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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), and is now submitted for the ETSI standards Membership Approval Procedure.

1 Scope

The present document specifies the Service Provisioning management of access networks.

Management Domain: The management domain regarded in the present document is depicted in Figure 4.

a) the provisioning of an access network transport bearer services by a Service Provider;

b) the resourcing of access network resources required for such a service;

c) the coordination between Access Network and Service Node network element configuration.

Management Services: Ths present document covers management operations necessary for an transmission-technology independent management of narrowband transport bearer services (pstn, isdn, leased line) across V5 and 2 MBit/s Service Port Functions. This includes the configuration and provisioning of both transport bearer services and their affected resources. Efforts are undertaken to design the management services applicable for narrow- and broadband. Ths present document provides an informative annex for the description of broadband service profiles.

Resources: The management of User Port Functions and Serivce Port Functions providing User Network Interface and Service Node Interface functionality, respectively, are considered in the present document and ITU-T Recommendation G.902. Transmission specific resources lie outside its scope.

Process Flows: Ths present document provides insights into the mapping of management services onto management operations across the specified reference points. Interactions with TMN support systems such as cable management are out of scope but are taken into account as datasources within the scenarios. The process flows illustrate the information required for service provisioning management and not a phyiscal implementation. Dependencies between information models at different reference points are modelled without, however, describing algorithmic aspects (e.g. timeslot allocation method).

Information Models: All management information models used in this Ensemble derive from existing libraries (ETSI or ITU-T). In cases where no satisfactory solution is available, the standard raises this as a work item and provides a temporary, non-normative proposal including solutions developed by industry fora's.

Protocol Stacks: Ths present document recognizes the need for a protocol-independent specification as advertised in ETR 046 [18]. In a first step, the present document describes the mapping of management functions onto CMIP. Other, non GDMO-based information and computational models (e.g. using OMG CORBA) are outside the scope of this deliverable.

Open Network Provisioning: Information flows are designed as ONP-enabled, i.e. applicable both for management operations within a Telecom Operator and between Telecom Operators (e.g. between Access Network Operators and Service Providers).

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] ITU-T Recommendation G.773 (1993): "Protocol suites for Q-interfaces for management of transmission systems".

[2] ITU-T Recommendation G.803 (1992): "Architecture of Transport Networks based on the SDH".

[3] ITU-T Recommendation M.3010 (1992): "Principles for a telecommunications management network".

[4] ITU-T Recommendation M.3100 (1992): "Generic network information model".

[5] ITU-T Recommendation Q.811 (1993): "Lower layer protocol profiles for the Q3 interface".

[6] ITU-T Recommendation Q.812 (1993): "Upper layer protocol profiles for the Q3 interface".

[7] ITU-T Recommendation X.720 (1992): "Management Information Model".

[8] ITU-T Recommendation X.721 (1992): "Definition of management information".

[9] ITU-T Recommendation X.730 (1992) "Object Management Function".

[10] ITU-T Recommendation X.731 (1992) "State management function".

[11] ITU-T Recommendation X.732 1992): "Attributes for representing relationships".

[12] ITU-T Recommendation X.733 (1992) "Alarm Reporting Function".

[13] ITU-T Recommendation X.734 (1992) "Event Report Management Function".

[14] ITU-T Recommendation X.735 (1992) "Log Control Function".

[15] ITU-T Recommendation X.745 1992): "Test Management Function".

[16] ETR 037: "Networks Aspects (NA); Telecommunications Management Network (TMN); Objectives, Principles, Concepts and Reference Configurations for a TMN".

[17] ETR 078: "Maintenance: Telecommunications management network; TMN interface specification methodology [CCITT Recommendation M.3020 (1992)]".

[18] ETR 046: "Networks Aspects (NA); Telecommunications management networks modelling guidelines".

[19] ETR 047: "Networks Aspects (NA) Telecommunications Management Network (TMN) Management services".

[20] I-ETS 300 653: "Generic Network Object Model and Object Class Definitions".

[21] NMF025, Network Management Forum "Ensemble Specification"...

[22] ITU-T Draft G.902: "Framework Recommendation on functionnal Access Network".

[23] ITU-T M.1400: "Designation of internationnal networks".

[24] ETS 300 376-1: "Signalling Protocols and Switching (SPS); Q3 interface at the Access Network (AN) for configuration management of V5 interfaces and associated user ports; Part 1: Q3 interface specification".

[25] ETS 300 477: "Universal Personal Telecommunication (UPT); UPT phas 2; Functionnal specification of the interface of a UPT Integrated Circuit Card (ICC) an Card Accepting Devices (CADs); UPT card accepting Dual Tone Multiple Frequency (DTMF) device".

[26] ETS 300 304: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); SDH information model for the Network Element (NE) view.

[27] ETS 300 324: "Signalling Protocols and Switching (SPS); V interfaces at the Digital Local Exchange (LE): V5.1 interface for the support of Access Network (AN)".

[28] ETS 300 377: "Signalling Protocols and Switching (SPS); Q3 interface at the Local Exchange (LE) for configuration management of V5 interfaces and associated customer profiles".

3 Definitions

For the purposes of the present document the definitions given in the standards referenced apply:

Agent: See ETR 037 [16].

Manager: See ETR 037 [16].

management domain: See ETR 037 [16].

network element: See ETR 037 [16].

TMN building blocks: See ETR 037 [16].

4 Abbreviations

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

AN	Access Network
BRA	Basic Rate Access
DN	Distinguished Name
FRU	Frequently Replacable Unit
GOM	Generic Object Model
GRM	Generic Ressource Model
GTP	Group Termination Point
MIB	Management Information Base
MO	Managed Obect
NNI	Network Network Interface
NMF	Network Management Function
PABX	Private Analogique Branch eXchange
POI	Point Of Interconnect
RDN	Relative DN
SPF	Service Port Function
SN	Service Node
TBS	Transport Bearer Service
TMN	Telecommunications Management Network
TTP	Trail Termination Point
UPF	User Port Function
USI	User Network Interface

5 Management Context

5.1 General comments

- The specification should try to restrict optionality and complexity of the management services and their information model as much as possible.

- The use of the terms OLT/ONU does not limit the specification to Optical Access Networks.

5.2 Functional architecture

ITU-T Draft Recommendation G.902 [22] forms the basis for a functional access network architecture. Figure 1 describes the network boundaries of an Access Network (AN), adapted to the case of separate organizational entities. The figure describes the Service Node (SN) as the entity generating the service transported across the access network to the service user. The Service Node Interface (SNI) is the interface between AN and SN. The User Network Interface (UNI) is located between the Access Network and the Service User. The Q3-interface is the interface between the management function of the Access Network and its Telecommunication Management Network (TMN). Information between different TMN's is exchanged across the X-interface.

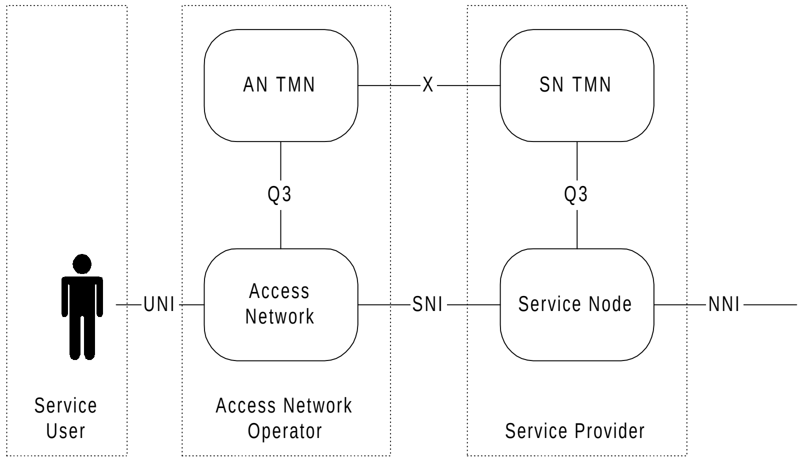


Figure 1: Access Network boundaries

The network itself consists of several functions shown in Figure 2. The User Port Function (UPF) adapts the specific UNI requirements to the core and management functions. The Service Port Function (SPF) adapts the requirements defined for a specific SNI to the common bearers for handling in the core function and selects the relevant information for treatment in the AN system management function. The core, transport and management functions are responsible for AN operations. Table 1 lists examples of User and Service Port Functions.

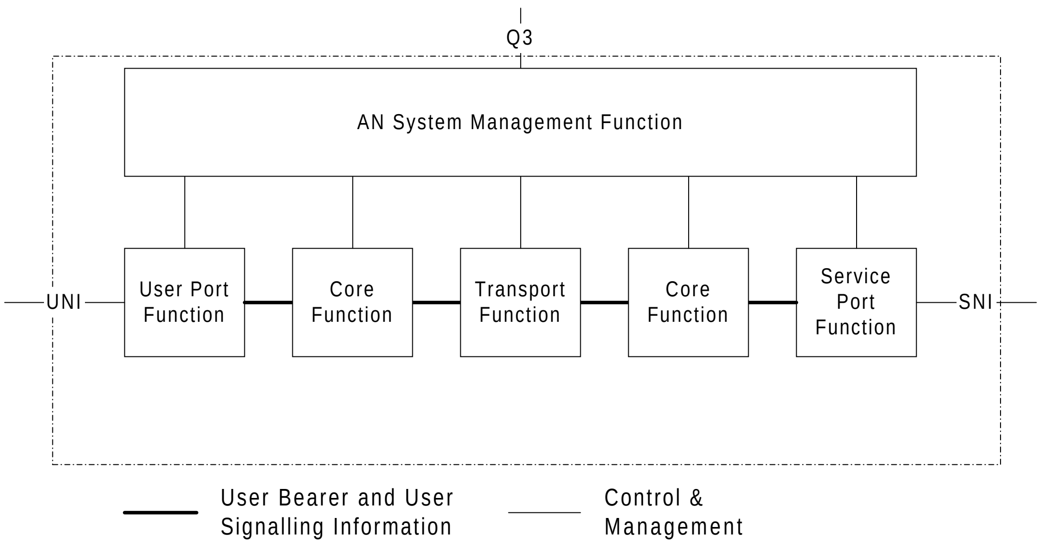


Figure 2: Example of functional architecture of an AN

The information flow across the x-reference point is concerned with OA&M of the User Port and Service Port Function. The Core and Transport functions are internal to the Access Network management.

Table 1: Examples of SPF and UPF

Service Port Function	User Port Function
Termination of the SNI functions, mapping of the bearer requirements and time critical management and operational requirements into the core function, mapping of protocols if required for particular SNI, testing of SNI, maintenance of SPF, management & control functions	Termination of the UNI functions, A/D conversion, signalling conversion, activation/deactivation of UNI, handling of the UNI bearer channels/capabilities, testing of the UNI, maintenance of the UPF, management & control functions

UNI's may be shared between Service Nodes. This implies the definition of logical UPF which are multiplexed into a single Transmission Media Layer Termination and demultiplexed in an Adaptation Function outside the AN. Access Network management must take shared-UNI's into account.

A UNI may support several User Port Functions at the same time. This concept is called a "shared UNI" and is typically found in broadband network applications. The User Network Interface and the User Port Functions therefore constitute two separate resources and must be managed seperately.

5.3 Transport bearer service, resource and management requirements

A transport bearer service (TBS) provides the facilities for the information transfer of a transport bearer service across the access network.

The access network provides *transport bearer services* (TBS) to service providers and network operators. The transport bearer service is the connectivity between the User Port Function and the Service Port Function. The connectivity (the bearer transport) is associated with specific user network and service port interfaces. The connection requires information on the traffic it supports to ensure its quality of service (e.g. jitter, wander, timing delays). Transport bearer services may be augmented by additional capabilities. Capabilities are divided in service-specific and service-independent capabilities.

The quality of the transport bearer service is dependent on the quality of the transmission path between UPF and SPF. Special emphasis must be placed on signalling delays and round-trip delays.

5.3.1 Service-dependent capabilities

Service profiles for narrow and broadband bearer transport services are described in annex A.

5.3.2 Resource capabilities

Resource profiles for narrow and broadband bearer transport services are described in annex A.

5.3.3 Service provisioning and resource configuration management services

In a deregulated environment Open Network Provisioning requires that all Telecom Operators gain equal access to the transport bearer services provided by the access network. Network management must ensure that the serivce management interfaces allow for third parties to perform the same functionality as the telecom operator.

Service Provisioning is tightly linked to the configuration of the resources providing the transport bearer services. However, the process of provisioning of a transport bearer service may be decomposed into generic configuration and technology-specific configuration parts. A third requirement, pre-provisioning, implies the introduction of a time-line (or lifecycle) into the model. These three requirements are orthogonal to each other, as shown in Figure 3.

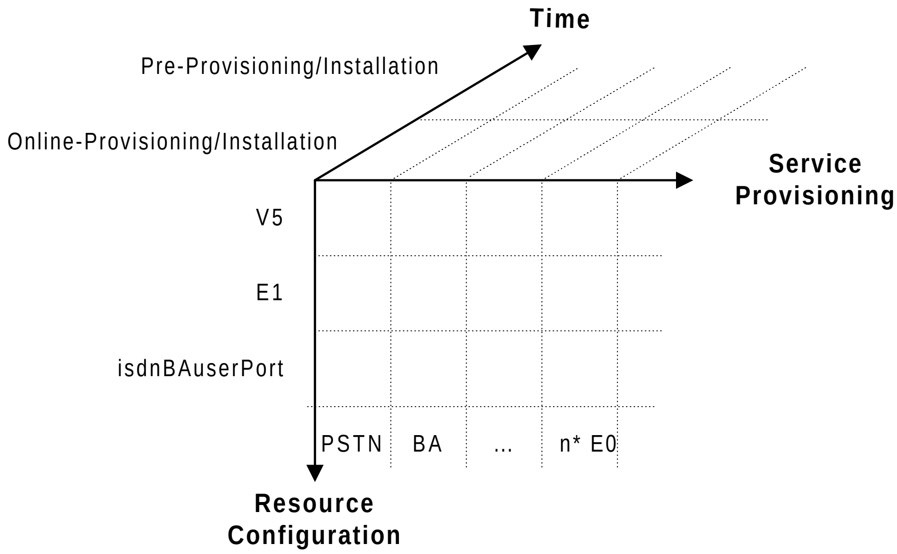


Figure 3: Three dimensions used in provisioning. Services, Resources and Time

Online vs. Pre-provisioning: In online provisioning the agent is only able to provision resources physically installed and currently not assigned to a transport bearer service. In pre-provisioning, resources may be assigned prior to effectuating the transport bearer service.

5.3.4 Policies

The specifications described in the standard provide an information model, general requirements and give references and pointers to those elements that have already been defined. The standard covers those points that are mandatory when providing a service. In order to be able to provide a fully functional implementation of a service the developer has to take some decisions on special points not contained in the standard itself. These open points in the standard, that can be developed in a different fashion from all implementors, are called management policies. A management policy could be for instance the decision on the value of a parameter or some specific algorithm or procedure. The standard contains usually a „simple" management information model, which already defines the functionality. A management policy could be interpreted in this context like a restriction to the given model, that doesn't modify the desired service functionality.

Example on the V5.1 information model

The model given by the standard on V5.1 requires that some related communication channels and communication paths have to be instantiated, but doesn't prescribe the number of instances nor which path has to be related to which channel. The developer must take a decision, a management policy, to provide a concrete service. The following rule provides for a policy on how the basic instantiation of a V5:

OBLIGATION V51-OBLI_1
C-channel C1 shall be allocated at creation time.

OBLIGATION V51-OBLI_2
upon instantiation pstn, control, and all isdn D-channel traffic shall be assigned to C1.

5.4 Functional TMN architecture and management domain

Figure 4 provides a coarse overview of the management domain relevant for access network management consisting of following functional units:

Access network and service node Network Element Functions (NEF) are connected by the v reference point. For the purpose of this discussion each NEF is subdivided into a "AN/SN-specific aspect" and a "common aspect". The latter provides functionalities required for the co-ordination between the Service Provider's NEF and the Access Network's NEF.

E_{AN}-OSF/QAF, N_{AN}-OSF, S_{AN}-OSF and E_{SN}-OSF, N_{SN}-OSF and S_{SN}-OSF provide element, network and service management of the access network and the service node, respectively. Three reference points provide for the information exchange between the TMN of the Access Network and the Service Node. The a3 reference point allows the management of bearer transport services in the AN. The a2 reference point enables the Service Provider to request (in a restricted manner) access network resources. Both a2 and a3, provide for a simple resource co-ordination information exchange. The Service Provider's OSF's act as managers. Table 2 describes all reference points and possible management services in detail.

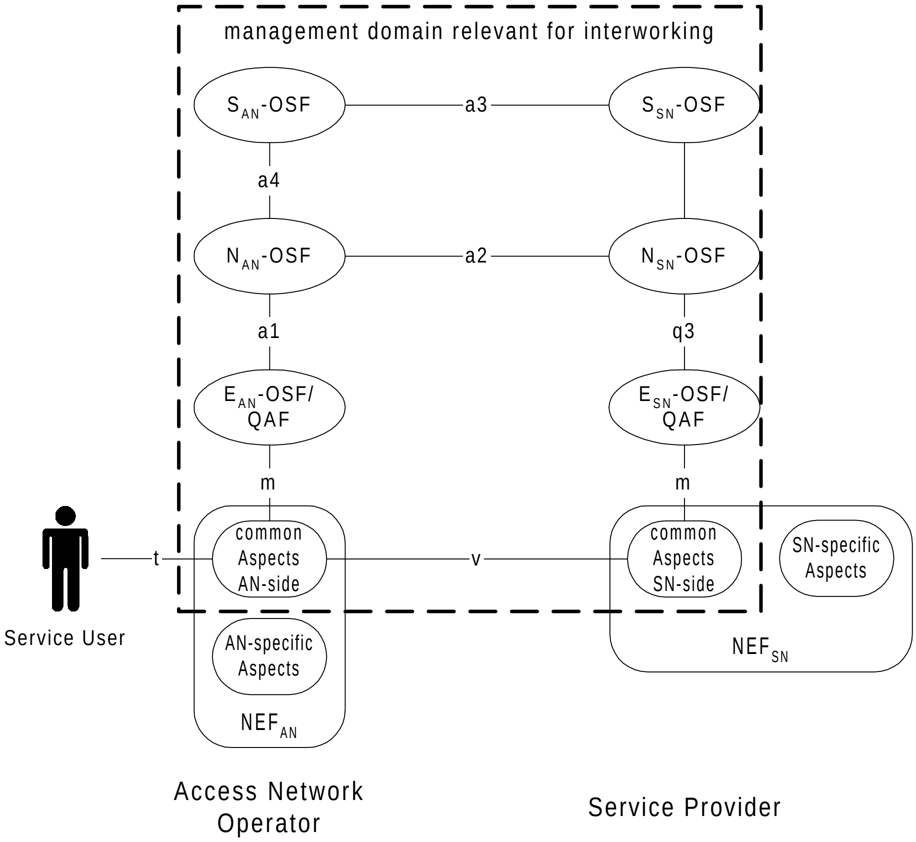


Figure 4: Interworking management domain and reference points covered in this model

The management domain necessary for interworking covers all OSF's listed above as well as those aspects of the Network Element Functions which are common to both the AN and the SN. AN-specific aspects (such as transmission management) lie outside the scope of the management domain. The same applies for SN-specific aspects such as customer administration or SN-fault management.

5.4.1 Management architecture

Figure 5 provides a complete overview of the interaction between the Access Network Operator's TMN and the Service Provider's TMN. It describes the major "actors" involved in such an environment. On the AN-side the E_{AN}-OSF/QAF manages proprietary network element functions and provides standardized reference points where relevant (a1). The N_{AN}-OSF supports transmission-technology transparent network management functions and provides appropriate management services to the S_{AN}-OSF (a2, a4). The a2 reference point provides a restricted network level view of the access network to the Service Provider. The S_{AN}-OSF is responsible for service management of the Access Network and provides reference points to the Service Provider's S_{SN}-OSF (a3). The S_{UN}-OSF and its lower-layer OSF's manage all aspects relevant to the "service user access" part of its services.

