CHAPTER 1

Introduction

This document outlines the level of functionality that the system provides for each supported technology.

Note This guide describes the system capabilities. The level of support provided for the VNEs for each technology may vary and the user should refer to the individual VNE guide for details.

Supported Technologies

The table below lists the technologies supported in this version of the document:

Note Cisco ANA provides different level of support for each technology, the fact that a specific technology is listed in the table below does not imply that all the specification of the relevant standard/s are represented and supported. For example, the system supports PWE3 (Pseudo Wire Edge to Edge) by modeling of the Cisco AToM implementation, but this support does not include TDM encapsulation in Pseudo Wire over MPLS.
For the details of the level of support provided for each technology please refer to the description in the specific technology chapter.

Table 1-1 Supported Technologies

Family	Technology	Chapter Reference
Virtual Private Networks (**VPN**)	BGP-MPLS VPN Routing and Forwarding (**VRF**)	Chapter 14, “Virtual Private Networks “VPNs””
	Pseudo Wire Emulation Edge to Edge (**PWE3**)	Chapter 15, “Pseudo Wire Emulation Edge to Edge (PWE3)”

Table 1-1 Supported Technologies (continued)

Family	Technology	Chapter Reference
Network Layer	Internet Protocol (**IP**)	Chapter 2, "Internet Protocol "IP""
	Internet Protocol (**IP**) and **ARP**	Chapter 2, "Internet Protocol "IP""
	Generic Routing Encapsulation (**GRE**)	Chapter 2, "Generic Routing Encapsulation (GRE) Tunnel Interface"
	Border Gateway Protocol and its Extensions for Multi-Protocol (**BGP**/**MP-BGP**)	Chapter 3, "Routing Protocols "BGP/OSPF"" Chapter 14, "Virtual Private Networks "VPNs""
	Open Shortest Path First (**OSPF**)	Chapter 3, "Routing Protocols "BGP/OSPF""
	Hot Standby Router Protocol (**HSRP**)	Chapter 2, "Hot Standby Router Protocol (HSRP) Group Entry"
Hybrid Network/Link Layer	Multi-Protocol Label Switching (**MPLS**)	Chapter 12, "Multiprotocol Label Switching "MPLS""
	Traffic Engineering (**MPLS-TE**)	Chapter 13, "Multi Protocol Label Switching Traffic Engineering (MPLS-TE)"
Link/MAC Layer	Ethernet, Virtual Local Area Network (**VLAN**) and Ethernet Channel/Link Aggregation (**LAG**)	Chapter 4, "Ethernet (IEEE 802™.3)"
	Token Ring (**TR**)	Chapter 5, "Token Ring "TR" (IEEE 802™.5)"
	Asynchronous Transfer Mode (**ATM**)	Chapter 6, "Asynchronous Transfer Mode "ATM""
	Inverse Multiplexing for ATM (**IMA**)	Chapter 6, "Asynchronous Transfer Mode "ATM""
	Frame Relay (**FR**)	Chapter 7, "Frame Relay "FR""
	Point To Point Protocol (**PPP**)	Chapter 8, "Point-to-Point Protocol "PPP" and High Level Data Link Control "HDLC""
	High Level Data Link Control (**HDLC**)	Chapter 8, "Point-to-Point Protocol "PPP" and High Level Data Link Control "HDLC""
	Layer 2 Tunnel Protocol (**L2TP**)	Chapter 9, "Layer 2 Tunnel Protocol "L2TP""
	Packet Over SONET/SDH (**POS**) **Note** This is not treated as a single technology; it is supported by a combination of IP, PPP/HDLC and Sonet.	Chapter 11, "Physical Technologies"

Table 1-1 Supported Technologies (continued)

Family	Technology	Chapter Reference
Physical Layer	Digital Subscriber Line (**xDSL**)	Chapter 10, "Digital Subscriber Line "DSL" and Integrated Services Digital Network "ISDN""
	Integrated Services Digital Network (**ISDN**)	Chapter 10, "Digital Subscriber Line "DSL" and Integrated Services Digital Network "ISDN""

Networking Related IMOs

Networking related IMOs represent the networking aspects of a Network Element (NE). The two major categories of IMOs are Termination Points and Forwarding Components.

Termination Points

Termination Points represent an end point of a connection. Termination Points may represent a physical end point, for example, a port connector or a connection end point also referred to as a network interface, for example, an ATM layer of a port.

The relationships between Termination Points is of containment nature, and these relationships are expressed by the following attributes:

- Contained Connection Termination Point—Points to all upper layer Termination Point bound to that Termination Point.
- Containing Termination Points—Points to all lower layer Termination Point on which this Termination Point is bound to.

The relation between Termination Points may represent one of the following:

- Type of Hardware - for example:

  A SONET/SDH port with a Fiber Optic connector will be represented by two IMOs:

  – Port Connector IMO—Representing the Fiber Optic connector.

  – SonetSdh IMO—Representing the SONET/SDH port.

  The Port Connector IMO is containing the SonetSdh IMO. This containment relationship will be represented as follows:

  – The Port Connector IMO will point to the SonetSdh IMO with the Contained Connection Termination Point attribute.

  – The SonetSdh IMO will point to the Port Connector IMO with the Containing Termination Point attribute.

- Configuration - for example:

  Ethernet port configured with an IP Address (and optionally other network layer attributes) will be represented by two IMOs:

  – Ethernet Interface IMO—Representing the Ethernet layer of the port.

  – IP Interface IMO—Representing the network layer aspect including the IP address configured on the port.

  The Ethernet Interface IMO is containing the IP Interface IMO. This containment relationship will be represented as follows:

  – The Ethernet Interface IMO will point to the IP Interface IMO with the Contained Connection Termination Point attribute.

  – The IP Interface IMO will point to the Ethernet Interface IMO with the Containing Termination Point attribute.

- State - for example:

  An active PPP connection running on top of ATM VC will be represented by two IMOs:

  – Atm Vc IMO—Representing the ATM VC.

  – Vc Based Encapsulation IMO—Representing the PPPoA encapsulation.

  The Atm Vc IMO is containing the Vc Based Encapsulation IMO. This containment relationship will be represented as follows:

  – The Atm Vc IMO will point to the IP Vc Based Encapsulation IMO with the Contained Connection Termination Point attribute.

  – The Vc Based Encapsulation IMO will point to the Atm Vc IMO with the Containing Termination Point attribute.

Note The relationship between Termination Points may be restricted to specific Termination Point types, based on how the technology is implemented. For example, a physical layer IMO may not contain an IP interface IMO, which represents the network layer interface.

Forwarding Components

Forwarding Components represent components that perform some kind of forwarding process between the Termination Points, for example, Forwarding Components are used to represent routing, bridging and switching components in the NE.

The relationship between the Forwarding Components and the Termination Points with which it does the forwarding, is of a logical association nature. This relationship is expressed by the logical sons attribute of the Forwarding Component IMO.

An example of such a relationship is between the IVcSwitchingEntity IMO representing the ATM/FR switching fabric and the IAtm/IFrameRelay IMOs representing the ATM/FR ports.

Note The support level of each network technology can be varied and is totally reflected by its related IMOs with their attributes, network topology as well as faults and alarms correlation, as described in each Technology section and Common section.

Conventions Used in this Guide

This document uses the following conventions:

Table 1-2 Document Conventions

Convention	Description
Italic text	Indicates references to enumeration values
Blue text	Indicates references to defined objects/tables

Note Each object that the interface uses in the IMO is written in parenthesis.