consisting of 3 model tiers: Tier 1 provides an overarching protocol-neutral information model which "hosts" or maps onto a set of Tier 2 protocol-neutral information models focused on specific problem domains which in turn map onto a set of Tier 3 implementable data models based on specific paradigms. The aim of the SIA is to characterize all known models to assist in identifying similar models requiring harmonization. See Appendix V for an overview of the Shared Information Architecture.

Status: In several subsequent NGNMFG virtual meetings, a preliminary view of the SIA (Annex 6) was prepared. More work in defining all 3 Tiers is needed. As it is recognized that one chart could not describe all the existing and planned Tier 2 and 3 models, a model comparison matrix methodology is being developed.

There are two generic information models included in the NGN Roadmap, the TMF Shared Information and Data Model (SID) and DMTF Common Information Model (CIM). Traditionally the CIM and SID models focused on different operational domains. Currently, CIM’s primary focus is on the IT resource management (Systems, Storage) and IP Networks, and SID provides a description of the telecom service provider's total technical and business systems. However, both models have a lot of similarities and overlap in the domain they cover and are currently used by the number of different management solutions.

Harmonization between CIM and SID needs to occur within operational domains where these models need to coexist in order to provide interoperability between different management solutions used for NGN.

The CIM-SID harmonization activity is a joint effort between the Distributed Management Task Force (DMTF) and the TeleManagement Forum (TMF). The project is divided into two phases. Phase 1 resulted in the publication of two companion documents: “DMTF/TMF Model Alignment Physical sub-Model Alignment”, DMTF DSP2004/TMF GB932, and “DMTF/TMF Model Alignment SID Logical Resources and CIM Networks Sub-Models”, DMTF DSP2000/TMF GB933. The goal of Phase 2 is to identify scenarios and guidelines for the CIM-SID model mapping. This effort is scoped to the physical and logical resources identified in Phase 1. To assist in this effort, TMF mTOP representatives have joined the CIM/SID harmonization teams. The final objective, however, is to develop an approach applicable to other domains as well.

Status: Further detail on this work is contained within Appendix IV.6

Appendix IV.6 - DMTF-TMF Information/Data Model Harmonization activity

Progress report (January 2007)

The DMTF-TMF Harmonization activity is a joint effort between the Distributed Management Task Force (DMTF) and the TeleManagement Forum (TMF). The working group started about two and a half years ago as CIM-SID Harmonization Group. Recently TMF started restructuring a SID team to facilitate SID/mTOP work consolidation. This impacts CIM/SID Harmonization and thus the

involvement of and participation in the CIM/SID Team has recently been expanded as well. As a result, currently the model harmonization work is going as a joint effort between mTOP Architecture and CIM/SID Harmonization teams.
This project is divided into several phases; an overview and status are provided below.

DMTF-TMF Model Harmonization, Phase 1 Overview
The project is divided into two phases. Phase 1 resulted in the publication of two companion documents: "DMTF/TMF Model Alignment Physical sub-Model Alignment", DMTF DSP2004/TMF GB932, and "DMTF/TMF Model Alignment SID Logical Resources and CIM Networks Sub-Models", DMTF DSP2000/TMF GB933. This work identifies the scope of the models, similarities and differences with respect to the modeling approach, major concepts captured in the models, and related classes.
GB932 (Physical Resources) provides an evaluation and high level comparison between GB922 Addendum 5PR and selected areas of the DMTF CIM 2.10 Physical Model.
GB933 (Logical Resources) provides an evaluation and high level comparison, within the domain of Communication Networks, between selected areas of GB922 Addendum 5LR – Logical Resource Business Entity Definitions (v1.1) defined as part of the Shared Information/Data (SID) Model and the Networks Model subset of CIM v2.10.
As noted, GB932 and GB933 identify the key concepts appropriate to their respective domains and describe how they are represented in each of the models. The conclusion in GB932 indicates that there is a great deal of similarity between the CIM and the SID Physical Models and mapping is possible. Nevertheless, in order to enable the automation of this process some changes could be made. Details of the possible changes are left for Phase 2. GB933 concludes by stating that simple federation between the two models is not feasible due to major differences in design approach and scope. However, it may be possible to identify a correspondence between common concepts between the CIM and SID. In order to accomplish this, it is likely that modifications will be needed to one or both models to make subsequent mappings based on these correspondences more straightforward.

