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# DSL Forum

# Working Text
# WT-141
## Draft
## Version 3.0

# Protocol Independent Management Model for TR-101 Compliant Access Nodes

## 18 September 2006

**Produced by**
**Operations and Network Management Working Group**

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**Version History**

| Version Number | Version Date | Version Editor | Changes |
|---|---|---|---|
| **Version 1.0** | **27 February 2006** | Moti Morgenstern – ECI Telecom | First draft |
| **Version 2.1** | **8 May 2006** | Moti Morgenstern – ECI Telecom | Added Diagrams<br>Implemented changes agreed in Vienna and San Jose meetings |
| **Version 3.0** | **18 September 2006** | Moti Morgenstern – ECI Telecom | Added support for requirements in TR-101 sections 6 and 7 |

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**Table of Contents**



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## List of Figures



## List of Tables



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## Summary

This DSL Forum Technical Report provides the Element Management System's (EMS) interpretation of requirements included in DSL 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.

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**DSL Forum Working Text WT-141**

# Protocol Independent Management Model for TR-101 Compliant Access Nodes

## 1 Purpose

The purpose of this DSL Forum Technical Report is defining the Element Management System's (EMS) interpretation of requirements included in DSL Forum Technical Report TR-101, focusing on management objects that are applicable for an Access Node (AN). The document indicates 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 simplifying the protocol dependent MIB development by defining a management model based on the relevant managed objects.

## 2 Scope

This DSL Forum Technical Report provides a management orientation to requirements included in TR-101 that are applicable for an Access Node. It derives from TR-101 the relevant managed objects and arranges them in the form of logical sets, called managed entities.

### 2.1 Abbreviations

The following abbreviations apply for the purposes of this document:

| | |
|---|---|
| AN | access node |
| BNG | broadband network gateway |
| BRAS | broadband remote access server |
| DEI | drop eligibility indicator |
| DHCP | dynamic host configuration protocol |
| DP | drop precedence |
| DSLAM | digital subscriber line access multiplexer |
| EAP | extensible authentication protocol |
| EFM | Ethernet in the first mile |
| EMS | element management system |
| GDT | (multicast) group description table |
| MEP | maintenance end point |
| NBP | network-side bridge port |
| PADT | PPPoE active discovery terminate |
| PPPoE | PPP over Ethernet |
| PVID | port VLAN identifier |
| OAM | operation, administration and maintenance |
| QoS | quality of service |
| RG | routing gateway |
| RO | read-only |
| RW | read-write |
| TLS | transparent LAN service |
| UBP | user-side bridge port |
| VID | VLAN identifier |

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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 DSL 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 DSL Forum Technical Reports is published at www.dslforum.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] DSL Forum TR-101 (April 2006), *Migration to Ethernet Based DSL Aggregation*.

## 4 Access Node Managed Objects Model

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

The managed objects model diagrams in this specification use the notations that Figure 4-1 illustrates.

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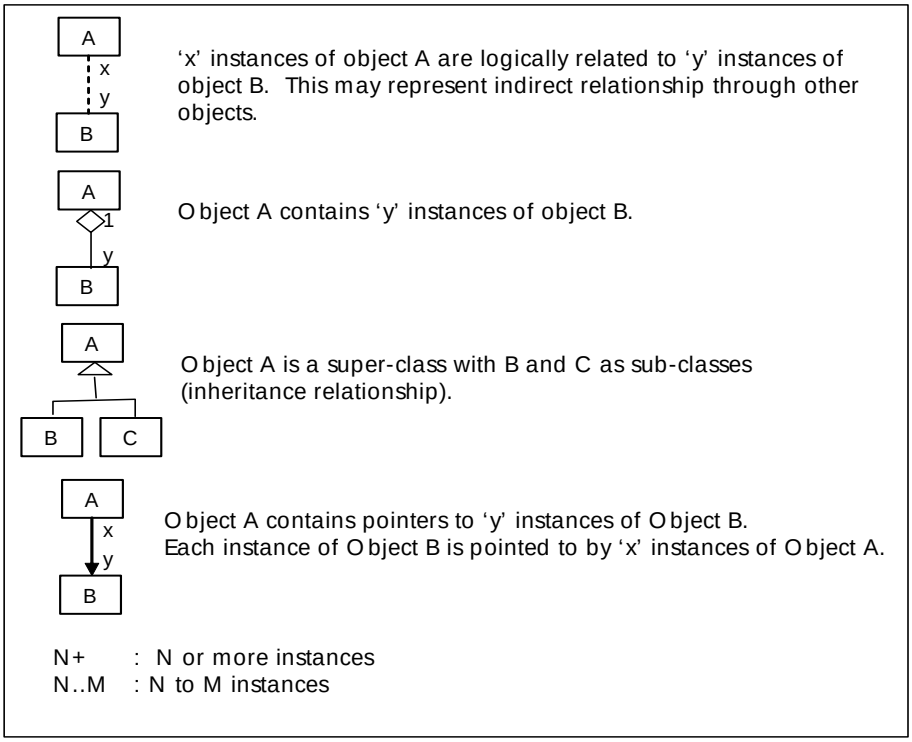


