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**SERIES Q: SWITCHING AND SIGNALLING**

**Specifications of Signalling System No. 7 – Signalling  
System No. 7 management**

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**Overview of Signalling System No. 7  
management**

**ITU-T Recommendation Q.750**

(Previously CCITT Recommendation)



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*For further details, please refer to ITU-T List of Recommendations.*

**ITU-T RECOMMENDATION Q.750****OVERVIEW OF SIGNALLING SYSTEM No. 7 MANAGEMENT****Summary**

This Recommendation provides an overview of the functions, procedures and entities for managing the Signalling System No. 7 (SS No. 7) network.

The requirements upon SS No. 7 management are summarized, namely:

- a) to provide a Telecommunication Management Network (TMN) interface to the network operator;
- b) to interwork with other TMN parts (e.g. Synchronous Digital Hierarchy (SDH) to enable the provision of a unified approach to managing the whole telecommunications network; and
- c) to extend where necessary the internal management functions of SS No. 7, so as to amalgamate them with TMN. OMAP should also provide consistency between the SS No. 7 levels (layers) and across the SS No. 7 network.

The abstract model of SS No. 7 management is defined, and its relationship with the SS No. 7 levels is explained.

The management functions additional to those of OSI (e.g. functions for auditing routing, functions for testing implementations of levels of SS No. 7 from an in-service node, etc.) are explained.

Compatibility is considered, and an overview of the OMAP Recommendations is given.

**Source**

ITU-T Recommendation Q.750 was revised by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 5th of June 1997.

## FOREWORD

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The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

## NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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**Recommendation Q.750****OVERVIEW OF SIGNALLING SYSTEM No. 7 MANAGEMENT***(revised in 1997)***1 Introduction**

This series of Recommendations on the Operations, Maintenance and Administration Part (OMAP) define the functions, procedures and entities for managing the Signalling System No. 7 network.

The management functions of SS No. 7 are divided into three main parts, viz:

- a) Management functions located in the Telecommunications Management Network (TMN) (which means the Network Element Functions (NEFs) and the Operations System Functions (OSF) – see Recommendation M.3010 [1]). These functions include measurement collection and cover TMN-to-TMN interactions; such management functions are modelled as managed objects at the interface between network elements and operations systems, or between operations systems.
- b) Management functions within the SS No. 7 protocol itself (e.g. changeover, forced rerouting, sub-system management, etc.).
- c) Management functions defined to enable verification and validation of routing tables, CICs, etc. These functions may require communication within the signalling network, and for this a separate protocol is defined. Such management functions are modelled as managed objects at the interface between the network elements and an operations system.

Of the three sets of management functions defined above, OMAP provides a) and c). Set b) can be modelled as existing within the "Layer Management Entities" of SS No. 7, and the functions are defined in the Recommendations pertinent to those layers.

OMAP interacts with all the layers (i.e. with all the levels) of SS No. 7 in order to effect control of the network.

Recommendation Q.750 gives the OMAP overview; the Q.751-Series of Recommendations define the SS No. 7 managed objects; Recommendation Q.752 (the successor to *Blue Book* Recommendation Q.791) defines the SS No. 7 monitoring and measurements; Recommendation Q.753 defines the SS No. 7 management functions for managed objects that themselves require SS No. 7 communication in the network, and also the OMASE-User where the logic of these functions is modelled (these functions are MRVT, SRVT and CVT, formerly defined in *Blue Book* Recommendation Q.795); Recommendation Q.754 defines the ASE for those functions defined in Recommendation Q.753, i.e. OMASE; Recommendation Q.755 defines the SS No. 7 Testers.

Figure A.1 shows the relationship between TMN, SS No. 7 management and the OMAP Recommendations.

OMAP uses principles of management defined in TMN Recommendation M.3010 [1], and in OSI Management Recommendations of the X.700-Series [2].

