New Generation Operations Software and Systems (NGOSS)

1. Introduction

This Paper provides a brief description of the Tele Management Forum's NGOSS (New Generation Operations Software and Systems). TeleManagement Forum (TMF) is an international membership organization of communications service providers and suppliers to the communications industry. TMF is regarded as the most authoritative source for standards and frameworks in OSS/BSS.

Operations Support Systems (OSS) is a suite of software designed specifically to manage a large network infrastructure, connecting individual sub-systems. OSS supports processes such as management, inventory, engineering, planning, billing and repair functions for telecom service provider's networks.

A complementary term Business Support Systems (BSS) typically refers to 'business systems' dealing with customers supporting processes such as taking orders, processing bills and collecting payments.

OSS and BSS systems together are often abbreviated as OSS/BSS. Component-based OSS/BSS solutions improve the management of service planning, deployment and operations in a multi-service, multi-vendor, multi-technology environment.

Today's service providers are required to manage a complex set of products, networks and services in a dynamic, competitive market. There is a world wide focus on automating Operations, Management and Business Processes by utilising technologies and solutions within Global telecom industry. To achieve this, standard requirements needs to be identified by following a market-centric approach and involving key industry players. Telecom service providers have started focusing on the realization of converged Next Generation Networks (NGN) for which an appropriate architecture for operation, administration and maintenance need to be established.

Based on state-of-the-art information technology, NGOSS facilitates service providers to maximise their return on investment (ROI), provide best customer services, accelerate new products & services and run their network operations, business operations as well as traffic & revenue settlement among other service providers.

2. Telecommunication Management Network (TMN) Architecture

OSS architecture has been defined by the ITU-T in its Telecommunications Management Network (TMN) model for managing telecom companies' public networks and services as shown in figure 1. TMN is a reference model for hierarchical telecommunications management and is organized in four layers i.e. Business Management, Service Management, Network Management and Element Management across which multiple functions or services apply.

Business Management: It manages the overall business processes, e.g. achieving return on investment (ROI), market share, employee satisfaction, community and government goals etc.

Service Management: It manages the service offered to customers, e.g. meeting customer service levels, service quality, cost and time-to market objectives etc.

Network Management: It manages the network and system that deliver services, e.g. capacity, diversity and congestion etc.

Element Management: It manages the elements comprising the network and the systems.

