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WORK GROUP: Architecture

TITLE: **SIF SONET TMN Architecture Requirements**

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ABSTRACT: This document contains a set of requirements that specify the components, mappings, granularities, and reference points of the SIF SONET TMN Architecture. When applied to candidate TMN architectures, these requirements will result in a specification that is in conformance with the SIF SONET TMN architecture.

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1. Introduction

At the August 1997 SIF meeting, contribution SIF-AR-9708-055 and subsequent
discussions revealed a need for a SONET TMN Architecture document.   Subsequently,
contribution SIF-AR-9710-075 and its two following revisions proposed a SIF SONET
TMN Architecture based on the ITU-T M.3010 (5/96), "Principles of a
Telecommunications Management Network" standard.

In brief, ITU-T M.3010 (5/96) presents both a functional and a physical TMN
architecture.   The M.3010 functional architecture is composed of function blocks, which
are further, decomposed into functional components.   Reference points describe each
unique path of interaction between the functional architecture components. The physical
architecture consists of physical components, "TMN Building Blocks" in the terminology
of M.3010, and interfaces.   Mappings of the functional architecture to the physical
architecture are also included in ITU-T M.3010.

A working knowledge of ITU-T M.3010 is therefore essential to understanding this
document.

The audience for this document is all who are involved in the specification, design, and
implementation of SONET TMNs. Equipment providers will find the contents useful in
architecting their NE and OS product offerings. Network providers will find the
document useful as a base for describing their TMN requirements.

2.   Scope

This edition is aligned with ITU-T M.3010 (05/96), and is limited to the functionality and
architectures M.3010 describes except for the SIF-specific additions that are clearly
identified in subsequent paragraphs. As such, this document is a "delta" document to
ITU-T M.3010 (05/96) and it should be expected that it will be revised and updated as
future editions of M.3010 are issued.

Detailed physical implementation aspects, such as specific protocol standards, profiles, and
implementation agreements will be found in the documents listed in the reference section.

3.   Goals

This requirements document has as its goals:

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1. Define a SIF SONET TMN physical and functional architecture that is based on
    international TMN standards.

2. Define a SIF SONET TMN that is faithful to the CMIP affirmation statement
    proposed in SIF-AR-9708-055 and subsequently approved by a plenary vote at the
    October 1997 SIF meeting.

3. Promote the deployment of TMN-based SONET management by defining a complete
    and comprehensive list of functional components and interfaces.

4. Define a SIF SONET TMN architecture that accommodates legacy (non-TMN) NEs
    to facilitate the rapid migration to TMN.

5. Define a SIF SONET TMN Architecture that is flexible, adaptable, and scaleable,
    taking full advantage of the rich combination of physical and functional blocks offered
    by ITU-T M.3010.

4.   Principles

The primary principle upon which this document and its contents are built is that the SIF
SONET TMN Architecture should be based upon and compliant with the ITU-T M.3010.

Additionally, this standards follows the principle that the existence of numerous non-TMN
NEs in deployed SONET networks necessitates that the SIF SONET TMN Architecture
include a representation of these legacy NEs to facilitate depiction of architectures which
transition from non-TMN to TMN NEs.

5.   References

1. SIF-AR-9708-055, Common Management Information Service Element (CMISE)
    Requirements For Network Element (NE) to Element Management System (EMS)
    Interface, Bob Gallo, Bell Atlantic.

2. M.3010 (05/96) Principles for a Telecommunications Management Network, ITU-T.

3. SIF-AR-9710-075r2, SIF SONET TMN Architecture, E-OS and NE, C. Klish, Nortel.

4. SIF-AR-9710-072, SIF SONET TMN Architecture, Examples of Use, C. Klish,
    Nortel.

5. ITU-T X.500 (11/93), The Directory: Overview of Concepts, Model and Services.

6. ITU-T X.501 (11/93), The Directory: Models.

7. ITU-T X.511 (11/93), The Directory: Directory Abstract Service Definition.

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   This document has received the approval of the SONET Interoperability Forum (SIF).
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8. ITU-T X.518 (11/93), The Directory: Procedures for Distributed Operations.