## 2 Requirements for SS No. 7 management

There are three main requirements for the management of SS No. 7 and its network. These may be summarized as:

- a) To provide a TMN interface for the network Administration<sup>1</sup>.
  - This requires that the Administration-to-OMAP interface has to be presented using TMN-defined concepts. See the Q.751-Series of Recommendations.
- b) To interwork with other TMN parts to enable the provision of a unified approach to managing the whole telecommunications network. Examples of these other parts are the Synchronous Digital Hierarchy (SDH) or the ISDN, which could be administered by the same body responsible for the MTP network – or TMNs of other jurisdictions (e.g. where an SCCP network covers more than one MTP network, one jurisdiction might exist for each MTP network).
  - This means that the OMAP managed objects (see the Q.751-Series of Recommendations) must be compatible with, and have appropriate attributes defined for interacting with, other TMNs' managed objects.
- c) To extend, where necessary, the management of the SS No. 7 network as described in functional SS No. 7 Recommendations (e.g. Recommendations Q.703 and Q.704 [3] for the MTP, Q.714 [4] for the SCCP), and to amalgamate this with the TMN approach.
  - Hence OMAP should provide for the complete management of the SS No. 7 network, it should provide consistency in approach between the different layers of SS No. 7, and it should provide consistency across the SS No. 7 network and its network elements.
  - OMAP should therefore be used to co-ordinate across the SS No. 7 network the parameters for User Part, MTP and SCCP congestion control. This should allow these parameters to take values appropriate for the traffic mix and signalling and traffic volumes at each signalling point (e.g. timers  $T_a$  and  $T_b$  and the number of restriction levels, etc., for SCCP congestion control might need to be adjusted for the particular signalling point, but this should be consistent for the role of the SP in the SCCP network).
  - SS No. 7 already has defined certain management functions in its functional Recommendations (e.g. MTP signalling network management as defined in Recommendation Q.704 [3], and SCCP management as defined in Recommendation Q.714 [4]). These functions provide some automatic fault, configuration and performance management activities. OMAP has taken these functions into account in the definition of the behaviour of SS No. 7 managed objects. OMAP also extends the functionality already defined in, for example, the MTP Recommendations into a complete management service for the whole SS No. 7 network.

### 2.1 OMAP layers of management functions

The "layers" of management functions define the partitioning of management processes on a hierarchical basis.

The definition of TMN is concerned with five layers in management, namely business management, service management, network management, network element management, and the elements in the network that are managed.

<sup>1</sup> Here the word "Administration" in the term "network Administration" refers to the body or bodies (either telecommunication administration or ROA) responsible for controlling the SS No. 7 network.

Of these, OMAP currently is not concerned with business management, and interacts with other TMN parts to provide service management. For example, this latter interaction occurs if ISDN services require to be added so that subscribers at one exchange can use these services to subscribers at another exchange. If the Telephony User Part only is installed at those exchanges, it needs to be replaced or extended by the ISDN User Part, with corresponding addressing enhancements to the MTP implementation at those exchanges. The OMAP implementation would be involved in these changes.

The top management level proper of OMAP is network management, which provides the functions and resources to allow Administrations (possibly via a set of administration managed objects) to control the SS No. 7 network. Management functions and resources are provided by OMAP to allow management within the SS No. 7 signalling points. See clause 3 for further information on the OMAP reference model.

The definitions of both network management and network element management functions and resources utilize the TMN and OSI managed object approach, and allow changes to be coordinated within OMAP. Certain managed objects (e.g. signalling linkset and linksetNePart) have relations defined between them to allow network actions to be correlated with actions in concerned signalling points.

Relations are also defined between managed objects to allow "management hierarchies" to be satisfied (e.g. to forbid removal of a signalling linkset without first removing all its constituent signalling links).

## 2.2 OMAP management categories

The purpose of management is to provide a service, and this can be classified as initial provisioning, maintaining existing service, and expansion or contraction of the service.

Management activities can be divided into categories which satisfy one or more of the above classifications.

OSI defines the categories of fault management, configuration management, performance management, accounting management and security management. Of these, the first three categories are applicable to OMAP; the last two are for further study in OMAP.

### 2.2.1 Fault management for OMAP

OMAP fault management encompasses fault detection, location, isolation and the correction of abnormal operation of the SS No. 7 network. Correction of faults can in some instances require fault diagnosis. Faults can cause the network to fail to meet operational objectives (e.g. visible faults might reduce the network's traffic capacity, latent faults would reduce the network's reliability).

Fault management includes:

- Handling of alarm conditions, e.g. the failure of a signalling linkset or the inaccessibility of a signalling point.

The MTP provides automatic mechanisms in MTP signalling network management that attempt restoration of normal operation. OMAP network management takes account of these automatic mechanisms, and coordinates attempts of the network operator to handle abnormal situations and isolate faults within the network. Other levels of SS No. 7 have analogous automatic mechanisms.

This function includes the required interactions with resources of other TMN parts (e.g. transmission failures causing signalling link failures need to be correlated).