DMTF-TMF Model Harmonization, Phase 2 Overview
The goal of Phase 2 is to identify processes and guidelines for the CIM-SID model mapping. This effort is scoped to the Physical and Logical Resources as identified in Phase 1. The final objective, however, is to develop an approach applicable to other domains as well. The group is proceeding with an in-depth analysis based on:

- Defining scenarios/use cases relevant to CIM- and SID-centric operational domains.
- Deriving a set of semantic concepts from the use cases.
- Organizing the semantic concepts into a higher-level ontology that captures their interactions.
- Mapping CIM and SID elements onto the identified semantic concepts.
- Inferring CIM-SID element mappings.

Example deployment scenario and business use case:
The following deployment scenario and high-level business use case is proposed as an initial representative of an important domain where CIM and SID may need to co-exist.
Customer: A traditional telecommunications service provider (SP) is rolling out IP Multimedia Subsystem (IMS).
Architecture: On one side the SP has the IP Multimedia Subsystem (IMS) core and radio access network and on the other side an IT infrastructure that supports the vast majority of the value added services being made available to subscribers/end-users.
Assumptions:

- The IMS core and radio access network expose resource management interfaces through the Integration Reference Points (IRPs) defined by 3GPP. The corresponding Network Resource Models (NRMs) are realized on specified protocols such as Simple Network Management Protocol (SNMP), Web Based Enterprise Management (WBEM), or Common Object Resource Broker Architecture (CORBA).
- The IP networking environment underlying both the IMS core and the IT infrastructure exposes CIM-based resource management interfaces.
- The SP's Operations Support System (OSS) uses Operations Support Systems through Java (OSS/J) APIs for Order Management, Service Quality Management, Trouble Ticketing, Billing Mediation and Quality of Service (QoS).

Requirement: The Order Management System must be used for order fulfillment in the IMS environment.
Conclusion: In order to meet the requirement for reuse of the SP's existing OSS/J implementation, CIM-based representations of the IMS NRMs and IP infrastructure resources must be mapped to corresponding elements of the OSS/J Core Business Entities (CBE) (and therefore of the SID).

Model Comparison and Mapping Methodology:
In general it is possible to identify a set of semantic concepts shared between different models within the scope of particular business use cases and deployment scenarios; each model would represent these concepts differently.
The set of concepts that collectively abstracts a domain can itself be described as a higher-level ontology. An example in the domain of Communication Networks is Topology, Network, SubNetwork, Network Elements, Connectivity, Protocols, etc. Element-level mappings can be made across the different models by mapping these concepts into the respective model elements. Semantic concepts may be mapped to the SID via the patterns defined by the Business View Entities (TMF GB922). The semantic concepts may be mapped to the CIM by leveraging CIM Profiles.
Mapping of the semantic concepts to a particular model is done in the context of business processes expressed as high-level Use Cases.
The set of Use Cases scoped to a particular domain (e.g. “Communication Networks”) implies key concepts that must be represented.
The initial goal of the mapping effort is to represent each of the semantic concepts for a given problem space using both CIM and SID. Initial efforts will concentrate on structural/relational mappings. Behavioral analysis will be undertaken as needed to support the semantic and structural mappings.

Phase 2 Deliverables:
The Deliverables for Phase 2 will include:

- Definition of deployment scenarios within an operational domain where CIM and SID need to coexist.
- A set of semantic concepts derived from these use cases.
- A mapping methodology.
- A mapping between the relevant CIM and SID model elements by applying the proposed mapping methodology to the concrete examples of Equipment and Network modeling.

