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Telekomunikacijsko upravljavno omrežje (TMN) - Informacijski model upravljanja asinhronega prenosnega naļ ina (ATM) za vmesnik X med obratovalnimi sistemi (OS) omrežja s prevezovanjem navidezne poti (VP)/navideznega kanala (VC) - 2. del: Upravljanje alarma VP

Telecommunications Management Network (TMN); Asynchronous Transfer Mode (ATM) Management information model for the X-type interface between Operation Systems (OSs) of a Virtual Path (VP)/Virtual Channel (VC) cross connected network; Part 2: VP alarm management

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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 2: Asynchronous Transfer Mode (ATM) VP alarm management

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Contents

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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 EN covering the management information model for the X-type interface between Operation Systems (OSs) of a Virtual Path (VP)/Virtual Channel (VC) cross connected network, as identified below:

Part 1: "Configuration management aspects";

Part 2: "Asynchronous Transfer Mode (ATM) VP alarm management";

Part 3: "Performance management aspects".

National transposition dates	
Date of adoption of this EN:	3 July 1998
Date of latest announcement of this EN (doa):	31 October 1999
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Date of withdrawal of any conflicting National Standard (dow):	30 April 1999

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, 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 Public Network Operators (PNOs).

The present document describes the X-interface VP alarm management area covering the following aspects:

- the Management Services (MS) and Management Functions (MF) needed that provide the necessary alarm messages for faults detected within ATM 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].

The present document has been named as "ATM VP alarm management" because it is expected to be part of a comprehensive fault management standard for ATM VP and Virtual Channels (VCs) in due course. As such it is self-sufficient for the defined scope of reporting faults on, and recovery procedures for, VPs across the X-interface.

2 Normative references

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case 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] EN 300 820-1: "Network Aspects (NA); 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".

[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] ITU-T Recommendation M.3010: "Principles for a Telecommunications Management Network".

[5] ITU-T Recommendation X.721: "Definition of Management Information".

[6] ITU-T Recommendation X.733: "Information Technology - Open Systems Interconnection - Systems management: Alarm reporting function".

[7] ITU-T Recommendation M.3400: "TMN management functions".

[8] ITU-T Recommendation X.734: "Event report management function".

[9] ITU-T Recommendation X.208: "Specification of Abstract Syntax Notation One".

[10] Network Management Forum NMF025: "The 'Ensembles' Concepts and Format", Issue 1.0, August 1992.

[11] ITU-T Recommendation X.711: "Common management information protocol specification for CCITT Applications".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following 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).

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

A Public Network Operator (A PNO): The A PNO is the PNO whose subnet is connected to the A user, the user where the overall VP-connection starts. The A PNO can be the initiating one, but this is not always the case. If it is the initiating PNO it is the root of the X-interface tree. If not, it is the most left leaf (as indicated in figure 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 connection.

cascade organization: It is described in EN 300 820-1 [1]. The impact of this organization on the model is for further study.

connection: A "transport entity" which is capable of transferring information transparently between "connection points". 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 VP, a PNO acts as a consumer if it has delegated the management of a VP subnetwork connection plus the outgoing link connection (both shall be part of the connection) to another PNO (that acts as a provider). 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 VP (acting as a provider), and at the same time asks another PNO to provide a part of the connection (acting as a consumer).

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

initiating Network Operator (PNO): The initiating PNO is the PNO requesting a particular ATM connection starting in the A subnetwork and ending in the Z subnetwork; it controls the overall VP 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 connection: A "transport entity" provided by the "client/server" association. It is formed by a near-end "adaptation" function, a server "trail" and a far-end "adaptation" function between "connection points". It can be configured as part of the "trail management process" in the associated server layer.

Link: A "topological component" which describes the fixed relationship between a "sub-network" and another "sub-network" or "access group".

mixture organization: It is described in EN 300 820-1 [1]. The impact of this organization on the X-interface model is for further study.

network connection: A "transport entity" formed by the series of "connections" between "termination connection points".

originating PNO: An A PNO when it is also the initiating PNO. (This term was used in older versions of the specification).

Public Network Operator (PNO): An operator that manages an administrative ATM domain. The term PNO is used in the present document to be in alignment with EN 300 820-1 [1].

pnoVpSubnetwork: A subnetwork (according to ITU-T Recommendation G.805 [3]) is a topological component used for carrying ATM cells. PnoVpSubnetworks are delineated by termination points, modelled by vpCTPs contained in NWATMAccesspoints, and they are used for setting up pnoVpSubnetworkConnections.

NOTE: In principle (cf. to I-ETS 300 653) one subnetwork can consist of several subcomponents: subnetworks and connections between subnetworks (generally called link connections). But this capability is not supported in Xcoop. Usually one pnoVpSubnetwork 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.

sub-network connection: A "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].

subnetwork: A "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.

termination connection point: It is defined in ITU-T Recommendation G.805 [3].

trail: It is defined in ITU-T Recommendation G.805 [3].

transit PNO: A transit PNO 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 (EN 300 820-1 [1]), it can be both a provider (where it acts as a transit) and a consumer (where it effectively acts as an Initiating PNO).

user: An end customer which is associated with the reservation of a VP connection.

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

X-interface tree: With respect to a particular VP, 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 VP form a tree, the X-interface relation tree. Note, that for a particular VP there can be several possible X-interface relation trees; the actual tree is formed at VP set-up. The root of the tree is the Initiating PNO; it uses (and via an 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 1 shows an example of an X-interface tree.

