



TECHNICAL REPORT

TR-141

Protocol Independent Management Model for Access
Nodes Supporting TR-101

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Summary

This Broadband Forum Technical Report provides the Element Management System's (EMS) interpretation of requirements included in Broadband Forum Technical Report TR-101 that are applicable for managing an Access Node (AN). The document indicates the managed objects derived from TR-101, arranged according to their association with logical managed entities. The document is protocol independent, which means it does not refer to any particular management protocol between the EMS and the AN.

Broadband Forum Technical Report TR-141

Protocol Independent Management Model for Access Nodes Supporting TR-101

1 Purpose

The purpose of this Broadband Forum Technical Report is to define the Element Management System's (EMS) interpretation of requirements in Broadband Forum Technical Report TR-101, focusing on management objects that are applicable for an Access Node (AN). The document defines the managed objects derived from TR-101 and the associated source requirement number(s) in TR-101.

In addition, this document arranges the managed objects according to their association with logical managed entities. The purpose of this is to simplify the protocol dependent MIB development by defining a management model based on the relevant managed objects.

2 Scope

The Broadband Forum Technical Report TR-101 outlines how an ATM aggregation network can be migrated to an Ethernet based aggregation network. As part of this, TR-101 provides the requirements for protocol translation and interworking, QoS, multicast, security, and OAM for a DSL aggregation network.

The requirements in TR-101 document refer to several kinds of systems: the Access Node (AN), the Broadband Network Gateway (BNG), the Broadband Remote Access Server (BRAS), the Aggregation Switch, and the Routing Gateway (RG). This Broadband Forum Technical Report provides a management model to meet the requirements in TR-101 that are applicable to an Access Node. It derives from TR-101 the relevant managed objects and arranges them in the form of logical sets, called managed entities.

Also, the requirements in TR-101 document are of two types. There are requirements that refer to configuration parameters, status parameters and performance indications all of which are applicable for the EMS and are reflected in this Technical Report. However, other requirements that refer to functional behavior of the various systems and to performance goals are beyond the scope of this document.

This Technical Report does not include the service/flow layer of an Access Node as part of Access Node management model. This is because no management requirement in TR-101 is explicitly defined per service/flow in the Access Node. Once such requirements are published, e.g., in a complementary Technical Report, they should be added to the Access Node management model either by a new version of this Technical Report or by a complementary Technical Report.

2.1 Abbreviations

The following abbreviations apply for the purposes of this document:

AN	Access node	MEP	Maintenance end point
BNG	Broadband network gateway	NBP	Network-side bridge port
BRAS	Broadband remote access server	PADT	PPPoE active discovery terminate
CFM	Connectivity fault management	PPPoE	PPP over Ethernet
DEI	Drop eligibility indicator	PVID	Port VLAN identifier
DHCP	Dynamic host configuration protocol	OAM	Operation, administration and maintenance
DP	Drop precedence	QoS	Quality of service
DSLAM	Digital subscriber line access multiplexer	RG	Routing gateway
EAP	Extensible authentication protocol	RO	Read-only
EFM	Ethernet in the first mile	RW	Read-write
EMS	Element management system	TLS	Transparent LAN service
GDT	(multicast) group description table	UBP	User-side bridge port
		VID	VLAN identifier
		VLAN	Virtual local area network

2.2 Conventions

In this document, several words are used to signify the requirements of the specification. These words are often capitalized.

MUST This word, or the adjective “REQUIRED”, means that the definition is an absolute requirement of the specification.

MUST NOT This phrase means that the definition is an absolute prohibition of the specification.

SHOULD This word, or the adjective “RECOMMENDED”, means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications must be understood and carefully weighted before choosing a different course.

MAY This word, or the adjective “OPTIONAL”, means that this item is one of an allowed set of alternatives. An implementation that does not include this option **MUST** be prepared to inter-operate with another implementation that does include the option.

3 References

The following Broadband Forum Technical Reports and other references contain provisions, which, through reference in this text, constitute provisions of this Technical Report. At the time of publication, the editions indicated were valid. All Technical

Reports and other references are subject to revision; users of this Technical Report are therefore encouraged to investigate the possibility of applying the most recent edition of the Technical Report and other references listed below. A list of the currently valid Broadband Forum Technical Reports is published at www.broadband-forum.org.

NOTE – The reference to a document within this Technical Report does not give it, as a stand-alone document, the status of a Technical Report.

- [1] Broadband Forum TR-101 (April 2006), *Migration to Ethernet Based DSL Aggregation*.
- [2] “Virtual Bridged Local Area Networks — Amendment 5: Connectivity Fault Management”, IEEE P802.1ag, Draft 8, February 8, 2007
- [3] “B-ISDN operation and maintenance principles and functions”, ITU-T Recommendation I.610, February 1999

4 Access Node Managed Objects Model

The managed object model in this specification is part of the comprehensive Access Node managed objects model as depicted in the following paragraphs.

Figure 4-1 below shows the management models required to completely manage an Access Node:

- The **xDSL management** model contains all the objects required to manage the DSL lines; this model has been covered in the Broadband Forum technical reports indicated.
- The **backhaul technology** model contains all the objects required to manage the backhaul technology; the Broadband Forum has not defined this model.
- The **equipment management** model contains those objects that are not managing Layer one and Layer 2 functions but are required to manage the physical implementation of the node.
- The **TR-101 management** model is the subject of this working text and is concerned with the management of the layer 2 functionality of the Access Node.
- The box labeled **EMS-NMS interface** provides the means for communicating with the management models from the Network Management System. The requirements for this interface are the subject of TR-130.

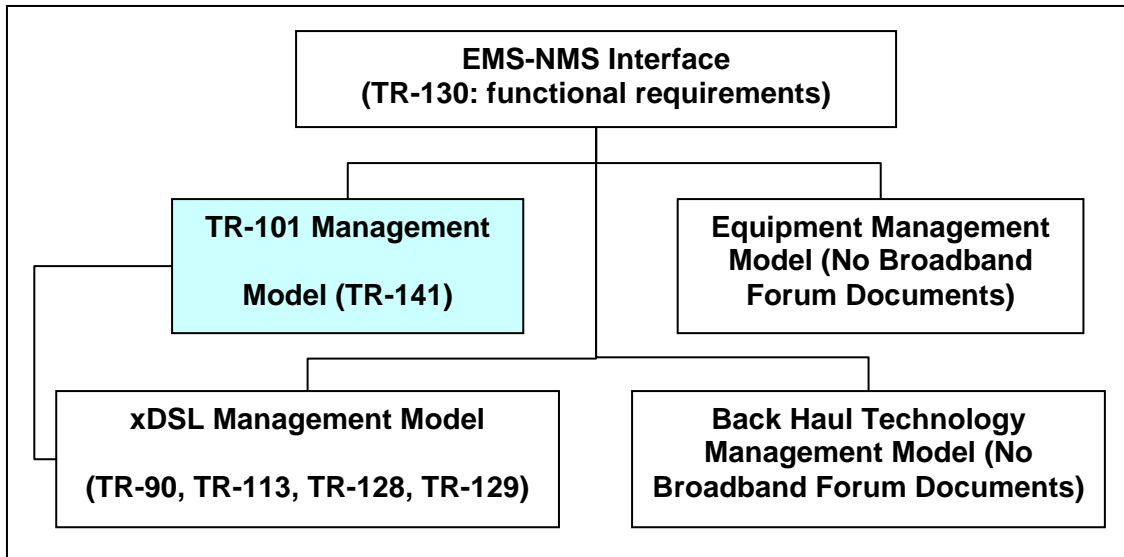


Figure 4-1: Access Node Managed Object Model

5 Applicable Access Node Managed Entities

The various managed objects that this document identifies in Broadband Forum Technical Report TR-101 are divided into groups; each group is associated with a physical or logical managed entity.

The following managed entities SHOULD exist in the management model of Access Nodes supporting TR-101. Once a managed entity exists in an Access Node's management model all its attributes MUST be implemented, unless otherwise is specified by this document:

- (1) **Access Node** - This managed entity is the collection of all managed objects that their scope is the whole Access Node.
- (2) **Access Loop** - This managed entity is the collection of all managed objects that their scope is a DSL port (i.e. the CO side of the DSL line).
- (3) **Virtual Bridge Port** - This managed entity is the collection of all managed objects that their scope is all kinds of bridge port (i.e., User-Side and Network-Side Bridge Ports).
- (4) **User-Side Bridge Port** - This managed entity is the collection of all managed objects that their scope is only a user-side bridge port (i.e., and not a Network-Side Bridge Port).
- (5) **PVC Bundle** - This managed entity is the collection of all managed objects that their scope is specifying bundles of user-side bridge ports.
- (6) **Network Interface** - This managed entity is the collection of all managed objects that their scope is a network interface.