<u>Phase 2 Work Progress Update</u>
The definition of deployment scenarios within an operational domain where CIM and SID need to coexist is covered by two documents: "System Deployment Scenarios" and "VPN Use Cases". Both of them are in a draft state and are available at the CIM-SID Harmonization team TM Forum Collaboration Workspace. The team needs to move the documents to the official contributions.

Creation of the draft document describing a set of semantic concepts derived from these use cases is in progress. It is expected to be finalized and moved for Harmonization team the review by the end of March.
The Mapping Methodology description document is available as a Draft at TM Forum's Collaboration Workspace. It is expected to be finalized and moved to the review by the end of March.
Development of the mapping examples between the relevant CIM and SID model elements by applying the proposed mapping methodology to the concrete examples of Equipment and Network modelling is currently in progress. The results of this implementation work affect second and 3-rd deliverables above. It is expected for the mapping examples to be "officially" published in the end of March.
As a result of recent internal to TMF work expansion for the SID team and increasing involvement of the mTOP group into SID model development the model harmonization work between DMTF and TMF is going as a joint effort between mTOP Architecture and CIM/SID Harmonization teams. Currently the following development is accelerating between these teams:

- Connection/connectionless conversion of the network resource modelling.
- Equipment (Physical resource) model harmonization.
- Logical Network resource harmonization.

The results of this work obviously will have an impact on the model relationships between CIM, SID and mTOP.

DMTF-TMF Harmonization Update - Mid August 2007
1. Phase 2 of the CIM/SID Harmonization - development of generic mapping methodology between models. The work is complete, draft specification is available and the final joint document is in the process of composition. Target completion date is end-August (slightly delayed). The methodology is already used in Phase 3, which is run under mTOP Architecture study (otherwise known as TP harmonization, see item 3 below).

2. Phase1 of Harmony Catalyst - demonstrated harmonization principles on practice and how they are used in the context of seamless NGOSS Solution. The catalyst suggested and proved the recipe (contracts, harmonized models and interfaces) that allows Service Providers to assemble OSS solutions quickly, with low cost and using COTS products.

3. TP Harmonization. This is joint mTOP/SID/CIM harmonization work, which can be considered as Phase 3 of TMF/DMTF joint work. Using and enhancing methodology developed in Phase 2 and applying the results of Connection/Connectionless convergence work the joint group is working on further understanding of the TMF/DMTF model differences and develops the principles of model alignment. The work is going on under TMF mTOP Architecture group (though this is joint TMF/DMTF work) and the results are constantly shared with the rest of DMTF members via DMTF Telco Work Group.

4. Interface Harmonization. This work is just being started. The first attempt to harmonize DMTF adopted Web Services interfaces (such as WS-Management interface) with MTOSI interface was done during the Phase 1 of the Harmony Catalyst. Right now there is a plan to feed the results of this work into the ongoing MTOSI-OSS/J harmonization work and make it another part of overall joint harmonization work.

5. Phase 2 of Harmony Catalyst. The plan is to have it ready by Niece TMW (not by Dallas, since the team decided that more time is needed to have a meaningful increment to the project). The

Dallas TMW is planned to be used to convey and expand the messages delivered by the first phase of the project as well as announce the detailed plans for the Phase 2. The target for the Phase 2 is to start doing actual end-to-end Service Assurance and SLA management. The project will be based on the infrastructure build during the first phase (which was focused primarily on the aspects of cross-domain transport provisioning and activation).

6. DMTF Presentation at TMW in Dallas. There will be a presentation called "SLA Management in Next Generation Networks: DMTF and TMF Join Forces to Address the Challenge", scheduled to be delivered in the Operational Challenges in a Converged Market track, as part of the Service Management module

Appendix IV.7 - XML Harmonization

XML-encoded data models are the foundation of the emerging use of web services for defining management interfaces. To ensure a common style of XML encoding and harmonized data models, the NGNMFG encourages and monitors industry harmonization efforts. In particular, joint efforts by the TMF MTOSI (now mTOP) group and 3GPP SA5 have been recognized.