Both the N_{AN}-OSF and S_{AN}-OSF of the Access Network will rely on non-TMN information systems such as legacy cable management, testing, topological databases, work flow management, etc. Access to these actors is provided through non-standardized m_1 and m_2 reference points. Note, that in a larger Telecom Operator Service Provider OSF's, too, will entertain access to the same support systems. Table 2 lists possible management services which can be made available through the reference points. Figure 4 provides an overview of the functional TMN-model and its major reference points.

The lower part of Figure 5 describes the functional architecture for V5. AN-specific part of the model is the management of the "Access Network" subnetwork. The second subnetwork visible in the diagram, the "digital section", is considered outside the scope of an Access Network Operator. The figure also shows the multiplexing structure of the communication paths as well as the allocation functions mentioned previously.

Three actors are involved in the Access Network, "the Service User", the Access Network Operator and the Service Provider. Figure 5 identifies two boundaries between these actors: a service boundary located vertically in the diagram and a management boundary, found horizontally. Two functions are visible on the service boundary, the user port function and the service port function. On the management boundary the a2 and a3 define the management information flow between Access Network Operator and Service Provider, while the m_{user} provides for the interaction between Service User and Service Provider. The latter is out of the scope of this discussion.

Table 2: management reference points

Ref Point	(incomplete list of) management services available at the reference point	Example
a1	• transport bearer service resource configuration • transport bearer service provisioning / testing / fault management • transport bearer service performance management • equipment management • transmission system fault/performance management • transmission system configuration management • (transmission-technology specific management)	• configuration of the common aspects, e.g. V5.1 interfaces, instantiation of userPorts • slot management • transmission system performance mgt • PON fibre-cut location • frequency management
a2	• transport bearer service resource configuration • resource provisioning	• V5.1 configuration based on requirements specified by the Service Provider • V5 interface request covering a certain area
a3	• transport bearer Service Configuration & Provisioning, ordering • trouble administration • QoS performance reporting • test administration • link management • accounting & billing	• order a transport bearer service with certain capabilities • configuration of UPF and SPF resources as well as the exchange of link connection information • billing information • pre-provisioning.
a4	• topology management, • resource provisioning, • subnetwork protection management • network fault management, -performance management • resource management	• domain management • UNI-selection for a specified location • pre-provisioning of resources • network requirements evaluation and planning • alarm collection for the entire AN • resource life-cycle management
m_0	• non-TMN reference point providing access to the NEF.	• All proprietary NEF management functions
m_1	• access to non-TMN management and database services: • cable information • workflow information • resource information • planning	• identify access-point of a cable • provision technicians for repair effort • issue long-term planning request
m_2	• cf. m_1	• -
m_{user}	• reference point between service user and Service Provider: service provisioning, trouble administration, billing, Quality of Service, Billing&Accounting	• e.g. Customer Trouble Handling
f_S	• functions available for the transport bearer service management through AN personnel, possibly regional S/NMC	• trouble tickets handling, QoS evaluation of the overall AN network,.
f_N	• functions typically available at a regional NMC	• network alarms, database update of new resources in the network ("churn" handling).
f_E	• functions available through the LCT (local craft terminal) or the element manager, typically product specific	• -

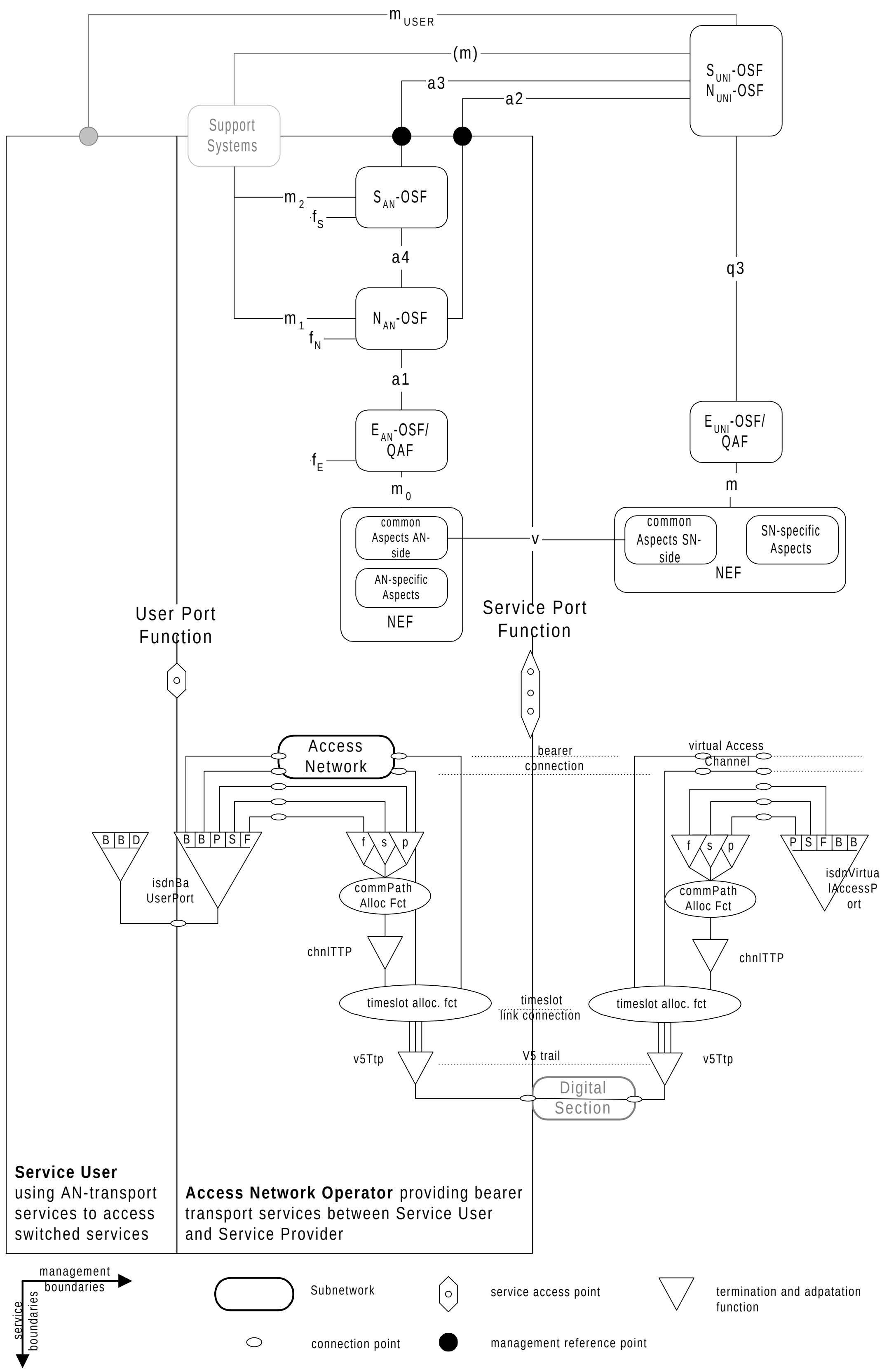


Figure 5: TMN Architecture for the Access Network with the example of isdnBA

5.4.2 Co-ordination

Co-ordination between the Service Provider and the Access Network Operator enables the interworking between the common parts of the Access Network with those of the Service Node. Co-ordination involves both network elements (e.g. configuration management) as well as service provisioning (e.g. common provisioning time).

Co-ordination information may be exchanged either on a resource basis using the resource-id or on a service basis (using the service-id). The latter is the preferred method of operation as it provides for a sufficient method of abstraction and keeps the a3 reference point simple and efficient.

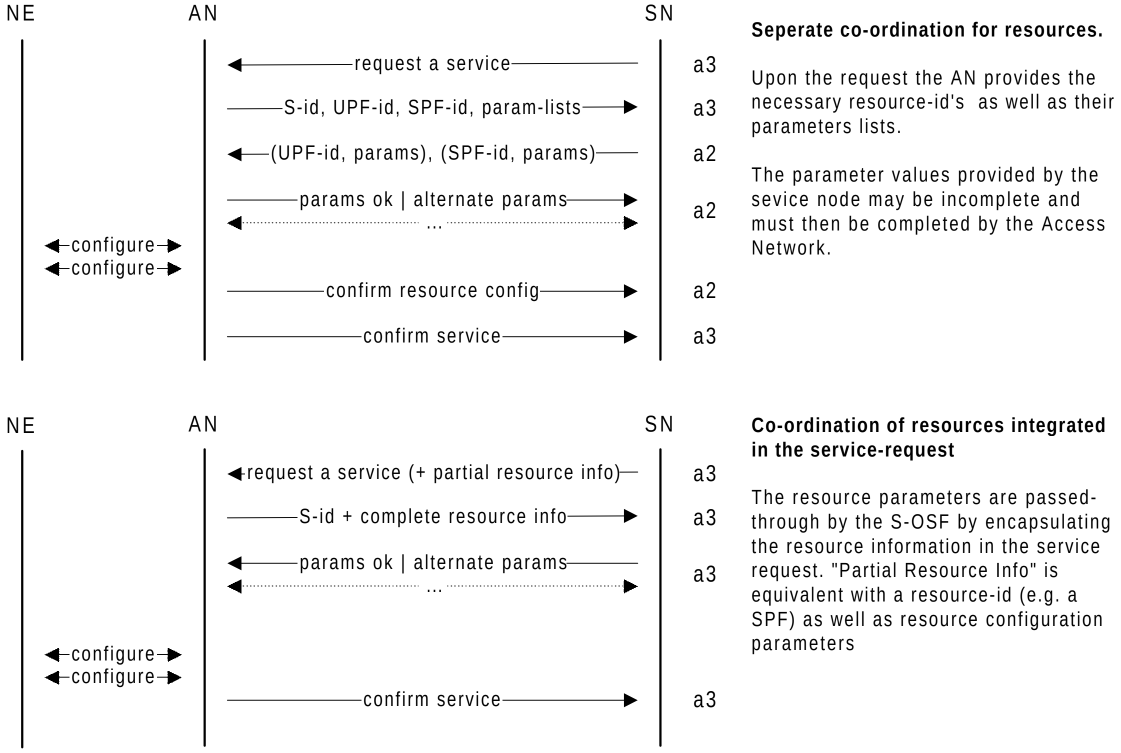


Figure 6: Interaction Models for Co-ordination (both service-id and resource-id based)

5.4.3 Management view and level of abstraction

Figure 7 shows an example of how higher level systems will interact with the reference points defined in the present document. This example is given to illustrate the use of this ensemble there is no attempt to standardize the functions at the higher layers.

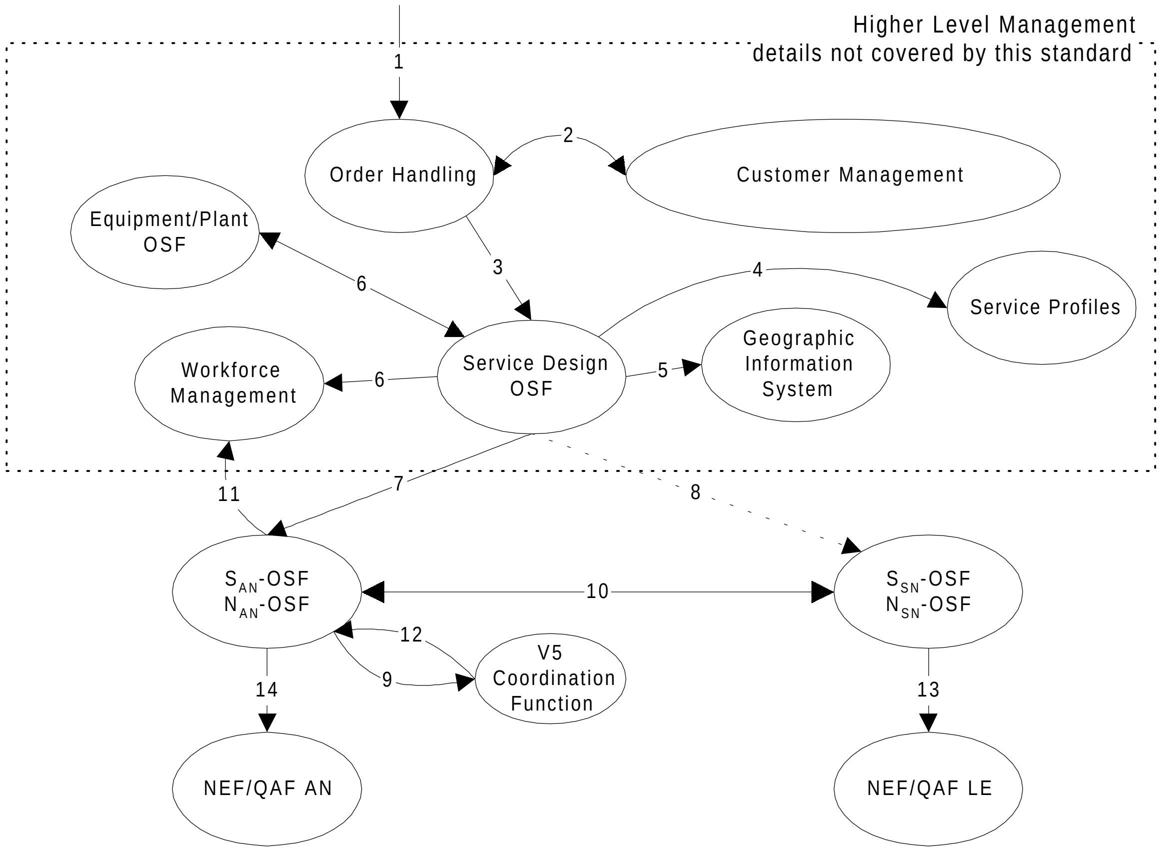


Figure 7: Example process for service provisioning

The following functions take place in this example:

1) An order for a Service is received from a customer.

2) Interaction takes place with Customer management in order to discover the customers details. This may include his location.

3) The request is passed to a Service Design function that will interact with other systems in order to provide the End-to-End solution.

4) Information about Service profiles is accessed in order to determine what is required to deliver this service to the customer.

5) Service Design accesses Geographic Information in order to determine the nearest node to the customer.

6) Copper plant information is accessed to determine if there is an existing drop to the customer and if so, where this is connected.

7) A Service Provider request is made to the Access Network manager.

8) A Service Provider request is made to the Service Node manager.

9) The Access Manager allocates resources for the Service and reports its configuration to the Coordination Function.

10) The co-ordination function (in this case located within the N_{AN}-OSF) requests a configuration of the Service Node manager. The Service Node replies with the configuration parameters.

11) A Workorder is emitted in order to provide details of work required to provide the service.

12) The Coordination function configures any additional parameters on the Access Network, for instance Layer3Addresses, EnvelopeFunctionAddress etc.

13) The Service Node is configured.

14) When the equipment is installed and connected the Access Network is configured.

This ensemble deals the following interactions: 7, 9, 10, 11, 12, 14.

5.5 Models

5.5.1 Resource model

The resource model of an Access Networks covers following resources:

- **logical resources**: describing the logical network and transport bearer service structure;
- **topological resources**: describing the topolgical layout of the access network, i.e. the location of access points;
- **physical resources**: describing the equipment and their connectability;
- **the service profiles**: describing the transport bearer service, its service profile and the relates to the resources which are used for this service;
- **digital section resources**: describing the transmission network connecting access network to the service node;
- **transmission network resources**: describing the transmission network representing the access network.

Figure 8 illustrates the resources that are of interest to the Service Provisioning Ensemble.

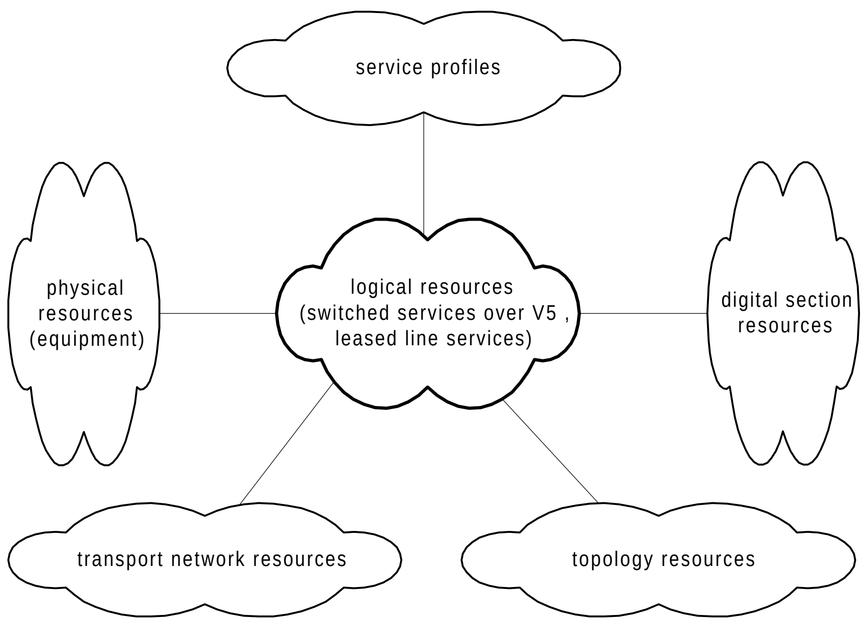


Figure 8: Resources relevant for the Service Provisioning Ensemble

5.5.2 Topological model

The topological model describes the Access Network as seen from the Service Provider. It identifies the minimal information which must be visible. Based on the functional model described in ITU-T Recommendation G.902 [22], naming conventions must exist for the Service User Access Points, Service Node Interface and the Point Of Interconnect.

5.5.2.1 Access point

The Access Point describes the location to where a service is requested and is necessary for service invocation. A unique naming scheme for the Access Point is therefore necessary. The Access Point is not identical with the UNI. An example would be a request for a bearer transport service to an Access Point which isn't accessible yet (i.e. has no UNI).Access Points are best identified by their geographical location, i.e. their address. Note too, that the Access Point need not necessarily be the location where the Service User receives the service. An access point may be a socket (typical example for a home owner connection) or the connection point to a PABX or in-house network outside the responsibility of the Access Network Operator (situation of a small businesses connection).

5.5.2.2 Service node interface

The Service Node Interface is the physical interface to a Service Port which in turn is the physical resource providing Service Port Functions. The Service Node Interface may itself consist of one or more Service Port Functions. The access network connects one or more Service Node Interfaces with a set of Access Points. The set of Access Points is called the bearer domain.

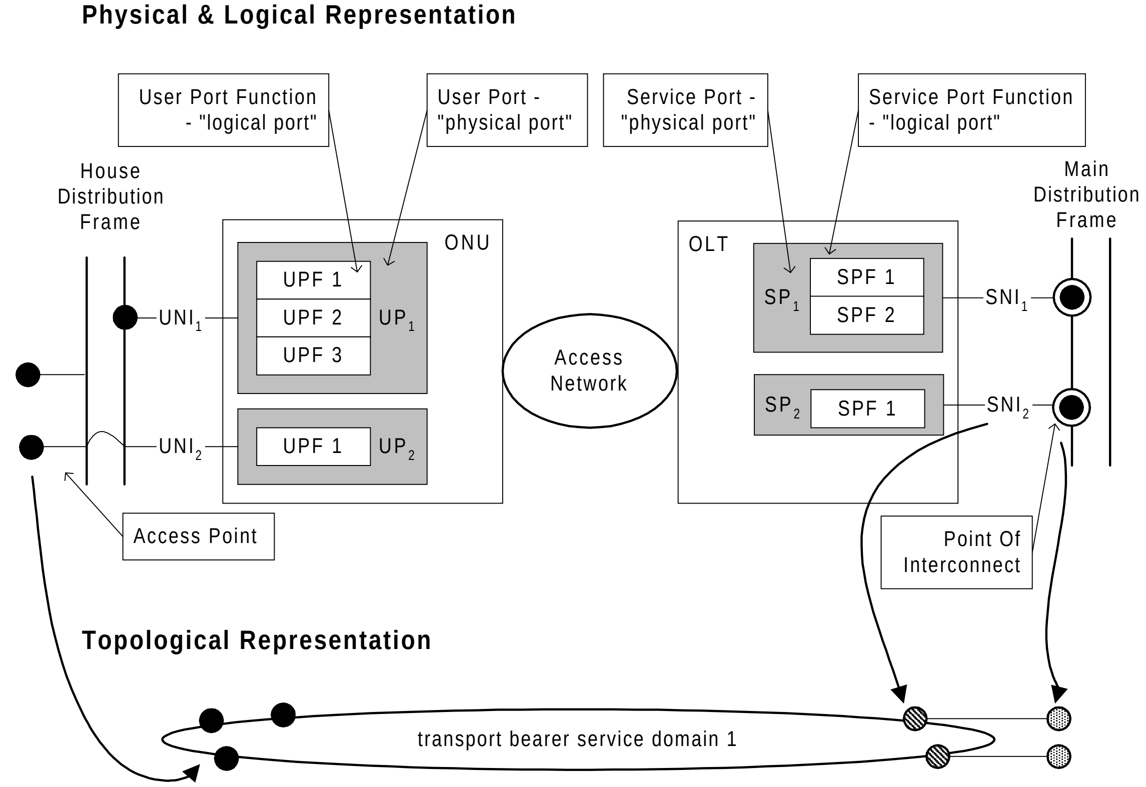
5.5.2.3 Point of interconnection

Connection between Access Network Operator and Service Providers require a common identifier of this connection point, called the Point of Interconnect (POI). By providing the POI to the Service Provider, the Access Network Operator makes available the location where the physical connection between the Access Network and a Service Node can be achieved. A typical example of the POI is the physical connector on the Main Distribution Frame where the cable to the Service Port is attached. The POI is usually used in international networks to designate cross-border links. Consequently, the POI name must be known by both the Access Network Operator and the Service Provider. POI's are typically named using the ITU-T Recommendation M.1400 [23] naming scheme.