**Figure 4-1**: Notations

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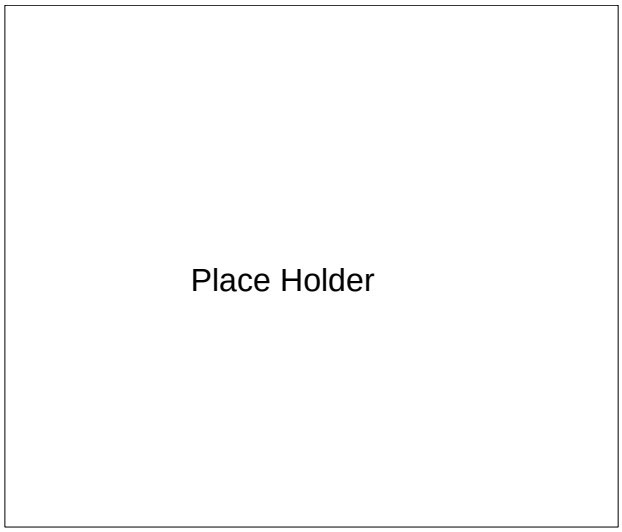


**Figure 4-2**: Access Node Managed Objects Model

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## 5 The Subset of TR-101 Requirements This TR Addresses

The DSL 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 document provides 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. Those are the Access Node (AN), the Broadband Network Gateway (BNG), the Broadband Remote Access Server (BRAS), the Aggregation Switch, and the Routing Gateway (RG). This document, however, concentrates on requirements that are applicable to the AN only.

Also, the requirements in TR-101 document are of different nature. There are requirements that refer to configuration parameters, status parameters and performance indications which all are applicable for the EMS and 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.

## 6 Applicable Access Node Managed Entities

The various managed objects that this document identifies in DSL 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 for TR-101 compliant access nodes:

(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 represents 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 represents 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 represents 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 represents the collection of all managed objects that their scope is specifying bundles of user-side bridge ports.

(6) **Network Interface** - This managed entity represents the collection of all managed objects that their scope is a network interface.

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(7) **Network-Side Bridge Port** - This managed entity represents 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 represents 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 represents collection of all managed objects that their scope is an S-VLAN.

(10) **VLAN Membership List** - This managed entity represents 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 represents collection of all managed objects that their scope is IP multicast groups for a multicast VLAN.

(12) **Multicast VLAN Statistics**- This managed entity represents 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 represents 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 a traffic class and drop precedence.

(15) **Queues Block Profile Table** - This managed entity represents 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 represents collection of all managed objects that their scope is a traffic classifier (e.g., ETHERTYPE filter, VLAN Priority filter, etc.).

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(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) **MEP Table** - This managed entity represents collection of all managed objects that their scope is configuring a MEP.

### 6.1 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. An example for such a managed entity is the "DSL Line Configuration Profiles" table.

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.

### 6.2 Diagram of Managed Entities in The Model

The diagram in Figure 6-1 depicts the relationships between the various managed entities in the model this document defines. The diagram also indicates associations with external managed entities.

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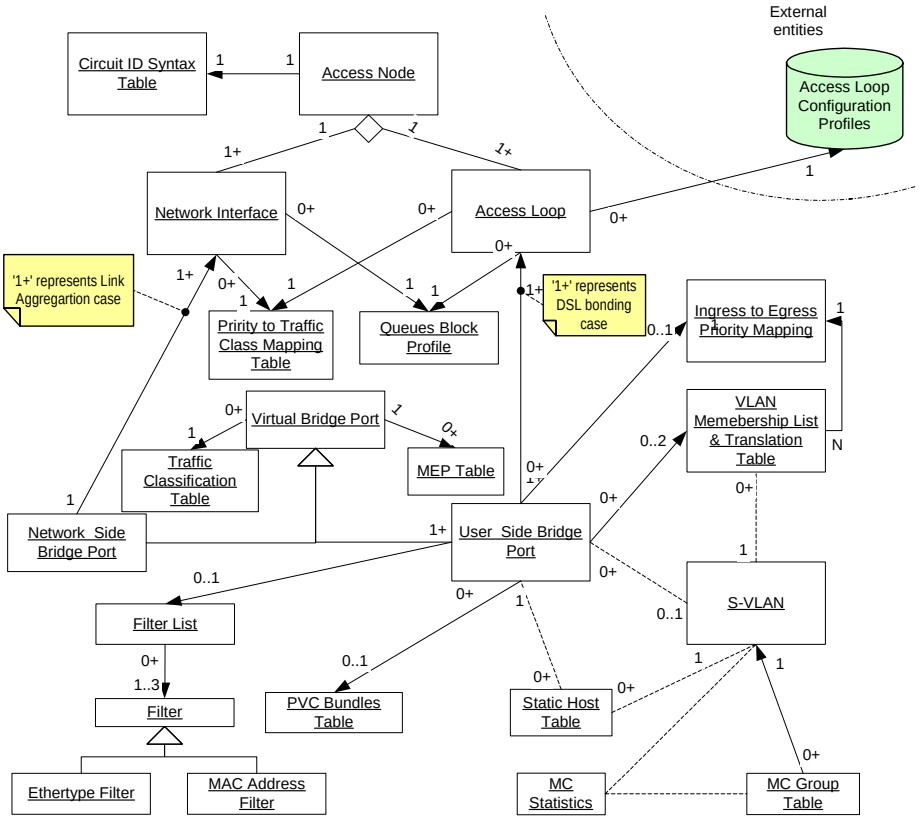


**Figure 6-1**: The Managed Entities Model Diagram

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# 7 The Access Node Managed Objects

The following paragraphs list the managed objects that SHOULD exist in the management model for TR-101 compliant 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.

