



# SLOVENSKI STANDARD

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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

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# ETSI EN 300 820-2 V1.3.1 (2000-11)

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*European Standard (Telecommunications series)*

**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)  
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Part 2: Alarm management**

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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 2 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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# 1 Scope

The present document addresses the requirements of network and service providers of Asynchronous Transfer Mode (ATM) cross connected networks for managing the fault alarms associated with the Virtual Path (VP) connections and 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 (OSs) belonging to different Network Operators (PNOs).

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 should be used in conjunction with EN 300 820-1 [1] and EN 300 820-3 [14]. The present document describes the X-interface VP / VC alarm management area covering the following aspects:

- the Management Services (MS) and functions needed that provide the necessary alarm messages for faults detected and related recovery procedures within ATM VP or VC Connections which span several administrative domains;
- 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 [2].

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# 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, 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] ETSI EN 300 820-1: "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".
- [2] ITU-T Recommendation X.722: "Information Technology - Open Systems Interconnection - Structure of management information: Guidelines for the definition of managed objects".
- [3] ITU-T Recommendation G.805: "Generic Functional Architecture of Transport Networks".
- [4] ETSI ES 200 653: "Telecommunications Management Network (TMN); Network level generic class library".
- [5] ITU-T Recommendation M.3010: "Principles for a Telecommunications Management Network".
- [6] Network Management Forum NMF025: "The 'Ensembles' Concepts and Format", Issue 1.0, August 1992.

- [7] ITU-T Recommendation X.733: "Information Technology - Open Systems Interconnection - Systems Management: Alarm reporting function".
- [8] ITU-T Recommendation X.711: "Common management information protocol specification for ITU-T Applications".
- [9] ITU-T Recommendation X.721: "Definition of Management Information".
- [10] ITU Recommendation M.3400: "TMN management functions".
- [11] ITU-T Recommendation X.734: "Event report management Function".
- [12] ITU-T Recommendation X.208: "Specification of Abstract Syntax Notation One".
- [13] ETSI TS 101 674-1: "Technical Framework for the provision of interoperable ATM services; Part 1: NNI-Interface User and Control plane specification (including network functions and service aspects) Phase 1".
- [14] 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".

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## 3 Definitions and abbreviations

### 3.1 Definitions STANDARD PREVIEW

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

(Some definitions depend on the future acceptance of the "cascaded/mixed mode" as described in EN 300 820-1 [1]. This dependence is already taken into account in these definitions. PNO is provided as the first definition in order to help clarify several different PNO roles subsequently provided in the list below).

**Providing Network Operator (PNO):** operator able to provide network resources to customers (including other PNOs). For the purposes of the present document these resources are ATM VP or VC subnetwork resources which may be interconnected to compatible resources provided by another operator or customer

**access point:** defined in ITU-T Recommendation G.805 [3]

**A PNO:** PNO where the Initiator (I PNO) starts reserving the End-to-end VP or VC connection. If the termination point of the connection is at a User accesspoint, this is considered to be the **A User** Accesspoint. 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

NOTE 1: If, in future the "cascaded" mode should be accepted as defined in EN 300 820-1 [1], and if the A PNO also acts as initiating PNO, then the A PNO is the consumer of the other PNO's parts of the VP/VC connection.

**ATM Interconnection Gateway:** represents an 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)". 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 PNO acts as a consumer if it has delegated the management of a VP/VC subnetwork connection plus the outgoing link connection to another PNO (being a Provider PNO). If, in future, the "cascaded/mixed" mode should be accepted (EN 300 820-1 [1]), a PNO can have both roles at once, 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)

**destination PNO:** Z PNO (This term was used in older versions of the specification)



**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.

These types are defined in [1]. 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

**initiating Network Operator (I PNO):** initiating PNO is the PNO requesting 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 overall End-to-end connection

**Inter PNO Physical Link (IPPL):** it represents a physical link that offers bi-directional transmission capabilities and connects two pnoVpSubnetworks. Each InterPNOPhysicalLink is terminated by two pnoNWAtmAccessPoints 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.). There is no explicit managed object defined in the X-interface that represents this resource. Information about IPPLs is included in the interPnoTopologicalSubnetworkPair object EN 300 820-1 [1]

**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

**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

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**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

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**Providing Network Operator (PNO):** operator able to provide network resources to customers (including other PNOs)

**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".

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

NOTE 2: In principle (cf. to ES 200 653 [4]) one subnetwork can consist of several subcomponents: subnetworks and connections between subnetworks. However, this capability is not supported in this specification for the X-interface. Usually one pnoVpSubnetwork or pnoVcSubnetwork represents an ATM network belonging to the domain one network operator.