Table 3: General format of layer 1 for the designation of international routes

Format of designation	SNI AN-side (Town A)	/	Suffix	-	SNI SN-side (Town B)	/	Suffix		Function Code	Serial number
Signs	Characters	Slash	Letters/ digits	Hyphen	Characters	Slash	Letters/ digits	Space	Letters/ digits	Digits
Number of characters	≤ 12	1	≤ 3	1	≤ 12	1	≤ 3	1	≤ 6	≤ 4
										↑ No Space

In Figure 9 a simple FITL-based access network consisting of a single OLT and ONU is drawn. It shows the Access Point, the Service Node Interface and the Point Of Interconnect. The figure displays that several "logical ports" (UPF or SPF) may be made available across the same Service Node Interface and Access Point, respectively. The Point Of Interconnect is very similar to the Service Node Interface. While the SNI gives port location, the POI defines the location where the interconnect is possible.



NOTE: Need to provide a mapping between the resources onto the Information Objects. Need to understand the requirements on how to connect SNI's to the POI.

Figure 9: Sample mapping of the physical/logical representation of a FITL access network onto the topological model

6 Functions

NOTE: Upon the introduction of ODP Enterprise Viewpoint the Management Service specified here would be replaced by a EVP template.

6.1 Overview

The following management services for provisioning are expected:

NOTE 1: The functions will be assigned to reference points once the scenarios and IVP/CVP have been developed.

NOTE 2: The names list persons who are to provide an example of the management function.

6.1.1 Resource configuration and provisioning management (a2, a4)

Table 4: Resource management

Management Function	Summary
1. Request a Resource	The Service Provider requests a User Port Function / Service Port Function resource. The resource is identified by the transport bearer service domain it can cover and by its type.
2. Configure Resource parameters	The management function enables the Service Provider to configure resources-specific parameters. It covers UPF/SPF and management resources.
3. View Resource Setup	provides a view of the current resource-configuration
4. Release a Resource	The Service Provider requests the release of resources and become re-allocatable to other Service Providers.
5. Connect Service Port Function to Point Of Interconnect	The Service Provider requests for the connection between SPF and a POI. The result of this service gives the SPF the capability of transferring information from SPF to SNF and visa versa.
6. Disconnect SPF-resource from Point Of Interconnect	The Service Provider requests for the disconnection of a SPF from a POI, i.e. the service node.
7. Connect UPF to Access Point	The Service Provider requests that a User Port Function is connected to a Service User location, specified through its Access Point.
8. Disconnect UPF from Access Point	The Service Provider requests that a User Port Function is disconnected from a Service User location.
9. Request change of resource capabilities	The Service Provider requests the addition or removal of resource capabilities, e.g. upgrade/downgrade or migration, to conform with new requirements.

6.1.2 Service configuration and provisioning management (a3)

Table 5: Service Management

Management Function	Summary
Request a Bearer-Transport Service	The Service Provider requests that a service, specified through the service description, is made available at a certain access point location to a service port function. Connection between UPF and SPF is performed automatically. The Service may be requested with following restrictions: - use of specific UPF instead of one automatically assigned by the Access Network Operator - use of specific service node instead of service port function
Delete a Bearer-Transport Service	The Service Provider requests the termination of a service. The resources become re-allocatable to other services but are assigned to the Service Provider. The resources are released completely if their assignment had occurred automatically through the Access Network Operator.
Identify service capabilities	The service returns the set of capabilities a bearer-transport service has.
Add service capability to a Bearer-Transport Service	A service capability is added to an existing bearer transport service instance.
Remove service capability from a Bearer-Transport Service	A service capability is removed from an existing bearer-transport service instance.
Block/unblock a bearer transport service	During maintenance work such as the upgrade of equipment in the Access Network the Access Network Operator must be able to temporarily block the service in the Access Network. The Access Network Operator may request permission to block from the Service Provider.

6.1.3 Configuration and provisioning at the resource level (a1)

6.1.3.1 Q3-V5 AN

Table 6: Q3-V5 AN Management

Management Function	Description
Insert / Delete / Modify / Read a user port	- assign port address; - assign port type; - assign port specific parameters
Insert a V5 interface	**Add a V5.1 interface:** - V5.1 interface ID; - time slots for communication and for bearer channels; - protocol version; - provisioning variant. **Add a V5.2 interface:** - V5.2 interface ID; - associated 2 Mbit/s link(s); - time slot(s) for C-channels; - protocol version; - provisioning variant. **Augment a V5.2 interface:** Add 2 Mbit/s link(s) to the existing V5.2 interface and provide relevant data:- associated 2 Mbit/s link(s); - time slot(s) for C-channels; - provisioning variant.
Delete a V5 interface	**V5.1:** Remove a V5.1 interface and delete relevant data mentioned **V5.2:** Remove a V5.2 interface ID and delete the relevant data
Modify / Read a V5 interface	Modify one or more information elements
Reducing a V5.2 interface	Remove 2 Mbit/s link(s) from a V5.2 interface and delete the relevant data
Upgrade a V5.1 to a V5.2 interface	The upgrade is performed by deleting the affected V5.1 interface and inserting a V5.2 interface using the relevant data having been assigned to the V5.1 interface
Establish a connection	- assign access port to V5 interface, including V5 port address; - assign port bearer channel to V5 bearer channel; - assign PSTN signaling to V5 communication channel; - assign ISDN Ds-type data to V5 communication channel; - assign ISDN p-type data to V5 communication channel; - assign ISDN f-type data to V5 communication channel
De-establish / Modify / Read a connection	as above

Other functions/capabilities:

- B- and C-Channel configuration
- provisioning variant configuration
- protection configuration
- Association of interfaces with exchanges
- Persistency checking
- Global PSTN parameters (timers, cadencing, ... of all PSTN user ports)
- definition of the operational threshold for user ports
- Port blocking request
- configuration of SP-LL and PL

6.1.3.2 Leased Lines

Table 7: Leased lines management

Management Function	Description
Insert / Delete / Modify / Read a user/service port	- assign port address; - assign port type; - assign port specific parameters
Modify / Read a V5 interface	Modify one or more information elements
Augment / reduce the bandwidth of a connection	Add or remove timeslots from a leased line transport bearer service
Establish a connection	- assign access port to V5 interface, including V5 port address; - assign port bearer channel to V5 bearer channel; - assign PSTN signaling to V5 communication channel; - assign ISDN Ds-type data to V5 communication channel; - assign ISDN p-type data to V5 communication channel; - assign ISDN f-type data to V5 communication channel
De-establish / Modify / Read a connection	as above

6.2 Functions applicable at the service provisioning a3 reference point

The following functions may be applied at the a3 reference point.

6.2.1 Request a transport bearer service (a3)

A manager will have the ability to request a service across the access network. The request will have the following parameters.

Table 8: Request Parameters

Parameter	M/O	Value	Behavior
Service_Type	M	PSTN, ISDN BRA , E1	
Service_Profile	M		describes parameters which may be used for the specific service-type (e.g. FMBS, semi-permanent, etc.)
Far End	M	{ AP | Node | Port | CableReference}	
Near End	M	(Service Node | SPF-Id)	
Service Provider Id	O		
Number_of_Services	O	integer	permits the multiple instantiation of services at a farend, all connecting to near-end. The value must be equal the number of entires in far-end unless far-end is specified as "SUAP" or "node".
Schedule	O	start-time/date	
ServiceReference	M	graphic string	permits the identification of the service using a service provider given reference. The combination of SP-Id and UserDefinedReference must be unique.
Service ID	M	RDN	
SN Co-ordination Information	O	Service Port Function - Connection Points etc	

NOTE 1: The end-date is considered a generic service-profile component. If no end-date exists the service continues for ever.
NOTE 2: HW specific parameters need to be taken into account for certain conditions.
NOTE 3: The model assumes that information on the status of a service is available through a "service-FSM". This implies a Service state model for which contributions are requested.
NOTE 4: check if the UNI/SNI is sufficiently specified.

In order to provide service it may be necessary to determine some information prior to the request. The following functions are defined.

6.2.1.1 Identify user port

An appropriate;"in service and not allocated" user port may be identified.

6.2.1.2 Identify service port function

An appropriate; "in service with spare capacity" Service Port Function may be identified. This may be selection based upon an address or a node.

6.2.1.3 Identify service port function connection point (a2)

An appropriate; "in service and not allocated" Service Port Function Connection Point may be identified.

The following information may be generated in response to the Service request. Note some of these responses may be sent to other reference points.

6.2.2 Transport bearer service status

6.2.2.1 Status (a3)

Table 9: Status parameters

Parameter	M/O	Value	Behavior
Service ID	M		
Current_ServiceState	M		
Expected_ServiceState	O		
Schedule	O		schedule when expected state will be reached
Coordination Information	C		

6.2.2.2 Coordination information (a2)

The coordination information that is sent is dependant of the type of service that was requested. The following information will be sent to the Coordination Function as a result of the provide ISDN BRA service function.

- **PSTN**

The following information will be sent to the Coordination Function as a result of the provide PSTN service function.

Table 10: PSTN parameters

Parameter	M/O	Value	Behavior
Service Port Function	M		
Timeslot	M		

- **ISDN BRA**

Table 11: ISDN BRA parameters

Parameter	M/O	Value	Behavior
Service Port Function	M		
Timeslot 1	M		
Timeslot 2	M		
Frame Channel	O		
Packet Channel	O		

- **E1 Leased line**

The following information will be sent to the Coordination Function as a result of the provide E1 service function.

Table 12: E1 Leased line parameters

Parameter	M/O	Value	Behavior

- **E0 Leased line**

Table 13: E0 leased line parameters

Parameter	M/O	Value	Behavior
Service Port Function	M		
Length	M		
Timeslots	M	Array of integers	

6.2.3 Remove service (a3)

The following information is required in order to remove a service.

Table 14: Remove service parameters

Parameter	M/O	Value	Behavior
Service ID (or service reference)	M		
Service Provider	O		
Schedule	M		immediate removal if no schedule is indicated

6.2.4 Report service removal

6.2.4.1 Report service removal (a3)

Inform the service provider of the removal of the service (cf. state change)

Table 15: Report service removal (a3) parameters

Parameter	M/O	Value	Behavior

6.2.4.2 Report service removal (a2)

Inform the Network Elements of the removal of the information to ensure synchronization between NE configurations.

Table 16: Report service removal (a2) parameters

Parameter	M/O	Value	Behavior

6.2.5 Read service information (a3)

A manager may read the information relating to a service.

6.2.6 Modify a service profile (a3)

Table 17: Modify service profile parameters

Parameter	M/O	Value	Behavior
Service ID	M		
new_Service_Profile	M		describes parameters which may be used for the specific service-type (e.g. FMBS, semi-permanent, etc.)
Service Provider Id	O		
Schedule	O	start-time/date	
SN Co-ordination Information	O	Service Port Function - Connection Points etc	

6.2.7 Modify a service location (a3)

Table 18: Modify service location parameters

Parameter	M/O	Value	Behavior
Service ID	M		
Service Provider Id	O		
new_far_end	M	graphic string	
Schedule	O	time/date	
SN Co-ordination Information	O	Service Port Function - Connection Points etc	

6.2.8 Report service modification

c.f. service state report

Table 19: Report modification parameters

Parameter	M/O	Value	Behavior

6.2.9 Block/unblock a service

This management operations is necessary to inform/request the counterpart actor (Access Network Operator or Service Provider) of a service block, e.g. due to operational reasons.

Table 20: Block/unblock service parameters

Parameter	M/O	Value	Behavior

6.3 Functions applicable at the resource provisioning (a4) reference point

6.3.1 Insert a user port (a4)

The following information is required in order to insert a User Port.

Table 21: Insert user port parameters

Parameter	M/O	Value	Behavior
User Port Type	M	PSTN, ISDN BRA , E1, E0	
User Port ID	O		
Node	M	graphic string	
Schedule	O	time/date	

6.3.2 Delete a user port (a4)

The manager may request the deletion of a User Port.

Table 22: Delete user port parameters

Parameter	M/O	Value	Behavior
User Port ID	M		
Node	O		

6.3.3 Modify a user port (a4).

The manager may configure a User Port.

6.3.4 Read a user port (a4).

The manager may read information relating to the User Port.

6.3.5 Insert a service port function (a4)

The manager may request the creation of a Service Port Function.

Table 23: Insert service port parameters

Parameter	M/O	Value	Behavior
Near-end Node			
Type			
Address / Link ID (POI-Id)			

6.3.6 Delete a service port function (a4)

The manager may request the deletion of a Service Port Function.

Table 24: Delete service port parameters

Parameter	M/O	Value	Behavior
Near-end Node			
ResourceReference			

6.3.7 Read a service port function

For futher study.

6.3.8 Modify a service port function

For futher study.

6.3.9 Provision of admin domain (a4)

A manager may have the ability to request the creation or deletion of Admin Domains..

6.3.10 Set up/Release trail (a4)

A manager may initiate or release an OAN Transmission Protocol Trail. The initiation of this trail may be as a result of other internal functions.

7 Management information model

7.1 Overview of the management information model

The management information model describes all information objects needed for the successful operation of the management services listed in this Ensemble. The management information model is independent of the location of the information in OSF's. The information model is structured in fragments. The fragments themselves are derived from various GDMO libraries, such as V5, the AN network level view or the equipment. The overview lists the relationships which describe the cohesion between the fragments and provide an overall information model. Figure 10 identifies several management information model fragments. Relationships within the fragments are not depicted. The fragments are:

Transport bearer service Fragment(s) provide a functional representation of the transport service offered by the access network. Examples are: Leased Lines, V5-based PSTN/ISDN, non-V5-based PSTN/ISDN, etc. It is the core of the information model.

Topology Fragment takes care of the access network layout, the location of interfaces and user port and service port functions.

Equipment & Cabling Fragment handles the management of equipment structures and their physical connectivity.

Digital Section Fragment provides the service node interface with an association to a digital section.

Service Fragment handles the overall management of a service, i.e. the service identifier, the resources used to provide the service, etc. It also handles the management of the Service Providers making use of the Access Network including which service provider is responsible.

Transport Access Network Fragment manages the overall bandwidth of the access network. It is associated with the topology and the bearer transport subnetworks.

Not depicted is the technology-specific management of access network technologies such as FITL/PON or SDH as it is not relevant for service provisioning.

7.1.1 Major relationships

Following relationships connecting fragments are identified:

Owner identifies which service provider has "ownership" for which access network resource (user ports and/or service ports).

ServiceResource associates services with the resources.

Interface provides the association between a digital section fragment (which provides the "Point Of Interconnection" into the access network) and the transport bearer service fragments.

The **resourceLocation** relationship aids the TMN in locating network functionalities in respect to the network topology and the underlying transport access network.

Similarly, the **connectivity** associates a subnetwork (in V5 identified as a V5interface, in Leased Lines as a subnetwork) with its topological representation.

The **transmission** relationship associates the transport bearer service resources with resources in the transmission network(s). Equiment (port-#, racks, cards, cabling, etc) is mapped to the functional models (transport bearer service fragments) through the resource relationship.

The **equipmentLocation** relationship locates equipment within the topology of the access network.

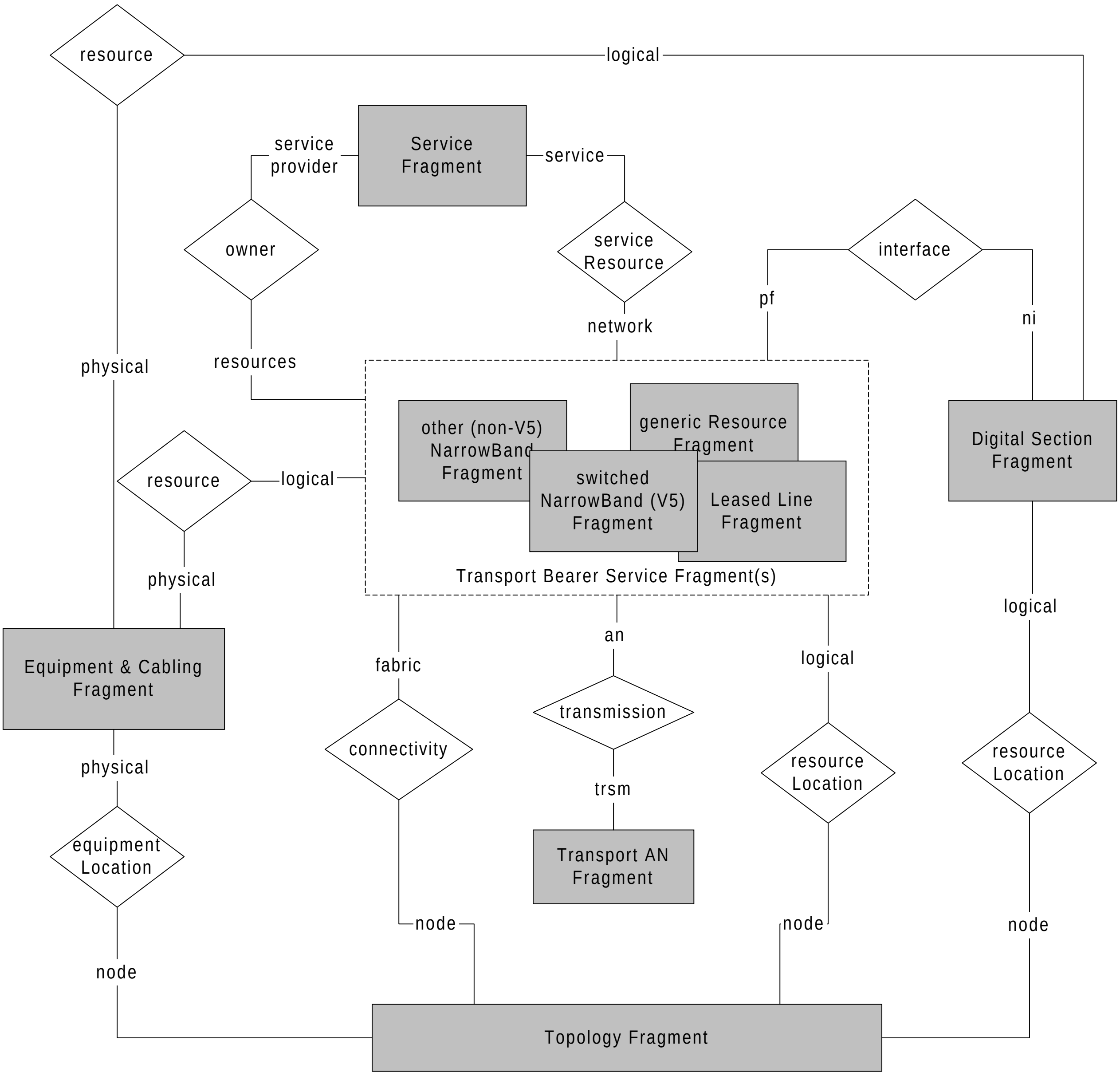


Figure 10: Information model (overview)

7.1.2 GRM description

This subclause describes the relationships used link the various fragments. GRM mappings are found in the fragments themselves.