9. ITU-T X.519 (11/93), The Directory: Protocol Specifications.

10. ITU-T X.520 (11/93), The Directory: Selected Attribute Types.

11. ITU-T X.521 (11/93), The Directory: Selected Object Classes.

12. ITU-T X.525 (11/93), The Directory: Replication.

13. ITU-T X.581 (11/95), The Directory: Directory access protocol - Protocol Implementation Conformance Statement (PICS) proforma.

14. ITU-T X.582 (11/95), The Directory: Directory system protocol - Protocol Implementation Conformance Statement (PICS) proforma

15. ISO 8571-1:1988, File Transfer, Access, and Management -- Part 1: General Introduction.

16. ISO 8571-2:1988, File Transfer, Access, and Management -- Part 2: Virtual File Store.

17. ISO 8571-3:1988, File Transfer, Access, and Management -- Part 3: File Service Definition.

18. ISO 8571-4:1988, File Transfer, Access, and Management -- Part 4: File Protocol Specification.

19. ISO 8571-5:1990, File Transfer, Access, and Management, -- Part 5: PICS Proforma.

20. ANSI T1.245-1996, Directory Services for SONET.

21. Meeting Minutes, SIF Plenary, October 1997.

22. Bellcore GR-253-CORE, Section8 and Appendices C&D.

23. Bellcore GR-828-CORE.

24. ANSI T1.204-1997, OAM&P - Lower Layer Protocols for Telecommunications Management Network (TMN) Interfaces, Q3 and X Interfaces

25. ANSI T1.208-1997, OAM&P - Upper Layer Protocols for Telecommunications Management Network (TMN) Interfaces, Q3 and X Interfaces

26. ITU-T Recommendation Q.811 (06/97) - Lower layer protocol profiles for the Q3 X interfaces.

27. ITU-T Recommendation Q.812 (06/97) - Upper layer protocol profiles for the Q3 and X interfaces.

6.   The SIF SONET TMN Architecture Requirements

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Given the richness of M.3010 physical and functional components, no single box and line drawing, or even a collection of drawings can capture all the significant architectural variants possible and still fit within a reasonably sized document. As a result, the SIF SONET TMN Architecture is specified by a set of requirements, which constrain candidate architectures into an M.3010-compliant model whose detail and terminology are well standardized. These requirements, when rigorously conformed to, will result in the definition or specification of an architecture that is compliant with the SIF SONET TMN Architecture.

Additionally, the addition of SIF-specific functions and reference points realizes architectural completeness and cohesiveness, and increases the meaningful use of this architecture by other SIF working groups.

6.1   Component Requirements

1. All TMN function blocks and functional components defined in ITU-T M.3010 are valid components of the SIF SONET TMN architecture.

2. All TMN building blocks defined in ITU-T M.3010 are valid physical components of the SIF SONET TMN architecture.

3. A File Transfer Responder Function (FTRF) and File Transfer Initiator Function (FTIF) functional components shall be used to specify the file transfer function. The FTRF and FTIF are SIF-originated increments to ITU-T M.3010.

4. A Registration Manager Function (RMF) and Registration Agent Function (RAF) shall be used to define a T1.245 compliant Registration Management Application. The RMF and RAF are SIF-originated increments to ITU-T M.3010.

5. The term non-TMN function (NTF) shall be used to describe a functional block that is not TMN compliant, e.g. a non-TMN management component of a NNE. The NTF is a SIF-originated increment to ITU-T M.3010.

6. The term "TMN NE" (TNE) shall be used to describe a NE physical building block that is wholly TMN compliant. . The TNE is a SIF originated increment to ITU-T M.3010.

7. The term "non-TMN NE" (NNE) shall be used to describe a NE physical building block that is not TMN compliant. The NNE is a SIF originated increment to ITU-T M.3010.

<div align="center">Note</div>

The inclusion of a non-TMN NE physical building block does not constitute an endorsement of non-TMN NEs. The sole purpose of the non-TMN NE physical building block is allow the depiction of transitional architectures which will accelerate the migration of legacy NEs to the TMN envisioned by the CMIP Affirmation Statement.

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8. The term "combination NE" (CNE) shall be used to describe a NE physical building block that has both TMN compliant and non-TMN compliant characteristics. The CNE is a SIF originated increment to ITU-T M.3010.