**protection switching:** automatic switching to pre-assigned spare capacity in network resources, consequent on reaction to receipt of an alarm signal by a network management system. (In the context of the present document, this is internal to a PNO)

**recovery:** recovery is a procedure performed by a PNO which makes use of spare capacity in the subnetwork or inter-pno physical links belonging to this PNO. It follows after an alarm signal from a fault in the PNO's network resources

**star organization:** it is described in EN 300 820-1 [1]. It is the organizational form that is used in this specification

**subnetwork:** "topological component" used to effect routing and management. It describes the potential for "subnetwork 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

**subnetwork connection:** "transport entity" formed by a "connection" across a "sub-network" between "connection points". It can be configured as part of the "trail management process" as defined in ITU-T Recommendation G.805 [3]

**transit PNO (T PNO):** transit PNO is a PNO using its own subnetwork to perform its required transit part of VP/VC 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 (EN 300 820-1 [1]), it can be both a provider (where it acts as a Transit operator) and a Consumer (where it virtually acts as an Initiating PNO)

**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

**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

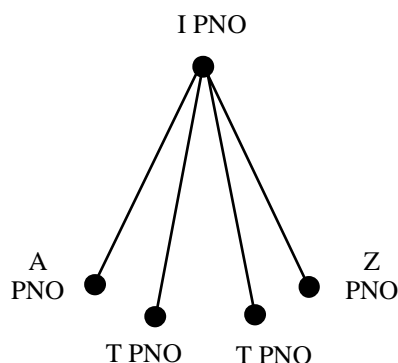
**VC subnetwork connection:** "transport entity" which is capable of transferring information transparently between "connection points" across a VC subnetwork or from a VC subnetwork access point to a user

**VP subnetwork connection:** "transport entity" which is capable of transferring information transparently between "connection points" across a VP subnetwork or from a VP subnetwork access point to a user

**X-interface:** management interface between two PNOs. In the "Responsibility Model", which is described in ITU-T Recommendation M.3010 [5], two Operations Systems Functions (= Managers) that are located in different TMNs (= different PNOs), communicate over an X Reference Point

**X-interface tree:** with respect to a particular VPC/VCC, an X-interface relationship exists between each provider PNO and its consumer PNO. Because each provider has exactly one consumer, the X-interface relations between all PNOs involved in the management of a particular VPC/VCC form a tree, the X-interface relation tree. Note, that for a particular VP/VC there can be several possible X-interface relation trees; the actual tree is formed at VP/VC set-up. The root of the tree is the Initiating PNO; it uses (using X-interface management processes) 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 1 shows an example of an X-interface tree

**Z PNO:** PNO where the Initiator (I PNO) ends reserving the End-to-end VP or VC connection. 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



Legend:

PNO Providing Network Operator

I PNO Initiating PNO

T PNO Transit PNO

A PNO Access PNO

Z PNO Terminating PNO

**Figure 1: Example of an X-interface tree with the Initiating PNO not being the A PNO**

## 3.2 Abbreviations

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

A PNO	Access PNO. Refer also to Definitions
ASN.1	Abstract Syntax Notation-1
ATM	Asynchronous Transfer Mode
CMISE	Common Management Information Service Element
CP	Connection Point
eFD	Event Forwarding Discriminator
EN	European Norm
ETS	European Technical Standard
GDMO	Guidelines for the Definition of Managed Objects
I PNO	Initiating PNO. Refer also to Definitions
INMS	Inter-operator Network Management System
IPPL	Inter-PNO Physical Link
ITU-T	International Telecommunications Union, Telecommunications Standardization Sector
MFS	Management Function Set
MS	Management Service
NMS	Network Management System
ONMS	Operator's Network Management System
OS	Operations System
PDH	Plesiochronous Digital Hierarchy
PNO	Providing Network Operator
PS	Protection Switching
QALog	Qualified Alarm Log
RALog	Received Alarm Log
SALog	Sent Alarm Log
SDH	Synchronous Digital Hierarchy
T PNO	Transit PNO. Refer also to Definitions
TMN	Telecommunications Management Network
VC	Virtual Channel
VCC	Virtual Channel Connection
VCSC	Virtual Channel Subnetwork Connection
VP	Virtual Path
VPC	Virtual Path Connection
VPSC	Virtual Path Subnetwork Connection
X-type	Network Management interface between telecommunications operators