NGN Management Focus Group

NGN Management Specification Roadmap v2.1

1. Purpose and scope

The goal of the work of the NGN Management Focus Group (NGNMFG) is to "organize and undertake a centralized approach regarding specification of NGN management related to FCAPS interfaces, in particular to support the NGN Release 1[1]". FCAPS interfaces are generally understood to include NE-OS and OS-OS interfaces in support of element, network, service, and business management.

Note that the term “centralized” in the goal statement does not imply that the NGNMFG will create all required specifications in a centralized way. The creation of specifications is distributed over many bodies and the responsibilities of these bodies are fully recognized. “Centralized” means here that the main role of the NGNMFG is acting as a coordinator and as an information broker on work directions, plans and progress in the various bodies. In this role, the NGNMFG has a good overview of the field and it can stimulate bodies in filling gaps and resolving harmonization issues.

This roadmap document provides the result of this work. It lists the specifications which the NGNMFG agreed to offer to ITU-T SG4 as candidates for a suite of management specifications. It identifies also the gaps which have to be filled and candidate bodies to undertake this work.

The current content is relevant for NGN Release 1; information regarding later Releases will be added when needed.

2. Specification architecture

The NGNMFG ToR lists a number of objectives. This list provides a high level architecture for the set of specifications to be generated by the NGNMFG.

The specification architecture comprises High Level Requirements (objective 1), Management Requirements (objective 2), Management Framework, Principle and Architecture (objective 3), Protocol-neutral and Protocol-specific NGN Management Interface Specifications (objective 4).

Figure 1 visualizes the specification architecture.

[1] NGNMFG Terms of Reference, section 1 [Annex 1]

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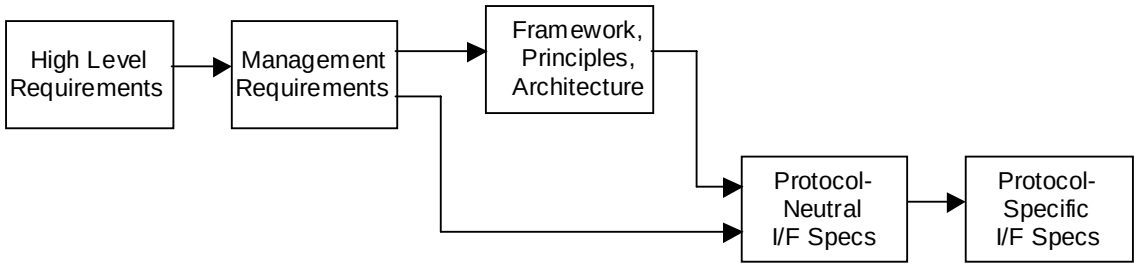

Figure 1: Specification Architecture

Each of the five rectangles in Figure 1 represents a group of specifications, which are contained in one or more documents.

The High Level Requirements are given from outside the NGNMFG, the most important source being the ITU-T NGN Focus Group (NGN FG). The documents containing the high level requirements are:

- Y.2001, General overview of NGN;
- Y.2011, General principles and general reference model for next generation networks;
- Y.NGN-FRA, NGN Functional Requirements and Architecture [1].

The task of the NGNMFG is to identify candidate documents for the remaining four groups. Candidates will be selected from existing documents, from documents which are under construction, or from planned documents. When no suitable candidate can be identified, the NGNMFG will identify a suitable body and invite it to generate the required specification document(s). Only as a very last resort, the NGNMFG will generate a specification.

The suite of candidate documents will be proposed to ITU-T SG4.

3. Specification categories

The set of NGN Management specifications described in this roadmap is separated in four categories:

1) Specifications for NGN management (section 4.1):

Specifications are listed under this category if they have been written specifically for NGN management and their scope is the NGN as a whole, i.e. they are not related to a specific functional entity in the NGN.

Within this category, specifications are grouped according to their role in the specification architecture in Figure 1.

2) Generic telecommunications management specifications, reused for NGN (section 4.2):

Specifications will be listed under this category, if they have not been written specifically for management of the NGN. The indication "NGN" does not appear anywhere in the titles of these documents, yet they are recognized as applicable for management of the NGN because of their generic applicability to telecommunications management.

Dependent on their main subject areas, specifications within this category are identified as generic or according to their relation with the FCAPS and other functional areas.