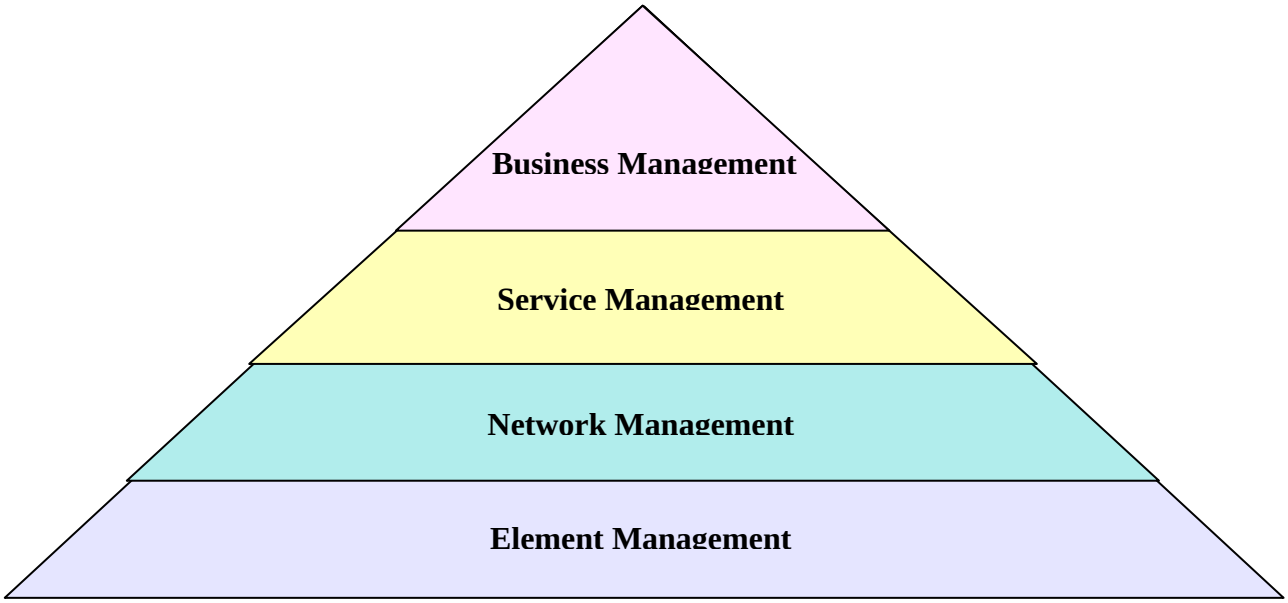

Figure 1: TMN Architecture (ITU-T)

The changing business environment caused by telecom deregulation, evolving business models, competitive pressures, demanding customers and many other issues pose major challenges to service providers in trying to stay ahead of competition.

In order to survive in the highly competitive telecommunications environment, service providers need to streamline and optimize their operations. Failure to do so can severely jeopardize a service provider's business. To achieve a lean operations environment, a service provider needs efficient processes supported by a high level of automation. This requires a comprehensive, integrated framework for developing, procuring and deploying OSS/BSS systems and software that focus on the Service Fulfilment, Service Assurance and Billing areas for all legacy, Next-Generation and Hybrid networks. The requirements not only cover core networks, but also interface networks required to provide value-added multimedia services.

The Tele Management Forum's New Generation Operations Systems and Software (NGOSS) is an architectural framework for organising, integrating and implementing telecom systems.

NGOSS is a component based framework consisting of the following elements:

- The enhanced Telecom Operations Map (eTOM) is a business process framework, (i.e., a model for categorizing all the business activities that a service provider might use).
- The Shared Information Data (SID) model provides a comprehensive information/data model that may be specialized for the needs of a particular organization.
- The Technology Neutral Architecture (TNA) and contract interface are the components make up the heart of the NGOSS integrated framework. TNA is an architecture that is

sustainable through the technology changes. The contract interface defines APIs for interfacing across the architecture from different software vendors.

- NGOSS compliance element provides a suite of tests for compliance to the eTOM, SID, TNA and contract interface components. These tests allow vendors to achieve certification for complying with one or more NGOSS standards.

Figure 2 illustrates the overview of the Tele Management Forum's NGOSS Framework.