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- The managed object is assigned an ***Object Name***. The Object Name is either explicitly specified by requirement(s) in DSL Forum TR-101 or is based on the content of those.
- One or more ***Reference Requirements in DSL Forum TR-101*** are 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 DSL Forum TR-101.
- Several managed objects are assigned a ***Comment***.

## 7.1 Access Node

The following table (Table 7.1-1) lists the managed objects under the Access Node managed entity as well as the source requirement(s) in TR-101.

Deleted: Table 7.1-1

| Object Reference Number | Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | Access Node ID (RW) | An alphanumeric string that identifies this AN (Optionally serves the Circuit ID syntax) | R-124, R-125 | See 7.16 |
| 2. | Circuit ID Syntax Type (RW) | This object selects between two alternatives for the Circuit ID Syntax:<br>Use of the default syntax specified in TR-101.<br>Use of the syntax specified in the Circuit ID Table. | R-123, R-126 | See 7.16 |
| 3. | ETHERTYPE 802.1ad (RW) | ETHERTYPE field for the 802.1ad tagging, | R-8 | 16 bits value; Default value=0x88A8 |

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**Table 7.1-1: Access Node Related Managed Objects**

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## 7.2 Access Loop

The following table (Table 7.2-1) lists the managed objects under the Access Loop managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | Access Loop ID (index) | A number that uniquely identifies the Access | | ifIndex |

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| | | Loop within the Access Node | | |
| 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 |
| 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 | Controls (enables/disable) | R-95 | Default=disabled |

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Deleted: R-51

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| | (RW) | EAP for this Access Loop. | | |
| 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. | | | | |

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**Table 7.2-1: Access Loop Related Managed Objects**

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### 7.3 Virtual Bridge Port

The following table (Table 7.4-1) lists the managed objects under the Virtual Bridge Port managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL 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 | |

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**Table 7.3-1: Virtual Bridge Port Related Managed Objects**

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### 7.4 User-Side Bridge Port

The following table (Table 7.4-1) lists the managed objects under the User-Side Bridge Port managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL 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.<br>If this attribute is set to NULL then the Access Loop level (if not NULL) or Access Node level Circuit ID syntax is utilized for this User-Side Bridge Port. | R-112<br>R-119<br>R-122 | Default=NULL |
| 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.<br>If this attribute is set to NULL then the Access Loop level is utilized for this User-Side Bridge Port. | R-113<br>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<br>VLAN Tagged Frames Only,<br>Untagged/Priority- | R-9 | Default=?; |

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| | | Tagged Frames only, or Admit All Frames. | | |
| 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:<br>Ethertype filtering.<br>Source MAC Address filtering , and<br>Destination MAC Address filtering | R-26<br>R-27<br>R-94 | See 7.8, 7.8.4 |
| 9. | Maximum learned addresses (RW) | Maximum number of source MAC addresses learned from this bridge port | R-92<br>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<br>R-16<br>R-17 | 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. | R-29<br>R-30<br>R-31 | 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 | |

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| | | TLS Function=On: *Ignored* | | |
| 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 | |
| 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.<br>The method can be:<br>Add S-tag, or<br>Add both S-tag and C-tag | R-19 | |

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 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, | |
| 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, | |

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**Table 7.4-1: User-Side Bridge Port Related Managed Objects**

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## 7.5 PVC Bundle

The following table (Table 7.5-1) lists the managed objects under the PVC Bundle managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | PVC Bundle ID (index) | A first index. A number that uniquely identifies a PVC Bundle within the | R-59, | |

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| | | Access Node. | | |
| 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. |

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**Table 7.5-1: PVC Bundle Related Managed Objects**

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### 7.6 Network Interface

The following table (Table 7.6-1) lists the managed objects under the Network Interface managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL 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 |

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 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 | |

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**Table 7.6-1: Network Interface Related Managed Objects**

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### 7.7 Network-Side Bridge Port

The following table (Table 7.7-1) lists the managed objects under the Network-Side Bridge Port managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 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 |

**Table 7.7-1: Network-Side Bridge Port Related Managed Objects**

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### 7.8 Filter

The following table (Table 7.8-1) lists the managed objects under the Filter managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | Filter ID (Index) | An ordered number of this filter | R-26, R-94 | |

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|---|---|---|---|---|
| 2. | Filter Type (RW) | A parameter that indicates the filter type. The following types are possible:<br>**Ethertype** Filter<br>**Allowed Source MAC Addresses**<br>**Denied Source MAC Addresses**<br>**Allowed Destination MAC Addresses**<br>**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 7.8-2 and Table 7.8-3 or in Table 7.8-4 |

