



SLOVENSKI STANDARD
SIST EN 300 820-1 V1.2.1:2003
01-november-2003

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Telecommunications Management Network (TMN); Asynchronous Transfer Mode (ATM) management information model for X interface between Operation Systems (OSs) of a Virtual Path (VP)/Virtual Channel (VC) cross connected networks; Part 1: Configuration management

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Ta slovenski standard je istoveten z: EN 300 820-1 Version 1.2.1

ICS:

33.040.35 Telefonska omrežja Telephone networks

SIST EN 300 820-1 V1.2.1:2003 en

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ETSI EN 300 820-1 V1.2.1 (2000-11)

European Standard (Telecommunications series)

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Asynchronous Transfer Mode (ATM)
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between Operation Systems (OSs)
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Reference

REN/TMN-GOM003-1

KeywordsATM, B-ISDN, configuration, interface,
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Foreword

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

The present document is part 1 of a multi-part deliverable covering the management information model for the X-type interface between Operations Systems (OSs) of a Virtual Path (VP)/Virtual Channel (VC) cross connected network, as identified below:

Part 1: "Configuration management";

Part 2: "Alarm management";

Part 3: "VP Performance management".

(VC Performance Management aspects are for further study).

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National transposition dates

Date of adoption of this EN:	24 November 2000
Date of latest announcement of this EN (doa):	28 February 2001
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2001
Date of withdrawal of any conflicting National Standard (dow):	31 August 2001

1 Scope

The present document addresses the requirements of network and service providers of Asynchronous Transfer Mode (ATM) cross connected networks for establishing, maintaining and releasing Virtual Path (VP) and / or Virtual Channel (VC) connections (generally denoted as 'VP/VC connections' in the present document), which span several administrative ATM domains. These requirements are satisfied by the use of a standardized interface (the "X-interface") between Operation Systems belonging to different network operators.

Readers of the present document should be made aware that the abbreviation 'PNO' is taken to mean Providing Network Operator. In the previous version of the present document (and related documents), PNO was defined as Public Network Operator. The change in definition has been provided to reflect the change in market conditions for provision of interconnected telecommunications services. However, it is considered necessary to retain the abbreviation 'PNO' because it is found in many of the managed object definitions used to specify the X-interface. It would be disadvantageous to introduce major changes in these managed object definitions, which serve purely technical purposes for management of interconnections only.

The present document contains a general overview describing the different management areas that will be covered in the different X-interface ENs - configuration, alarm and performance - as well as the relationships between them.

The present document describes the configuration management area covering the following aspects:

- a management architecture that shows how the X-interface is to be used between service or network providers;
- the management services and functions needed to manage ATM connections, which span several administrative domains. These management services and functions cover the requirements for the X- interface;
- the management information crossing the X-interface. This management information specification uses the Guidelines for the Definition of Managed Objects GDMO formalism, described in ITU-T Recommendation X.722 [4].

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2 References

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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, the latest version applies.
- 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] ITU-T Recommendation M.3100: "Generic network information model".
- [2] ITU-T Recommendation M.1400: "Designations for international networks".
- [3] ITU-T Recommendation I.751 (1996): "Asynchronous Transfer Mode Management Of The Network Element View".
- [4] ITU-T Recommendation X.722: "Guidelines for the definition of managed objects for ITU-T applications".
- [5] ETSI EN 300 820-2: "Telecommunications Management Network (TMN); Asynchronous Transfer Mode (ATM) management information model for the X interface between Operation Systems (OSs) of a Virtual Path (VP)/Virtual Channel (VC) cross connected networks; Part 2: Alarm management".

- [6] ITU-T Recommendation I.630 (1999): "Integrated Services Digital Network, Maintenance Principles: ATM Protection Switching" (Prepublished Recommendation).
- [7] ITU-T Recommendation M.3010 (1996): "Principles for a Telecommunications management network".
- [8] ETSI EN 300 820-3: "Telecommunications Management Network (TMN); Asynchronous Transfer Mode (ATM) management information model for the X interface between Operation Systems (OSs) of a Virtual Path (VP)/Virtual Channel (VC) cross connected networks; Part 3: VP Performance management".
- [9] ETSI ES 200 653 (V1.2.1): "Telecommunications Management Network (TMN); Network level generic class library".
- [10] ITU-T Recommendation X.721: "Information technology - Open Systems Interconnection - Structure of management information: Definition of management information".
- [11] ISO/IEC 10165-2: "Information technology - Open Systems Interconnection - Structure of management information: Definition of management information".
- [12] ETSI ETS 300 469 (1997): "Broadband Integrated Services Digital Network (B-ISDN); Asynchronous Transfer Mode (ATM); Management of the network element view [ITU-T Recommendation I.751 (1996)]".
- [13] ETSI EN 300 820-1 (V1.1.1): "Telecommunications Management Network (TMN); Management information model for the X-type interface between Operation Systems (OSs) of a Virtual Path (VP)/Virtual Channel (VC) cross connected network; Part 1: Configuration management aspects".
- [14] ITU-T Recommendation I.356: "B-ISDN ATM Layer Cell Transfer Performance".