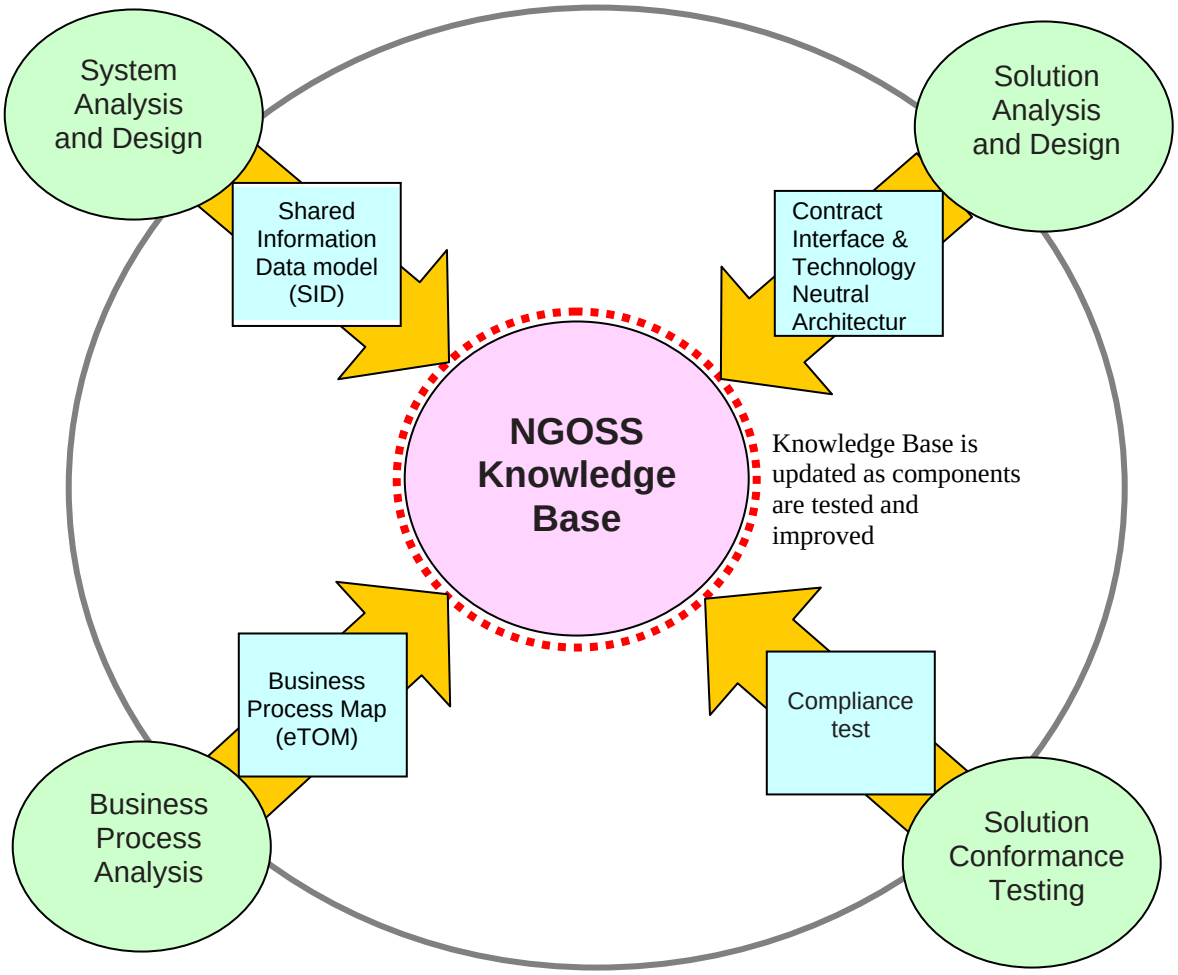

Figure 2: the overview of the Tele Management Forum's NGOSS Framework

3. Enhanced Telecommunications Operational Map (eTOM)

TM Forum has defined Enhanced Telecommunications Operational Map **(eTOM**), a business process model for the telecommunications industry. The eTOM describes all the enterprise processes required by a service provider and analyses them to different levels of detail according to their significance and priority for the business. The eTOM Business Process Framework serves as the blueprint for process direction and the starting point for development and integration of new generation Business and Operations Support Systems for Operators.

