



SLOVENSKI STANDARD
SIST EN 300 292 V1.2.1:2003
01-november-2003

**Telekomunikacijsko upravljavno omrežje (TMN) - Funkcijska specifikacija
upravljanja informacije usmerjanja klica na vmesniku obratovalnega
sistema/omrežnega elementa (OS/NE)**

Telecommunications Management Network (TMN); Functional specification of call
routing information management on the Operations System/Network Element (OS/NE)
interface

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Telecommunications Management Network (TMN); Functional specification of call routing information management on the Operations System/Network Element (OS/NE) interface

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Telecommunications Management Network (TMN).

National transposition dates	
Date of adoption of this EN:	7 August 1998
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1 Scope

The present document provides a management information model [12] which covers the management aspects of the "routing and digit analysis" function in an exchange. The scope is further limited to the exchange aspects of circuit switched networks. This model is restricted to the Operations Systems (OSs) to Network Element (Q3) interface (see ITU-T Recommendation M.3010 [7]).

The information to be managed is limited to the signalling systems Digital Subscriber Signalling System No. 1 (DSS1), Signalling System CCITT No.5 (C5), Signalling System Number 7 (SS No.7) - ISDN User Part (ISUP) only) and Regional Signalling 2 (R2). (SS No.7 with Telephone User Part (TUP) level 4 is not considered.) The information for routing purpose, which needs to be maintained by the manager, depends on the signalling systems used by the exchange. This information model can be applied for exchanges with the known standardized signalling systems DSS 1, SS No. 7, R2, C5. Because of the existence of different signalling systems, not all attributes and objects will be applicable for all exchanges. Information about applicability can be found in the object classes behaviour.

As this model only offers an element management layer view (ie: limited to a switch) of the routing information, and only shows the partial view a switch has of its network environment, and does not show the whole network picture, it does not provide all the information needed for network-wide management application.

The information model covers the management of following aspects:

- incoming digit rebuilding;
- locally originating, locally terminating (up to recognizing that the Directory Number (DN) belongs to the exchange), and transit calls;
- digit analysis;
- circuit end point selection;
- outgoing digit preparation;

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as far as they are relevant for routing. It does not cover management of:

- DN portability;
- Cordless Terminal Mobility (CTM);
- Dynamic Routing;

due to lack of stable requirements at the time of writing the present document.

The information model includes entry/exit points (via instances of specific Object Class (OC)) for:

- customer administration (see ITU-T Recommendation Q.824.x [15] or ETS 300 291 [1]);
- Subscriber Controlled Input (SCI) (no standard exists yet);
- Intelligent Network (IN) (no standard exists yet);
- specific treatments as e.g. announcements.

The information model does not cover routing or digit analysis aspects of following topics:

- traffic management (see ITU-T Recommendation Q.823 [14] or I-ETS 300 637 [2]);
- call-control;
- broadband;
- supplementary services;
- IN (Intelligent Network);
- customer administration;

- other services of which the definition is still under study (e.g. tariff management);
- Private Automatic Branch Exchange (PABX) as exchanges or as termination points of subscriber lines (because this is covered by customer administration);
- centrex implementations;
- mobility issues like cellular and personnel mobility;

neither following specific points:

- characterization of non-blockable digits (e.g. emergency numbers);
- characterization of destinations for which carrier dialling is not allowed or ignored e.g. service numbers, emergency calls, specific local calls;
- numbering plans for virtual private networks;
- blocking of national and/or international traffic due to subscriber permission;
- echo suppressor handling depending on selected routing possibility;
- use of propagation delay counter;
- permanent connections.

Because the borders between call processing, digit analysis, routing and traffic management are not always clear, the following rules have been used to differentiate between call processing, digit analysis and routing, and traffic management:

- digit analysis and routing processes are related to the end point selection. If a managed item has no relation with the choice of the end point selection, then this managed item is not included in this model;
- call control processes are related to whether or when a call is required to be routed. These processes do not influence the end point selection;
- the border between traffic management and routing is determined by following conditions:
 - routing management deals with individual calls under normal conditions;
 - traffic management optimizes overall traffic flow in case of overload or network failure.