7.1.3 Mapping to reference points

This subclause describes which fragment may be visible at which reference point. It will be changed following the implementation of the scenarios.

Table 25: Referency point mapping fragment

Fragment	Reference Point
Service	a3
Transport bearer service generic resource	a1, a2 a4, (a3)
Topology	a3, a4
Transport Access Network	a1
Equipment & Cabling	a1, (a3)
Digital Section	a1

7.2 Working assumptions

NOTE: This chapter defines working assumptions copied from the original model. Some of these assumptions are not captured in either the GOM or the network level model (transmission) and require liaison to appropriate sources.

Assumption 1: Nodes contain several equipment structures. Nodes are connected through subnetwork. A node may be part of several subnetworks. This relationship is implemented through the supportedbyObjectList within each node object.

Assumption 2: networkCTP’s are created by the equipment objects (FRU’s) which they support. The rationale for this assumption is that an equipment card will support the use of a maximum number of nCTP’s which may be independent of the type services the card implements. This leads to following change that nCTP’s are not contained within nTTP’s.

Assumption 3: We assume that nTTP’s belonging to the same subnetwork are non-blocking with blocking-restrictions implemented in the behavior of the subnetwork object. The rationale for this decision is reusability of the network level model for several technologies, e.g. FITL (where blocking between ONU-TTPs is possible and implementation dependent) and SDH-rings (which is inherently non-blocking).

Assumption 4: Because of configurable equipment types the rationale for using nGTP’s is becoming increasingly vague. As there is no clear justification for the usage of nGTP’s, we currently assume that nGTP’s aren’t necessary for the creation of subnetwork connections. This assumption must be revisited.

7.3 Service fragment

NOTE: No model identified, yet. Possible candidates are: The NMF Ordering Model or the X.160 Customer Network Management Model.

7.4 Topology fragment

7.4.1 Overview

NOTE: Alternate proposal based on M.3100 (right hand side) [4] is added without a decision which topology to use. Rationale for the second proposal: uses well accepted objects (as opposed to the GOM objects), introduces a simple relationship describing the connectivity across networks, adds the ability to model changing topologies due to link connections.

The topology fragment derives from information objects defined in [GOM]. The Node object identifies a distinct location within the access network. Nodes are defined when specific functionality is available at that location. Not all Service User Access Point (i.e. the endpoints of a drop at the service user's location) are modelled due to the large database size. Instead, the Node contains the information on all Service User Access Points which are reachable from that Node. The Administrative Domain objects are used to structure the access network along administrative regions.

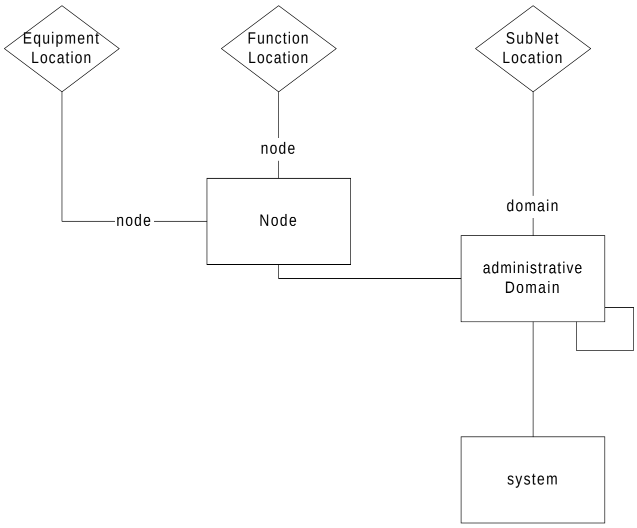


Figure 11: Topology Fragment (GOM-based proposal)

The topology fragment provides the framework in which the other fragments are located. In addition it provides the model for static blocking between ports within a bearer domain. Resources (both logical and physical) are associated to a managed element. A network consists of one or more managed elements(as may be the case in an Active Optical Network-AON). The network object provides the connectivity between the managed elements. The minimal structure for the topology management is depicted in Figure 12.

The most superior equipment object which is in the physical role of the RresourceLocation relationship provides the information on the actual node-location of the resources. Through a fine-grained modelling of the physical resources (see equipment fragment) additional details on the topology may be stored within the MIM.

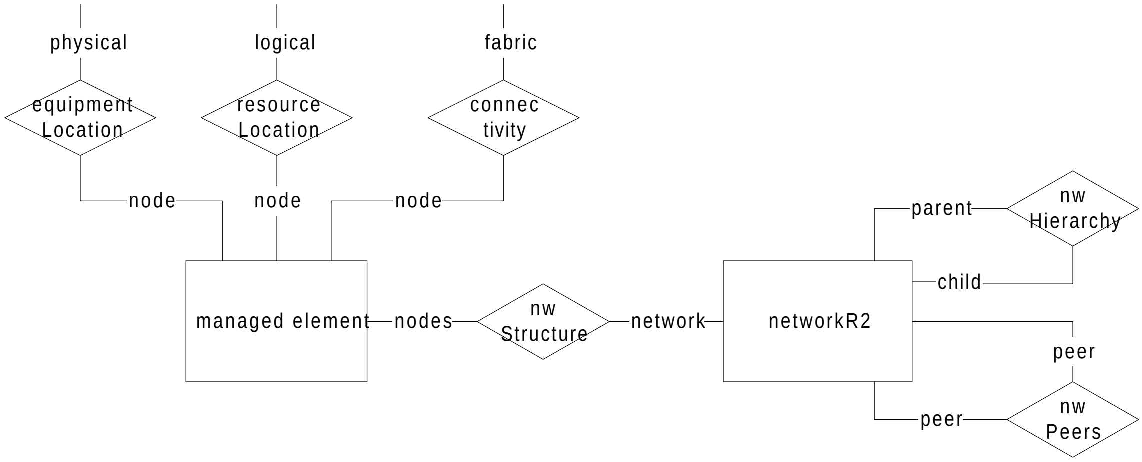


Figure 12: Topological fragment (M.3100 based proposal+ extensions)

The topology shall reflect the topological connectivity (i.e. static blocking) between the UPF and SPF, independent of bandwidth details. To comply with this requirement the relationship RnwPeers is introduced. Two networks such as SDH rings are considered peers in the case when they are interconnected by a link connection therby enabling new connectivity abilities. The MIM must reflect the ability to connect a user port from one ring to a service port of the other as required in NW-TOP-4. To implement this relationship, the network object is subclassed to **networkR1** object and augmented by a peerNetworkPointer to model peer-to-peer relationships between networks.

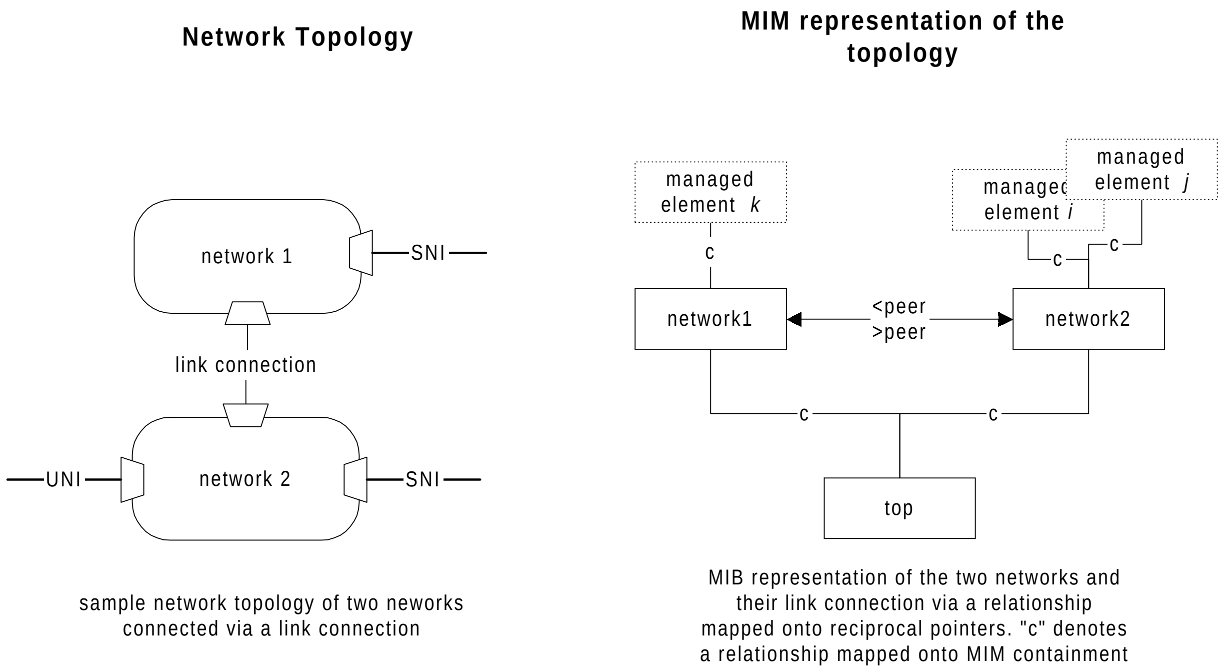


Figure 13: Peer-network example (left) and its MIM representation (right)

The minimal instantiation of a network topology consists of one networkR1 object and one managed element.

7.4.2 Information objects

This clause lists the objects and explains how they are used in this context. Include Q3 implementation comments if necessary.

7.4.3 Relationships

c.f. Relationship Mapping and the Relationships within the Fragment.

7.5 V5-based transport bearer service fragment

7.5.1 Overview

The V5 fragment derives from ETS 300 376 and ETS 300477.

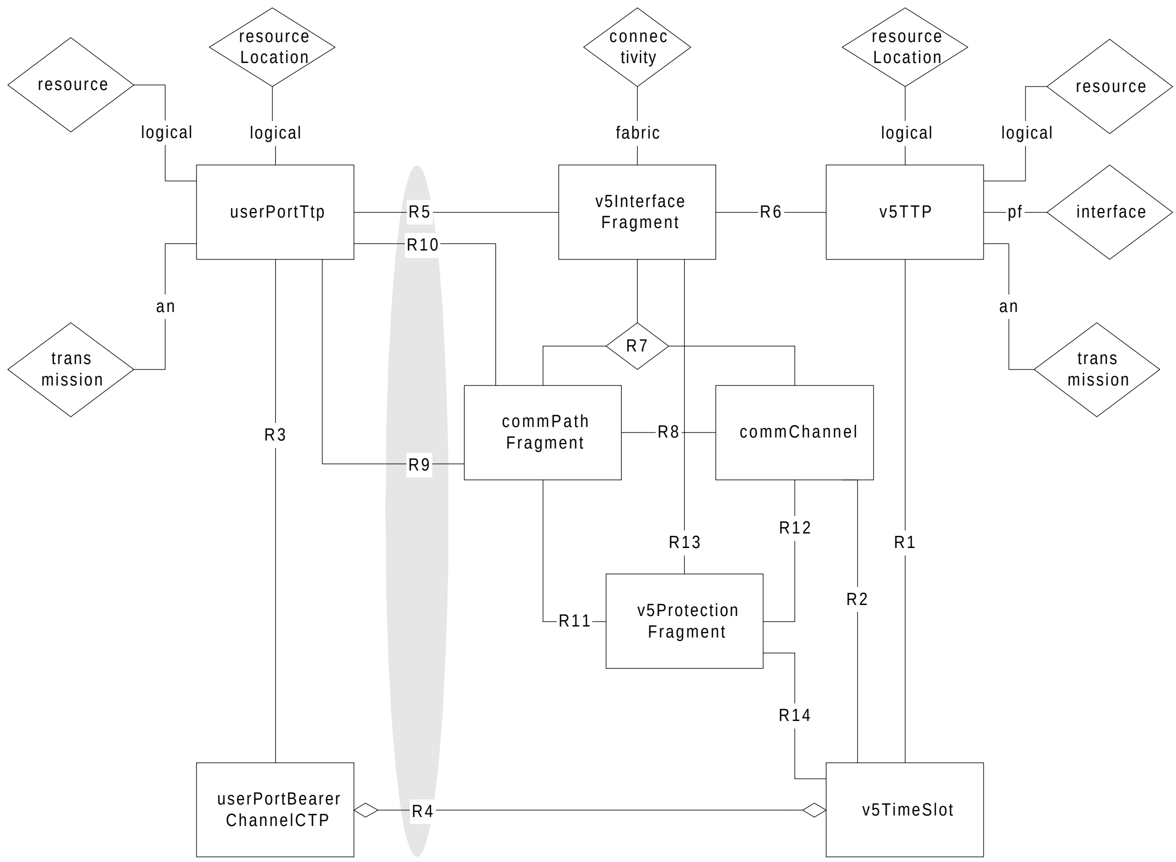


Figure 14: V5 transport bearer service fragment

The v5Interface fragment consists of the v5Interface object. Note, that the v5Provisioning object is not implemented. In V5.1, the commPath Fragment consists of the pstn-, isdn-, controlCommPath objects. V5.2 makes use of the bcc- and protectionCommPaths, too.

The creation of the MIB for the V5 fragment can be split into four parts. This structure can be observed as well in Figure 14.

1) The initial MIB Configuration: The managed objects which represent the domain for the V5 fragment (container objects) should be present before any other phase starts. (upper part of Figure 14).

2a) Insertion of the User Port and related objects. In this phase the UP Ttp and its related Bearer Channel Ctp's are instantiated (left part of Figure 14).

2b) Insertion of the V5.1 Interface related objects. Besides the V5 Interface MO, the V5Ttp, V5TimeSlot, commPath's and commChannel's too are instantiated is this phase (right part of Figure 14).

3) Provisioning of a V5.1 User Port. This phase assumes the precedent three phases are already done. No more managed object needs to be created, but the connections (relationship pointers) between the UP side and the V5 side must be set up. After this phase the service is available. In Figure 14 it is represented by the relationships R4, R5, R9 and R10 (greyed area).

7.6 non-V5 transport bearer service fragment

7.6.1 Overview

NOTE: Makes use of the userport objects from V5 but not the SNI parts; for futher study.

7.7 narrowband leased line transport bearer service fragment

7.7.1 Overview

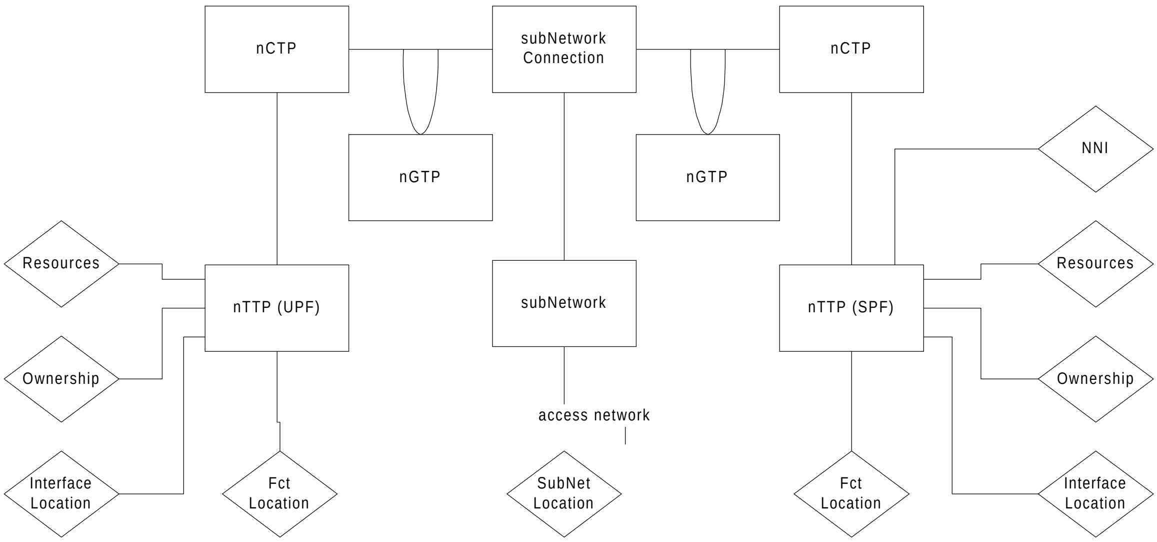


Figure 15: Leased Line transport bearer service fragment

Next to the E0 and E1 user ports and their associated channel objects (cTP's) the leased line fragment consists of several managed objects representing channel grouping and crossconnection facilities across the access network.

The gTP (group termination point) managed object is instantiated by the object fabric when the service type of the leased line is n * E0 and a crossconnection is to be created. It will be used to summarize the involved CTPs. The fabric managed object is instantiated a single time during the configuration and is responsible for the handling of connections across the access network. The crossconnection managed object provides the connection between user port and service ports and is instantiated through the fabric, once per connection.

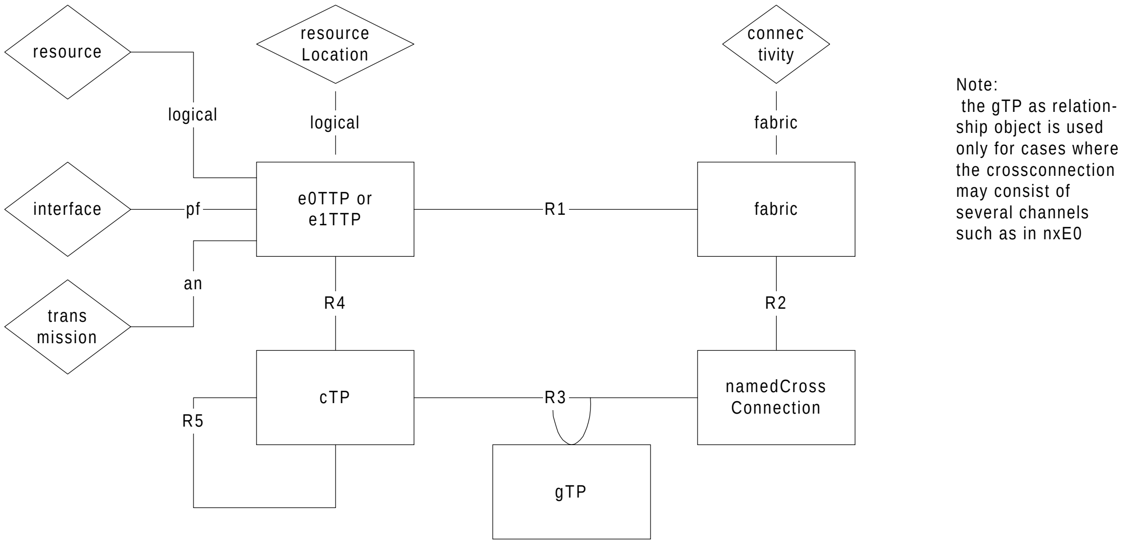


Figure 16: Leased Line transmission bearer service fragment

7.8 Digital section fragment

7.8.1 Overview

Simplified version describing only a 2 Mbit/s transmission system. For higher levels of multiplexing more layers need to be introduced (e2, e3, ...) or linked to the SDH model (ETS 300 304).

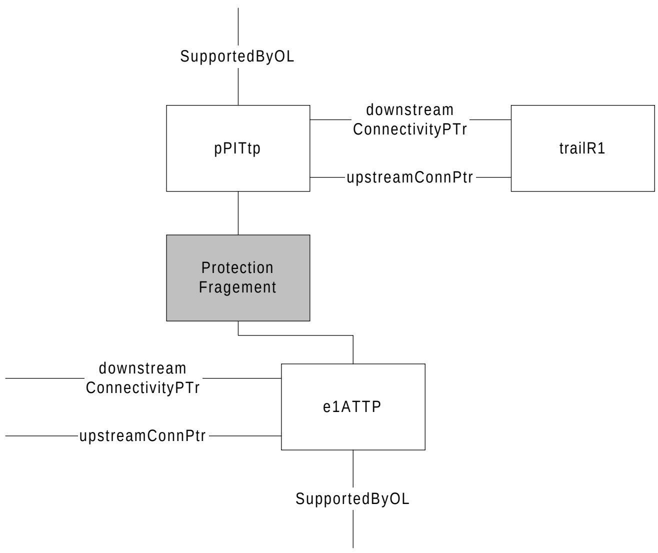


Figure 17: Digital section fragment

7.9 Equipment and cabling fragment

7.9.1 Overview

Describe when which variant of the two information models should be used (i.e. which mf's mandate their use).