**Table 7.8-1: Filter Managed Objects**

### 7.8.1 Ethertype Filter – Ethertype Values

The following table (Table 7.8-2) 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 7.8-3 details the actions to perform on the filtered frames.

| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | Filter ID (Index) | An ordered number of this filter | R-26, | Same as the Filter ID in Table 7.8-1 |
| 2. | Ethertype value (Index) | An Ethertype value this filter handles. | R-26, | |

**Table 7.8-2: Ethertype Filter Managed Objects**

### 7.8.2 Ethertype Filter – Actions

The following table (Table 7.8-3) 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 7.8-2.

| Object Reference Number | Managed Object Name | Description | Reference in DSL 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 7.8-1 and Table 7.8-2 |
| 2. | C-VID (RW) | The C-VLAN ID value as part of the filter assigned tagging. | R-27 | If =0 only S-tag is applicable |
| 3. | S-VID (RW) | The S-VLAN ID value as part of the filter assigned tagging. | R-27 | |
| 4. | Ingress to Egress Priority Mapping - Profile Index (RW) | Specifies the entry in the "Ingress to Egress Priority Mapping Table" applicable for this frame. | R-27 | |

**Table 7.8-3: Ethertype Filter Managed Objects**

### 7.8.3 MAC Address Filter

The following table (Table 7.8-4) 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 DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | Filter ID (Index) | An ordered number of this filter | R-94 | Same as the Filter ID in Table 7.8-1 |
| 2. | MAC Address (Index) | A MAC Address included in this filter. The Filter Type object in the Filter's main table (Table 7.8-1) 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 | |

**Table 7.8-4: MAC Address Filter Managed Objects**

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### 7.8.4 Filters List

The following table (Table 7.8-5) lists the managed objects under the Filters List managed entity as well as some assumptions on the contents of the Filter List managed entity.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL 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.<br>A Filter List SHOULD include at least one filter and at most one filter for each of the following Filter Types (Filter Type is an object in the Filter's main table (Table 7.8-1):<br>**"Ethertype"**<br>**"Allowed Source MAC Addresses"** or **"Denied Source MAC Addresses"**<br>**"Allowed Destination MAC Addresses"** or "**Denied Destination MAC Addresses"** | Ethertype per R-26,<br>R-27<br>Allowed/Denied MAC Addresses per R-94 | Same as a Filter ID in Table 7.8-1 |

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**Table 7.8-5: Filters List Managed Objects**

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### 7.9 VLAN

The following table (Table 7.9-1) lists the managed objects under the VLAN managed entity as well as the source requirement(s) in TR-101.

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

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| 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.<br>Note that the function may be disabled for selected member user-side bridge ports. | R-96<br>R-97 | Default=disabled |

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| 9. | IP Address Spoofing Prevention Control (RW) | Defines whether or not IP Address Spoofing Prevention function is enabled in this S-VLAN.<br>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 dedicated **Multicast** VLAN, **Unicast** VLAN or **Shared** 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.<br>Possible setups:<br>Discard,<br>Forward,<br>Process | R-202<br>R-209<br>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:<br>Transparent Snooping<br>Snooping with Proxy Reporting | R-247<br>R-248 | |

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| 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 7.9-1: VLAN Related Managed Objects**

### 7.10 VLAN Membership List

The following table (Table 7.10-1) lists the managed objects under the VLAN Membership List managed entity as well as the source requirement(s) in TR-101.

| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | VLAN Membership List (index) | A first key that identifies the VLAN Membership List | R-16<br>R-17<br>R-30<br>R-31 | |
| 2. | C-VID In (index) | A second key that identifies a C-VLAN ID In the list. | R-16<br>R-17<br>R-30<br>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<br>R-31 | |
| 4. | C-VID Out (RW) | The C-VLAN ID value that should override the C-VID In value. | R-16<br>R-30 | If =0 only S-VID is applicable |



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| 5. | S-VID Out (RW) | The S-VLAN ID value in a S-tag that should be added to the frame. | R-16, R-30 | |
| 6. | IGMP Processing Mode (RW) | The way IGMP messages are handled in the context of this S-VID Out.<br>Possible setups:<br>**Discard,** - IGMP messages are discarded. Option is always relevant<br>**Forward,** - IGMP messages are forwarded as regular traffic.<br>**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.**<br>**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.<br>Possible setups:<br>**Discard**,<br>**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 (§7.9) is set to **true** (discard) then upstream multicast traffic is anyhow discarded. |



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| 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**. |

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**Table 7.10-1: VLAN Membership List Related Managed Objects**

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### 7.11 Multicast Group Description Table

The following table (Table 7.11-1) lists the managed objects under the Multicast Group Description Table managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL 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 | |

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**Table 7.11-1: Multicast Group Description Table Related Managed Objects**

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## 7.12 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.