Modelling described here does not imply any sequencing of call processing activities.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, subsequent revisions do apply.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] I-ETS 300 291 (1995): "Network Aspects (NA) - Functional specification of Customer Administration (CA) on the Operations System/Network Element (OS/NE) interface".
- [2] I-ETS 300 637 (1996): "Network Aspects (NA) - Functional specification of traffic management on the Network Element/Operation System (NE/OS) interface".
- [3] EN 301 098 (V1.1): "Telecommunications Management Network (TMN); Scheduling function; Support object classes".
- [4] ITU-T Recommendation E.164 (1991): "Telephone Network and ISDN Operation, Numbering, Routing and Mobile Service - Numbering Plan for the ISDN Era".
- [5] ITU-T Recommendation E.170 (1992): "Traffic Routing".
- [6] ITU-T Recommendation E.400 (1992): "Telephone Network And ISDN - Quality Of Service, Network Management And Traffic Engineering - International Network Management - General Information".
- [7] ITU-T Recommendation M.3010 (1992): "Maintenance: Telecommunications Management Network - Principles for a Telecommunications Management Network".
- [8] ITU-T Recommendation M.3100 (1995): "Generic Network Information Model".
- [9] ITU-T Recommendation Q.115 (1993): "Control of Echo Suppressors and Echo Cancellers".
- [10] ITU-T Recommendation Q.440 (1988): "(Signalling System R2 - Interregister signalling) General".
- [11] ITU-T Recommendation Q.441 (1988): "(Signalling System R2 - Interregister signalling) Signalling code".
- [12] ITU-T Recommendation Q.751.1 (1995): "Signalling System No.7 Managed Objects".
- [13] ITU-T Recommendation Q.763 (1993): "Specifications of Signalling System No.7 - Formats and Codes of the ISDN User Part of Signalling System No.7".
- [14] ITU-T Recommendation Q.823 (1996): "Stage 2 and Stage 3 function specifications for traffic management".
- [15] ITU-T Recommendation Q.824.x (1995): "Stages 2 and 3 description for the Q3 interface - Customer administration - Integrated System Digital Network (ISDN) series".
- [16] ITU-T Recommendation Q.850 (1993): "Usage of cause and location in the digital subscriber signalling system no 1 and the signalling system no 7 ISDN user part".
- [17] ITU-T Recommendation Q.931 (1993): "Digital Subscriber Signalling System No. 1 (DSS 1) - ISDN user-network interface layer 3 specification for basic call control".

- [18] ITU-T Recommendation X.720 (1992): "Information technology - Open Systems Interconnection - Structure of management information: management information model".
- [19] ITU-T Recommendation X.721 (1992): "Information technology - Open Systems Interconnection - Structure of management information: definition of management information".
- [20] ITU-T Recommendation X.746 (1995): "Information technology - Open Systems Interconnection - Systems management scheduling function".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions apply:

call routing: The process consisting of digit rebuilding, destination selection, routing possibility selection and digit preparation.

circuit: Transmission means which allows communication between two exchanges (Same definition as in ITU-T Recommendation E.410 [6]).

circuit end point: Terminates a circuit.

circuit end point subgroup: Terminates a circuit subgroup or (second definition) a set of circuit end points with common characteristics, i.e. the same signalling characteristics, the same bearer capabilities and other characteristics. All circuits in a circuit end point subgroup shall connect the exchange with the same adjacent exchange.

circuit group: The set of all switched circuits which directly interconnect one exchange with another (same definition as in ITU-T Recommendation E.410 [6]).

circuit subgroup: A set of circuits within a circuit group which are uniquely identifiable for operational or technical reasons (i.e. because they have same signalling characteristics, same bearer capabilities or other common characteristics). A circuit group may consist of one or more circuit subgroups (same definition as in ITU-T Recommendation E.410 [6]).

destination: A country, an area, an exchange or other location, or a special service, in which a terminal point is located from an exchange point of view.

end point: A physical point in an exchange where any connection set-up inside an exchange starts or ends e.g. circuit end point, local destination.

exchange: The aggregate of traffic carrying devices, switching stages, controlling and signalling means at a network node that enables subscriber lines to be interconnected and/or packets to be forwarded as required by individual users.

routing: In the scope of the present document, it has the same meaning as call routing.

routing possibility: Abstraction of possible end points to which the call can be routed.

terminal point: Unique geographical address in a telecommunication network where a connection set-up leaves the network because of the conditions given by the connection set-up initiating subscriber and by the telecommunication network (e.g. subscriber line, PABX access, announcement machine, processor or bytes on a tape or on an optical disc).

treatment: The handling of calls in specific situations (e.g. routing to an announcement for incorrect dialled digits).