Status: The TMF and SA5 have agreed work plans and exchanged information regarding their XML encoding styles and data models and are initially focused on the former activity.

Appendix IV.8 - Ethernet Harmonization

IEEE 802.3-based Ethernet technology is a key component of the NGN transport stratum. ITU-T Recommendation Q.840.1 is the management specification aligned with MEF 7, and it will also be aligned with TMF MTNM Solution Suite if needed.

Status: Needs better understanding of role of MTNM Solution Suite 3.5.

Appendix IV.9 - Interface Specification Methodology

Implementable interfaces are defined in most management standards organizations by a similar methodology resulting in the following set of specification types: interface requirements, a protocol-neutral information model formatted using UML notation, and one or more protocol-specific data models. The following methodology specifications have been identified for harmonization: ITU-T SG 4 M.3020 and 3GPP TS 32.150 series.

Status: As a result of a series of meetings between SG 4 and 3GPP representatives agreement on common text for two specification types, requirements and protocol-neutral information models, have been agreed. Furthermore, a revised M.3020 is expected to be presented for SG 4 approval in February 2007 with a revised 3GPP TS 32.150 series planned for later in the year.

Appendix IV.10 - 3GPP and 3GPP2 IMS Management Harmonization

The management of 3GPP and 3GPP2-based IMS networks are harmonized at two levels:

1. Interfaces.
2. Models and Network Element Specific Data.

For interfaces, the 3GPP SA5 32-series of specifications are reused in 3GPP2 TSG-S WG5 and 3GPP2 TSG-X WG3 (charging) specifications, whenever appropriate. The concepts of Integration Reference Points (IRPs) and Itf-N interfaces are shared between 3GPP and 3GPP2. Typically, this means that the management interfaces are common between 3GPP and 3GPP2 (e.g., common alarm interfaces, common provisioning interfaces, common performance management interfaces, common charging interfaces, etc.) but the network element specific information are not common (e.g.,

different Network Resource Models (NRMs), different performance measurements, different Call Detail Records (CDRs), etc.). For non-charging management interfaces, the 3GPP2 S.S0028-001-C (and 3GPP2 S.S0028-001-D) specifications describe any additions or exclusions from the 3GPP SA5 Release 6 (and Release 7) specifications. For charging, the additions or exclusions are described in the 3GPP2 X.S0013-007-A and 3GPP2 X.S0013-008-A specifications.

For IMS models and network element specific data, much of the data is common between 3GPP and 3GPP2 when there is commonality between the 3GPP and 3GPP2 architectures. As an example, 3GPP SA5 and 3GPP2 TSG-S WG5 share a common underlying object model (called the Generic NRM, 3GPP R7 32.622) that all object models are built upon. In Release 7, 3GPP and 3GPP2 will also share common IMS object model specifications (3GPP R7 32.731, 32.732, 32.733 and 32.735). These specifications (and the corresponding 3GPP2 specifications), will specify both 3GPP and 3GPP2 shared objects and 3GPP or 3GPP2-specific objects (where there are architecture differences, such as unique interfaces between IMS and the 3GPP and 3GPP2 Radio Access Networks).

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Appendix V - Shared Information Architecture