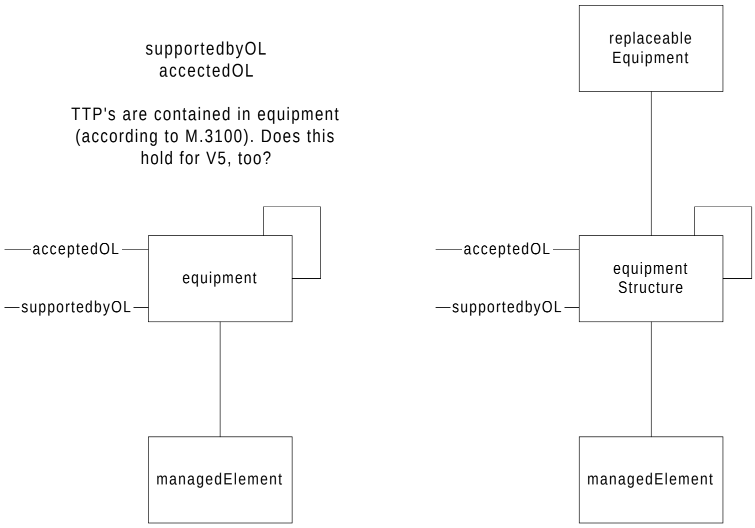


Figure 18: Equipment Fragment (retain only temporarily)

Equipment management itself lies outside the scope of this Ensemble. A minimal equipment management model is necessary, however, to provide for the proper configuration and provisioning processes. The equipment model must also take the management of connection points into account should the manager wish to store such information (see topology fragment). Dependencies within the equipment model (e.g. between line cards and their power supply) are not considered here because they are irrelevant for configuration management purposes.

Figure 19 describes the managed objects and relationships required to cover the minimal requirements.

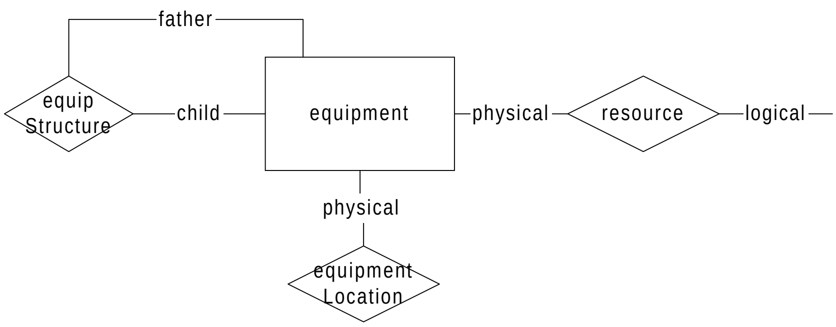


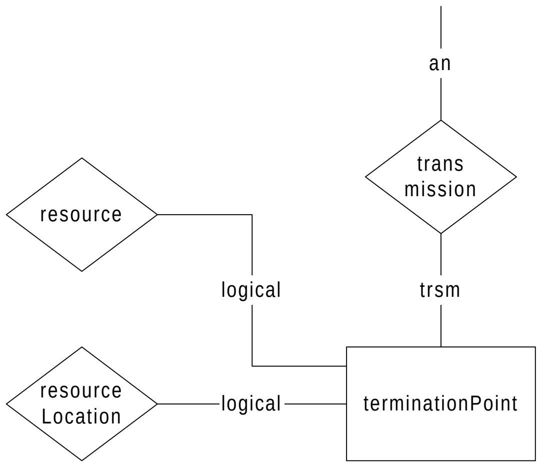
Figure 19: Equipment fragment

The Resource connects logical resources and a physical resource.

The minimal number of instantiations for the equipment fragment is 1, e.g. for the modelling of an multiplexer. In those cases, where the equipment structure isn't modelled, the logical resources may take over this functionality (e.g. by using the RDN as an identifier of the equipment port to which this logical resource is mapped to).

7.10 Transport access network fragment

The transport access network fragment describes the transmission aspects of the one or more subnetworks compromising the access network. Its internal structure is outside the scope of this ensemble. Relationships between the transport bearer service fragment and the transport access network fragment describe the mapping of logical resources to transmission resources. The connectivity across the access network (e.g. the relationships R4/R5/R9/R10 in the V5 model) are not explicitly mapped. It is assumed that the implementation of the connection-setup between userport and serviceport handles the provisioning of transmission resources and the connection setup in the transmission network(s).



Note: the relationships *resource* and *resource-Location* link this fragment to the equipment and topology fragments and are listed for completeness' sake. They remain outside the scope of this ensemble.

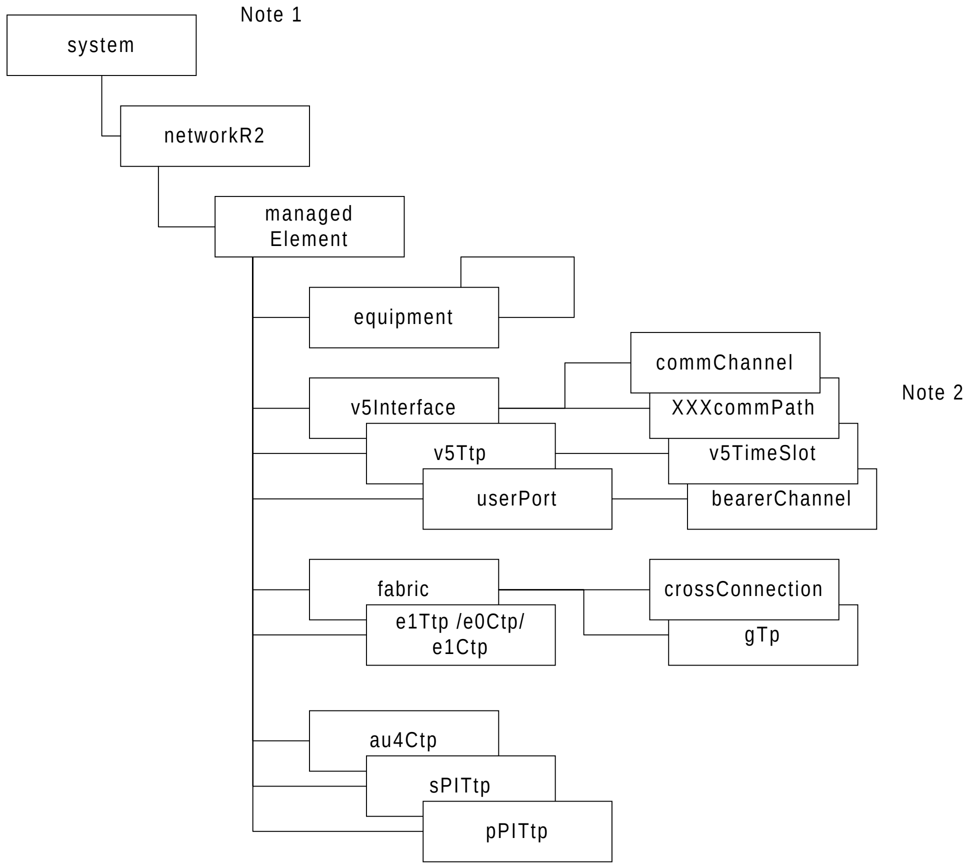
Figure 20: Transport access network fragment

8 Engineering Viewpoint

8.1 GDMO definitions

NOTE: This chapter is meant as a temporary placeholder for Engineering Viewpoint issues. The final document structure may require revision.

8.1.1 Name binding tree



Note 1 : system provides EFD-services
Note 2 : v5Protection is currently not included as outside the scope of this Ensemble

Figure 21: Name binding tree

8.1.2 Additional GDMO

```
networkR2 MANAGED OBJECT CLASS
   DERIVED FROM      networkR1;
   CHARACTERIZED BY
      networkR2Package PACKAGE
         BEHAVIOUR
            networkR2Behaviour BEHAVIOUR
               DEFINED AS
                     "The networkR2 object provides for a simple machanism
                      to manage the topology of linked subnetworks through
                      a peer-relationship. Peer networks provide for static
                      blocking, i.e. the network topology can support the
                      creation of a trail between arbitrary termination points
                      between peer networks.";;
         ATTRIBUTES
            peerNetworkList GET-REPLACE;;;
REGISTERED AS {m3100ObjectClass xx};


peerNetworkList ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   ASN1DefinedTypesModule.ObjectList;
   MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
   BEHAVIOUR
      peerNetworkListBehaviour BEHAVIOUR
         DEFINED AS
               "The Peer Network Pointer attribute type specifies the object
               instances representing networks which are related to each
               other due to topological connections, e.g. link connections.
               The peer relationship models uniquely the static blocking
```

```
            ability of the set of subnetworks.";;
REGISTERED AS {m3100Attribute xx};
```

8.2 Notifications

The following table lists the generic notifications emitted by the objects in this ensemble. Values in brackets denote the status of the notification in the base library, the second term the ensemble requirement.

Table 26: Notifications emitted by objects

Managed Object Class	object creation & deletion	attribute value change	relationship change	state change
v5Interface	-	-	(C) -	-
v5Ttp	(C) M	(C)	-	(C)
v5TimeSlot	(C) -	(C)	-	(C)
commChannel	M	-	-	-
commPath	M	-	-	-
userPort	(C) M	(C)	-	(C)
bearerChannel	(C) -	(C) -	-	(C)
e1Ttp	(C)	(C)	-	(C)
e0Ctp, e1Ctp	(C) M	(C) M	-	(C)
gTP	-	-	-	-
fabric	-	-	-	-
crossconnection	-	-	-	-
managed element	(C) -	(C)	-	(C)
equipment	(C) M	M (C)	-	M (C)
network	-	-	-	-

9 Scenarios

Four types of scenarios are distinguished: general scenario's providing "house-keeping" functions, (like installation and configuration) scenarios for service user ports and provisioning scenarios. Scenario's with similar algorithms (such as pstn or leased line installation) are considered equivalent and noted as such.

Pre and postconditions define predicates which apply to the MIB. They do *not* list the possible interactions between manager and agent. The scenarios describe the management-interactions between manager and agent.

9.1 General Scenarios

9.1.1 Initial MIB structure

This scenario describes the stepwise construction of the initial structure of the MIB as considered relevant for the subsequent scenarios. This scenario is executed once upon the instantiation of the agent.

Precondition

A system ***s*** exists. Note, that the system provides the OSI system management functionality and is specific to implementations

Postcondition

A system ***s***, one or more networks ***n*** and one or more managed elements ***me*** are defined, where each $\boldsymbol{me_i}$ is in relationship to a network ***n*** (relationship nwStructure) and all networks ***n*** are related to a system ***s*** (containment relationship).

Scenario

The container object at highest level for a topological unit is a network. If it doesn't exist yet then execute this:

1) Create a network object.

Mgr -->

M-CREATE Request (..., managedObjectClass = networkR1, managedObjectInstance = <automatic_naming>, superiorObjectInstance = ***system***, ..., attributeList = { systemTitle = <Domain_Name>,... }, ...)

Mgr<--

M-CREATE Confirmation (..., attributeList = {***net*** = networkId} ...)

2) Creation of an object of type managedElement. At least one is needed, but depending on the physical network configuration more can be instantiated.

Eventually repeat the following as needed:

Mgr -->

M-CREATE Request (..., managedObjectClass = managedElement , managedObjectInstance =, superiorObjectInstance = ***net***, ..., attributeList = { managedElementId = <RDN of the instance>, locationName = ..., vendorName = ..., ...}, ...)

Mgr<--

me = M-CREATE Confirmation (...)

NOTE: No NOTIFICATION is emitted.

9.1.2 Locate a port

This scenario provides the functionality to locate a port based on following criteria's: equipment-id, port-type, equipment location, node location, user-defined.

Table 27: Criteria to locate port

Requirement	Managed Object	Attribute
cable number	all tTP-derived objects	userLabel
service provider defined code	all tTP-derived objects	userLabel
port identification	all tTP-derived objects	tTPid
equipment location	equipment, tTP	equipmentId, tTPid (note 2)
transport bearer service domain	network	systemTitle
port type	all tTP derived objects	objectClass

NOTE 1: Topological location removed as its description is unclear. Syntax removed as its either part of the GDMO specification or else operator specific.

NOTE 2: See subclause 5.1.2

Precondition

There exists a network ***n***.

Postcondition

There exists a network ***n*** and zero or more objects passing the query request are provided, or, an error-indication is emitted by the agent.

Scenario

The example scenario models a query of a port using a "user-defined code".

Mgr -->

M-GET Request (..., scope = {baseObjectClass=network, baseObjectInstance=***n***, managedObjectClass=ttp, level=+2} filter={"userLabel contains the searchstring"})

Mgr <---

M-GET Confirmation (...) OR

M-GET-Error (...)

9.1.3 Ensure connectivity between User Port and Service Port

This scenario verifies that two ports (User and Service) are connectable across the same access network. Assuming the two Port instances are given, the scenario consists in checking if the two ports have the same network MO as "root" MO in the MIB containment tree.

Precondition

There exist a service port ***sp*** and a user port ***up***, where both are subclasses of trailTerminationPoint.

Postcondition

no change to the MIB.

Scenario

1) Compare the distinguished names of the ports to be compared, whether they contain the same root network managed object instance. This results in the variables ***network1*** and ***network2.***

2) If the two ports do not share the same network instance, one of the two networkR2 instances must be fetched. If one network object instance name is found in the peerNetworkList of the other, a static connection exists between the two transport bearer service domains.

Mgr-->

M-GET Request (…, baseObjectClass = networkR2, baseObjectInstance = ***network1***, …);

Mgr<--

M-GET Confirmation(...);

NOTE: the same approach may be used to ensure connectivity between equipment.

9.1.4 Insert equipment

The insert equipment operation creates the appropriate equipment structure within the MIB. Equipment insertion may be initiated by the manager or the agent, depending on the equipment management functionality. This scenario describes the minimal operations. The entire structure of the equipment is supplier-dependent.

The superior Managed Object (MO) can be a managed elementor also an equipment dependent of the network topology. The equipment can be the portrayal of a element, cabinet, shelf or slot.

In case of failure, the cause shall be identified.

9.1.4.1 Agent driven on-line installation

Precondition

There exists a managed element ***me*** or an equipment object ***e***, where ***me*** represents the management domain of where the new equipment is to be installed and the equipment ***e*** represents an (optional) superstructure in which the equipment is inserted.

Postcondition

One or more equipment objects $\boldsymbol{e_{1..n}}$ have been created, contained in either ***me*** or ***e*** and ($\boldsymbol{e_i}$.operationalState = enabled, $\boldsymbol{e_i}$.administrativeState = unlocked) and (one or more terminationPoint objects $\boldsymbol{tp_{1..m}}$ representing the logical resources provided by the equipment);

or

no change to the MIB.

Scenario

The agent receives notifcation from the NE that equipment has been installed and automatically generates the appropriate MIB structure. Opon completion it notifies the Manager of the equipment now available. If an equipment installation failed an alarm is raised, describing the cause.

This scenario will work with all M3100.equipment and all subclasses.

Mgr<--

M-EVENT-REPORT (objectCreation, 1,managedObjectClass = equipment,managedObjectInstance = equipmentId, …)
or
M-EVENT-REPORT(alarm)

9.1.4.2 Mgr/Agent driven pre-installation

9.1.4.2.1 Part 1: pre-installation phase

The manager creates the expected equipment. The agent automatically generates the appropriate MIB structure. Note, that the manager may now provide equipment parameter information (e.g. userPort configuration data).

This scenario will work only with G.774.SDHequipment and subclasses.

NOTE: Verify if other equipment objects support this feature.

Precondition

There exists a managed element ***me*** or an equipment object ***e***, where (***me*** represents the management domain of where the new equipment is to be installed) and (the equipment ***e*** represents an (optional) superstructure in which the equipment is inserted) and (the namebinding used to represent the equipmentLocation/equipmentStructure relationships to $\boldsymbol{e_1}$ supports the M-CREATE operation).

Postcondition

One or more equipment objects $\boldsymbol{e_{1..n}}$ have been created, contained in either ***me*** or ***e***) and (one or more terminationPoint objects $\boldsymbol{tp_{1..m}}$ representing the logical resources provided by the equipment)) and ($\boldsymbol{e_{1..n}}$ and $\boldsymbol{tp_{1..m}}$ are both parties of the resource relationship) and ($\boldsymbol{e_{1..n}}$.equipmentActual = "").

or

Precondition.

If the equipment is physically not yet available this is indicated by the use of a parameter within the associated logical resources (AvailabilityStatus contains "notInstalled").

Scenario

1) Insert the equipment managed object at location equipment. The managed object class ***equipment*** is created by the manager. Following sequences must be executed.

Mgr -->

M-CREATE Request (..., managedObjectClass = equipment, superiorObjectInstance = ***me*** OR ***e***, ..., attributeList = {{ nameBinding = } { attributeId = "" } ... }, ...)

Mgr <--

M-CREATE Confirm (...)

2) The following notification is emitted **only if** the M-CREATE Confirmation was successful. If the M-CREATE failed (e.g. slot occupied or pwer-supply insuffient for support of the linecard) the MIB must be rolled back to the precondition.

A series of M-EVENT-REPORTS are received due to the creation of the logical resources associated with ***equipment***.

Mgr<--

M-EVENT-REPORT (objectCreation, 1, managedObjectClass = equipment, managedObjectInstance = equipmentId, …)

9.1.4.2.2 Part 2: installation phase

The agent receives notifcation from the NE that equipment has been installed and compares it with the expected equipment. If the actual equipment and the expected equipment don't match, an alarm is raised. If configuration information is already available it is downloaded into the network element.

Failure of this scenario is due to the installation of undefined or wrong equipment.

Precondition

There exists a managed object e_1 of class equipment with e_1.equipmentActual="".

Postcondition

There exists an equipment e_1 where (e_1.equipmentExpected = e_1.equipmentActual)) or ((e_1.equipmentExpected <> e_1.equipmentActual) and (e_1.operationalState=disabled).

or

Precondition.

Scenario

The notification indicates a change in the attribute equipmentActual.

Mgr<--

M-EVENT-REPORT (attributeValueChange, 1, managedObjectClass = equipment, managedObjectInstance = equipmentId, …)

In addition, the agent verifies if the equipment actual conforms to the expected equipment, and if not, issues a second notificiation.

Mgr<--

M-EVENT-REPORT (equipmentAlarm, 1, managedObjectClass = equipment, managedObjectInstance = equipmentId, …)

9.1.5 Delete equipment

The deletion of equipment makes the Frequently Replacable Unit (FRU) unavailable to installation or provisioning functions. Alarms from equipment earmarked as removed are not forwarded anymore.

Failures of this scenario may be due to unexpected implications of the command (e.g. removal affecting other services), unkown or wrong equipment.

9.1.5.1 Agent-driven deletion

Precondition

There exists **e_1** of class equipment and **tP_i**, i=1..n of class terminationPoint and (for all **tP_i** in relationship to **e_1** via the resource relationship there holds **tP_i**.administrativeState=locked or **tP_i**.administrativeState=shutingDown) and e1.namebinding does not support the M-DELETE operation.

Postcondition

There does not exist any object **e_1** nor terminationPoint objects **tP_i**, i=1..n, associated to **e_1** through the resource relationship.

Scenario

Mgr -->

M-SET Request (..., managedObjectClass = equipment, managedObjectInstance = equipmentId,
attributeList = { administrativeState = shutingDown});

Mgr <---

M-SET Confirm (...);

M-EVENT-REPORT (StateChangeNoticifcation, administrativeState=locked).

NOTE: At this stage reactivation of an equipment remains possible until the equipment has been removed.

Mgr <--

M-EVENT-REPORT (objectDeletion, 1, managedObjectClass = ttp, managedObjectInstance = ttpId, …);

M-EVENT-REPORT (objectDeletion, 1, managedObjectClass = equipment, managedObjectInstance = equipmentId, …).