3) Specifications for the management of NGN functions (section 4.3):

Specifications will be listed under this category if their scope is the management of one or more specific functional entities in the NGN. This category includes specifications which have been written specifically for the management of NGN functions, and specifications which have been written for the management of non-NGN functional entities which are re-used in the NGN.

Specifications in this category are identified according to their main application area in terms of the functional entities of the NGN as they are defined in Y.NGN-FRA [1], Figure 8. These entities are:

- Service Stratum:
    - Application Functions Support Functions and Service Support Functions
    - Service User Profile Functions
    - Service Control Functions:
        - Other Multimedia Components
        - Streaming Service Component
        - PSTN/ISDN Emulation Service Component
        - IP Multimedia Service Component

- Transport Stratum:
    - Transport User Profile Functions
    - Network Access Attachment Function
    - Resource and Admission Control Functions
    - Access Transport Functions
    - Edge Functions
    - Core Transport Functions

- CPE:
    - Legacy Terminals
    - Gateways
    - NGN Terminals
    - Customer Networks

4) Other relevant specifications (section 4.4):

Specifications, considered relevant for the management of the NGN, which do not belong to another category.

4. Agreed specifications

The following tables list the specifications as agreed by the NGNMFG.

4.1 Specifications for NGN management

Subcategory	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	
	IETF RFC 3535, section 3	Overview of the 2002 IAB Network Management Workshop	
	ITU-T M.3060, clause 7	Management of Next Generation Networks	
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)

4.2 Generic telecommunications management specifications reused for NGN

Subcategory	Document ID	Title	Notes/Issues
Generic	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
	DMTF CIM	Common Information Model	harmonization issue with SID
Fault	X.alarm	Protocol-Neutral UML Description of the Alarm Reporting Function	harmonisation issue with SID, MTNM, and 32.111
Configuration			
Accounting	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)

Subcategory	Document ID	Title	Notes/Issues
Performance			
Security	M.3016 series	Security of the management plane	NGN relationship explained in M.3060
Service Management	ITU-T M.3341	QoS/SLA management service requirements	
	ITU-T M.3350	Emergency Telecommunication Service (ETS) management service requirements	
Protocol	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
Interface definition language	IETF STD 58	Structure of Management Information version 2	to support SNMP; recommended MIBs are for further study

Editor's note: consider adding SG4 M.ngn-ta for trouble ticketing

4.3 Specifications for the management of NGN functions

Subcategory	Document ID	Title	Notes/Issues
Core Transport Functions	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)	harmonisation issues with: SID, X.alarm-neutral, and 32.111 (see section 6.2) SID and 32.671-675
	TMF 608	MTNM Information Agreement (part of TMF MTNM Solution Suite)	

Subcategory	Document ID	Title	Notes/Issues
	TMF 814	MTNM Solution Set in CORBA IDL with Supporting Documentation (part of TMF MTNM Solution Suite)	(see section 6.4) MEF 7 and Q.840.1 (see section 6.7)
	TMF 814A	MTNM Implementation Statement Templates for CORBA (part of TMF MTNM Solution Suite)	
	Q.840.1	Requirements and Analysis for NMS-EMS Management Interface of Ethernet over Transport and Metro Ethernet Network (EoT/MEN)	harmonization issue with MEF 7 and MTNM Solution Suite (see section 6.7)
	MEF 7	EMS-NMS Information Model (for Metro Ethernet Network)	harmonization issue with Q.840.1 and MTNM Solution Suite (see section 6.7)
Access Transport Functions	TMF MTNM Solutions Suite (see Core Transport Functions)		
	Q.838.1	Requirements and analysis for the management interface of Ethernet passive optical networks (EPON)	
Service Stratum	ATIS TMOC Usage Data Management specifications (see table 4.2)		
IMS	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 32.301-304	Notification IRP	
	3GPP TS 32.311-314	Generic IRP	
	3GPP TS 32.601-604	Basic CM IRP	
	3GPP TS 32.621-625	Generic NRM IRP	
	3GPP TS 32.631-635	Core NRM IRP	

Subcategory	Document ID	Title	Notes/Issues
	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 23.125, 32.240, 32.260, 32.296-299	IMS Charging Management	harmonization issue with TMOC Usage Data Management specifications (see section 6.3)

Editor's note: harmonization issues regarding the equipment model need to be investigated

Editor's note: 3GPP 32 series specifications for the management of UMTS packet switching in Core Transport and UTRAN in Access Transport need to be investigated

4.4 Other relevant specifications

Subcategory	Document ID	Title	Notes/Issues
	IETF RFC 3444	On the Difference between Information Models and Data Models	

5. Gaps

The following table identifies areas for which suitable specifications candidate could not be identified. The NGNMFG has brought the gap areas to the attention of the organizations listed in the third column.