### 7.12.1 Multicast VLAN Statistics – Currently Active Hosts Table

The following table (Table 7.12-1) 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.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL 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 | |

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**Table 7.12-1: Currently Active Hosts Table Related Managed Objects**

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### 7.12.2 Multicast VLAN Statistics – Access Loop IGMP Activity Table

The following table (Table 7.12-2) 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.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
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|---|---|---|---|---|
| 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 7.12-2: Access Loop IGMP Activity Table Related Managed Objects**

### 7.12.3 Multicast VLAN Statistics –VLAN IGMP Activity Table

The following table (Table 7.12-3) 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 DSL 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 | |



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| 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 | |

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Table 7.12-3: VLAN IGMP Activity Table Related Managed Objects

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### 7.13 Static Hosts Table

The following table (Table 7.13-1) the managed objects under the Static Hosts Table managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL 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 | |

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Table 7.13-1: Static Hosts Table Managed Objects

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### 7.14 Priority to Traffic Class Mapping Profiles

#### 7.14.1 Priority to Traffic Class Mapping Top Table

The following table (Table 7.14-1) includes one managed object under the Priority to Traffic Class Mapping managed entity (the selection between using and not using the DEI field) as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL 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<br>R-46<br>R-47<br>R-48 | |

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 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.<br>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<br>R-48 | |

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**Table 7.14-1: Priority to Traffic Class Mapping Top Table Managed Objects**

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### 7.14.2 Priority to Traffic Class Mapping Main Table

The following table (Table 7.14-2) lists the main managed objects under the Priority to Traffic Class Mapping Table managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL 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<br>R-46<br>R-47<br>R-48 | Same as the index in Table 7.14-2 |
| 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<br>R-46<br>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.<br>This object MUST support at least 4 different values and SHOULD support at least 6 different values. | R-45<br>R-46<br>R-47 | |

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 4. | Drop Precedence (RW) | The Drop Precedence (DP) adapted to the given Ethernet Priority.<br>The possible values of this objects are:<br>**None** – No drop precedence value is specified,<br>**High** – High drop precedence, or<br>**Low** – Low drop precedence<br>High and low drop precedence MUST be applicable for at least 2 different traffic classes. | R-47<br>R-48 | If the DEI Support attribute is set to "enabled" for the related profile then the Drop Precedence attribute is ignored. |

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**Table 7.14-2: Priority to Traffic Class Mapping Main Table Managed Objects**

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### 7.15 Queues Block Profiles Table

The following table (Table 7.15-1) lists the managed objects under the queues block profiles table managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | Queue Setup Profile (index) | A first key that identifies a profile of queues setup | R-51<br>R-52<br>R-55<br>R-56<br>R-57 | |
| 2. | Queue Number (index) | A second key that identifies a queue number in the queue setup profile. | R-51<br>R-52<br>R-55<br>R-56<br>R-57 | The "Queue Number index" is same as "Traffic Class" in the 7.14 |

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| 3. | Queue Priority (RW) | The priority assigned to the queue.<br>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.<br>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 7.15-1: Queue Block Related Managed Objects**

### 7.16 Circuit ID Syntax

The following table (Table 7.16-1) lists the managed objects under the Circuit ID Syntax managed entity as well as the source requirement(s) in TR-101.

| Object Reference Number | Managed Object Name | Description | Reference in DSL 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:<br>**Standard** - A TR-101 based variable<br>**PropVar** - A proprietary variable<br>**PropStr** - A delimiter or constant string | R-126 | |



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|---|---|---|---|---|
| 4. | Component Identifier (RW) | A unique and content sensitive identifier for the specific definition of this component. The following identifiers are expected:<br>A row number in table 2 of TR-101 (R-126).<br>An index into a proprietary managed entity that specifies possible proprietary variables.<br>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 7.1-1 (1)] is utilized when "Component Type" attribute is set to '**Standard**' and "Component Identifier" attribute is set to '1'.

**Table 7.16-1: Circuit ID Syntax Related Managed Objects**

### 7.17 Traffic Classification Table

The following table (Table 7.17-1) lists part of the managed objects under the Traffic Classification Table managed entity (the criteria part of the classifier) as well as the source requirement(s) in TR-101.

| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | Traffic Classifier Index (index) | A first key that identifies the specific traffic classifier. | R-58 | |
| 2. | Criteria (index) | A second key that identifies a specific criteria/rule in this traffic classifier. | R-58 | |
| 3. | Criteria Type | The classification criteria type of the rule:<br>User Port ID (physical | R-58 | |



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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| | | or logical)<br>Ethernet Protocol ID<br>Received Ethernet priority bits<br>IP protocol ID | | |
| 4. | Value | The value of the classification criteria/rule. | R-58 | Syntax should be determined by criteria type |

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**Table 7.17-1: Traffic Classification Table Criteria Managed Objects**

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The following table (Table 7.17-2) lists the other managed objects under the Traffic Classification Table managed entity (the priority marking/remarking) as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | Traffic Classifier Index (index) | A first key that identifies the specific traffic classifier. | R-58 | |
| 2. | Priority | The priority used to mark/re-mark the frame in case of classification match. | R-58 | |

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**Table 7.17-2: Traffic Classification Table - Priority**

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### 7.18 Ingress to Egress Priority Mapping Table

The following table (Table 7.18-1) lists the managed objects under the Ingress to Egress Priority Mapping Table managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL 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<br>R-17<br>R-20<br>R-31 | |

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 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 | |

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**Table 7.18-1: Ingress to Egress Priority Mapping Table Managed Objects**

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### 7.19 MEP Table

The following table (Table 7.19-1) lists the managed objects under the MEP Table managed entity as well as the source requirement(s) in TR-101.