- (7) **Network-Side Bridge Port** - This managed entity is the collection of all managed objects that their scope is only a network-side bridge port (i.e., and not a User-Side Bridge Port).
- (8) **Filter** – This managed entity is the collection of all managed objects that their scope is a filter (e.g., Acceptable source MAC address, Destination MAC address, EtherType, etc.).
 - **Filters List** – This managed entity represents a collection of multiple instances of a **Filter** managed entity.
- (9) **VLAN** - This managed entity is the collection of all managed objects that their scope is an S-VLAN.
- (10) **VLAN Membership List** - This managed entity is the collection of all managed objects that their scope is a VLAN Membership List for a virtual bridge port.
- (11) **Multicast Group Description Table** - This managed entity is the collection of all managed objects that their scope is IP multicast groups for a multicast VLAN.
- (12) **Multicast VLAN Statistics**- This managed entity is the collection of all managed objects that their scope is multicast VLAN counters. This includes three categories:
 - Currently active hosts per each IP multicast group
 - IGMP activity per each IGMP host (i.e., Access Loop)
 - IGMP activity for the multicast VLAN
- (13) **Static Hosts Table** – This managed entity is the collection of all managed objects that their scope is a list of IP Addresses associated with a user-side bridge port and an S-VLAN.
- (14) **Priority to Traffic Class Mapping Table** - This managed entity is the collection of all managed objects that their scope is mapping an ingress priority to traffic class and drop precedence.
- (15) **Queues Block Profile Table** - This managed entity is the collection of all managed objects that their scope is port's queues.
- (16) **Circuit ID Syntax** - This managed entity is the collection of all managed objects that their scope is configuring a flexible syntax for the DHCP option 82 Circuit ID field.
- (17) **Traffic Classification Table** - This managed entity is the collection of all managed objects that their scope is a traffic classifier (e.g., ETHERTYPE filter, VLAN Priority filter, etc.).

- (18) **Ingress to Egress Priority Mapping Table** - This managed entity is the collection of all managed objects that their scope is mapping an ingress priority to egress priority.
- (19) **Peer MEPs Table** - This managed entity is the collection of all managed objects that their scope is configuring the peer <MEP name, MAC address> associations.

5.1 External Access Node Managed Entities

In addition to the managed entities this document defines, there are few other managed entities to which this specification refers. The document only assumes they exist but does not specify them.

Although those managed entities are part of the comprehensive Access Node's managed objects model they are still considered external and beyond the scope of this document.

5.1.1 DSL Line Configuration Profiles

This document refers to the "DSL Line Configuration Profiles" table, assuming that such a table exists.

5.1.2 ATM Related Managed Objects

This document does not specify managed objects for ITU-T I.610 ([3]) based requirements listed in TR-101.

5.1.3 Ethernet OAM Managed Entities

Generally, this document does not specify managed objects for requirements listed in the "OAM" section (paragraph §7) of TR-101. Most of those managed objects are included in the management model, chapter §12, of IEEE 802.1ag ([2]). Only managed objects that are not covered by IEEE 802.1ag are modeled in this document.

5.2 Diagram of Managed Entities in the Model

The managed objects model diagrams in this specification use the notations that Figure 5-1 illustrates.

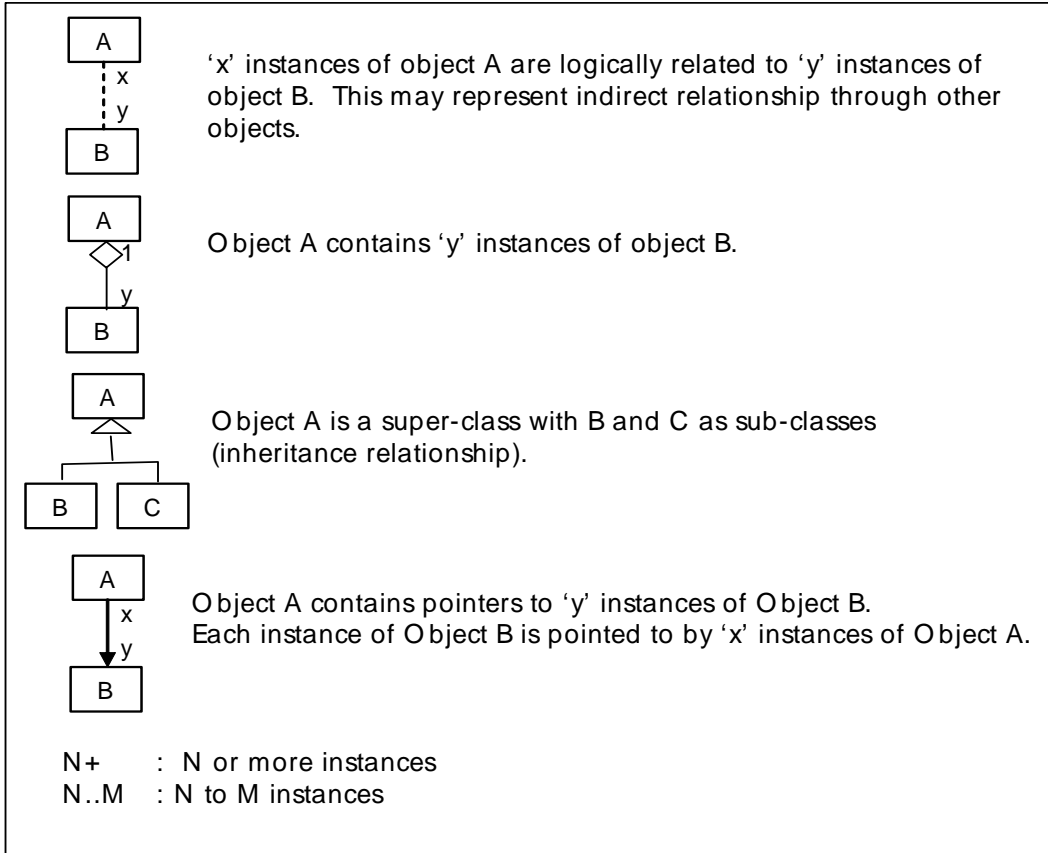


Figure 5-1: Notations

The diagram in Figure 5-2 depicts the relationships between the various managed entities in the model this document defines. The diagram also indicates associations with external managed entities defined in other Broadband Forum Technical Reports as well as in documents mentioned in Appendix I.