Area	Reference	Organization	Follow up
Exchange of service orders, trouble tickets, etc	NGNMFG-ID-028 NGNMFG-OD-006	ITU-T Q.7/4	working on M.ngn-ta for trouble ticketing
NGN function oriented NE MIBs	NGNMFG-ID-135	ETSI TISPAN WG8	working on the MIM

6. Harmonization Issues

6.1 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.

6.2 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.

6.3 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.NGN-FRA.

6.4 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.

6.5 Generic Information Models

There are two Generic Information Models which were both inputs to the NGN Roadmap - TMF Shared Information and Data Model (SID) and DMTF Common Information Model (CIM). Traditionally the CIM and SID models were focusing 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 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.

Further detail on this work is contained within Annex 4.

6.6 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 model which "hosts" or maps onto a set of Tier 2 protocol-neutral models focused on specific problem domains which in turn map onto a set of Tier 3 implementable models based on specific paradigms.

6.7 Ethernet Harmonization

802.3-based ethernet technology is a key component of the NGN transport stratum. The following specifications include ethernet management capabilities that have been identified for harmonization: ITU-T SG 4 Q.840.1, MEF 7, and TMF MTNM Solution Suite.

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Annex 1: Terms of reference for the NGNMFG

Available at the NGNMFG website: http://ftp3.itu.ch/ngnmfg/perm/ToR-4.0.doc

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Annex 2: 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
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
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

Annex 3: Description of Managed Entities

The following documents contain specifications and descriptions of the NGN Managed Entities.

Identification	Title	Notes
3GPP 23.002	Network architecture	
3GPP 23.228	IP Multimedia Subsystem (IMS); Stage 2	
ITU-T Y.NGN-FRA	Functional Requirements and Architecture of the NGN	
ITU-T Y.INF	IMS for Next Generation Networks	
ETSI ES 282 001	NGN Functional Architecture Release 1	
ETSI ES 282 002	PSTN/ISDN Emulation Sub-system (PES); Functional architecture	

Editor's note: other specifications to be added

Annex 4: CIM-SID Harmonization activity – Progress Report (May 2006)

The CIM-SID Harmonization activity is a joint effort between the Distributed Management Task Force (DMTF) and the TeleManagement Forum (TMF). The working group started more than a year and a half ago. This project is divided into two phases; an overview is provided below.

CIM-SID 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.

CIM-SID 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.

Annex 5: Information about the listed specifications

Annex 5 contains bibliographic information for each of the specifications listed in this document. This appendix is contained in a separate powerpoint file.

References

[1] Y.NGN-FRA, Functional Requirements and Architecture of the NGN Version 0.1 (ITU-T TD 133 (WP 2/13))

Document history

Version	Published in	Comments
0.0	NGNMFG-ID-045	input to 31 March 2005 meeting
0.1	NGNMFG-ID-045-R1	output of 31 March 2005 meeting
0.2	NGNMFG-ID-045-R2	output of 26 May 2005 meeting
0.3	NGNMFG-ID-045-R3	output of 22 June 2005 meeting
0.4	NGNMFG-ID-045-R4	output of 27 July 2005 meeting
0.5	NGNMFG-OD-010-R2	output of 28 July 2005 meeting
1.0	NGNMFG-OD-013-R2	output of 7 September 2005 meeting (doc id: NGNMFG-OD-013-R2_Final_Roadmap.doc)
1.1	Permanent Document	header format adapted input to 1 November 2005 meeting
1.2	Permanent Document	agreed output of January, February, March, April 2006 meetings
2.0	Permanent Document	changes made after April meeting, before SG4 meeting, reviewed per email; reported to SG4 in NGNMFG-OD-019
2.1	Permanent Document	changes made after SG4 meeting: replaced ToR text in Annex 1 by pointer to revised ToR v4.0