9.1.5.2 Mgr/Agent-driven deletion

Precondition

There exists **e_1** of class equipment and **tP_i**, i=1..n of class terminationPoint and (for all **tP_i** in relationship to **e_1** via the resource relationship there holds **tP_i**.administrativeState=locked or **tP_i**.administrativeState=shutingDown) and e1.namebinding supports the M-DELETE operation.

Postcondition

There does not exist any object **e_1** nor terminationPoint objects **tP_i**, i=1..n, associated to **e_1** through the resource relationship.

Scenario

The manager initiates shutdown.

Mgr -->

M-SET Request (..., managedObjectClass = equipment, managedObjectInstance = equipmentId,
attributeList = { administrativeState = shutingDown}).

Mgr <---

M-SET Confirm (...).

Mgr <--

M-EVENT-REPORT (StateChangeNoticifrcation, administrativeState=locked).

NOTE: At this stage reactivation of an equipment remains possible until the equipment has been removed.

Mgr -->

M-DELETE Request (..., managedObjectClass = equipment,managedObjectInstance = equipmentId,
superiorObjectInstance = ***equpimentId*** , ...).

The deletion of the equipment object results in the deletion of all associated logical resources. This will result in the events emitted for certain resources (cf. Notfication table).

Mgr <--

M-EVENT-REPORT (objectDeletion, 1, managedObjectClass = ttp, managedObjectInstance = ..., …).

Mgr <--

M- DELETE Confirmation (..., successful, managedObjectClass = equipment, managedObjectInstance = ***equipmentId***).

9.2 User port management scenarios

9.2.1 Insert user port

The insert operation creates the MIB structure of a user port. This scenario is only a component of the entire scenario as described in clause 9. This operation is applicable to user ports: pstnUserPort, isdnBAUserPort, E0ctp and E1tTP. The precise structure is identified by the equipment inserted.

The following scenario applies for an isdnBAUserPort.

Precondition

There exists a managed element ***me*** and an instance ***e*** of class equipment that supports the functionality provided by the user port.

Postcondition

PSTN:
There exists an object instance ***u*** of class pstnUserPort and one instance ***bc1*** of class userPortBearerChannelCtp where (***u*** and ***bc1*** are related through the R3 relationship) and (a logicalResource-relationship exists between ***u*** and ***me***) and (a resource-relationship exists between ***u*** and ***e***) and (***u***.administrativeState = locked) and (***u***.specialFeatures = {}).

ISDN BA:
There exists an object instance ***u*** of class isdnBAUserPort and two instances ***bc1*** and ***bc2*** of class userPortBearerChannelCtp where ***u*** and ***bc1*** as well as ***u*** and ***bc2*** are related through the R3 relationship) and (a logicalResource-relationship exists between ***u*** and ***me***) and (a resource-relationship exists between ***u*** and ***e***) and (***u***.administrativeState = locked) and (***u***.gradingEnabled = disabled).

E0 / E1 unstructured:

There exists an object instance ***u*** of class e0Ctp or e1Ctp with (a logicalResource-relationship exists between ***u*** and ***me***) and (a resource-relationship exists between ***u*** and ***e***) and (***u***.administrativeState = locked).

E1 structured port:

There exists one object instance ***u*** of class e1Ctp, one instance ***t*** of class e1Ttp and instances c_i i=1..30 of class e0Ctp with (***u*** in the superior role of the containment relationship between ***u*** and ***t***) and (all c_i in the subordinate role of the containment relationship between ***t*** and c_i) and (***u***.administrativeState=locked) and (***t***.administrativeState=locked) and (all ci, i=1..30: c_i.administrativeState=locked).

Scenario

The manager is informed of the creation of user ports as follows:

Table 28: User port insertion

user port	notification
pstnUserPort	M-EVENT-REPORT (objectCreation, ..., 1, managedObjectClass = pstnUserPortTtp, managedObjectInstance = tTPId)
isdnUserPort	M-EVENT-REPORT (objectCreation, ..., 1, managedObjectClass = isdnBAUserPortTtp, managedObjectInstance = tTPId)
E0	M-EVENT-REPORT (objectCreation, ..., 1, managedObjectClass = e0Ctp, managedObjectInstance = cTPId)
E1 unstructured	M-EVENT-REPORT (objectCreation, ..., 1, managedObjectClass = e1Ctp, managedObjectInstance = cTPId)
E1 structured	M-EVENT-REPORT (objectCreation, ..., 1, managedObjectClass = e1Ctp, managedObjectInstance = cTPId) 30 times: M-EVENT-REPORT (objectCreation, ..., 1, managedObjectClass = e0Ctp, managedObjectInstance = cTPId)

9.2.2 Remove User Port

The delete operation removes the MIB structure of a user port. This operation is applicable to user ports: pstnUserPort, isdnUserPort, E0CTP and E1tTP. Note, this operation is performed only in conjunction with the "Delete Equipment" scenario (subclause 9.1.5). The following example applies to all user ports listed above.

Precondition

The precondition ensures that no services or active resources are bound to the user port.PSTN / ISDN BA / E0 / E1u / E1s:

for ***u*** of class termination point it holds that (u.administrativeState = locked)
and (for ***u*** of type pstnUserPortTtp it holds that (***u*** is not party of an R5 relationship) and
(no c_i: bearerChannelCtp, i=1, with c_i contained in ***u*** are party of an R4 relationship))
and (for ***u*** of type isdnBAUserPortTtp it holds that
(***u*** is not party of an R5 relationship) and (***u*** is not party of an R9 relationship) and
(***u*** is not party of an R10 relationship) and
(no c_i: bearerChannelCtp, i=1..2, with c_i contained in ***u*** are party of an R4 relationship))
and (for ***u*** of type e0Ctp it holds that (***u*** is not party of an R1 relationship) and (***u*** is not party of an R3 relationship)
and (for ***u*** of e1Ctp it holds that (***u*** is not party of an R1 relationship) and (there exists a ***t***:e1Ttp contained in ***u***) and
(no c_i: e0Ctp, i=1..n, with c_i contained in ***t*** is party of an R3 relationship).

Postcondition

there exists no ***u.***

Scenario

This example scenario applies to isdnBA, but applies, in similar fashion to all user ports (cf. also table 26).

1) Two userPortBearerChannelCtp are related to the isdnBAUserPortTtp instance object "***isdnUPTtp***" that is going to be deleted: they need to be deleted first.

Mgr <--

M-EVENT-REPORT (objectDeletion, 1, managedObjectClass = isdnBAUserPortTtp, managedObjectInstance = ***isdnUPTtp***, …).

9.2.3 Read User Port

This operation is applicable to user ports: pstnUserPort, isdnBAUserPort, E0CTP and e1Ctp.

Scenario

1) Read the current values of the attributes of a given isdnBAUserPortTtp object ***isdnUPTtp***:

Mgr -->

M-GET Invoke (..., baseObjectClass:= isdnBAUserPortTtp, baseObjectInstance:= ***isdnUPTtp*** , ...,);

Mgr <--

isdnUPTtp = M-GET Result (..., attributeList = {...})

9.2.4 Modify User Port Attribute

This operation is applicable to user ports: pstnUserPort, isdnBAUserPort, E0CTP and E1CTP. Excluded from this list are attributes participating in a relationship, such as the isdnBAUserPort. assocIsdnSignallingCommPath attribute.

The scenario focusses on attribute changes which have an effect outside the user port itself. It also includes checks to be performed by the agent itself, e.g. conistency test of the Layer3Address.

Table 27: List of notifications

OBJECT.ATTRIBUTE	FROM/TO	PRECONDITION	POSTCONDITION
tp.administrativeState	locked/unlocked	adminState=locked	tp is party of a transmission-Relationship (bandwidth provided by the access network)
userPort.administrativeState	unlocked/ shutdown	adminState=unlocked	all contained channels are set to shutdown
(e0Ctp, e1Ctp) .administrativeState	unlocked/ shutdown	adminState=unlocked	all contained channels are set to shutdown
tp.administrativestate	shutdown/ locked	adminState=shutdown and all contained channels are locked	tp is released of a transmission-Relationship (reserved AN-bandwidth freed)
to be completed...	...	...	...

9.2.5 Modify user port association

The following scenario provides an example of establishing a PMBS service feature for an isdnBA user port. The scenario assumes that the communication path has already been selected by the manager.

Precondition

There exists an isdnBAUserPort ***u***, an isdnCommPath ***c*** and a v5Interface ***v*** with
(***u*** and ***v*** are bound through a R5 relationship) and (***c*** is contained in ***v***) and (***c***.dataType=pType) and
(***u***.assocPacketCommPath={})

NOTE: Is there a precondition that the available capacity across the C-channel must be verified prior to the association establishment?

Postcondition

for ***u***: isdnBAUserPort and ***c***: isdnCommPath it holds that (***u***.assocPacketCommPath = ***c***) and (***u*** IN ***c***.clientUserPorts)

Scenario

Mgr -->

M-ACTION setReciprocalPtr Request (v5Interface, ***v***, ..., actionInfoArg = {
objectClass1 = isdnBAUserPort, objectInstance1 = ***u***, attribute1 = assocPacketCommPath,
objectClass2 = isdnCommPath, objectInstance2 = ***c***, attribute2 = clientUserPorts } }, ...)

Mgr <--

M-ACTION setReciprocalPtr Confirm (..., ActionReply = {originalPointerInfo = (failed ¦ set) } ...)

9.3 Service Port Management Scenarios

9.3.1 Insert V5.1 Interface

The V5.1 interface is inserted in a given equipment identified by the equipment-id. The equipment-id itself may be found using the "locate a port" scenario. This scenario builds the entire V5.1 MIB structure as predefined in the v5 policy.

Precondition

There exists ***e***: equipment

Postcondition

There exist ***v***: v5Interface, ***t***: v5Ttp, ***c1***: commChannel, ***ctrl***: contorlCommPath, ***pstn***: pstnCommPath,
i1, ***i2***: isdnCommPath where
(***i1***.dataType = dType) and (***i2***.dataType= pType) and (***c1***, ***ctrl***, ***pstn***, ***i1***, ***i2*** contained in ***v***) and
(***v*** and ***t*** are party of the same relationship R6) and
(***v***.supportedProtocolVersion ="V51")

NOTE: There is a dependency between v.availabilityStatus and the status of the equipment, such as ("notInstalled" in v.availabilityStatus) iff (resource.physical.equipmentActual <> resource.physical.equipmentExpected).

Scenario

1) Based on the equipment-DN of ***e***, its superior managed element-DN ***me*** is identified.

2) create a v5Interface object.

Mgr<--

M-EVENT-REPORT (objectCreation ,..., 1, managedObjectClass = v5Interface, managedObjectInstance = v5InterfaceId);

M-EVENT-REPORT (objectCreation ,..., 1, managedObjectClass = v5Ttp, managedObjectInstance = tTPId).

Mgr<--

M-EVENT-REPORT (objectCreation, ..., 1, managedObjectClass = commChannel, managedObjectInstance = commChannelId).

Mgr<--

M-EVENT-REPORT (objectCreation ,..., 1, managedObjectClass = controlCommPath, managedObjectInstance = commPathId).

3) Generate the relationship instances between the managed objects of the V5 interface MIB structure.

9.3.2 Associate v5 link to physical link

This operation associates the v5Ttp to a trail termination point of a transmission system. The Point of Interconntection is handled by this TTP.

This operation may yield redundant in cases where the v5Ttp represents the link itself (as is the case in small network elements). The manager may identify this case by verifying if the (v5Ttp.upstreamPointer = NIL) & NOT("offline" IN v5.availabilityStatus).

The unlinking of the service port is equivalent and performed with the releaseReciprocalPointer action.

Precondition

There extits a v5Ttp ***v*** and a trail termination point ***t*** representing a transmisison (digital section) resource.

Postcondition

v and t are associated through the interface relationship where (v participates in the anRole) and (t in the dsRole).

Scenario

1) The digital section is identified by a location-code, e.g. the Point Of Interconnection (POI). The scenario "locate a port" makes it available. Note it may be of any subclass of M3100:trailTerminationPoint. It is up to the agent to verify if it is compatible with service port.

2) Establish interface relationship:
The relationship RdigitalSection is established with the digitalSection-ttp in the dsRole and the service port in the anRole. Note, that this operation may result - on the access network/digital section transmission level - in a series of routing management operations to generate the trail between the service port and the digital section ttp.

Mgr -->

M-ACTION setReciprocalPtr Invoke (..., actionInfoArg =
objectClass1 = v5Ttp, objectInstance1 = ***v***, attribute1 = upStreamConnectivityPointer,
objectClass2 = *tTP*, objectInstance2 = ***t***, attribute2 = downStreamConnectivityPointer } }, ...)

Mgr <--

M-ACTION setReciprocalPtr Result (..., ActionReply = {originalPointerInfo = (failed ¦ set) } ...)

9.3.3 Startup the V5.1 Interface

The V5.1 interface is activated through a management command, in this case by the Access Network Operator. Once a V5interface is physically available and configured it can be associated with the counterpart interface on the local exchange side. System startup and restart is provided through the v5Interface.systemStartup and v5Interface.restart ACTIONs. The v5Interface.systemStartupResult and v5Interface.restartResult notifications deliver the action results.

Precondition

There exists a ***v***: v5Interface, ***t***: v5Ttp, ***e***: equipment where (***v*** and ***e*** are related through the resource relationship) and (***e***.eqiupmentActual=***e***.equipmentExpected) and (***t*** and ***v*** are related through an R6 relationship) and (***v***.operationalState=disabled)

NOTE: Alternatively "notInstalled" $\notin$ v.availabilityStatus may be applied.

Postcondition

There ***v***.operationalState = "enabled" and for all ***t***: v5Ttp holds that ***t***.operationalState = "enabled";
or;
there exists a ***t***: v5Ttp which is in relationship to ***v*** with ***t***.operationalState = "disabled".

Scenario

1) Issue to command to activate the V5 interface.

Mgr -->

M-ACTION systemStartup(Mode = confirmed, ManagedObjectClass = v5Interface, ManagedObjectInstance = ***v5in***,).

Mgr<--

M-ACTION Result (...)

2) Inform the manager of the result of a systemStartup. This operation takes place, too, if the systemStartup was initiated by the peer V5-interface.

Mgr<--

M-EVENT-REPORT (systemStartupResult, ...,ManagedObjectClass = v5Interface, ManagedObjectInstance = v5interfaceId,
..., EventInformation = { Success }, ...).

9.3.4 Delete V5.1 Interface

This operation removes the V5.1 management interface structure from the MIB. This scenario is a component of the equipment deletion scenario listed in subclause 9.1.5.

Precondition

For all ***t***: v5Ttp associated to the ***v***: v5 interface and the ***ts:*** bearerChannels associated to ***t*** holds that
(***v***.clientUserPorts = NULL) and (all $\boldsymbol{ts_i}$.assocResource=NULL) and (all $\boldsymbol{ts_i}$.v5ChannelType=bearerChannel).

Postcondition

there exists no ***v***, ***t*** and subordinate object instances.

Scenario

1) The scenario assumes, that remaining reciprocal relationships are removed automatically if contained within the same subtree. Only those relationships between v5interface and v5Ttp subtrees need to be terminated.

Mgr <--

M-EVENT-REPORT (objectDeletion , managedObjectClass = v5Interface, managedObjectInstance = ***v5in*** ...).

9.3.5 Modify V5.1 Interface

Change a timeslot to commChannel usage.

Precondition

There exist ***v***: v5Interface, ***ts***: v5Timeslot, ***c***:commChannel for which hold that
(***ts*** is contained in ***v***) and (***c*** is contained in ***v***) and (***ts***.v5ChannelType = "bearerChannel") and (***ts***.assocResource = NULL)).

Postcondition

ts.v5ChannelType = "commChannel".

Scenario

NOTE: A similar scenario applies when changing a commChannel to a bearerChannel with the difference that the commChannel may not carry any signalling information.

Establish the R5 relationship.

Mgr -->

M-ACTION setReciprocalPtr Invoke (..., actionInfoArg =
objectClass1 = v5TimeSlot, objectInstance1 = ***ts***, attribute1 = assocResource,
objectClass2 = commChannel, objectInstance2 = ***c***, attribute2 = assocV5TimeSlot} }, ...).

Mgr <--

M-ACTION setReciprocalPtr Result (..., ActionReply = {originalPointerInfo = (failed ¦ set) } ...).

9.4 Provisioning

9.4.1 Establish a connection to a V5.1

This scenario provides for the connection between an ISDN basic rate user port and a V5.1 interface. The input parameters are *u* = userPort and *v* = v5Interface, identified by their Distinguished Name (DN). The DN itself is provided by the "Locate Port" scenario.

Precondition

∃(***u***: isdnBaUserPortTtp) ∧ ∃(***v5in***: v5Interface) ∧ ("***u*** and ***v5in*** within the same access network - rule verified by static blocking scenario -").

Postcondition

∃(r8: R8, ***u:*** isdnBaUserPortTtp, ***v5in***: v5Interface | (r8.assocV5Interface=v5in AND r8.clientUserPort=u) AND ...

Scenario

1) identify whether free bearerChannels are available at userPort ***u*** .

Mgr -->

M-GET Invoke (..., baseManagedObjectClass:= isdnBAUserPortTtp, baseManagedObjectInstance:= ***u,*** , ...,
scope:= +1, filter:= (objectClass = bearerChannelCtp) AND (assocResource=NULL))}.

Mgr <--

{***Uctp***} = M-GET Result (..., attributeList = {...}).

2) identify all "free" v5TimeSlots available on the v5Interface. Note, that this operation is only necessary if the V5interface administration is not preformed by the LE. In the case of V5.2 this operation turns redundant.

Mgr -->

M-GET Invoke (..., baseManagedObjectClass:= v5Interface, baseManagedObjectInstance:= ***v,*** ...,
scope:= +2, filter:= (objectClass = v5TimeSlot) & (assocResource=NULL).

Mgr <--

{***Vctp***} = M-GET Result (..., attributeList = {...}).

Post condition of the operation:.

∃(Vctp: {v5TimeSlot} | (∀c_i IN Vctp | c_i PART-OF (PART-OF(*v*)) ∧ (|Vctp|≥2));

if |Vctp|< 2 then EXCEPTION "insufficient bandwidth at v5Interface available". A different v5Interface must be identified. This operation above can be simplified if the V5AN model contains an equipment fragment as well through which all V5Interfaces connected to the same Access Network can be found;

identify two free timeslots. Apply the Telecom Operator specific timeslot allocation strategy.
(Vctp1, Vctp2) ⇐ B-ChannelAllocation(Vctp);

3) connect the userPort to the V5 Interface (Relationship R8). This operation sets up the path across the access network between user and service port.

Mgr -->

M-ACTION Invoke setReciprocalPtr(ManagedObjectClass = v5Interface, ManagedObjectInstance = ***v5in***, ...
actionInfoArg = ReciprocalPointersInfo = {objectClass1 = isdnBAUserPortTtp, objectInstance1 = ***u***,
attribute1 = assocV5Interface, objectClass2 = v5Interface, objectInstance2 = ***v5in***,
attribute2 = clientUserPorts } }, ...).

Mgr <--

M-ACTION Result ("failed" or "set").

4) Connect userPortBearerChannels and the v5TimesSlots executing the M-ACTION twice (Relationship R7).

Mgr -->

M-ACTION Invoke setReciprocalPtr(...,actionInforArg = ReciprocalPointersInfo = {
objectClass1 = userPortBearerChannelCtp, objectInstance1 = ***Uctp[i],***
attribute1 = connectivity, objectClass2 = v5TimeSlot, objectInstance2 = ***Vctp[i]***,
attribute2 = connectivity } }, ...).

Mgr <--

M-ACTION Result ("failed" or "set").

5) Configure the isdnBAUserPort attributes according to the Telecom Operator strategy or an configuration-message. As the PL-capability is not required by this ensemble, the modification of bearerChannels is not necessary.

Mgr -->

M-SET Invoke (baseManagedObjectClass:= isdnBAUserPort, baseManagedObjectInstance:= ***u***, modifyList:= {(
attributeId:= envelopeFunctionAddress, attributeValue:= ***envelopeFunctionAddressValue***,
modifyOperator:= replace)}.

Mgr <--

M-SET Result (...).