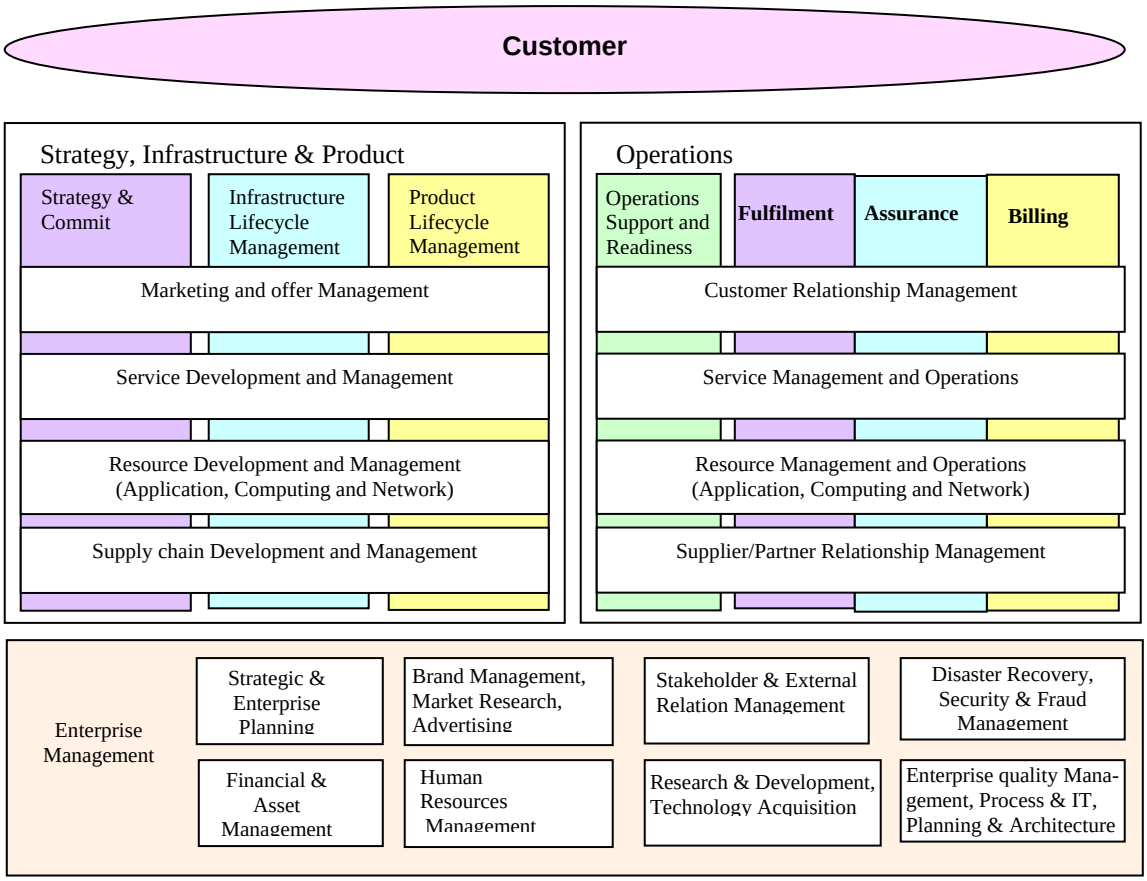

Figure 3: TMF eTOM process map

It provides a neutral reference point for internal process reengineering needs, partnerships, alliances, and general working agreements with other providers.

The eTOM model has multiple levels of abstraction, covering three main areas:

- **Operations:** This area includes customer relationship management, service management, resource management, and supplier/partner relationship management.
- **Strategy, Infrastructure & Product:** This area includes processes that support the creation of strategies for marketing, development of new services, resource development & management, and supply chain development & management.
- **Enterprise Management:** This area includes those basic business processes that are required to run and manage an enterprise. Enterprise Management includes process areas such as human resource management, financial asset management, and disaster recovery management

3.1 Vertical Processes of NGOSS addressed by eTOM Operations Model

3.1.1 Service Fulfilment or Provisioning

The Service Fulfilment or Provisioning process is responsible for providing customers services on time and correctly. It translates the customer's needs into a solution delivered through

specific products and services. This process informs customers about the status of their purchase order and ensures completion on time and customer satisfaction.

3.1.2 Service Assurance

Service Assurance is the process responsible for executing maintenance activities for customer's satisfaction. Network status and performance are constantly monitored to detect possible failures. Performance data is collected and analysed to identify potential problems and fix them without impacting on the customer side. This process manages SLAs and reports service performance levels to the customer. It involves receiving problem reports from customers, informing the customers of the problem status, and ensuring restoration and repair. It ensures that customers are being adequately serviced as per committed QoS.

3.1.3 Billing

The billing process is responsible for the production of accurate bills in time, processing and collecting payments and providing pre-billing and billing information to the customers. In addition, it involves handling customer enquiries about bills, providing enquiry status and resolving billing problems to ensure customer satisfaction in a timely manner. This process also supports prepaid services.

The billing process offers following services:

- Rapid creation of new service plans and rates
- Flexible rating and discount options ("pricing")
- Real- time event processing
- Convergent billing
- Prepaid and post-paid billing
- Customer self- management of services via web
- Analysis of customers, rates, plans, usage etc.

3.2 Horizontal processes of NGOSS addressed by eTOM Operations Model

3.2.1 Customer Relationship Management

These processes use the knowledge of customers' needs and include all functions necessary for the acquisition, enhancement and retention of a customer by supporting storefront, telephone, web or field services. It also involves churn analysis, cross-selling/up-selling and direct marketing activities targeted to increasing sales. CRM applies to both conventional retail customer interactions, and wholesale interactions.

3.2.2 Service Management

The Service processes deals with functions related to service development and delivery of service capability, service configuration, service problem management, quality analysis and rating.