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ASN.1	Abstract Syntax Notation One
C5	Signalling System CCITT No.5
CAC	Carrier Access Code
CC	Country Code
CIC	Circuit Identification Code
CTM	Cordless Terminal Mobility
DN	Directory Number
DSS 1	Digital Subscriber Signalling System No. 1
E-R	Entity Relationship
FIFO	First In First Out
IN	Intelligent Network
IPI	ISDN Preferred Indicator
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
LIFO	Last In First Out
NDC	National Destination Code
OC	Object Class
ORM	Object Model for Call Routing Management
OS	Operations System
PABX	Private Automatic Branch Exchange
PCM	Pulse Code Modulation
PSTN	Public Switched Telephone Network
RDN	Relative Distinguished Name
R2	Regional Signalling 2
SCI	Subscriber Controlled Input
SMO	Scheduled Managed Object
SN	Subscriber Number
SO	Scheduled Object
SS No. 7	Signalling System Number 7
TMR	Transmission Medium Requirement
TNS	Transit Network Selection
TUP	Telephone User Part

4 Functional requirements

The Object Model for Call Routing Management (ORM) is a description of an interface which will be restricted by requirements. This clause gives the functional requirements of the routing process itself and will therefore have its influence on the ORM.

General Requirements

- R.1 It is required to find the destination based on at least the digit code.
- R.2 The routing process can be divided into several phases: digit rebuilding, destination selection, routing possibility selection, digit preparation, exception handling.

Digit Rebuilding

- R.3 Digit rebuilding manages the insertion of digits into the digit code (e.g. for prefixing).
- R.4 The model shall support digit rebuilding based on incoming circuit subgroup.
- R.5 The model shall support digit rebuilding based on nature of address.
- R.6 The model shall support digit rebuilding based on group of subscribers.

Destination Selection

- R.7 The model shall support the translation of a digit code into a nature of address and vice versa.
- R.8 The destination shall be determined by the dialled digits and, in addition, possibly by nature of address, selected carriers or others.
- R.9 The model shall support modification of digit codes.
- R.10 The model shall support treatment as result of destination selection.
- R.11 The model shall support identification of the carrier.
- R.12 The model shall support time dependent selection of destination.
- R.13 The model shall support destination selection based on incoming circuit subgroup.
- R.14 The model shall support destination selection based on group of subscribers.

Routing Possibility Selection

- R.15 It shall be possible to handle a call as local or outgoing. Depending on special characteristics, a local call can be changed into an outgoing call in the routing sense. (e.g. a call arriving within the digital exchange will be routed to the PABX either directly or via the analogue exchange. See figure 1).

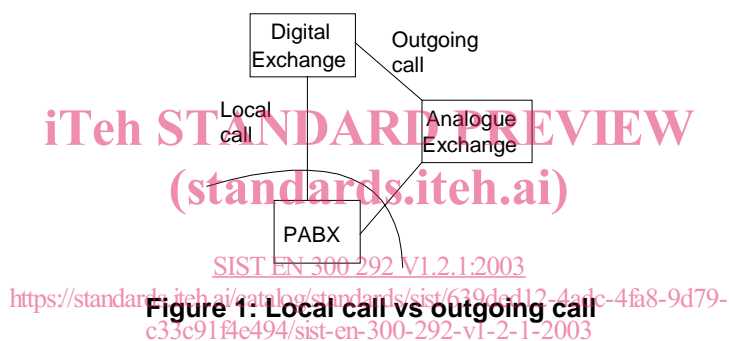


Figure 1: Local call vs outgoing call

- R.16 Treatment is needed when certain routing possibility selection criteria are encountered (e.g. when an ISDN Preferred Indicator (IPI)/Transmission Medium Requirement (TMR) is not supported, an announcement has to be triggered).
- R.17 Selection of routing possibility is influenced by parameters as signalling capability, bearer capability, presence of echo suppressor on outgoing circuit subgroup, number of satellite links, or others.
- R.18 This distribution of traffic on different carriers/destinations has to be possible (by means of network providers or administration):
 - on a percentage basis;
 - on the proportion of the available outgoing capacity;
 - on the proportion of the incoming traffic.
- R.19 The model shall support crankback as described in ITU-T Recommendation E.170 [5].
- R.20 The model shall support time dependent selection of routing possibility.
- R.21 The model shall support routing possibility selection based on incoming circuit subgroup.
- R.22 The model shall support routing possibility selection based on group of subscribers.