6) Configure the $isdnCommPath_{Ds}$ (and $isdnCommPath_{P}$ if PMBS is supported). Upon creation of the UserPort an initial pointer may be predefined. If this method is used an a static allocation strategy implemented, an M-SET from the isdnCommPath to the userPort is sufficient (Relationships R12 and R13).

Mgr-->

M-GET Invoke (..., baseManagedObjectClass:= v5Interface, baseManagedObjectInstance:= ***v5in***,
scope:= +1, filter:= (objectClass = isdnCommPath)).

Mgr<--

*{**isdnCommPath**}* = M-GET Result (..., attributeList={...}, ...).

The commPath objects must be evaluated for p and ds type. If several p-instances exist, the C-channel Allocation Strategy must select the proper instance, e.g. by counting the number of isdnUserPorts already connected path.

(***cpD***: isdnCommPath | isdnCommPath.type = "Ds")
(***cpP:*** (CchannelStrategy({isdnCommPath} | isdnCommPathtype = "P").

Mgr-->

M-ACTION Invoke setReciprocalPtr(..., actionInfoArg = ReciprocalPointersInfo = {
objectClass1 = isdnBAUserPortTtp, objectInstance1 = ***u***,
attribute1 = assocIsdnSignallingCommPath, objectClass2 = isdnCommPath,
objectInstance2 = ***cpD***, attribute2 = clientUserPorts } }, ...).

Mgr<--

M-ACTION Result ("failed" or "set")

9.4.2 De-establish a connection to a V5.1

This management operation deletes the connection between the V5.1 interface and the user port.

Precondition

INPUT: ***u***

∃(r8: R8, ***u:*** isdnBaUserPortTtp | r8.clientUserPort=u).

Postcondition

∃(***u***: isdnBaUserPortTtp | r8.clientUserPort=NULL

- the v5Timeslots have been freed.

Scenario

1) block the user port thereby ensuring that it is not in use. (see <block a user port>);

2) get the pointers used to map the r12, r13, r7 and r8 relationships;

3) terminate relationships r12, r13, r7 and r8.

Mgr-->

M-GET Invoke (..., baseManagedObjectClass:= isdnBAUserPortTtp, baseManagedObjectInstance:= ***u,*** , ...,
scope:= +1, filter:= (objectClass = bearerChannelCtp))}.

Mgr<--

*{**userPortChannel[0..1]**}* = M-GET Result (..., attributeList={...}, ...).

Mgr-->

M-GET Invoke (..., baseManagedObjectClass:= V5Interface, baseManagedObjectInstance:=
u.assocV5Interface, , ...,
scope:= +2, filter:= (objectClass = v5Timeslot) AND ((attributeId = assocResource,
attributeValue = ***userPortChannel[0]***) OR(attributeId = assocResource, attributeValue =
userPortChannel[1]))}.

Mgr<--

*{**v5TS[0..1]**}* = M-GET Result (..., attributeList={...}, ...).

Mgr -->

M-ACTION Invoke releaseReciprocalPtr (..., actionInfoArg = ReciprocalPointersInfo = {
objectClass1 = bearerChannelCtp, objectInstance1 = ***userPortChannel[0]***,
attribute1 = assocTimeSlot, objectClass2 = v5TimeSlot,
objectInstance2 = ***v5TS[0]***, attribute2 = assocResource} }, ...).

Mgr <--

M-ACTION Result ("failed" or "set")
repeat the above for the ***userPortChannel[1]*** and ***V5TS[1]***.
Remove the r12 and r13

Mgr -->

M-ACTION Invoke releaseReciprocalPtr (..., actionInfoArg = ReciprocalPointersInfo = {
objectClass1 = isdnBAUserPortTtp, objectInstance1 = ***u***,
attribute1 = assocIsdnSignallingCommPath, objectClass2 = isdnCommPath,
objectInstance2 = clientUserPorts, attribute2 = ***u.assocIsdnSignallingCommPath[0]***} }, ...).

Mgr <--

M-ACTION Result ("failed" or "set").

Mgr -->

M-ACTION Invoke releaseReciprocalPtr (..., actionInfoArg = ReciprocalPointersInfo = {
objectClass1 = isdnBAUserPortTtp, objectInstance1 = ***u***,
attribute1 = assocIsdnSignallingCommPath, objectClass2 = isdnCommPath,
objectInstance2 = clientUserPorts, attribute2 = ***u.assocIsdnSignallingCommPath[1]]***} }, ...).

Mgr <--

M-ACTION Result ("failed" or "set").

9.4.3 Modify/Read a connection to a V5.1

This scenario requires excerpts of the functionality listed in v51c-es and other scenarios and are not described here.

9.4.4 Block/Unblock user port

This operation is applicable to user ports: pstnUserPort, isdnUserPort. To block a User Port the manager sets its administrativeState attribute to locked. Respectively the unblocking is done setting the attribute to unlocked.

Precondition

Blocking: (***isdnUPTtp.***administrativeState = unlocked);

Unblocking: (***isdnUPTtp.***administrativeState = locked).

Postcondition

Blocking: (***isdnUPTtp.***administrativeState = locked);

Unblocking: (***isdnUPTtp.***administrativeState = unlocked).

Scenario

Blocking:

Mgr-->

M-SET Invoke (...,baseObjectClass:= isdnBAUserPortTtp, baseObjectInstance:= ***isdnUPTtp,***
modificationList:= {(administrativeState, locked, replace),...},…).

Mgr<--

isdnUPTtp = M-SET Result (..., attributeList = {...}, errors = {}).

Unblocking:

Mgr-->

M-SET Invoke (..., baseObjectClass:= isdnBAUserPortTtp, baseObjectInstance:= ***isdnUPTtp,***
modificationList:= {(administrativeState, unlocked, replace),...},…).

Mgr<--

isdnUPTtp = M-SET Result (..., attributeList = {...}, errors = {}).

9.4.5 Find free leased line port

Description

To find a free port with scope and filter the following attributes of a MO must fulfil the conditions: objectClassId identifies the service type, supportedByObjectList identifies the location of the service, crossConnectionObjectPtr points at the fabric object (i.e. the port is not associated to a connection).

Precondition

There exists a managed element ***me*** and an equipment object ***e***, with (***e*** contained in ***me***).

Postcondition

A confirmation for each free Leased Line port.

Scenario

Following sequences must be executed:

Mgr -->

M-GET Request (…, managedObjectClass = managedElement, managedObjectInstance = ***meId***, scope = 3,
filter = {((PRESENT e0CTPId) OR (PRESENT e1CTPId)) AND (**<*equipmentId*>** IN supportedByObjectList)
AND
(crossConnectionObjectPtr = ***fabricId***}), ...).

Mgr <--

M- GET Confirmation (…,1, managedObjectClass = e0/1CTP, managedObjectInstance = e0/1CTPId,…)

M- GET Confirmation (…,n, managedObjectClass = e0/1CTP, managedObjectInstance = e0/1CTPId,…)

In the case of n * E0 the filter is adapted to include following predicate:

filter = (PRESENT e0Ctp) AND (nameBinding = e1Ttp) AND (e0Ctp.crossConnectionObjectPtr = fabricId)

9.4.6 Establish / Delete leased line connection E0 / E1

Description

To establish an E0 or E1 leased line the TPs can be connected with the ACTION connect. This Action will create a crossConnection Object. The scenario for deleteing an E0 / E1 leased line can be easily deduced as it effects exactly the opposite with the ACTION disconnect.

Precondition

Least one not connected E0 or E1 on both sides.

Postcondition

A leased line with the bandwidth E0 / E1.

Scenario

Following sequences must be executed:

setup connection:

Mgr -->

M-ACTION connect Request (managedObjectClass = fabric, managedObjectInstance = fabricId, actionInformation = (e0/1ctpId1, e0/1ctpId2), ..., attributeList = {{ nameBinding = }{ = } ... }, ...).

Mgr <--

M- ACTION connect Confirmation (successful, managedObjectClass = fabric, managedObjectInstance = fabricId,
actionReply = crossConnectionId, e0/1ctpId1, e0/1ctpId2,…).

M-EVENT-REPORT (objectCreation,managedObjectClass = crossConnection, managedObjectInstance = crossConnectionId,
attributeList = {{ nameBinding = },{ fromTermination = e0/1ctpId1},{ toTermination = e0/1ctpId2}, ... }).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0/1CTP, managedObjectInstance = e0/1ctpId1,
attributeList = {{ crossConnectionObjectPtr, fabricId, crossConnectionId },
{ upstreamConnectivityPointer, NULL, e0/1ctpId2},
{ downstreamConnectivityPointer, NULL, e0/1ctpId2}}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0/1CTP, managedObjectInstance = e0/1ctpId2,
attributeList = {{ crossConnectionObjectPtr, fabricId, crossConnectionId },
{ upstreamConnectivityPointer, NULL, e0/1ctpId1},
{ downstreamConnectivityPointer, NULL, e0/1ctpId1}}).

9.4.7 Establish / Delete leased line connection n × E0

Description

To establish a n × E0 leased line the TPs must be combined to a GTP on both sides with the ACTION addTpsToGTP. The two GTPs can be connected with the ACTION connect. This Action will create a crossConnection Object. The scenario for deleteing a n × E0 leased line can be easily deduced as it effects exactly the opposite with the ACTIONs disconnect and removeTpsFromGTP.

Precondition

For connection-establishment: A set of e0CTPs.

Postcondition

For connection-establishment: A disabled leased line with the bandwidth n × E0.

Scenario

1) Combine TTPs to the GTPs:

This part has to be executed for both side one time.

Mgr -->

M-ACTION addTpsToGTP Request (managedObjectClass = fabric, managedObjectInstance = fabricId, ActionInformation = e0ctpId1, …, e0ctpIdn, gtpId, ..., attributeList = {{ nameBinding = }{ = "" } ... } ...).

Mgr <--

M- ACTION addTpsToGTP Confirmation (successful, managedObjectClass = fabric, managedObjectInstance = fabricId,
actionReply = gtpIdx).

M-EVENT-REPORT (objectCreation, managedObjectClass = GTP, managedObjectInstance = gtpIdx, attributeList = { { nameBinding = } { tpsInGtpList = e0ctpId1, …, e0ctpIdn } ... }).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId1,
attributeList = {crossConnectionObjectPtr, fabricId, gtpIdx }, ... }).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpIdn,
attributeList = {crossConnectionObjectPtr, fabricId, gtpIdx }, ... }).

2) Setup connection:

Mgr -->

M-ACTION connect Request (managedObjectClass = fabric, managedObjectInstance = fabricId, actionInformation = gtpId1, gtpId2, ..., attributeList = {{ nameBinding = }{ = "" } ... }, ...)

Mgr <--

M- ACTION connect Confirmation (successful, managedObjectClass = fabric, managedObjectInstance = fabricId,
actionReply = crossConnectionId, gtpId1, gtpId2,…)

M-EVENT-REPORT (objectCreation,managedObjectClass = crossConnection,managedObjectInstance = crossConnectionId,
attributeList = {{ nameBinding = }{ fromTermination = gtpId1}{ toTermination = gtpId2) ... }.

M-EVENT-REPORT (attributeValueChange, managedObjectClass = GTP, managedObjectInstance = gtpId1, attributeList = {crossConnectionObjectPtr, fabricId, crossConnectionId}, ... }).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = GTP, managedObjectInstance = gtpId2, attributeList = {crossConnectionObjectPtr, fabricId, crossConnectionId}, ... }).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP,
managedObjectInstance = e0ctpId11, attributeList = {{ upstreamConnectivityPointer, NULL, e0ctpId21},
{ downstreamConnectivityPointer, NULL, e0ctpId21}}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP,managedObjectInstance = e0ctpId1n,
attributeList = {{ upstreamConnectivityPointer, NULL, e0ctpId2n},
{ downstreamConnectivityPointer, NULL, e0ctpId2n}}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId21,
attributeList = {{ upstreamConnectivityPointer, NULL, e0ctpId11},
{ downstreamConnectivityPointer, NULL, e0ctpId11}}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId2n,
attributeList = {{ upstreamConnectivityPointer, NULL, e0ctpId1n},
{ downstreamConnectivityPointer, NULL, e0ctpId1n}}).

9.4.8 Augment/Reduce leased line n × E0

Description

Once a n × E0 leased line is defined, additional bandwidth (n × E0) can be added with the ACTION addTpsToGTP. This ACTION will be failed if the GTP is involved in a cross connection. This means that we have to delete the crossConnection Object before. The scenario for reducing a n × E0 leased line can be easily deduced as it effects exactly the opposite with the ACTION removeTpsFromGTP.

Precondition

A disabled leased line service n × E0 (no traffic).

Postcondition

A leased line with more bandwidth and but no traffic.

Scenario

1) Disconnect connection:

Mgr -->

M-ACTION disconnect Request (managedObjectClass = fabric, managedObjectInstance = fabricId, actionInformation = gtpId1, ..., attributeList = {{ nameBinding = }{ = "" } ... }, ...).

Mgr <--

M- ACTION disconnect Confirmation (successful, managedObjectClass = fabric, managedObjectInstance = fabricId).

M-EVENT-REPORT (objectDeletion, managedObjectClass = crossConnection, managedObjectInstance = crossConnectionId).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = GTP, managedObjectInstance = gtpId1, attributeList = {crossConnectionObjectPtr, crossConnectionId, fabricId }, ... }).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = GTP,managedObjectInstance = gtpId2, attributeList = {crossConnectionObjectPtr, crossConnectionId, fabricId }, ... }).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId11,
attributeList = {{ upstreamConnectivityPointer, e0ctpId21, NULL },
{ downstreamConnectivityPointer, e0ctpId21, NULL }}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId1n,
attributeList = {{ upstreamConnectivityPointer, e0ctpId2n, NULL },
downstreamConnectivityPointer, e0ctpId2n, NULL }}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId21,
attributeList = {{ upstreamConnectivityPointer, e0ctpId11, NULL },
{ downstreamConnectivityPointer, e0ctpId11, NULL }}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId2n,
attributeList = {{ upstreamConnectivityPointer, e0ctpId1n, NULL },
{ downstreamConnectivityPointer, e0ctpId1n, NULL }}).

2) Add TTPs to the GTPs:

This part has to be executed for both GTP one time.

Mgr -->

M-ACTION addTpsToGTP Request (managedObjectClass = fabric, managedObjectInstance = fabricId,
actionInformation = ttpId1, ctpIdn, gtpIdx, ..., attributeList = {{ nameBinding = }{ attributeId = "" } ... }, ...).

Mgr <--

M- ACTION addTpsToGTP Confirmation (successful, managedObjectClass = fabric, managedObjectInstance = fabricId,
actionReply = gtpIdx).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = GTP, managedObjectInstance = gtpIdx,
{tpsInGtpList, oldValue, (oldValue, ctpId1, ... , ctpIdn)}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = ctpId1,
crossConnectionObjectPtr, fabricId, gtpIdx).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = ctpIdn,
crossConnectionObjectPtr, fabricId, gtpIdx).

3) Setup connection:

Mgr / RR -->

M-ACTION connect Request (managedObjectClass = fabric, managedObjectInstance = fabricId,
actionInformation = gtpId1, gtpId2, ..., attributeList = {{ nameBinding = }{ attributeId = "" } ... } , ...).

M- ACTION connect Confirmation (successful, managedObjectClass = fabric, managedObjectInstance = fabricId,
actionReply = crossConnectionId, gtpId1, gtpId2, …).

M-EVENT-REPORT (objectCreation, managedObjectClass = crossConnection, managedObjectInstance = crossConnectionId,
attributeList = {{ nameBinding = }{ fromTermination = gtpId1}{ toTermination = gtpId2) ... }.

M-EVENT-REPORT (attributeValueChange, managedObjectClass = GTP, managedObjectInstance = gtpId1,
attributeList = {crossConnectionObjectPtr, fabricId, crossConnectionId}, ... }).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = GTP, managedObjectInstance = gtpId2,
attributeList = {crossConnectionObjectPtr, fabricId, crossConnectionId}, ... }).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId11,
attributeList = {{ upstreamConnectivityPointer, NULL, e0ctpId21},
{ downstreamConnectivityPointer, NULL, e0ctpId21}}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId1n,
attributeList = {{ upstreamConnectivityPointer, NULL, e0ctpId2n},
{ downstreamConnectivityPointer, NULL, e0ctpId2n}}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId21,
attributeList = {{ upstreamConnectivityPointer, NULL, e0ctpId11},
{ downstreamConnectivityPointer, NULL, e0ctpId11}}).

M-EVENT-REPORT (attributeValueChange, managedObjectClass = e0CTP, managedObjectInstance = e0ctpId2n,
attributeList = {{ upstreamConnectivityPointer, NULL, e0ctpId1n},
{ downstreamConnectivityPointer, NULL, e0ctpId1n}}).

Annex A: Service Communities

This annex provides requirement descriptions confirming to the ODP Enterprise Viewpoint and is intended as a non-formal introduction to the management requirements on both services and resources. It is split into a part describing the transport bearer services and a part on the resources. A third part, concerning the resources required as part of the overall management process (e.g. topology, equipment, transport network) are provided in ODP Enterprise viewpoint format, too.

A.1 Service-independent capabilities

These capabilities are applicable to all services pending the support through the hardware

SER-IND-1 QoS parameters are determined by the transport bearer service type and specified in the Service Level Agreement.

SER-IND-2 *Priority Capability* ensures that the service is handled with special care.

SER-IND-3 *Reserved Bandwidth* ensures that the bandwidth is available at all times both within the access network and across the service node interface.

SER-IND-4 *Special features* pertinent to the port which may affect the transmission access network as well as operations shall be noted in the agent. Examples are public telephone, redlined port, etc.

SER-IND-5 *Encryption* implies the additional encoding of the up- or downstream through the access network for security reasons.

Following capabilities are not covered by this ensemble:

- *access network protection*, i.e. the ability to provide for the protected information transfer between UNI and SNI. User Port protection is considered the implication of a special feature.
- *link protection* across the digital section, i.e. the ability to provide for the protected information transfer across the digital section. This excludes the management of protection mechanisms embedded within the Service Ports such as C-Channel protection in V5.

A.2 Service Communities

A.2.1 Switched Narrowband Capabilities Requirements

Following user ports are supported:

SER-UP-1 PSTN (national), ISDN Basic Rate, ISDN Primary Rate

The following narrowband capabilities are supported:

SER-DEP-1 Packet Mode Bearer Service (PMBS) enables the transport of D-channel packets from an ISDN Basic Rate or ISDN Primary Rate user port

SER-DEP-2 Semi-Permanent-Leased Line (SPLL) enables the use of ISDN-channels for semi-permanent leased line services.

SER-DEP-3 Frame Mode Bearer Service (FMBS) enables the transport of D-channel frames from an ISDN Basic Rate or ISDN Primary Rate user port

This Ensemble does not support the following capabilities:

- Permanent Line (PL) across a V5 interface

A.2.2 Leased Lines Capabilities Requirements

Following user ports are supported:

SER-UP-2 V.36, V.35, V.10/V.11, X.21, G.703, G.703/704

Following leased line capability is supported:

SER-DEP-4 In n × 64 kbit/s services the service user shall be able to define the channels to which a service is associated.

SER-DEP-5 In n × 64 kbit/s services the multi-hosting shall be supported, i.e. the connection of a single UNI to multiple SNI's.

A.3 Resource communities

Resource profiles are modeled according to the ODP Enterprise Viewpoints (G.851-01 [26]).

NOTE similar communities are required for the various userports

A.3.1 COMMUNITY <v51> V5.1 resource and configuration management

A.3.1.1 Community purpose

This resource describes a V5.1 interface as described in ETS 300 324 [27]. The V5.1 resource has following properties:

SP-V51-1 The properties are defined in ETS 300 324 [27].

The functionalities of the resource are specified in the operator-specific V5 requirements. Not required are following properties:

- support for the provisioning variant.

A.3.1.2 Enterprise roles

resource customer: The resource customer is the community making use of the V5.1 resource.

v5 interface: This role represents the entire v5.1 resource.

A.3.1.3 Community policies

Following policies apply to a V5.1 resource and are derived from ETS 300 324 [27]:

OBLIGATION V51-OBLI_1
C-channel C1 shall be allocated at creation time of the managed object.

OBLIGATION V51-OBLI_2
upon instantiation of the V51 interface
either the pstn signalling, control and ISDN D-channels are assigned to C1, or,
if a profile is provided the V51 communication channels can be allocated as required, provisioning C2 and C3 automatically if needed.