3.2.3 Resources Management

Resource processes management deals with development and delivery of resource infrastructure (i.e. IT and Network resources). These processes include provisioning, trouble management and performance management. Resource infrastructure supports products and services as well as supporting the enterprise itself.
These processes are responsible for ensuring that end-to-end service delivery is correctly supported by network and information technology infrastructure. The Resource Management

and Operations processes manage both service provider networks/sub-networks and information technology architectures.

3.2.4 Supplier/Partner Relationship Management

These processes deal with an enterprise's interaction with its suppliers and partners. This can be summarised within the concept of supply chain processes supporting product offering and infrastructure, as well as those supporting operational interfaces with suppliers and partners

4. Shared Information/Data Model (SID)

An NGOSS system is characterised by the usage of a common information model for enabling communication, integration and interoperability. The SID is designed for standard representation of information/data that can be shared and/or reused by OSS/BSS software applications provided by multiple vendors. The SID provides the concepts and principles needed to define a shared information model and diagrams to provide a system view of the information and data. Complementing the eTOM's process framework, the SID focuses on the things that are involved in business processes, people, assets, products and services.

The SID business view is a layered framework, mapping the shared information into eight domains namely Market/Sales; Product; Customer; Service; Resource; Supplier/Partner; Enterprise and Common Business which are aligned with the eTOM framework. These processes are shown in horizontals of figure 4.

The SID model is further extended and specialised by the various TM Forum interface specification efforts.

5. Interfaces

In order to insure interoperability between systems provided by various vendors for each of the above 8 domains, a set of open interface specifications are required. The TM Forum has taken the task of defining the MTOSI (Multi-Technology Operations Systems Interface) and MTNM (Multi-Technology Network Management) interfaces.

MTOSI is designed for operating between operations systems for network and service management. The goal is to cover all technologies from layer 1 (e.g., SONET/SDH) to high layer technologies such as VoIP.

The MTNM interface is designed for NMS to EMS communications.

PROSSPERO is a vehicle to package successful technical solutions, in terms of inter-operability and ease of deployment. The PROSSPERO approved 'solutions' are based on TM Forum standards and have verifiable, live deployments.

6. Technology Neutral Architecture (TNA)

Technology Neutral Architecture (TNA) is an architecture that is sustainable through the technology changes. The NGOSS TNA defines component-based, distributed system architecture and an associated critical set of system services.

The NGOSS supports the following TNA requirements:

i). An NGOSS system must have re-useable software entities that offer their services via open, well-defined interfaces known as contracts.

ii). An NGOSS system must have all its external dependencies explicitly defined.

iii). An NGOSS system must be characterised by a separation of the services offered by the constituent components from the software that automates business processes across the components.
iv). An NGOSS system must support data stewardship. For each datum, there is a steward that controls access and modification of the datum.
v). An NGOSS system must support a common communication mechanism like Java Message Service (JMS).

7. Telecoms Application Map (TAM)

Although beneficial, the SID and eTOM are defining the roadmap of NGOSS, and sometimes it is challenging for Service Providers to map business and operational areas to commercial software applications available to the market. To simplify this, the TMF introduced TAM. TAM allows software vendors to define the functional footprint of their applications relative to the horizontal processes within eTOM as shown in figure 4.