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3 Definitions and abbreviations

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(Some definitions depend on the future acceptance of the "cascaded/mixed mode" as described in annex D. This dependence is already taken into account in these definitions).

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

A PNO: PNO where the Initiator starts reserving the end-to-end VP or VC connection

NOTE 1: If the termination point of the connection is at a User access point, this is considered to be the **A User Access point**. The A PNO can be the Initiating PNO, but this is not always the case. It is the Consumer of other PNO's parts of the VP/VC connection.

ATM Accesspoint: means by which a subnetwork offers external interfaces to other subnetworks

NOTE 2: It is associated with an end point of an IPPL.

ATM Interconnection Gateway: ATM access point in one subnetwork, which is associated with an ATM access point in another subnetwork for the purpose of topological interconnection

connection: "transport entity" which is capable of transferring information transparently between "connection points (CP)"

NOTE 3: A "connection" defines the association between the "connection points" and the "connection points" delimit the "connection".

consumer and provider roles of a PNO: with respect to a particular End-to-end connection, a Consumer PNO is a PNO that has delegated the management of a subnetwork connection plus the outgoing link connection to another PNO (being a Provider PNO)

NOTE 4: If, in future, the "cascaded/mixed" mode should be accepted (annex D) a PNO can have both roles at the same time, if it is providing part of the End-to-end connection (being a Provider), and at the same time asks another PNO to provide a part of the End-to-end connection (being a Consumer).

end: point where a connection terminates and which is associated with an address

NOTE 5: The address should be specified in accordance with ITU-T Recommendation M.1400 [2].

end-to-end Connection: overall Connection which can be one of the following types: User-to-user VPC / VCC, Network-to-user VPC, User-to-network VPC or Network-to-network VPC)

NOTE 6: These types are defined in the remainder of this subclause.

NOTE 7: For a given end-to-end connection, any PNO may act in any of the I, A, T or Z PNO roles according to the interconnection requirements to provide the service.

EXAMPLE 1: Figures 2 and 3 provide some examples of end-to-end connections.

Inter PNO Physical Link (IPPL): represents a physical link that offers bidirectional transmission capabilities and connects two subnetworks. Each InterPNOPhysicalLink is terminated by two ATM Access Points which are in charge of emitting failures related to the link or to the access point itself. An IPPL can be realized by any transmission capability (SDH, PDH etc.)

I PNO: initiating PNO. It is the PNO requesting for a particular ATM end-to-end connection. It starts requesting in the subnetwork of the A PNO and ends in the subnetwork of the Z PNO. It controls the end-to-end connection

link: "topological component" which describes the fixed relationship between a "sub-network" and another "sub-network" or "access group". It is defined by an access point on one sub-network, which is associated with an access point on another subnetwork

link connection: link connection is supported by a trail in the server layer network. It is capable of transferring information transparently across a link between two connection points or between a termination connection point and a connection point in the case of a link connection at the boundary of a layer network

NOTE 8: Figures 2 and 3 show how a link connection is a part of an end-to-end connection.

network-to-network VPC: VP "transport entity" formed by the series of "connections" between "termination CPs", starting at an ATM Interconnection Gateway and ending at an ATM Interconnection Gateway. This involves the ATM resources of more than one PNO. The Network-to-network connections that are relevant to the X Interface are of the VP type

(Figure 2 shows how a Network-to-network connection is build up by a series of other connections)

network-to-user VPC: VP "transport entity" formed by the series of "connections" between "termination CPs", starting at an ATM Interconnection Gateway and ending at the Z User Accesspoint in the network of the Z PNO. This involves the ATM resources of more than one PNO. The Network-to-user connections that are relevant to the X Interface are of the VP type