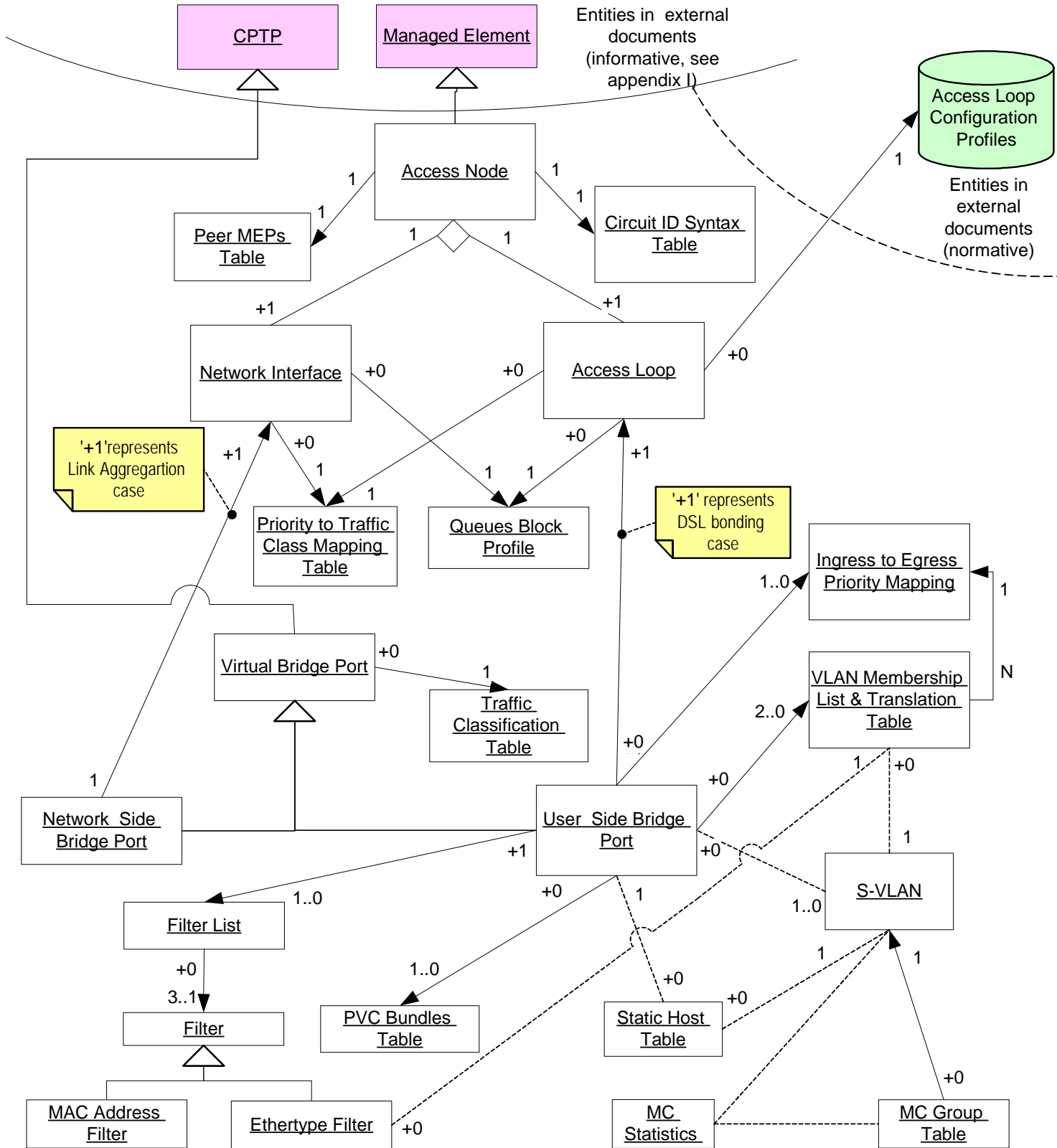


Figure 5-2: The Managed Entities Model Diagram

6 The Managed Objects

The following paragraphs list the managed objects that SHOULD exist in the management model for TR-101 Access Node. The managed objects that are directly derived from TR-101 requirements are complemented by objects that their purpose is either administrative (e.g., table row index) or producing an efficient management model. The managed objects are sorted according to the managed entity with which they are associated.

Each managed object is described with the following attributes:

- ❖ The managed object is assigned an ***Object Identifier***. This identifier only serves for the convenience of referring to the managed object in other parts of the document.
- ❖ The managed object is assigned an ***Object Name***. The Object Name is either explicitly specified by requirement(s) in Broadband Forum TR-101 or is based on the content of those.
- ❖ One, or more, ***Reference Requirements in Broadband Forum TR-101*** is listed for each managed object. It is possible however that the role of the managed object is not the same in all requirements that refer to it.
- ❖ The managed object is assigned a ***Description***. This contains a short text that explains the meaning (or meanings) the related managed object has according to requirement(s) in Broadband Forum TR-101.
- ❖ Several managed objects are assigned a ***Comment***.

6.1 Access Node

The following table (Table 6.1-1) lists the managed objects under the Access Node managed entity.

Object Reference Number	Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Access Node ID (RW)	An alphanumeric string that identifies this AN (Optionally serves as the Circuit ID syntax)	R-124, R-125	See 6.16
2.	Circuit ID Syntax Type (RW)	This object selects between two alternatives for the Circuit ID Syntax: <ul style="list-style-type: none"> • Use of the default syntax specified in TR-101. • Use of the syntax specified in the Circuit ID Table. 	R-123, R-126	See 6.16

Object Reference Number	Object Name	Description	Reference in Broadband Forum TR-101	Comments
3.	ETHERTYPE 802.1ad (RW)	ETHERTYPE field for the 802.1ad tagging,	R-8	16 bits value; Default value=0x88A8

Table 6.1-1: Access Node Related Managed Objects

6.2 Access Loop

The following table (Table 6.2-1) lists the managed objects under the Access Loop managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Access Loop ID (index)	A number that uniquely identifies the Access Loop within the Access Node		ifIndex
2.	Configuration Profile (RW)	An index into the “DSL Line Configuration Profiles” database according to the Access Loop’s DSL technology.	R-343	See Note 1
3.	Priority to Traffic Class mapping Profile Index (RW)	Specifies the entry in the “Priority to Traffic Class Mapping Profiles” applicable for this Access Loop. The number of traffic classes supported for this Access Loop MUST be at least 4 and SHOULD be at least 6.	R-45, R-46	Number of queues is same as number of traffic classes

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
4.	Queues Setup Profile Index (RW)	Specifies the entry in the “Queues Block Profiles Table” applicable for this Access Loop. The number of queues supported for this Access Loop MUST be at least 4 and SHOULD be at least 6.	R-49, R-50, R-51, R-52	
5.	Circuit ID (RW)	An alphanumeric string of up to 63 characters that is being used for the DHCP relay option 82 Circuit ID field. If this attribute is set to NULL then the Access Node level Circuit ID syntax is utilized for this Access Loop.	R-119, R-122, R-123	Default=NULL
6.	Remote ID (RW)	An alphanumeric string of up to 63 characters that is being used for the DHCP relay option 82 Remote ID field.	R-113, R-120	Default=NULL
7.	EAP Control (RW)	Controls (enables/disable) EAP for this Access Loop.	R-95	Default=disabled
8.	Slow Protocol Control (RW)	Controls (enables/disable) Slow Protocols for this Access Loop.	R-95	Default=disabled
9.	Maximum Number of Simultaneous Multicast Groups (RW)	Defines the maximum number of multicast groups this Access Loop can simultaneously join.	R-220	
Note 1: The “DSL Line Configuration Profiles” database is an “external” managed entity. Its structure and attributes are beyond the scope of this document.				

Table 6.2-1: Access Loop Related Managed Objects

6.3 Virtual Bridge Port

The following table (Table 6.3-1) lists the managed objects under the Virtual Bridge Port managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Virtual Bridge Port ID (index)	An index that uniquely identifies the virtual bridge port within this Access Node		
2.	Traffic Classification Profile Index (RW)	Specifies an entry in the "Traffic Classification Table" applicable for this virtual bridge port.	R-58	

Table 6.3-1: Virtual Bridge Port Related Managed Objects

6.4 User-Side Bridge Port

The following table (Table 6.4-1) lists the managed objects under the User-Side Bridge Port managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	User-Side Virtual Bridge Port ID (index)	An index that uniquely identifies the user-side virtual bridge port within this Access Node		Equivalent to Virtual Bridge Port ID
2.	PVC Bundle ID (RW)	A nonzero number in this attribute identifies a PVC Bundle in which this User-Side Virtual Bridge Port is a member.	R-59	Default=0 (i.e., not a member in a PVC Bundle)
3.	Circuit ID (RW)	An alphanumeric string of up to 63 characters that is being used for the DHCP relay option 82 Circuit ID field. If this attribute is set to NULL then the Access Loop level (if not NULL) or Access Node level	R-112, R-119, R-122	Default=NULL

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
		Circuit ID syntax is utilized for this User-Side Bridge Port.		
4.	Remote ID (RW)	An alphanumeric string of up to 63 characters that is being used for the DHCP relay option 82 Remote ID field. If this attribute is set to NULL then the Access Loop level is utilized for this User-Side Bridge Port.	R-113, R-120	Default=NULL
5.	Auto-Sense Control (RW)	Specifies whether or not the Auto-Sense of protocol, encapsulation and multiplexing mode should be active on this Access Loop	R-62	
6.	Acceptable Frame Type(s) (RW)	Acceptable frame type may be either <ul style="list-style-type: none"> • VLAN Tagged Frames Only, • Untagged/Priority-Tagged Frames only, or • Admit All Frames. 	R-9	
7.	TLS function (RW)	Is TLS active for the associated UBP	R-10	On/Off
8.	Filters List Index (RW)	Specifies the entry in the “Filters List Table” applicable for this bridge port. The list of filters includes filters for: <ul style="list-style-type: none"> • Ethertype filtering. • Source MAC Address filtering , and • Destination MAC Address filtering 	R-26, R-27, R-94	See 6.8, 6.8.4