X-interface: The management interface between two PNOs. In the "Responsibility Model", which is described in ITU-T Recommendation M.3010 [4], two Operations Systems Functions (= Managers) that are located in different TMNs (= different PNOs), communicate over an X Reference Point.

Z PNO: A Z PNO is a PNO whose subnet is connected to a user, where the overall VP connection ends.

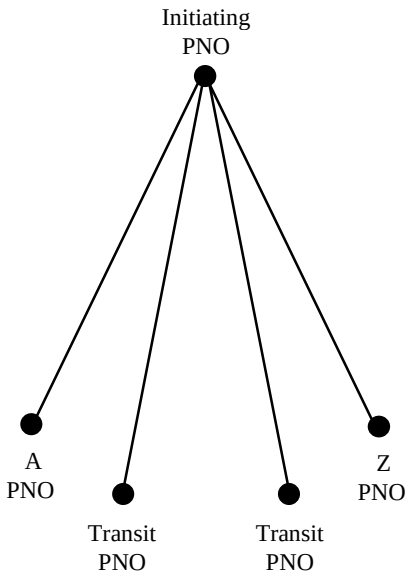

Figure 1: Example of an X-interface tree with the Initiating PNO not being the A PNO

3.2 Abbreviations

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

ATM	Asynchronous Transfer Mode
GDMO	Guidelines for the Definition of Managed Objects
MF	Management Functions
MFS	Management Function Sets
MS	Management Service
OS	Operation System
PNO	Public Network Operator
TMN	Telecommunications Management Network
VP	Virtual Path
VC	Virtual Channel

4 Requirements

F1 In case of faults, it should be possible to localize faults on a PNO sub-network and/or IPPL level.

F2 All parties which are affected by a faulty PNO sub-network are to be informed of the failure.

F3 All alarm information passed across the X-interface should be time-stamped.

F4 Elimination of redundant multiple alarms relating to a single underlying cause before the alarm information is transmitted across the X-interface.

F5 Protection switching and the result of the protection should be notified.

F6 It should be possible to enable/disable alarm reporting on a given connection or group of connections.

F7 It should be possible to modify the filtering criteria for alarm reporting.

5 Resources for ATM VP alarm management

5.1 The basis for the exchange of management information

The architectural framework characterizing the exchange of management information across the X-interface is represented in figure 2.

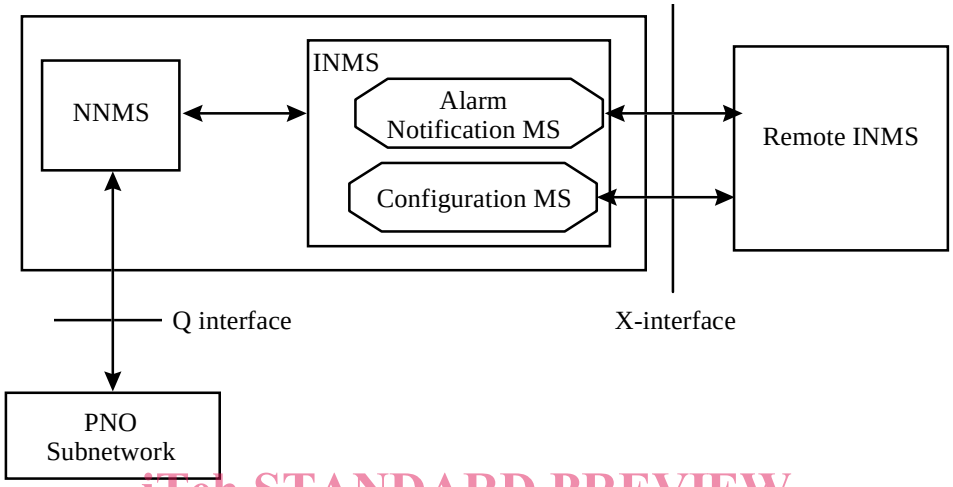

Figure 2: Architectural framework for the X-interface

In figure 2, the terms "NNMS" and "INMS" were derived from an earlier organizational point of view whereby administrations operated "National" (NNMS) and corresponding International (INMS) parts of a single overall network management system. For the present document these terms are retained but "INMS" can be assumed to be generalized to the management system for an X-interface interconnection between any two operators, whether within national boundaries or across them. NNMS can be assumed to be generalized to the internal management system of any operator which also relies on interconnections using X-interfaces.

The block named NNMS is responsible for the management of an operator's sub-network while the block named INMS is responsible for the management of connections between operators which in turn rely on interconnections with the operator's subnetworks. The distinction has been made because these two systems act on different Information Models and because there is the necessity of exchange of information between them. The logical positioning of the "Q" interface, which basically controls network switches in the NNMS, is also indicated but any matters relating to this interface are outside the scope of the present document.

The INMS has to support the following operations as far as the Alarm Notification MS is concerned:

- reception of notifications coming from a remote INMS. These notifications are described in detail in subclause 7.1;
- reception of alarms coming from the NNMS and relevant to the X-interface. These alarms may be associated with faulty VP connections used for inter-network connections (they may be Physical Layer alarms or VP Layer alarms or faults affecting the ATM Cross Connect which acts as the inter-network gateway);
- elaboration of alarms coming from the NNMS (qualification and adaptation to inter-network alarm format);
- sending of alarms to the appropriate PNOs (Initiating PNO in the case of a VPSC fault or all PNOs in the case of Inter-PNO Physical Link (IPPL) fault);
- logging alarms and retrieving alarm reports.