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 1. | Maintenance Level (index) | A first key that identifies the specific maintenance level associated with this MEP.<br>Possible values for this index are:<br>▪ **Customer**,<br>▪ **Carrier**,<br>▪ **IntraCarrier**, and<br>▪ **Link** | R-280, R-281, R-291, R-292 | Not all combinations of maintenance level, port id and VLAN id values are relevant. |
| 2. | Virtual Bridge Port ID (index) | A second index that uniquely identifies the virtual bridge port within this Access Node associated with this MEP. | R-280, R-281, R-291, R-292 | |
| 3. | VLAN ID (index) | A third index that identifies a specific VLAN associated with this MEP. | R-280, R-281, R-291, R-292 | |

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| Object Reference Number | Managed Object Name | Description | Reference in DSL Forum TR-101 | Comments |
|---|---|---|---|---|
| 4. | MEP Direction (RW) | Identifies the direction of the respective MEP. Possible values for this index are: ▪ **Inward**, or ▪ **Outward** | TBD | |
| 5. | CCM Source (RW) | Identifies whether the respective MEP should generate Continuity Check Messages (CCM). | R-280, R-281, R-291, R-292 | true/false |
| 6. | CCM Sink (RW) | Identifies whether the respective MEP should enable the Continuity Check Messages (CCM) sink function. | R-280, R-281, R-291, R-292 | true/false |

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**Table 7.19-1: MEP Table Managed Objects**

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# 8 Mapping TR-101 Requirements to Managed Objects

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

## 8.1 TR-101 Requirements to Managed Entities and objects

The following table (Table 8.1-1) depicts the requirements in DSL 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.

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| DSL 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 | Table 7.1-1 (3) | |

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| | 802.1ad | | |
| R-9 | Acceptable Frame Type(s) | Table 7.4-1 (6) | |
| R-10 | TLS function | Table 7.4-1 (7) | |
| R-11 | VLAN Membership List | Table 7.4-1 (10), (11) | |
| R-12 | (TLS) S-VID | Table 7.4-1 (14) | |
| R-13 | None | - | |
| R-14 | Default Priority | Table 7.4-1 (13) | |
| | Ingress to Egress Priority Mapping Table | 7.18 | |
| | Ingress to Egress Priority Mapping - Profile Index | Table 7.4-1 (16) | |
| R-15 | None | - | |
| R-16 | VLAN Membership List | 7.10 | The VML refers to the VLAN translation function |
| | VLAN Membership List (VML) -Index | Table 7.4-1 (10), (11) | |
| R-17 | VLAN Membership List | 7.10 | The VML associates ”Ingress to Egress Priority mapping” per VLAN. |
| | VLAN Membership List (VML) -Index | Table 7.4-1 (10), (11) | |
| | Ingress to Egress Priority Mapping Table | 7.18 | |
| | Default Priority | Table 7.4-1 (13) | |
| R-18 | None | - | |
| R-19 | Non-Tagged Frames Handling | Table 7.4-1 (17) | |
| R-20 | Ingress to Egress Priority Mapping Table | 7.18 | |
| | Ingress to Egress Priority Mapping - Profile Index | Table 7.4-1 (16) | |
| R-21 | S-VID | Table 7.4-1 (14) | |
| | S-Priority | Table 7.4-1 (15) | |

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-22 | C-VID | Table 7.4-1 (12) | |
| | C-Priority | Table 7.4-1 (13) | |
| R-23 | None | - | |
| R-24 | None | - | |
| R-25 | None | - | |
| R-26 | Filters List Index | Table 7.4-1 (8) | |
| | (Ethertype) Filter Table | 7.8, 7.8.1, 7.8.2, 7.8.4 | |
| R-27 | Ethertype Filter - Actions | 7.8, 7.8.1, 7.8.2, 7.8.4 | |
| R-28 | None | - | |
| R-29 | VLAN Membership List -Index | Table 7.4-1 (10), (11) | |
| R-30 | VLAN Membership List | 7.10 | The VML refers to the VLAN translation function |
| | VLAN Membership List (VML) -Index | Table 7.4-1 (10), (11) | |
| R-31 | VLAN Membership List | 7.10 | The VML associates ”Ingress to Egress Priority mapping” per VLAN. |
| | VLAN Membership List (VML) -Index | Table 7.4-1 (10), (11) | |
| | Ingress to Egress Priority Mapping Table | 7.18 | |
| | Default Priority | Table 7.4-1 (13) | |
| R-32 | None | - | |
| R-33 | Forwarding Paradigm | Table 7.9-1 (4) | |
| R-34 | None | - | TR-101 Paragraph 3.2 |
| R-35 | None | - | |
| R-36 | None | - | |
| R-37 | None | - | |
| R-38 | None | - | |
| R-39 | None | - | |
| R-40 | User To User Traffic Control | Table 7.9-1 (2) | |
| R-41 | None | - | |
| R-42 | None | - | |