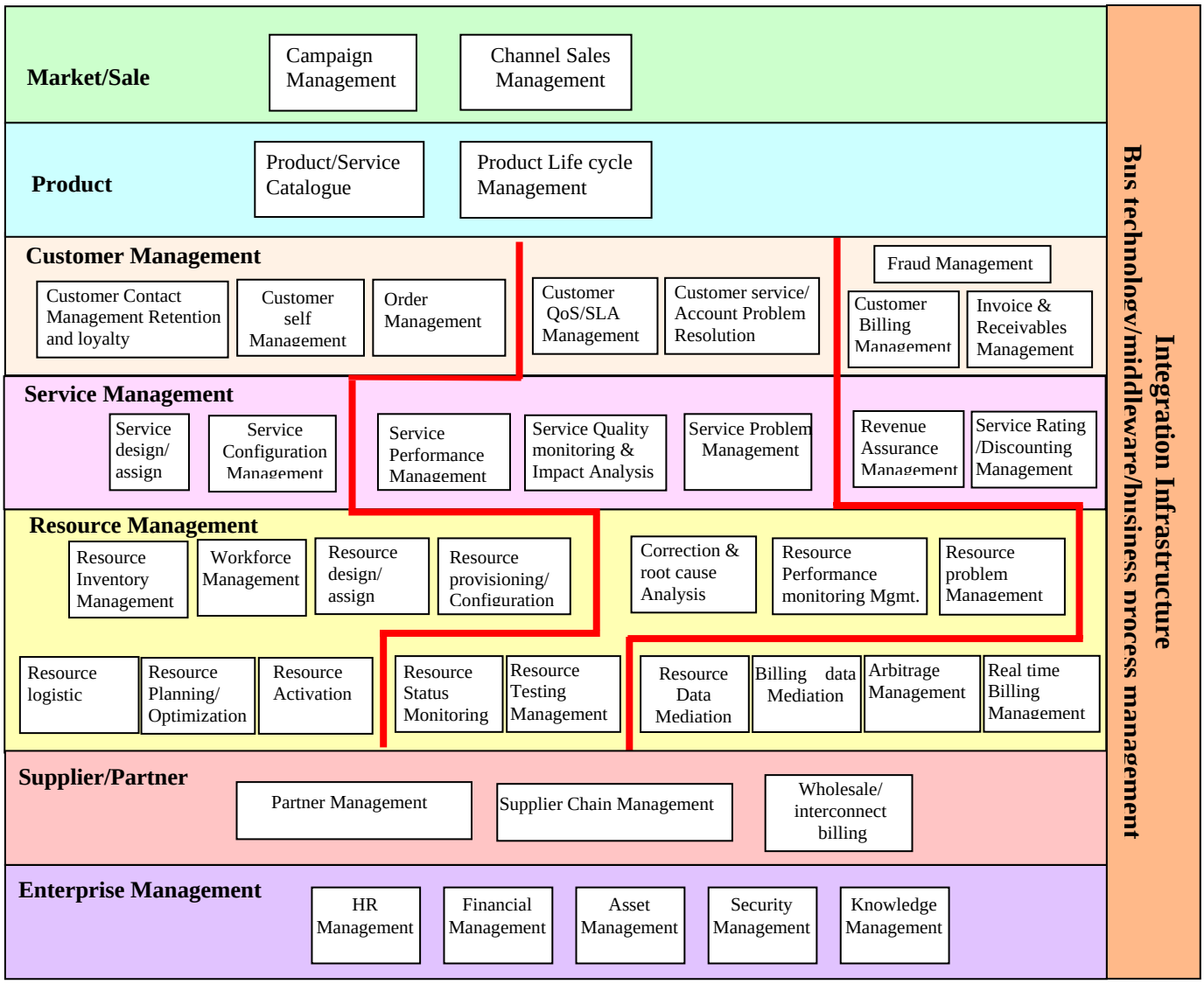

Figure 4: TMF Telecoms Application Map (TAM)

8. Conclusion

NGOSS defines a comprehensive, integrated framework for developing, procuring and deploying operational and business support systems and software for communications service providers and their suppliers. It is the industry's standard for development and deployment of OSS/BSS system.

For NGOSS TMF has provided with a set of documents that make up a toolkit of industry-agreed specifications and guidelines that cover key business and technical areas and a defined methodology for use of the tools.

The TMF is further developing NGOSS artefacts to address new business requirements based on fast growing industry.

ABBREVIATIONS

API	Application Program Interface
BSS	Business Support System
EMS	Element Management System
eTOM	Enhanced Telecommunications Operational Map
ITU-T	International Telecommunication Union - Telecommunications Standardization Sector
MTNM	Multi-Technology Network Management
MTOSI	Multi-Technology Operations Systems Interface
NGN	Next Generation Networks
NGOSS	New Generation Operations Support Systems
OSS/J	Operational Support Systems through Java
QoS	Quality of Service
SID	Shared information Data Model
SLA	Service Level Agreement
SP	Service Provider
TAM	Telecom Application Map
TOM	Telecommunications Operational Map
TMN	Telecommunications Management Network
TNA	Technology Neutral Architecture

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