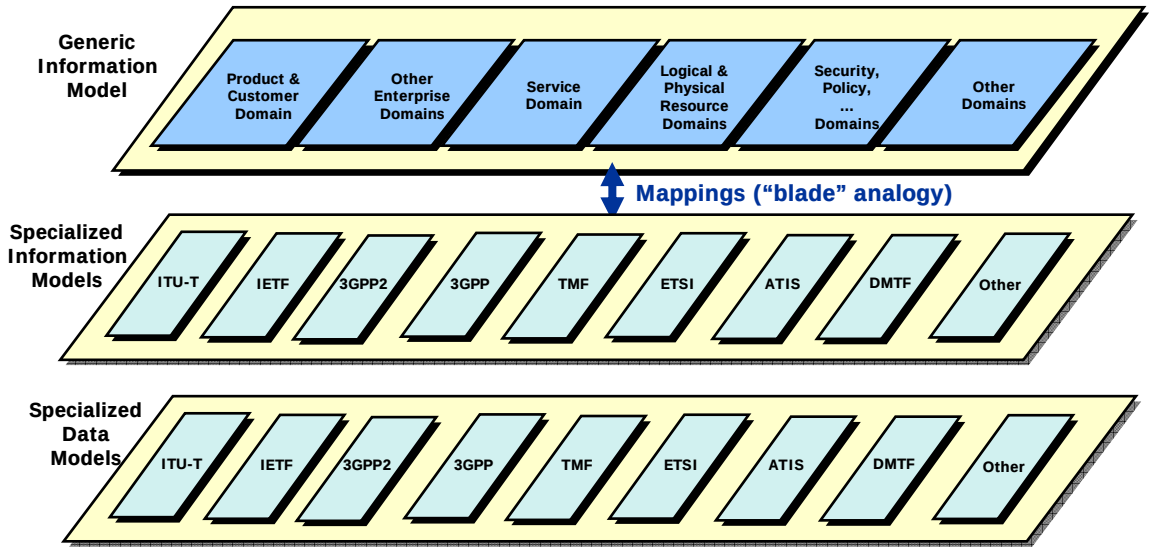

Figure V.1: Shared Information Architecture

DEFINITIONS:

- **Information model:**
  - An information model for a problem space represents all relevant things, i.e. objects in that problem space along with all of their relevant attributes, and relationships
    - There may be a number of different relevant viewpoints represented for different purposes
  - An information model is *independent* of implementation, i.e. independent of platform, language, protocol etc.
    - For example, it does not represent whether it is defined using CORBA IDL or a XML schema
  - Not all things (objects) in the information model will result in implementation forms
    - For example an information model view may be specified for the purpose of communication across management interfaces. However, not all things (objects, attributes, relationships) in that model will be visible across a management interface.
    - The things to be encoded in an implementation form will be identified in the information model
- **Data model:**
  - A data model is an encoded form of relevant parts of the information model for a *specific* platform, language and/or protocol, i.e. this is an implementation view
    - A data model adds no problem space specific properties, it only applies encoding and augments the information model with encoding directives
    - The relevant parts to be encoded for a specific application will be identified in the information model
  - A single information model may give rise to one or more data models.
    - Data models are typically designed with respect to the characteristics of the platform, language or protocol.

- For example, an information model may be represented via a data model defined in CORBA IDL and also a data model defined using a XML schema.

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Appendix VI - Specification Gaps

For further study.

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Document history (to be removed before final publication)

Version	Published in	Comments
4.1	NGNMFG-OD-028	final version 4 (last one in old format)
4.2	NGNMFG-ID-311-Rx	output of January 2008 meeting – first reviewed version of the restructured Roadmap
4.3	NGNMFG-ID-324-R1	output of the February and March 2008 meetings – the change marks in this version are with respect to NGNMFG-ID-311-R1, which contained partial output of the 5-8 February 2008 meeting and which was reviewed in the 28 February and 26 March meeting the changes in ID-324-R1 with respect to ID-324 are: – clause 5 populated with revised text from ID-309-r1, clause 2.3 – date adapted; version number adapted from 4.2 to 4.3
4.3	NGNMFG-ID-324-R2	changes in ID-324-R2 with respect to ID-324-R1: – removed bibliographic data for MTNM Solution Suite Supporting Document (action agreed in 28 February meeting) – added bibliographic data for ITU-T M.3017, M.3342 and M.3343 (editorial action: repair of errors made when converting v4.1 to v4.2) – removed spelling errors
4.3	NGNMFG-ID-324-R3	clean version, including editorial cleanup
4.4	NGNMFG-ID-335	includes changes discussed in May meeting, version for final review before submission to SG4 meeting.
5.0	NGNMFG-OD032	clean version for submission to SG4, no changes with respect to draft 4.4
5.1	SG4 TDxxx/G	minor editorial updates, version for publication on SG4 website and communication to NGNMFG partner organisations

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