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-43 | None | - | |
| R-44 | Address Learning Control | Table 7.9-1 (5) | |
| R-45 | Priority to Traffic Class Mapping Table | 7.14 | TR-101 Paragraph 3.3 |
| | Priority to Traffic Class mapping Profile Index | Table 7.2-1 (3), Table 7.6-1 (2) | |
| R-46 | Priority to Traffic Class Mapping Table | 7.14 | |
| | Priority to Traffic Class mapping Profile Index | Table 7.2-1 (3), Table 7.6-1 (2) | |
| R-47 | Priority to Traffic Class Mapping Table | 7.14 | |
| R-48 | Priority to Traffic Class Mapping Table | 7.14 | |
| R-49 | Number of Queues | Table 7.2-1 (4) | |
| R-50 | Number of Queues | Table 7.2-1 (4) | |
| R-51 | Queues Block Profiles Table | 7.15 | |
| | Queues Setup Profile Index | Table 7.2-1 (4) | |
| R-52 | Queues Block Profiles Table | 7.15 | |
| | Queues Setup Profile Index | Table 7.2-1 (4) | |
| R-53 | Number of Queues | Table 7.6-1 (3) | |
| R-54 | Number of Queues | Table 7.6-1 (3) | |
| R-55 | Queues Block Profiles Table | 7.15 | |
| | Queues Setup Profile Index | Table 7.6-1 (3) | |
| R-56 | Queues Block Profiles Table | 7.15 | |
| | Queues Setup Profile Index | Table 7.6-1 (3) | |
| R-57 | Queues Block Profiles Table | 7.15 | |



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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-58 | Traffic Classification Table | 7.17 | |
| | Traffic Classification Profile Index | Table 7.3-1 (2) | |
| R-59 | PVC Bundle ID | Table 7.4-1 (2) | |
| | PVC Bundle | 7.5 | |
| R-60 | None | - | |
| R-61 | None | - | TR-101 Paragraph 3.5 |
| R-62 | Auto-Sense Control | Table 7.4-1 (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 | - | |
| R-72 | None | - | |
| R-73 | None | - | |
| R-74 | None | - | |
| R-75 | None | - | |
| R-76 | Interworked PPPoE Inactivity Timeout | Table 7.9-1 (6) | |
| R-77 | PADT VLAN Priority | Table 7.9-1 (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 |

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-88 | Downstream Broadcast/Multicast filtering | Table 7.9-1 (3) | TR-101 Paragraph 3.7 |
| R-89 | None | - | |
| R-90 | None | - | |
| R-91 | None | - | |
| R-92 | Maximum learned addresses | Table 7.4-1 (9) | |
| R-93 | Maximum learned addresses | Table 7.4-1 (9) | |
| R-94 | MAC Address Filters | 7.8, 7.8.3, 7.8.4 | |
| | Filters List Index | Table 7.4-1 (8) | |
| R-95 | EAP Control | Table 7.2-1 (7) | |
| | Slow Protocol Control | Table 7.2-1 (8) | |
| R-96 | L2 DHCP Relay Agent Control | Table 7.4-1 (18), Table 7.9-1 (8) | TR-101 Paragraph 3.8 |
| R-97 | L2 DHCP Relay Agent Control | Table 7.4-1 (18), Table 7.9-1 (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 7.9-1 (9) | |
| R-109 | Static Hosts Table | 7.11 | |
| R-110 | Not applicable | - | TR-101 Paragraph 3.9 |
| R-111 | Not applicable | - | |

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-112 | Agent Circuit ID | Table 7.4-1 (3) | Managed objects are specified in other requirements. |
| R-113 | Agent Remote ID | Table 7.2-1 (6)<br>Table 7.4-1 (4) | |
| R-114 | None | - | |
| R-115 | None | - | |
| R-116 | Not applicable | - | |
| R-117 | Not applicable | - | |
| R-118 | None | - | |
| R-119 | Agent Circuit ID | Table 7.2-1 (5)<br>Table 7.4-1 (3) | Managed objects are specified in other requirements. |
| R-120 | Agent Remote ID | Table 7.2-1 (6)<br>Table 7.4-1 (4) | Defining Remote IDs on both layers is for having a design similar the Circuit IDs. |
| R-121 | None | - | |
| R-122 | Agent Circuit ID | Table 7.2-1 (5)<br>Table 7.4-1 (3) | |
| R-123 | Agent Circuit ID | Table 7.2-1 (5)<br>Table 7.4-1 (3) | "… per individual access loop and logical port" |
| | Circuit ID Syntax Type | Table 7.1-1 (2) | |
| R-124 | Circuit ID Syntax Type | Table 7.1-1 (2) | |
| | Access Node ID | Table 7.1-1 (1) | |
| R-125 | Access Node ID | Table 7.1-1 (1) | |
| R-126 | Circuit ID Syntax Type | Table 7.1-1 (2) | |
| | Circuit ID Syntax | 7.16 | |
| R-127 | Loop Characteristics Insertion Control | Table 7.4-1 (19) | |
| R-128 | Not applicable | - | |
| R-129 | None | - | |
| R-130 | None | - | |
| R-131 | None | - | |

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-132 | None | - | |
| R-133 | Not applicable | - | |
| R-134 | Not applicable | - | |
| R-135 | Not applicable | - | |
| 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 7.9-1 (11), Table 7.10-1 (6) | |
| R-203 | None | - | |
| R-204 | IGMP No-Match Behavior | Table 7.10-1 (7) | |
| R-205 | None | - | Behavior determined according to "IGMP No-Match Behavior" |
| R-206 | Discard Upstream Multicast Traffic | Table 7.9-1 (13) Table 7.10-1 (8) | |
| 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 |