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
9.	Maximum learned addresses (RW)	Maximum number of source MAC addresses learned from this bridge port	R-92, R-93	
10.	Primary VLAN Membership List (VML) Index (RW)	Specifies the primary entry in the "VLAN Membership List" applicable for this UBP.	R-11, R-16, R-17, R-29, R-30, R-31	The VML table handles the "VLAN translation" and "Ingress to egress priority mapping" functions per VLAN ID in the membership list.
11.	Secondary VLAN Membership List (VML) Index (RW)	Specifies an optional secondary entry in the "VLAN Membership List" applicable for this UBP.		The secondary list MAY be used for efficiently building the VLANs membership list from a basic list and a complementary list.
12.	PVID (RW)	Default VLAN ID for untagged frames	R-22	
		TLS Function=On: <i>Ignored</i>		
13.	Default Priority (RW)	Default priority for untagged frames.	R-14, R-17, R-22, R-31	
14.	S-VID (RW)	TLS Function=On: TLS S-VID	R-12	
		Configured S-VID	R-21	
15.	S-Priority (RW)	Configured S-Priority value	R-21	

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
16.	Ingress to Egress Priority Mapping - Profile Index (RW)	Specifies the entry in the “Ingress to Egress Priority Mapping Table” applicable for this UBP. This mapping applies to the TLS portion in TLS UBP and to the priority tagged frames in non-TLS UBP.	R-14, R-20	Note that copying the priority from the ingress C-tag to the egress S-tag can be achieved by a trivial mapping table.
17.	Non-Tagged Frames Handling (RW)	If Acceptable Frame Type is either “Untagged/Priority-tagged Frames Only” or “Accept All Frames”, specifies the method of handling untagged frames. The method can be: <ul style="list-style-type: none"> • Add S-tag, or • Add both S-tag and C-tag 	R-19	
18.	L2 DHCP Relay Agent Control (RW)	Defines whether or not Layer 2 DHCP Relay Agent is enabled for the related UBP. Assuming the function is enabled for this port, it applies, in the context of this port, for each S-VLAN in which it is a member and provided the same function is enabled for that S-VLAN.	R-96, R-97	Default=enabled
19.	Loop Characteristics Insertion Control (RW)	Defines whether or not the Access Node should insert the access loop characteristics via its PPPoE intermediate agent and/or via its layer2 DHCP Relay agent for the related UBP.	R-127	

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
20.	Upstream Ethernet OAM Message Rate Limit (RW)	The rate limit (packets per seconds) of Ethernet OAM messages arriving on the related UBP. Setting the parameter to zero (0) means completely filtering the Ethernet OAM messages from the related UBP..	R-267, R-268	
21.	Server MEP Function Control (RW)	Defines whether or not the Access Node should activate a "Server MEP" function for the related UBP.	R-283	

Table 6.4-1: User-Side Bridge Port Related Managed Objects

6.5 PVC Bundle

The following table (Table 6.5-1) lists the managed objects under the PVC Bundle managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	PVC Bundle ID (index)	A first index. A number that uniquely identifies a PVC Bundle within the Access Node.	R-59	
2.	Ethernet Priority Value (index)	A second index that specifies an Ethernet priority in the context of this PVC Bundle.	R-59	
3.	User-Side Virtual Bridge Port ID (RW)	Identifies a user-side virtual bridge port within this Access Node that is allowed to use the Ethernet Priority Value associated with this row.	R-59	All members in the same PVC bundle MUST relate to the same Access Loop.

Table 6.5-1: PVC Bundle Related Managed Objects

6.6 Network Interface

The following table (Table 6.6-1) lists the managed objects under the Network Interface managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Network Interface ID (index)	A number that uniquely identifies the Network Interface within the Access Node		ifIndex
2.	Priority to Traffic Class mapping Profile Index (RW)	Specifies the entry in the “Priority to Traffic Class Mapping Profiles” applicable for this Network Interface. The number of traffic classes supported for this Network Interface MUST be at least 4 and SHOULD be at least 6.	R-45, R-46	Number of queues is same as number of traffic classes
3.	Queues Setup Profile Index (RW)	Specifies the entry in the “Queues Block Profiles Table” applicable for this Network Interface. The number of queues supported for this Network Interface MUST be at least 4 and SHOULD be at least 6.	R-53, R-54, R-55, R-56	

Table 6.6-1: Network Interface Related Managed Objects

6.7 Network-Side Bridge Port

The following table (Table 6.7-1) lists the managed objects under the Network-Side Bridge Port managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
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1.	Network-Side Virtual Bridge Port ID (index)	An index that uniquely identifies the network-side virtual bridge port within this Access Node		Equivalent to Virtual Bridge Port ID
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Table 6.7-1: Network-Side Bridge Port Related Managed Objects

6.8 Filter

The following table (Table 6.8-1) lists the managed objects under the Filter managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Filter ID (Index)	An ordered number of this filter	R-26, R-94	
2.	Filter Type (RW)	A parameter that indicates the filter type. The following types are possible: <ul style="list-style-type: none"> • Ethertype Filter • Allowed Source MAC Addresses • Denied Source MAC Addresses • Allowed Destination MAC Addresses • Denied Destination MAC Addresses 	R-26, R-94	According to the Filter Type it is possible to determine whether the filter details are located in Table 6.8-2 and Table 6.8-3 or in Table 6.8-4.

Table 6.8-1: Filter Managed Objects

6.8.1 Ethertype Filter – Ethertype Values

The following table (Table 6.8-2) lists more managed objects under the Filter managed entity in case it filters Ethertype values. This following table lists the Ethertype values in this Ethertype filter while Table 6.8-3 details the actions to perform on the filtered frames.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
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1.	Filter ID (Index)	An ordered number of this filter	R-26	Same as the Filter ID in Table 6.8-1
2.	Ethertype value (Index)	An Ethertype value this filter handles.	R-26	

Table 6.8-2: Ethertype Filter Managed Objects**6.8.2 Ethertype Filter – Actions**

The following table (Table 6.8-3) lists more managed objects under the Filter managed entity in case it filters Ethertype values. This table details the actions to perform on the frames filtered according to the Ethertype values listed in Table 6.8-2.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Filter ID (Index)	An ordered number of this filter	R-26	Same as the Filter ID in Table 6.8-1 and Table 6.8-2
2.	Ethertype value (Index)	An Ethertype value this filter handles.	R-26	Same as the Ethertype value in Table 6.8-2
3.	C-VID In (RW)	The C-VLAN ID In value associated with this Ethertype filter.		

Table 6.8-3: Ethertype Filter Managed Objects**6.8.3 MAC Address Filter**

The following table (Table 6.8-4) lists more managed objects under the Filter managed entity in case it filters source or destination MAC addresses.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Filter ID (Index)	An ordered number of this filter	R-94	Same as the Filter ID in Table 6.8-1

2.	MAC Address (Index)	A MAC Address included in this filter. The Filter Type object in the Filter's main table (Table 6.8-1) defines whether the MAC Addresses in this filter are source or destination MAC addresses and also whether those addresses are allowed or denied.	R-94	
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Table 6.8-4: MAC Address Filter Managed Objects

6.8.4 Filters List

The following table (Table 6.8-5) lists the managed objects under the Filters List managed entity as well as some assumptions on the contents of the Filter List managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Filters List ID (Index)	An ordered number of this filters list		
2.	Filter Id (Index)	An ordered number of a filter included in this Filter List.	Ethertype per R-26, R-27 Allowed/Denied MAC Addresses per R-94	Same as a Filter ID in Table 6.8-1

Table 6.8-5: Filters List Managed Objects

6.9 VLAN

The following table (Table 6.9-1) lists the managed objects under the VLAN managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	VLAN ID (index)	The S-VLAN ID number		