6.2 Granularity of Functional Specification

1. As a minimum, valid SIF SONET TMN architectures are specified to the functional component level, consisting of the functional components specified in ITU-T M.3010 section 2.2.

2. DCFs and DCNs shall be defined to the subnetwork level.

3. As an objective, the MAF functional component(s) shall be decomposed to reveal the full range of specific options or mechanisms within it.

4. As an objective, the SF functional component shall be decomposed to reveal the full range of specific options or mechanisms within it.

5. The MCF functional component(s) shall be decomposed to reveal the full range of specific options or mechanisms within them.

6.3 Component Mapping Requirements

1. All valid function block to physical block mappings described in ITU-T M.3010 (05/96) Table 4/M.3010 are valid relationships for an architecture claiming conformance with the SIF SONET TMN architecture.

2. All valid functional component to function block mappings specified in ITU-T M.3010 (05/96) Table 3/M.3010 shall be valid relationships for an architecture claiming conformance with the SIF SONET TMN Architecture.

3. To be compliant with this standard, SIF SONET TMN architecture must meet any of the mandatory relationships of ITU-T M.3010 (05/96) Table 3/M.3010 and Table 4/M.3010 that apply to the components the SIF SONET TMN architecture contains.

6.4 Reference Point Requirements

The following requirements describe reference points that are incremental to M.3010; their definition is intended to promote the definition of standard service interfaces and interoperability among functional components.

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1. The s reference point shall delineate the service boundary between the SF and the users of the SF's services. The s reference point is a SIF-originated increment to ITU-T M.3010.

2. The r_i reference point shall delineate the service boundary between the FTIF and the users of the FTIF's services. The r_i reference point is a SIF-originated increment to ITU-T M.3010. Reference 6 describes a file transfer initiator based on the ITU-T's FTAM.

3. The r_r reference point shall delineate the service boundary between the FTRF and the users of the FTRF's services. The r_r reference point is a SIF-originated increment to ITU-T M.3010. Reference 6 describes a file transfer initiator based on the ITU-T's FTAM.

4. The d_u reference point shall delineate the service boundary between the DAF and the users of the DAF's services. The d_u reference point is a SIF-originated increment to ITU-T M.3010. Reference 5 describes a DAF based on The Directory of the ITU-T.

5. The d_s reference point shall delineate the service boundary between the DSF and the users of the DSF's services. The d_s reference point is a SIF-originated increment to ITU-T M.3010. Reference 5 describes a DAF based on The Directory of the ITU-T.

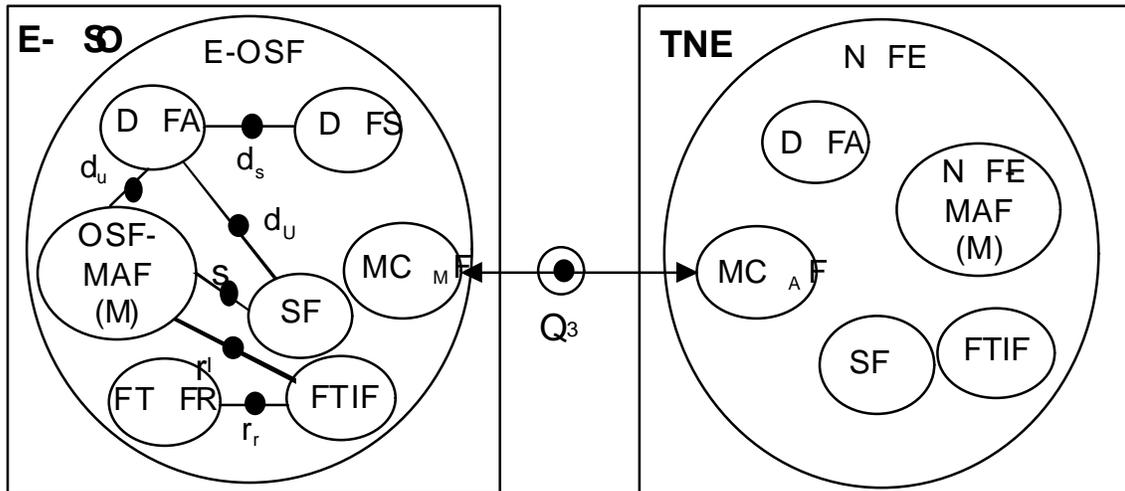The following figures illustrate these reference points:

Figure 1: Reference Points

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An E-OSF is an Element Management Layer OSF as defined by M.3010 section 5.7.
Similarly, an N-OSF is a Network Management Layer OSF, an S-OSF is a Service
Management Layer OSF, and a B-OSF is a Business Management Layer OSF.