PNO: providing Network Operator. An operator able to provide network resources to customers

pnoVcSubnetwork: topological component used to effect routing and management of ATM cells. It describes the potential for setting up "ATM-VC connections" across the subnetwork. The pnoVcSubnetworks are delineated by ATM AccessPoints and interconnected by "inter-PNO Physical links"

NOTE 9: A pnoVcSubnetwork can be partitioned into interconnected "sub-networks" and "links", but this partitioning is not shown over X Interface. In the context of the present document, one pnoVcSubnetwork represents an ATM network belonging to one PNO.

pnoVpSubnetwork: topological component used to effect routing and management of ATM cells. It describes the potential for setting up "ATM-VP connections" across the subnetwork. The pnoVpSubnetworks are delineated by ATM AccessPoints and interconnected by "inter-PNO Physical links"

NOTE 10: A pnoVpSubnetwork can be partitioned into interconnected "sub-networks" and "links", but this partitioning is not shown over Xinterface. In the context of the present document, one pnoVpSubnetwork represents an ATM network belonging to one PNO.

sub-network: "topological component" used to effect routing and management. It describes the potential for "sub-network connections" across the "sub-network". It can be partitioned into interconnected "sub-networks" and "links". Each "sub-network" in turn can be partitioned into smaller "sub-networks" and "links" and so on. A "sub-network" may be contained within one physical node. In the present document this partition is not used

sub-network connection: subnetwork connection is capable of transferring information transparently across a subnetwork. It is delimited by connection termination points at the boundary of the subnetwork and represents the association between these connection points. It can be a VP or a VC connection

subnetwork view: subtree of the X-interface tree. A subnetwork view belongs to a particular PNO: The PNO at the root of the subtree.

T PNO: transit PNO. This is a PNO using its own subnetwork to perform its required transit part of VP connection. It has a provider role and corresponds to a leaf in the X-interface tree, not being the Z side. In the "cascaded/mixed approach" case it can be both a Provider (where it acts as a Transit operator) and a Consumer (where it virtually acts as an Initiating operator)

trail: defined in ES 200 653 [9]

user: consumer of the ATM interconnection, provided by the end-to-end connection

user-to-network VPC: "transport entity" formed by the series of "connections" between "termination CPs", starting at the A User Accesspoint in the network of the A PNO and ending at an ATM Interconnection Gateway. This involves the ATM resources of more than one PNO. The User-to-network connections that are relevant to the X Interface are of the VP type

NOTE 11: Figure 2 shows how a User-to-network connection is build up by a series of other connections.

User-to-user VPC / VCC: "transport entity" formed by the series of "connections" between "termination CPs", starting at the A User Accesspoint in the network of the A PNO and ending at the Z User Accesspoint in the network of the Z PNO. This involves the ATM resources of more than one PNO. The User-to-user connections that are relevant to the X Interface can be of the VP type or the VC type

EXAMPLE 2: Figures 2 and 3 show examples of User-to-user connections.

X-interface tree: with respect to a particular VPC, X-interface relations exist between each Provider PNO and their Consumer PNO. Because each Provider has exactly one Consumer, the X-interface relations between all PNOs involved in the management of a particular VPC form a tree, the X-interface relation tree

NOTE 12: For the cascaded/mixed mode there can be several possible X-interface relation trees; the actual tree is formed at VPC setup. The root of the tree is the Initiating PNO; it uses (via X-interface controls) the PNOs (often Transit PNOs), to which it is connected in the tree via its branches. The most right leaf of the tree is the Z PNO. Figure 2 shows an example of an X-interface tree for the star mode with the A PNO being the Initiator.

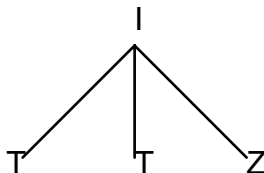


Figure 1: Example of a X-interface tree with the Initiating PNO being the A PNO

Z PNO: PNO where the Initiator ends reserving the end-to-end connection

NOTE 13: If the termination point of the connection is at a User accesspoint, this is considered to be the Z User Accesspoint. In this case, the I PNO views the Z PNO as a PNO whose subnet is connected to the Z User.

(Note that for User-to-user Connections the VP Link connections that are part of it are not visible across the X-Interface. The Link Connections that terminate the "network side" of an end-to-end Connection are visible over the X-Interface)

EXAMPLE 3: The following figures 2 and 3 show examples of possible end-to-end connections.

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