OBLIGATION V51-OBLI_3
the protocol version shall be set to "v51".

OBLIGATION V51-OBLI_4
The V51-link bandwidth shall be allocated upon the installation of the V51 interface. The number of channels is 31.

OBLIGATION V51-OBLI_5
The resource customer shall be able to set the peer-V5 interface identification. The identification has informative character, only.

PERMISSION V51-PERM_1
C-channels C2 and C3 may be allocated while respecting allocation precedence rules (C1<C2<C3).

PROHIBITION V51-PROH_1
Provisioning Variant information is not considered. Associated management functions are not supported.

PROHIBITION V51-PROH_2
A V5.1 logical resource may not be set operational unless the node bandwidth resources (the timeslots) have been made available by the transmission access network.

PROHIBITION V51-PROH_3
Timeslots may be allocated only if bandwidth resources are available.

OBLIGATION V51-OBLI_6
Per default, information pertaining to one ISDN D-channel is not divided over different C channels.

A.3.1.4 Enterprise Actions

The following enterprise actions are derived from ETS 300 376-1 [24] and ETS 300 377-1 [28].

A.3.1.4.1 V51 Restart (v51restart)

This action enables the resource_customer to restart a V5.1 resource for intialization or following a failure.

OBLIGATION v5restart-OBLI_1
The rules specified in ETS 300 324 [27] concerning co-ordination between V5.1 AN and LE apply.

A.3.1.4.2 Insert V5.1 Interface (v51in)

This action may be split into the following sub-actions:

ACTION v51in-Create
Creation of the managed object structure which represents a complete V5.1 interface and set the following attributes: V5.1 interface ID, time-slots for communication and bearer channels and protocol version.

ACTION v51in-Link
Assignment of the V5.1 interface to a 2 MBit/s port.

OBLIGATION v51in-OBLI_1
v51in-Create shall occur before v51in-Link.

PERMISSION v51in-PERM_1
The creation of a v51 interface may result in the configuration of the interface by the manager if such a management operation is allowed by the agent.

PERMISSION v51in-PERM_2
v51in-Create and v51in-Link may occur in a single management transaction.

PERMISSION v51in-PERM_3
v51in-Link operations may be performed on userports or v5-interfaces involved in an active connection if said connection is blocked.

PROHIBITION v51in-PROH_1
v5in-Link operations may not associate a V5-link to a port which is already associated.

A.3.1.4.3 Delete V5.1 Interface (v51del)

This action may be split into following sub-actions:

ACTION v51del-Rem
Remove a v5.1 interface from the agent MIB and delete all references to other resources.

ACTION v51del-Ul
Unlink a V5.1 interface from a 2Mbit/s port.

OBLIGATION v51del-OBLI_1
V51-del-UI has to be completed before v51rem-Del can take place.

PERMISSION v51del-PERM_1
v51del-rem and v51-UI may occur through the same management transaction.

PROHIBITON v51del-PROH_1
v51del may not be performed if any non-blocked user port on the V51interface is carrying traffic.

4.3.1.4.4 Modify a V5.1 Interface (v51mo)

The operation modifies attributes within the V5.1 interface as listed in v51in. A combination of insertion and deletion of V51interfaces is not to be considered as a modification.

ACTION V51mo
Modification of attributes within the V5.1 interface.

PROHIBITION V51mo-PROH_1
the v51mo shall not modify the v51 link association.

PROHIBITON V51mo-PROH_2
attributes are only to be set within the valid ranges of the attributes as specified in [ETS 300 376].

PROHIBITION v51mo-PROH_3
state management cannot be performed by v51mo.

OBLIGATION v51mo-OBLI_1
with v51mo it shall be possible to modify V5.1 interface ID, time slots for communication and bearer channels and protocol version.

PERMISSION v51mo-PERM_1
Modification of several attributes may occur through the same management transaction.

4.3.1.4.5 Read a V5.1 Interface (v51rd)

The operation reads attributes of the V5.1 interface as listed in v51in. All v51 management information as specified in ETS 300 376 [24] may be retrieved.

ACTION v51rd
this action reads attributes of the V5.1 interface.

PROHIBITION v51rd-PROH_1
the read operations v51rd shall not disrupt services on the V51 interface.

PERMISSION v51rd-PERM_1
the reading of several attributes may occur through the same management transaction.

OBLIGATION v51rd-OBLI_1
it shall be possible to read single attributes.

OBLIGATION v51rd-OBLI_2
all information pertaining to the management information model in ETS 300 376 shall be accessible.

A.4 General Communities

The following ODP Enterprise Viewpoint Communities reflect the resources described in chapter §0.

A.4.1 COMMUNITY <anTop> Access Network Topology Management

A.4.1.1 Community purpose

This community describes the requirements for the description and management of the access network topology.

A.4.1.2 Enterprise roles

topology customer: the topology customer describes the entities requiring access to topological information of the access network.

bearer transport service domain: this role represents the network.

access point: the access point role identifies the location(s) where the service is requested.

point of interconnection: the Point Of Interconnection (POI) role identifies the location(s) where access network resources provide interconnection between the access network (or a digital section therof) and a transmission network or service node.

A.4.1.3 Community policies

OBLIGATION anTop-OBLI_1
Management Functions for access networks shall be able to manage the User Port Function, Service Port Function as well as the AP/POI into the Access Network. Connections spanning several network technologies are out of scope unless they are embedded within the same (potentially proprietary) transmission architecture.

OBLIGATION anTop-OBLI_2
The transmission network topology shall be able to reflect the topological connectivity (i.e. the static blocking) between the UPF, SPF and AP/POI, independent of bandwidth abilities. A *transport service bearer domain* is defined as the network which allows for static connectivity among its UPF/SPF's.

OBLIGATION anTop-OBLI_3
The topology used to identify the location of UPF/SPF shall be adaptable to the extent so that changes in transmission access network topologies can be handled without affecting the UPF/SPF. If, for example, two SDH access networks are connected via a link connection the bearer domain shall reflect the ability to connect UPF/SPF's across the link connection.

OBLIGATION anTop-OBLI_4
UPF and SPF shall be identifiable by following topological points. This includes the following:
- port-number
- equipment location (the containing equipment)
- node location (the equipment site)
- network
- cable identification (the cable to which the UPF/SPF is connected)

OBLIGATION anTop-OBLI_5
The manager shall be able to provide user-defined names to topological entities.

OBLIGATION anTop-OBLI_6
The level of granularity in the topological model shall be down to the equipment location level, e.g. the location of a single Optical Network Unit (ONU).

PERMISSION anTop-PERM_1
The UPF, SPF and AP/POI may, be distributed across separate managed elements.

PERMISSION anTop-PERM_2
The transmission network topology may be set up by the Manager. If the topology and its connectivity is given by the network element type, the agent shall be able to pre-define such a topology as far as possible.

PERMISSION anTop-PERM_3
Co-locationing of equipment at a single site (e.g. building) may be provided through the community. The co-locationing information may be encoded within the user-definable names or be modeled within the information model.

A.4.1.4 Enterprise actions

A.4.1.4.1 Locate a port (anTop-loc)

ACTION anTop-loc
This action enables to locate a port using various descriptors. It returns a list of ports fulfilling the search criteria. In addition to the topological identifier, which is mandatory, other filter-options may be applied, such as port-states, its availability, etc.

A.4.1.4.2 Ensure connectivity (anTop-con)

ACTION anTop-con
This management function ensures the static connectivity between two ports.

A.4.2 COMMUNITY <v51c> V5.1-based Provisioning

A.4.2.1 Community purpose

This community provides for connection management between user ports and a V5.1 resource. It includes actions responsible for connection establishment, termination and modification.

A.4.2.2 Enterprise roles

manager The manager requests for the connection establishment and termination between user port and service port (in this case the v5.1).

userport The user port role represents the resource providing the User Port Function at the location where the service user (itself not an explicit role) is located.

v51_interface this role represents the resource providing the service port function for V5.1

A.4.2.3 Community policies

NOTE the scheduling is removed as it cannot be provided within the context of provisioning, if current gdmo models are to be used. Enterprise Actions

A.4.2.3.1 Set up a connection to a V5.1 (v51c-set)

ACTION v51c-set
The action supports the establishment of an connection between a defined user port and the v5.1 interface.

OBLIGATION v51c-set-OBLI_1
The establishment must include the cross-connection of all components of the service, i.e. bearer channels as well as communciation channels.

OBLIGATION v51c-set-OBLI_2
The agent shall inform the manager of the successful establishment.

PROHIBITION v51c-set-PROH_1
The connection may not be established if bandwidth lacks at either node (user port or service port) or across the access network.

A.4.2.3.2 Release a connection to a V5.1 (v51c-rel)

The action terminates all associations between a userport and its associated v5 interface. The resources are subsequently freed for other connection associations.

ACTION v51c-rel
release of all associations between a userport and its associated V5 interface.

OBLIGATION v51c-rel-OBLI_1
The release must include the release of all components of the service, i.e. bearer channels as well as communciation paths.

OBLIGATION v51c-rel-OBLI_2
The agent shall inform the manager of the successful release.

PROHIBITION v51c-rel-PROH_1
Non blocked connections that are carrying traffic may not be released.

A.4.2.3.3 Modify a connection to a V5.1 Interface (v51c-mo)

This action may either operate on attributes within the user port or on relationships between the userport and the v5.1 interface (e.g. isdn communication path configuration).

ACTION V51c-mo
Modification of the connection.

PROHIBITION V51c-mo-PROH_1
the v51c-mo shall not release and or set up a connection.

PROHIBITON V51mo-PROH_2
attributes are only to be set within the valid ranges of the attributes as specified in [ETS 300 376].

NOTE v51mo-PROH_3
is not completely true and thus removed.

PERMISSION v51mo-PERM_1
modification of several attributes may occur through the same management transaction.

A.4.2.3.4 Read a connection to a V5.1 (v51c-rd)

The operation reads attributes of the user port or information on relationships between the user ports and the V5.1 interface.

ACTION v51c-rd
this action reads attributes of the connection.

PROHIBITION v51rd-PROH_1
the read operations v51c-rd shall not disrupt services on the V51 connection.

PERMISSION v51rd-PERM_1
the reading of several attributes may occur through the same management transaction.

OBLIGATION v51rd-OBLI_1
it shall be possible to read single attributes.

A.4.3 COMMUNITY <eqInst> Equipment installation management

A.4.3.1 Community purpose

This community describes the requirements for the installation and configuration management of equipment in the access network. This community relates to the communities <anTop> for access network topology description as well as the various resource description communities (e.g. <v51>). The following terms are defined:

Manager- vs. Agent-driven Configuration: In manager-driven configuration, the manager must perform all configuration operations including the creation of the MIB (c.f. online-configuration). In agent-driven configuration, the agent performs the MIB generation itself, (if the data is available) its configuration and updates the manager. Agent-driven configuration is also called "plug & play".

Online Vs Pre- Installation: In online installation, the agent is only able to represent (physical as well as logical) resources actually available in the network element. Pre-installation allows the manager to install and configure equipment which isn't physically available, yet. Upon actual installation, the agent compares the expected equipment with the installed equipment.

Figure A.1 describes the two forms required by this community. Note that pre-installation ability of an agent affects other management functions as well, notably equipment removal.

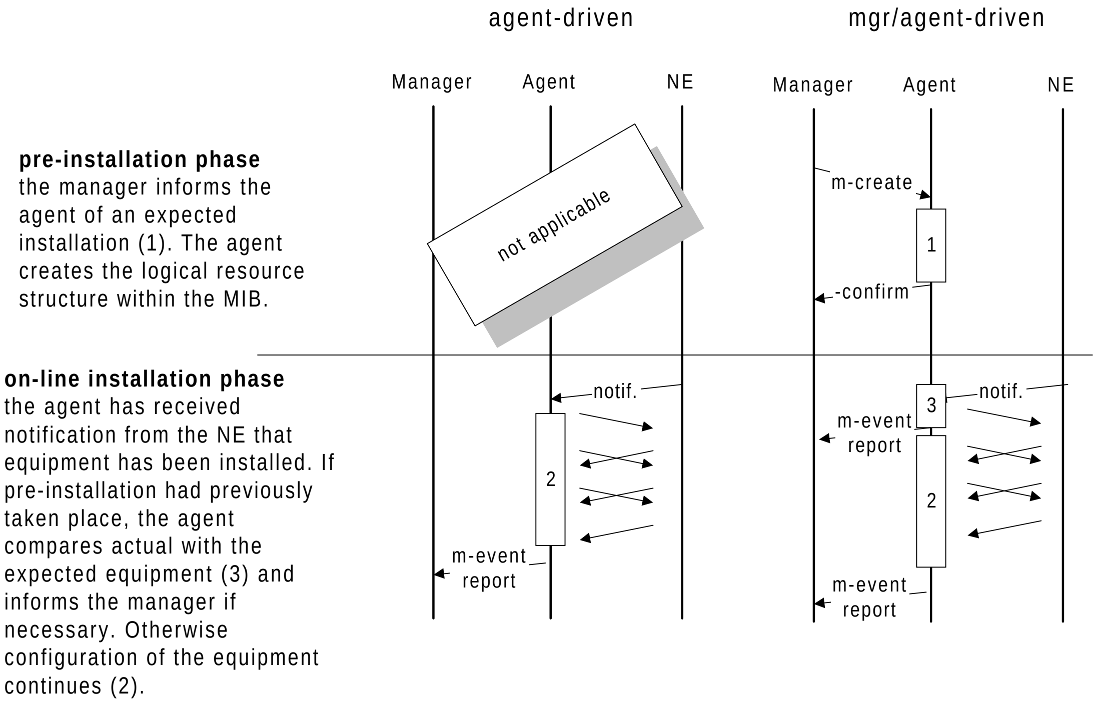


Figure A.1: Forms of equipment installation and configuration

A.4.3.2 Enterprise roles

equipment manager: the equipment customer identifies the management entity requesting installation/configuration to be performed on equipment and networks within the access.

equipment: the equipment roles identifies equipment resources to be managed.

transport bearer services: this role identifies the functionality provided by the equipment with respect to provisioning in the access network. An ISDN linecard, for example, will entertain a transport bearer service role which identifies the ISDN BA user port functionality.

topology: this role provides the location of the equipment.

A.4.3.3 Community policies

Knowledge of the equipment topology is a necessary component for certain installation operations. Following topology management shall be taken into account:

OBLIGATION eqInst-OBLI_1
Equipment management shall cover management operations for the connection point management (AP / POI). It shall take the various forms of equipment-cable connections into account, such as backpanel-connections or direct connections to the FRU. The cable-identification of the cable connected to a connection point shall be stored.

OBLIGATION eqInst-OBLI_2
Logical resource management shall not be affected by the forms of equipment management mentioned in <eqInst>.

OBLIGATION eqInst-OBLI_3
The equipment structure relevant for the installation/configuration of Field Replaceable Units shall be modelled.

OBLIGATION eqInst-OBLI_4
The equipment_manager shall be informed of changes in the equipment structure and configuration.

PERMISSION eqInst-PERM_1
The notification of equipment changes to the equipment_manager may be suppressed upon request by the equipment_manager.

In addition to the various forms of installation the following "housekeeping" operations must be supported:

PROHIBITION eqInst-PROH_1
The replacement of equipment shall have no effect on the configuration or provision of a service. The equipment shall inform the agent of changes. As a result, the agent shall reconfigure the equipment based on the MIB status unless HW/SW changes necessitate **equipment_manager** intervention.

A.4.3.4 Enterprise actions

A.4.3.4.1 Capacity queries in equipment (eqInst-Cap)

ACTION eqInst-Cap
The equipment shall provide information on the available space (slots) as well as the used and free slots.

A.4.3.4.2 Insert equipment (eqInst-Ins)

ACTION eqInst-Ins
The insert equipment operation is executed by the equipment manager or the equipment itself. In the prior case, the equipment_manager informs the management system of a change in the equipment infrastructure. The first case occurs for pre-installation and during on-line installation when the network element isn't able to identify changes within the equipment structure. The latter case occurs during on-line installation when the network element is aware of changes in its structure ("plug & play").

OBLIGATION eqInst-Ins-OBLI_1
Online installation shall be implemented with the support of manager/agent-driven configuration.

OBLIGATION eqInst-Ins-OBLI_2
Pre-Installation shall support the combined manager/agent-driven configuration. When a card is actually installed the predetermined configuration information shall be downloaded into the FRU.

OBLIGATION eqInst-Ins-OBLI_3
The manager is always notified if the configuration succeeded or whether its failed (together with the reason for its failure).

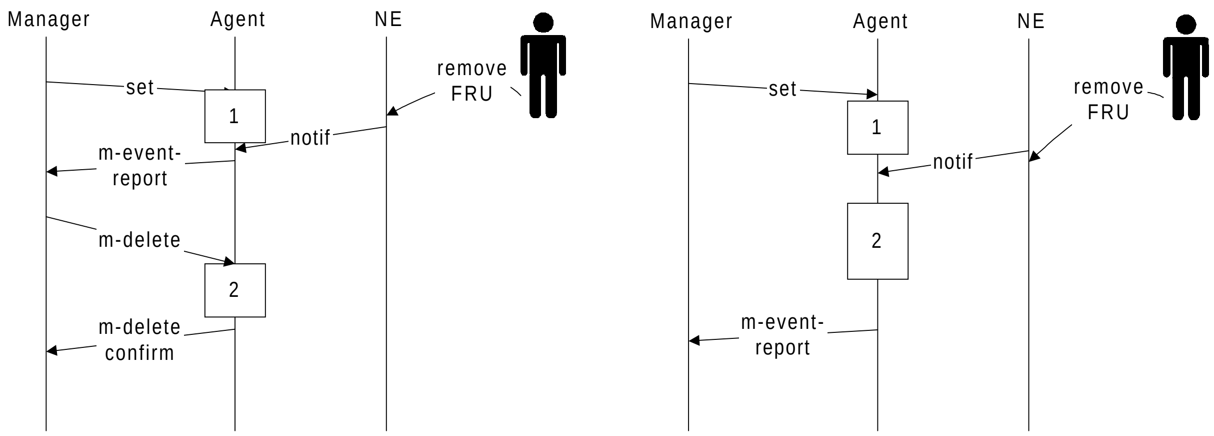
PERMISSION eqInst-Ins-PERM_1
The agent-driven installation approach may be supported. The ability of the equipment to support for this approach must be identifiable in the MIB.

PERMISSION eqInst-Ins-PERM_1
The automatic configuration may be postponed until initiated by the equipment manager.

A.4.3.4.3 Delete equipment (eqInst-Del)

ACTION eqInst-Del

This action marks the card as ready for removal The card entry is deleted from the MIB once the FRU has been physically removed. This is described in following figure:



Removal of Linecards with Pre-installation ability

1. mark FRU for removal
2. delete FRU following alarm notification by the Agent of recent linecard removal

Alternative to 2) a re-installation can be effectuated

Removal of Linecards without Pre-installation ability

1. mark FRU for removal
2. automatic deletion of linecard upon removal

Figure A.2: Resource removal and re-activation

OBLIGATION eqInst-del-OBLI_1

Removal of physical resources deletes the entries of the logical and the physical resources in the MIB.

PROHIBITION eqInst-del-PROH_1

A physical resource (e.g. FRU) shall not be deleted if it is service-affecting.

PERMISSION eqInst-del-PERM_1

Until the equipment has been physically removed the equipment_manager has the ability to revoke the removal request and to re-activate equipment.

A.4.3.4.4 Equipment Replacement (eqInst-rep)

Equipment replacement handles the automatic re-configuration of equipment which has been replaced, e.g. due to a hardware-fault.

ACTION eqInst-rep
The action initiates the download of the latest stored configuration from the agent into the designated equipment.

OBLIGATION eqInst-rep-OBLI_1
The equipment shall be configured with the latest stored configuration available to the agent.

OBLIGATION eqInst-rep-OBLI_2
Equipment configuration download is under manager-control.

PERMISSION eqInst-rep-OBLI_3
The agent may initiate this enterprise action if a new component has been installed without the old equipment component having been locked.

History

Document history		
V1.1.1	May 1998	Membership Approval Procedure MV 9828: 1998-05-12 to 1998-07-10