2.	User To User Traffic Control (RW)	Configures per S-VLAN ID whether or not to prevent traffic between user bridge ports.	R-40	
3.	Downstream Broadcast/Multicast filtering (RW)	Control whether the AN filters out downstream Broadcast/Multicast frames	R-88	
4.	Forwarding Paradigm (RW)	Determines the forwarding paradigm. Optional values are: nToOneVlan or oneToOneVlan .	R-33	
5.	Address Learning Control (RW)	If Forwarding Paradigm attribute is oneToOneVlan , controls (enables/disable) the MAC address learning	R-44	
6.	Interworked PPPoE Inactivity Timeout (RW)	Defines the “inactivity timeout” in the context of considering an interworked PPPoE session to be disconnected.	Derived from R-76	
7.	PADT VLAN Priority (RW)	Defines the VLAN priority value assigned to PPPoE PADT packets.	R-77	
8.	L2 DHCP Relay Agent Control (RW)	Defines whether or not Layer 2 DHCP Relay Agent is enabled in this S-VLAN. Note that the function may be disabled for selected member user-side bridge ports.	R-96, R-97	Default=disabled

9.	IP Address Spoofing Prevention Control (RW)	Defines whether or not IP Address Spoofing Prevention function is enabled in this S-VLAN. This function MUST be enabled only if "L2 DHCP Relay Agent Control" is enabled too.	R-108	Default=disabled
10.	NtoOne VLAN Type (RW)	When Forwarding Paradigm attribute is set to nToOneVlan this attribute indicates if this is a <ul style="list-style-type: none"> • <u>Multicast</u> VLAN, • <u>Unicast</u> VLAN or • <u>Shared</u> VLAN, i.e., provides both unicast and multicast traffic. 	R-218	For Multicast/Shared VLANs "IGMP Processing Mode" attribute cannot be set to Forward .
11.	IGMP Processing Mode (RW)	The way IGMP messages are handled in the context of this VLAN. Possible setups: <ul style="list-style-type: none"> • Discard, • Forward, • Process 	R-202, R-209, R-221	For Multicast/Shared VLANs the "IGMP Processing Mode" attribute cannot be set to Forward

12.	IGMP Snooping Mode (RW)	If "NtoOne VLAN Type" attribute of this VLAN is set to either Multicast or Shared and "IGMP Processing Mode" attribute is set to Process , then this attribute defines the process type, which can take one of the following values: <ul style="list-style-type: none"> • Transparent Snooping • Snooping with Proxy Reporting 	R-247, R-248	
13.	Discard Upstream Multicast Traffic (RW)	Defines whether or not (true or false) the Access Node should discard multicast traffic on upstream direction in the context of this VLAN.	R-206	
14.	IGMP Default Priority (RW)	Defines the priority (re)marking for user-initiated IGMP messages received in this VLAN before forwarding them to the network.	R-215	

Table 6.9-1: VLAN Related Managed Objects

6.10 VLAN Membership List

The following table (Table 6.10-1) lists the managed objects under the VLAN Membership List managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	VLAN Membership List (index)	A first key that identifies the VLAN Membership List	R-16, R-17, R-30, R-31	

2.	C-VID In (index)	A second key that identifies a C-VLAN ID In the list.	R-16, R-17, R-30, R-31	
3.	Ingress to Egress Priority Mapping - Profile Index (RW)	Traffic Priority Handling is set to “Use Ingress to Egress Priority Mapping”, specifies the entry in the “Ingress to Egress Priority Mapping Table” applicable for this C-VLAN ID.	R-17, R-27, R-31	
4.	C-VID Out (RW)	The C-VLAN ID value that should override the C-VID In value.	R-16, R-27, R-30	If =0 only S-VID is applicable
5.	S-VID Out (RW)	The S-VLAN ID value in a S-tag that should be added to the frame.	R-16, R-27, R-30	
6.	IGMP Processing Mode (RW)	The way IGMP messages are handled in the context of this S-VID Out. Possible setups: Discard, - IGMP messages are discarded. Option is always relevant Forward, - IGMP messages are forwarded as regular traffic. Process – IGMP messages are processed	R-202	Forward can be selected only if the same attribute for the S-VID Out is either Process of Forward . Process can be selected only if the same attribute for the S-VID Out is Process too.

7.	IGMP No-Match Behavior (RW)	When the IGMP Processing Mode attribute is set to ' Process ' then this attribute defines the behavior when there is no match between the content of IGMP messages received on this VLAN and the list of multicast groups supported by VLANs in this VLAN Membership List. Possible setups: <ul style="list-style-type: none"> • Discard, • Forward 	R-204	
8.	Discard Upstream Multicast Traffic (RW)	Defines whether or not (true or false) the Access Node should discard multicast traffic on upstream direction in the context of this S-VID Out.	R-206	If same attribute in the VLAN entity (§6.9) is set to true (discard) then upstream multicast traffic is anyhow discarded.
9.	Upstream IGMP Messages Rate Limit (RW)	Defines the rate limit (messages/second) for IGMP messages received on upstream direction.	R-208	This attribute is relevant only if the "IGMP Processing Mode" attribute is set to Process .

Table 6.10-1: VLAN Membership List Related Managed Objects

6.11 Multicast Group Description Table

The following table (Table 6.11-1) lists the managed objects under the Multicast Group Description Table managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	S-VID (index)	A first key that identifies the multicast S-VLAN to which this row refers.	R-219	

2.	IP Multicast Group Address (index)	A second key that identifies the IP multicast group address to which this row refers.	R-219	
3.	IP Source Address (index)	A third key that identifies the IP source address to which this row refers. A value of 0.0.0.0 indicates that the operator is indifferent to this attribute.	R-219	

Table 6.11-1: Multicast Group Description Table Related Managed Objects

6.12 Multicast VLAN Statistics

The following paragraphs define the managed objects under the Multicast VLAN Statistics managed entity, as well as the source requirement(s) in TR-101.

6.12.1 Multicast VLAN Statistics – Currently Active Hosts Table

The following table (Table 6.12-1) lists the managed objects under the Multicast VLAN Statistics managed entity that their scope is the currently active hosts per each multicast VLAN and IP multicast group associated with it.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	S-VID (index)	A first key that identifies the multicast S-VLAN to which this row refers.	R-217	
2.	IP Multicast Group Address (index)	A second key that identifies the IP multicast group address to which this row refers.	R-217	
3.	IP Source Address (index)	A third key that identifies the IP source address to which this row refers. A value of 0.0.0.0 indicates that the operator is indifferent to this attribute.	R-217	
4.	Active Hosts (RO)	The number of hosts (i.e., Access Loops) that are currently members of this IP multicast group.	R-217	

Table 6.12-1: Currently Active Hosts Table Related Managed Objects**6.12.2 Multicast VLAN Statistics – Access Loop IGMP Activity Table**

The following table (Table 6.12-2) lists the managed objects under the Multicast VLAN Statistics managed entity that their scope is the IGMP activity per each Access Loop and multicast VLAN.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Access Loop ID (index)	A first key that identifies the Access Loop within the Access Node to which this row refers.	R-217	ifIndex
2.	S-VID (index)	A second key that identifies the multicast S-VLAN to which this row refers.	R-217	
3.	Total Successful Joins (RO)	The number IGMP join messages received from this Access Loop that were successful.	R-217	
4.	Total Unsuccessful Joins (RO)	The number IGMP join messages received from this Access Loop that were unsuccessful.	R-217	
5.	Total Leaves (RO)	The number IGMP leave messages received from this Access Loop.	R-217	
6.	Total General Queries (RO)	The number IGMP general query messages sent to this Access Loop.	R-217	
7.	Total Specific Queries (RO)	The number IGMP specific query messages sent to this Access Loop.	R-217	
8.	Total Invalid Messages (RO)	The number invalid IGMP messages received from this Access Loop.	R-217	

Table 6.12-2: Access Loop IGMP Activity Table Related Managed Objects

6.12.3 Multicast VLAN Statistics –VLAN IGMP Activity Table

The following table (Table 6.12-3) lists the managed objects under the Multicast VLAN Statistics managed entity that their scope is the IGMP activity per multicast VLAN.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	S-VID (index)	A key that identifies the multicast S-VLAN to which this row refers.	R-217	
2.	Active Groups (RO)	The number of IP multicast groups that are currently active on this multicast VLAN.	R-217	
3.	Total Sent Joins (RO)	The number IGMP join messages sent from this multicast VLAN to the network.	R-217	
4.	Total Received Joins (RO)	The number IGMP join messages received by this multicast VLAN from all hosts.	R-217	
5.	Total Successful Received Joins (RO)	The number IGMP join messages received by this multicast VLAN from all hosts and that were successful.	R-217	
6.	Total Unsuccessful Received Joins (RO)	The number IGMP join messages received by this multicast VLAN from all hosts and that were unsuccessful.	R-217	
7.	Total Sent Leaves (RO)	The number IGMP leave messages sent from this multicast VLAN to the network.	R-217	
8.	Total Received Leaves (RO)	The number IGMP leave messages received by this multicast VLAN from all hosts.	R-217	
9.	Total Sent General Queries (RO)	The number IGMP general query messages sent from this multicast VLAN to the hosts.	R-217	