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-208 | Upstream IGMP Messages Rate Limit | Table 7.10-1 (9) | |
| R-209 | IGMPv3 Transparent Snooping | Table 7.9-1 (11) | |
| R-210 | None | - | |
| R-211 | None | - | |
| R-212 | None | - | |
| R-213 | None | - | |
| R-214 | None | - | |
| R-215 | IGMP Default Priority | Table 7.9-1 (14) | |
| R-216 | None | - | |
| R-217 | Multicast VLAN Statistics tables | 7.12, 7.12.1, 7.12.2, 7.12.3 | |
| R-218 | NtoOne VLAN Type | Table 7.9-1 (10) | |
| R-219 | Multicast Group Description Table | Table 7.11-1 | |
| R-220 | Maximum Number of Simultaneous Multicast Groups | Table 7.2-1 (9) | |
| R-221 | IGMP Processing Mode | Table 7.9-1 (11) | |
| R-222 | None | - | |
| R-223 -237 | Not applicable | - | |
| R-238 | TBD | TBD | |
| R-239 | TBD | TBD | |
| R-240 | TBD | TBD | |
| R-241 | None | - | This requirement is covered by other entities in the model, i.e., the VLAN entity (§7.9) and VLAN Membership List entity (§7.10) |
| R-242 | Not applicable | - | |
| R-243 | Not applicable | - | |
| R-244 | Not applicable | - | |
| R-245 | Not applicable | - | |
| R-246 | Not applicable | - | |

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-247 | IGMP Snooping Mode | Table 7.9-1 (12) | |
| R-248 | IGMP Snooping Mode | Table 7.9-1 (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 7.4-1 (20) | |
| R-268 | Upstream Ethernet OAM Message Rate Limit | Table 7.4-1 (20) | |
| R-269 | None | - | |
| R-270 | None | - | |
| R-271 | None | - | |
| R-272 | None | - | |
| R-273 | TBD | TBD | *Editor comment: Requires an activation command possibly with several parameters, such as the maintenance level involved. Applicability to this WT is TBD.* |
| R-274 | None | - | |
| R-275 | None | - | |

*Editor comment* Most of par. 7 is under construction

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-276 | TBD | TBD | *Editor comment: Requires an activation command possibly with several parameters, such as the maintenance level involved. Applicability to this WT is TBD.* |
| R-277 | None | - | |
| R-278 | None | - | |
| R-279 | TBD | TBD | *Editor comment: Requires a table with the "Peer MEP Name" as an index and the "Peer MAC Address" as RW info. MEP Name structure is not in 802.1ag and is FFS* |
| R-280 | CCM Source | Table 7.19-1 (5) | |
| R-281 | CCM Source | Table 7.19-1 (5) | |
| | CCM Sink | Table 7.19-1 (6) | |
| R-282 | None | - | |
| R-283 | "Server MEP" function Control | TBD | *Editor comment: In the MEP Table should also have an object for "Server MEP" yes/no (RW)* |
| R-284 | None | - | |
| R-285 | None | - | |

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-286 | TBD | TBD | *Editor comment: Requires an activation command possibly with several parameters, such as the maintenance level involved. Applicability to this WT is TBD.* |
| R-287 | None | - | |
| R-288 | TBD | TBD | *Editor comment: Requires an activation command possibly with several parameters, such as the maintenance level involved. Applicability to this WT is TBD.* |
| R-289 | None | - | |
| R-290 | TBD | TBD | *Editor comment: Requires a table with the "Peer MEP Name" as an index and the "Peer MAC Address" as RW info. MEP Name structure is not in 802.1ag and is FFS* |
| R-291 | CCM Source | Table 7.19-1 (5) | |
| R-292 | CCM Source | Table 7.19-1 (5) | |
| | CCM Sink | Table 7.19-1 (6) | |
| R-293 | None | - | |
| R-294 | None | - | |
| R-295 | TBD | TBD | |
| R-296 | TBD | TBD | |
| R-297 | TBD | TBD | |

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| DSL Forum TR-101 Requirement Number | Managed Object Name | Managed Entity/ Managed Object (paragraph number) | Comments |
|---|---|---|---|
| R-298 | None | - | |
| R-299 | None | - | |
| R-300 | None | - | |
| R-301 - 339 | Not applicable | - | |
| R-340 | TBD | TBD | |
| R-341 | TBD | TBD | |
| R-342 | TBD | TBD | |
| R-343 | Access Loop Configuration Profile | Table 7.2-1 (2) | |
| R-344 | TBD | TBD | |
| R-345 | TBD | TBD | |
| R-346 | TBD | TBD | |
| R-347 | TBD | TBD | |
| R-348 | Not applicable | - | |
| R-349 | Not applicable | - | |
| R-350 | Not applicable | - | |
| R-351 | Not applicable | - | |
| R-352 | Not applicable | - | |

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**Table 8.1-1: TR-101 Requirements Mapping to Managed Objects**

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