7.   Summary

This document describes requirements for an ITU-T M.3010-compliant SIF SONET
TMN architecture. Because of the richness and variety of ITU-T M.3010 architectural
components, illustrating all allowable architectural variants is precluded. However, use of
the requirements provided will result in architectural definitions and specifications that are
readily and easily understood by all segments of the SONET industry.

Additionally, the document mandates that architectures must be defined at least to the
granularity of functional components in order to achieve basic blocks that are standardized
and interoperable, yet are independent of physical and function block arrangement. The
document also contains several extensions to the ITU-T M.3010 functional component
concepts. These extensions include the addition of functional components for file transfer,
registration management, inter-functional component reference points, and decomposition
of SF, MCF, and MAF functional components.

Among the extensions added is a non-TMN NE (NNE) physical building block; its
presence does not constitute an endorsement of non-TMN NE but is included solely to
allow depictions of transitional architectures which migrate non-TMN NEs to TMN NE in
accordance with the CMIP Affirmation Statement.

8.   Acronyms

B-OSF   Business Management Layer - Operations System Function (M.3010)

CMIP   Common Management Information Protocol (OSI)
CMISE   Common Management Information Service Element (OSI)
CNE   Combination Network Element (SIF)

DAF   Directory Access Function (M.3010)
DCF   Data Communications Function (M.3010)
DCN   Data Communications Network (M.3010)
DSF   Directory System Function (M.3010

EMS   Element Management System
E-OS   Element Management Operations System (M.3010)
E-OSF   Element Management Layer - Operations System Function (M.3010)

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FTF	File Transfer Function (SIF)
FTIF	File Transfer Initiator Function (SIF))
FTRF	File Transfer Responder Function (SIF)
ICF	Information Conversion Function (M.3010)
MAF	Management Application Function (M.3010)
MCF	Message Communications Function (M.3010)
MD	Mediation Device (M.3010)
MF	Mediation Function (M.3010)
NE	Network Element (M.3010)
NEF	Network Element Function (M.3010)
NMS	Network Management System
NNE	Non-TMN Network Element (SIF)
NTF	Non-TMN Function (SIF)
N-OS	Network Operations System (M.3010)
N-OSF	Network Management Layer Operations System Function (M.3010)
OS	Operations System (M.3010)
OSF	Operations System Function (M.3010)
QA	Q-Adaptor (M.3010)
QAF	Q-Adaptor Function (M.3010)
RAF	Registration Agent Function (SIF)
RMF	Registration Manager Function (SIF)
SF	Security Function (M.3010)
SIF	SONET Interoperability Forum
SONET	Synchronous Optical Network
S-OSF	Service Management Layer Operations System Function (M.3010)
TMN	Telecommunications Management Network (M.3010)
TNE	TMN-compliant Network Element (SIF)
UISF	User Interface Support Function (M.3010)
WS	Workstation (M.3010)
WSF	Workstation Function (M.3010)
WSSF	Workstation Support Function (M.3010)

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9.   Revision History

Revision	Date	History
initial	4/6/98	Initial version uploaded to SIF FTP site.
01	5/8/98	Incorporate input from April SIF meeting review.
02	5/18/98	Incorporate input from May 15 conference call.
03	6/4/98	Address Ron Roman's concerns about the inclusion of non-TNM NEs being inconsistent with CMIP Affirmation Statement.
04	10/6/98	Add references to detailed implementation specs and paragraph in scope per Ron Roman's request. Modify internal reference point figure 1. Delete "y internal reference points and figure.
05	10/16/98	Corrected Figure 1 flow between SF and DAF to "d_U," was "d_S." Removed strike throughs, underlines, and action items.

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