10.	Total Received General Queries (RO)	The number IGMP general query messages received by this multicast VLAN from the network.	R-217	
11.	Total Sent Specific Queries (RO)	The number IGMP specific query messages sent from this multicast VLAN to the hosts.	R-217	
12.	Total Received Specific Queries (RO)	The number IGMP specific query messages received by this multicast VLAN from the network.	R-217	
13.	Total Invalid Received Messages (RO)	The number invalid IGMP messages received by this multicast VLAN from all hosts.	R-217	

Table 6.12-3: VLAN IGMP Activity Table Related Managed Objects

6.13 Static Hosts Table

The following table (Table 6.13-1) the managed objects under the Static Hosts Table managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Port ID (index)	An index that uniquely identifies a user-side virtual bridge port within this Access Node in the context of specifying a static host in this row.	R-109	
2.	VLAN ID (index)	An S-VLAN ID number in the context of specifying a static host in this row.	R-109	
3.	Host Address (index)	The IP Address of a static host associated with the Port ID and VLAN ID in this row.	R-109	

Table 6.13-1: Static Hosts Table Managed Objects

6.14 Priority to Traffic Class Mapping Profiles

6.14.1 Priority to Traffic Class Mapping Top Table

The following table (Table 6.14-1) includes one managed object under the Priority to Traffic Class Mapping managed entity (the selection between using and not using the DEI field).

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Profile Index (index)	A key that identifies the specific set of mapping Ethernet priorities to Traffic Class and Drop Precedence.	R-45, R-46, R-47, R-48	
2.	DEI Support (RW)	When this attribute is set to “enabled” the drop precedence is directly determined according to the DEI bit value of the Ethernet header. When s this attribute is et to “disabled” the Access Node, according to this mapping, does not use the DEI bit value of the Ethernet header.	R-47, R-48	

Table 6.14-1: Priority to Traffic Class Mapping Top Table Managed Objects

6.14.2 Priority to Traffic Class Mapping Main Table

The following table (Table 6.14-2) lists the main managed objects under the Priority to Traffic Class Mapping Table managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Profile Index (index)	A first key that identifies the specific set of mapping Ethernet priorities to Traffic Class and Drop Precedence.	R-45, R-46, R-47, R-48	Same as the index in Table 6.14-2

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
2.	Ethernet Priority (index)	A second key that identifies a specific Ethernet priority as part of this set of mapping Ethernet priorities to Traffic Class and Drop Precedence.	R-45, R-46, R-47	There MUST be 8 rows in this table, corresponding to each possible Ethernet priority.
3.	Traffic Class (RW)	The Traffic Class adapted to the given Ethernet Priority. This object MUST support at least 4 different values and SHOULD support at least 6 different values.	R-45, R-46, R-47	
4.	Drop Precedence (RW)	The Drop Precedence (DP) adapted to the given Ethernet Priority. The possible values of this objects are: None – No drop precedence value is specified, High – High drop precedence, or Low – Low drop precedence High and low drop precedence MUST be applicable for at least 2 different traffic classes.	R-47, R-48	If the DEI Support attribute is set to “enabled” for the related profile then the Drop Precedence attribute is ignored.

Table 6.14-2: Priority to Traffic Class Mapping Main Table Managed Objects

6.15 Queues Block Profiles Table

The following table (Table 6.15-1) lists the managed objects under the queues block profiles table managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Queue Setup Profile (index)	A first key that identifies a profile of queues setup	R-51, R-52, R-55, R-56, R-57	
2.	Queue Number (index)	A second key that identifies a queue number in the queue setup profile.	R-51, R-52, R-55, R-56, R-57	The "Queue Number index" is same as "Traffic Class" in the 6.14
3.	Queue Priority (RW)	The priority assigned to the queue. If this queue priority is unique among all other queues in this profile then a strict priority scheduling method is assumed.	R-51, R-52, R-55, R-56	At least 4 priorities MUST be supported.
4.	Queue Weight (RW)	The weight assigned to the queue. The weight is relevant only when the same Queue Priority value is assigned to multiple queues and they are scheduled according to a weighted algorithm.	R-52, R-56	
5.	Maximum Queue Size (RW)	The maximum size (i.e., depth) of the queue, expressed in bytes.	R-57	

Table 6.15-1: Queue Block Related Managed Objects

6.16 Circuit ID Syntax

The following table (Table 6.16-1) lists the managed objects under the Circuit ID Syntax managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Circuit ID Syntax (index)	A first key that identifies the Circuit ID Syntax	R-126	See Note 1
2.	Circuit ID Component (index)	A second key that identifies a component in the Circuit ID Syntax.	R-126	
3.	Component Type (RW)	An attribute that identifies the type of this component. The following types are possible: <ul style="list-style-type: none"> • Standard - A TR-101 based variable • PropVar - A proprietary variable • PropStr - A delimiter or constant string 	R-126	
4.	Component Identifier (RW)	A unique and content sensitive identifier for the specific definition of this component. The following identifiers are expected: <ul style="list-style-type: none"> • A row number in table 2 of TR-101 (R-126). • An index into a proprietary managed entity that specifies possible proprietary variables. • An index into a proprietary managed entity that specifies possible delimiters and constant character strings. 	R-126	See Notes 2 and 3

Note 1: This key is required if there is a need to select between multiple Circuit ID Syntaxes, e.g., a primary syntax vs. an alternative syntax, current syntax vs. next syntax, etc.

Note 2: The interpretation of the “Component Identifier” attribute depends on the setup of “Component Type” attribute.

Note 3: The “Access Node ID” [Table 6.1-1 (1)] is utilized when “Component Type” attribute is set to ‘**Standard**’ and “Component Identifier” attribute is set to ‘1’.

Table 6.16-1: Circuit ID Syntax Related Managed Objects

6.17 Traffic Classification Table

The following table (Table 6.17-1) lists part of the managed objects under the Traffic Classification Table managed entity (the criteria part of the classifier).

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Traffic Classifier (index)	A first key that identifies the specific traffic classifier.	R-58	
2.	Rule (index)	A second key that identifies a rule in the related traffic classifier. A rule includes one or more criterions.	R-58	
3.	Criterion (index)	A third key that identifies a specific criterion in the related rule.	R-58	
4.	Criterion Type	The classification criterion type: <ul style="list-style-type: none"> • User Port ID (physical or logical) • Ethernet Protocol ID • Received Ethernet priority bits • IP protocol ID 	R-58	
5.	Value	The value of the classification criterion.	R-58	Syntax should be determined by criterion type

Table 6.17-1: Traffic Classification Table Criteria Managed Objects

The following table (Table 6.17-2) lists the other managed objects under the Traffic Classification Table managed entity (the priority marking/remarking).

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Traffic Classifier (index)	A first key that identifies the specific traffic classifier.	R-58	Same as the Traffic Classifier in Table 6.17-1
2.	Rule (index)	A second key that identifies a rule in the related traffic classifier.	R-58	Same as the Rule in Table 6.17-1
3.	Priority	The priority used to mark/re-mark the frame in case of classification match.	R-58	

Table 6.17-2: Traffic Classification Table - Priority

6.18 Ingress to Egress Priority Mapping Table

The following table (Table 6.18-1) lists the managed objects under the Ingress to Egress Priority Mapping Table managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	Profile Index (index)	A first key that identifies the specific set of mapping Ingress priorities to Egress priorities.	R-14, R-17, R-20, R-31	
2.	Ingress Priority (index)	A second key that identifies a specific ingress priority as part of this set of mapping Ingress priorities to Egress priorities.	R-14, R-17, R-1, R-31	
3.	Egress Priority (RW)	The Egress priority adapted by this set of mapping to the given Ingress Priority.	R-14, R-17, R-20, R-31	

Table 6.18-1: Ingress to Egress Priority Mapping Table Managed Objects

6.19 Peer MEPs Table

The following table (Table 6.19-1) lists the managed objects under the Peer MEPs Table managed entity.

Object Reference Number	Managed Object Name	Description	Reference in Broadband Forum TR-101	Comments
1.	MEP Name (index)	A key that identifies a peer MEP, using a field defined in 802.1ag.	R-279, R-290	
2.	MAC Address	A MAC Address associated with the MEP Name.	R-279, R-290	

Table 6.19-1: Peer MEP Table Managed Objects

7 Mapping TR-101 Requirements to Managed Objects

This chapter allows tracing the managed entities and objects that are derived from each requirement in Broadband Forum TR-101 document.

7.1 TR-101 Requirements to Managed Entities and objects

The following table (Table 7.1-1) depicts the requirements in Broadband Forum TR-101 that lead to managed objects in the Access Node management model. It also lists the requirements that do not have influence on the Access Node management model.

Several rows in the table have text with green background in the Comments column. Those comments are references to paragraph numbers in Broadband Forum TR-101. The purpose is indicating the first requirement number in main paragraphs of TR-101.

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-1	None	-	TR-101 Paragraph 2.1
R-2	None	-	
R-3	None	-	
R-4	None	-	TR-101 Paragraph 3.1
R-5	None	-	
R-6	None	-	
R-7	None	-	
R-8	ETHERTYPE 802.1ad	Table 6.1-1 (3)	
R-9	Acceptable Frame Type(s)	Table 6.4-1 (6)	
R-10	TLS function	Table 6.4-1	

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
		(7)	
R-11	VLAN Membership List	Table 6.4-1 (10), (11)	
R-12	(TLS) S-VID	Table 6.4-1 (14)	
R-13	None	-	
R-14	Default Priority	Table 6.4-1 (13)	
	Ingress to Egress Priority Mapping Table	6.18	
	Ingress to Egress Priority Mapping - Profile Index	Table 6.4-1 (16)	
R-15	None	-	
R-16	VLAN Membership List	6.10	The VML refers to the VLAN translation function
	VLAN Membership List (VML) -Index	Table 6.4-1 (10), (11)	
R-17	VLAN Membership List	6.10	The VML associates "Ingress to Egress Priority mapping" per VLAN.
	VLAN Membership List (VML) -Index	Table 6.4-1 (10), (11)	
	Ingress to Egress Priority Mapping Table	6.18	
	Default Priority	Table 6.4-1 (13)	
R-18	None	-	
R-19	Non-Tagged Frames Handling	Table 6.4-1 (17)	
R-20	Ingress to Egress Priority Mapping Table	6.18	
	Ingress to Egress Priority Mapping - Profile Index	Table 6.4-1 (16)	

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-21	S-VID	Table 6.4-1 (14)	
	S-Priority	Table 6.4-1 (15)	
R-22	C-VID	Table 6.4-1 (12)	
	C-Priority	Table 6.4-1 (13)	
R-23	None	-	
R-24	None	-	
R-25	None	-	
R-26	Filters List Index	Table 6.4-1 (8)	
	(Ethertype) Filter Table	6.8, 6.8.1, 6.8.2, 6.8.4	
R-27	Ethertype Filter - Actions	6.8, 6.8.1, 6.8.2, 6.8.4, 6.10	
R-28	None	-	
R-29	VLAN Membership List -Index	Table 6.4-1 (10), (11)	
R-30	VLAN Membership List	6.10	The VML refers to the VLAN translation function
	VLAN Membership List (VML) -Index	Table 6.4-1 (10), (11)	
R-31	VLAN Membership List	6.10	The VML associates "Ingress to Egress Priority mapping" per VLAN.
	VLAN Membership List (VML) -Index	Table 6.4-1 (10), (11)	
	Ingress to Egress Priority Mapping Table	6.18	
	Default Priority	Table 6.4-1 (13)	
R-32	None	-	
R-33	Forwarding Paradigm	Table 6.9-1 (4)	
R-34	Applicable	-	TR-101 Paragraph 3.2

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
			LAG management model is beyond this document's scope. E.g., IEEE model MAY be used.
R-35	Applicable	-	
R-36	None	-	
R-37	Applicable	-	
R-38	None	-	
R-39	None	-	
R-40	User To User Traffic Control	Table 6.9-1 (2)	
R-41	None	-	
R-42	None	-	
R-43	None	-	
R-44	Address Learning Control	Table 6.9-1 (5)	
R-45	Priority to Traffic Class Mapping Table	6.14	TR-101 Paragraph 3.3
	Priority to Traffic Class mapping Profile Index	Table 6.2-1 (3), Table 6.6-1 (2)	
R-46	Priority to Traffic Class Mapping Table	6.14	
	Priority to Traffic Class mapping Profile Index	Table 6.2-1 (3), Table 6.6-1 (2)	
R-47	Priority to Traffic Class Mapping Table	6.14	
R-48	Priority to Traffic Class Mapping Table	6.14	
R-49	Number of Queues	Table 6.2-1 (4)	
R-50	Number of Queues	Table 6.2-1 (4)	
R-51	Queues Block Profiles Table	6.15	
	Queues Setup Profile Index	Table 6.2-1 (4)	

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-52	Queues Block Profiles Table	6.15	
	Queues Setup Profile Index	Table 6.2-1 (4)	
R-53	Number of Queues	Table 6.6-1 (3)	
R-54	Number of Queues	Table 6.6-1 (3)	
R-55	Queues Block Profiles Table	6.15	
	Queues Setup Profile Index	Table 6.6-1 (3)	
R-56	Queues Block Profiles Table	6.15	
	Queues Setup Profile Index	Table 6.6-1 (3)	
R-57	Queues Block Profiles Table	6.15	
R-58	Traffic Classification Table	6.17	
	Traffic Classification Profile Index	Table 6.3-1 (2)	
R-59	PVC Bundle ID	Table 6.4-1 (2)	
	PVC Bundle	6.5	
R-60	None	-	
R-61	None	-	TR-101 Paragraph 3.5
R-62	Auto-Sense Control	Table 6.4-1 (5)	
R-63	None	-	
R-64	None	-	
R-65	None	-	
R-66	None	-	
R-67	None	-	
R-68	None	-	
R-69	None	-	
R-70	None	-	
R-71	None	-	

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-72	None	-	
R-73	None	-	
R-74	None	-	
R-75	None	-	
R-76	Interworked PPPoE Inactivity Timeout	Table 6.9-1 (6)	
R-77	PADT VLAN Priority	Table 6.9-1 (7)	
R-78	None	-	
R-79	Not applicable	-	
R-80	Not applicable	-	
R-81	Not applicable	-	
R-82	Not applicable	-	
R-83	Not applicable	-	
R-84	None	-	
R-85	None	-	
R-86	Not applicable	-	
R-87	None	-	TR-101 Paragraph 3.6
R-88	Downstream Broadcast/Multicast filtering	Table 6.9-1 (3)	TR-101 Paragraph 3.7
R-89	None	-	
R-90	None	-	
R-91	None	-	
R-92	Maximum learned addresses	Table 6.4-1 (9)	
R-93	Maximum learned addresses	Table 6.4-1 (9)	
R-94	MAC Address Filters	6.8, 6.8.3, 6.8.4	
	Filters List Index	Table 6.4-1 (8)	
R-95	EAP Control	Table 6.2-1 (7)	
	Slow Protocol Control	Table 6.2-1 (8)	

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-96	L2 DHCP Relay Agent Control	Table 6.4-1 (18), Table 6.9-1 (8)	TR-101 Paragraph 3.8
R-97	L2 DHCP Relay Agent Control	Table 6.4-1 (18), Table 6.9-1 (8)	
R-98	None	-	Managed objects are specified in other requirements.
R-99	None	-	
R-100	None	-	
R-101	None	-	
R-102	None	-	
R-103	None	-	
R-104	None	-	
R-105	None	-	
R-106	None	-	
R-107	None	-	
R-108	IP Address Spoofing Prevention Control	Table 6.9-1 (9)	
R-109	Static Hosts Table	6.11	
R-110	Not applicable	-	TR-101 Paragraph 3.9
R-111	Not applicable	-	
R-112	Agent Circuit ID	Table 6.4-1 (3)	Managed objects are specified in other requirements.
R-113	Agent Remote ID	Table 6.2-1 (6)	
		Table 6.4-1 (4)	
R-114	None	-	
R-115	None	-	
R-116	Not applicable	-	
R-117	Not applicable	-	
R-118	None	-	

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-119	Agent Circuit ID	Table 6.2-1 (5)	Managed objects are specified in other requirements.
		Table 6.4-1 (3)	
R-120	Agent Remote ID	Table 6.2-1 (6)	Defining Remote IDs on both layers is for having a design similar the Circuit IDs.
		Table 6.4-1 (4)	
R-121	None	-	
R-122	Agent Circuit ID	Table 6.2-1 (5)	
		Table 6.4-1 (3)	
R-123	Agent Circuit ID	Table 6.2-1 (5)	“... per individual <u>access loop</u> and <u>logical port</u> ”
		Table 6.4-1 (3)	
R-124	Circuit ID Syntax Type	Table 6.1-1 (2)	
	Access Node ID	Table 6.1-1 (1)	
R-125	Access Node ID	Table 6.1-1 (1)	
R-126	Circuit ID Syntax Type	Table 6.1-1 (2)	
	Circuit ID Syntax	6.16	
R-127	Loop Characteristics Insertion Control	Table 6.4-1 (19)	
R-128	Not applicable	-	
R-129	None	-	
R-130	None	-	
R-131	None	-	
R-132	None	-	
R-133	Not applicable	-	
R-134	Not applicable	-	
R-135	Not applicable	-	

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-136 - 157	Not applicable	-	TR-101 Paragraph 4
R-158 - 190	Not applicable	-	TR-101 Paragraph 5
R-191	Not applicable	-	TR-101 Paragraph 6
R-192	Not applicable	-	
R-193	Not applicable	-	
R-194	Not applicable	-	
R-195	Not applicable	-	
R-196	Not applicable	-	
R-197	Not applicable	-	
R-198	Not applicable	-	
R-199	Not applicable	-	
R-200	Not applicable	-	
R-201	Not applicable	-	
R-202	IGMP Processing Mode	Table 6.9-1 (11), Table 6.10-1 (6)	
R-203	None	-	
R-204	IGMP No-Match Behavior	Table 6.10-1 (7)	
R-205	None	-	Behavior determined according to "IGMP No-Match Behavior"
R-206	Discard Upstream Multicast Traffic	Table 6.9-1 (13)	
		Table 6.10-1 (8)	

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-207	None	-	This behavior should not be configurable. It is applied from the "NtoOne VLAN Type", "IGMP Processing Mode" and "Discard Upstream Multicast Traffic" attributes
R-208	Upstream IGMP Messages Rate Limit	Table 6.10-1 (9)	
R-209	IGMPv3 Transparent Snooping	Table 6.9-1 (11)	
R-210	None	-	
R-211	None	-	
R-212	None	-	
R-213	None	-	
R-214	None	-	
R-215	IGMP Default Priority	Table 6.9-1 (14)	
R-216	None	-	
R-217	Multicast VLAN Statistics tables	6.12, 6.12.1, 6.12.2, 6.12.3	
R-218	NtoOne VLAN Type	Table 6.9-1 (10)	
R-219	Multicast Group Description Table	Table 6.11-1	
R-220	Maximum Number of Simultaneous Multicast Groups	Table 6.2-1 (9)	
R-221	IGMP Processing Mode	Table 6.9-1 (11)	
R-222	None	-	
R-223 -237	Not applicable	-	
R-238	TBD	TBD	
R-239	TBD	TBD	

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-240	TBD	TBD	
R-241	None	-	This requirement is covered by other entities in the model, i.e., the VLAN entity (§6.9) and VLAN Membership List entity (§6.10)
R-242	Not applicable	-	
R-243	Not applicable	-	
R-244	Not applicable	-	
R-245	Not applicable	-	
R-246	Not applicable	-	
R-247	IGMP Snooping Mode	Table 6.9-1 (12)	
R-248	IGMP Snooping Mode	Table 6.9-1 (12)	
R-249	None	-	
R-250	None	-	Already covered by "IGMP Default Priority"
R-251 -263	Not applicable	-	TR-101 Paragraph 7
R-264	None	-	
R-265	None	-	
R-266	None	-	
R-267	Upstream Ethernet OAM Message Rate Limit	Table 6.4-1 (20)	
R-268	Upstream Ethernet OAM Message Rate Limit	Table 6.4-1 (20)	
R-269	None	-	
R-270	None	-	
R-271	None	-	
R-272	None	-	
R-273	Applicable	-	Use IEEE ([2]) management model

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-274	None	-	
R-275	None	-	
R-276	Applicable	-	Use IEEE ([2]) management model
R-277	None	-	
R-278	None	-	
R-279	Peer MEP Table	Table 6.19-1	
R-280	Applicable	-	Use IEEE ([2]) management model
R-281	Applicable	-	Use IEEE ([2]) management model
R-282	None	-	
R-283	“Server MEP” function Control	Table 6.4-1 (21)	
R-284	None	-	
R-285	None	-	
R-286	Applicable	-	Use IEEE ([2]) management model
R-287	None	-	
R-288	Applicable	-	Use IEEE ([2]) management model
R-289	None	-	
R-290	Peer MEP Table	Table 6.19-1	
R-291	Applicable	-	Use IEEE ([2]) management model
R-292	Applicable	-	Use IEEE ([2]) management model
R-293	None	-	
R-294	None	-	
R-295	Applicable	-	Use IEEE ([2]) management model

Broadband Forum TR-101 Requirement Number	Managed Object Name	Managed Entity/ Managed Object (paragraph number)	Comments
R-296	Applicable	-	Use IEEE ([2]) management model
R-297	Applicable	-	Use IEEE ([2]) management model
R-298	None	-	
R-299	None	-	
R-300	None	-	
R-301 - 339	Not applicable	-	
R-340	Applicable	-	ITU-T I.610 related objects are excluded from the scope of this document
R-341	None	-	
R-342	Applicable	-	ITU-T I.610 related objects are excluded from the scope of this document
R-343	Access Loop Configuration Profile	Table 6.2-1 (2)	TR-101 Paragraph 8
R-344	None	-	
R-345	None	-	
R-346	None	-	
R-347	Not applicable	-	
R-348	Not applicable	-	
R-349	Not applicable	-	
R-350	Not applicable	-	
R-351	Not applicable	-	
R-352	Not applicable	-	

Table 7.1-1: TR-101 Requirements Mapping to Managed Objects

Appendix I Existing EMS-NMS Interface Management Model

I.1 Purpose

The purpose of this informational appendix is to describe possible relationships between an existing EMS-NMS interface management model and this Broadband Forum Technical Report.

I.2 Scope

This appendix describes relevant managed entities in an existing EMS-NMS interface management model (I.[1]) and indicates the possible relationships between them and managed entities this Broadband Forum Technical Report defines.

I.2.1 Abbreviations

The following abbreviations apply for the purposes of this document:

CPTP Connectionless Port Termination Point

I.3 References

The following references are being used by this appendix of the Technical Report. The reference to a document within this appendix does not give it, as a stand-alone document, the status of a normative document.

I.[1] "Information Agreement for Multi-Technology Network Management (MTNM) Solution Suite Release 3.5 ", TMF 608 Version 3.4, May 2007

I.4 External Managed Entities

The managed entities this specification defines MAY be related to various managed entities in (I.[1]). The following paragraphs describe such possible relationships. Those are also indicated (for information only) in Figure 5-2 of this Technical Report.

I.4.1 Managed Element

Managed Element in (I.[1]) represents a managed network element (e.g., Ethernet Switch, ATM Switch, DSLAM, etc.). An implementation of the model in (I.[1]) MAY consider the Access Node managed entity (paragraph 6.1 in this Technical Report) to be actually a subclass of Managed Element. Being its subclass, Access Node managed entity inherits properties of Managed Element and need only those new managed objects that are pertinent to Broadband Forum TR-101.

I.4.2 Connectionless Port Termination Point (CPTP)

Connectionless Port Termination Point (CPTP) in (I.[1]) represents a port capability of an equipment, such as a Ethernet port. It can be an edge port or an internal port and it can support multiple flows. An implementation of the model in (I.[1]) MAY consider the

Virtual Bridge Port managed entity of this Technical Report to be actually a subclass of CPTP. Being its subclass, Virtual Bridge Port managed entity inherits properties of CPTP and need only those new managed objects that are pertinent to Broadband Forum TR-101.