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## Integrated broadband cable telecommunication networks (CABLE); Embedded Router

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# Foreword

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# 1 Scope

The present document defines a core set of features that enable multiple subscriber devices to gain access to operator provided high-speed data service using DOCSIS. This core set of features allows for both IPv4- and IPv6-enabled devices to gain connectivity to the Internet.

The eRouter is specified as an Embedded Service/Application Functional Entity (eSAFE) device that is implemented in conjunction with a DOCSIS cable modem device.

The core set of features defined in the present document includes the ability to provision multiple CPE devices, a description of how to forward data to and from CPE devices, and also the ability to forward IP Multicast traffic to CPE devices and among CPE devices.

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## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**Customer Edge Router (CER):** provides specific services and forwarding capabilities necessary for establishing and maintaining the customer edge on the Operator-Facing Interface (WAN)

NOTE: In this role, Router application services such as DHCP, NAPT and Packet Filtering Firewall are enabled.

**Customer-Facing Interface:** eRouter interface used for connecting CPE devices

NOTE: As defined in [57], this is a Local Area Network (LAN) interface and is represented by a physical port.

**Customer-Facing IP Interface:** IP interface connected to the eRouter that is not necessarily mapped one-to-one with the number of customer-facing ports on the eRouter

NOTE: As defined in [57], this is an IP LAN interface in which one or many physical ports are associated with an IP address.

**Customer-Facing Logical Interface:** logical interface connected to the eRouter that is not necessarily mapped one-to-one with the number of customer-facing ports on the eRouter

NOTE: As defined in [57], this is a LAN interface in which one or more physical ports are associated with a logical interface, such as a VLAN.

**DNS Proxy Forwarding:** mechanism in which the DNS queries of the LAN clients are proxied by the eRouter before being transmitted to the service provider's DNS servers that the eRouter learned during DHCP

**Down Interface:** interface on a router that is further away from the ISP network than the 'Up' interface on that same router

**eRouter:** eSAFE device that is implemented in conjunction with the DOCSIS embedded cable modem

**Hard Reset:** full reset of the eDOCSIS device and its constituent eSAFE application elements (such as the eRouter) and embedded CM

**Internet Gateway Device:** remotely managed gateway device as defined in CPE WAN Management Protocol [62]

**Link ID:** 16 bits of both IPv4 and IPv6 addresses chosen to uniquely identify each "link" or LAN segment (Customer-Facing IP Interface) within the home network. Counting from the left, the Link ID includes bits 49 - 64 (fourth 16-bit block) in an IPv6 address and bits 9 - 24 (middle two octets) in an IPv4 address.

**Multicast Subscription Database:** simple table of entries for the IPv4 or IPv6 Multicast Group Membership information maintained by the eRouter on respective interfaces

NOTE: Implementation details for storage of records are completely vendor-defined.

**Operator-Facing Interface:** eRouter interface that is connected to the embedded cable modem

NOTE: As defined in [57], this is a Wide Area Network (WAN) interface. In CPE WAN Management Protocol (CWMP) this is called an upstream interface.

**Operator-Facing IP Interface:** IP interface that is connected to the embedded cable modem and is provisioned with an IP address provided by the operator

NOTE: As defined in [57], this is a WAN interface.

**Prefix:** common address component, which defines a portion of a network

NOTE: The meanings of the terms Prefix and Subnet are interchangeable. The term Prefix is favored in the present document. See also Prefix Delegation.

**Prefix Delegation:** form of IPv6 address assignment allowing the operator's DHCP server to delegate a prefix of a specific length, such as /56, to a customer's router

NOTE: The delegation of one or more prefixes allows the router to further sub-divide and assign individual prefixes (which are /64 in length) to its interfaces and/or provide prefix sub-delegation to additional routers within the customer's network. Prefix Delegation occurs only between the operator's DHCP server and a router operating in the role of Customer Edge Router (CER). See also Customer Edge Router.

**Reset:** routine in which the operational state is interrupted by the instruction to shut down and restart

NOTE: The term is synonymous with the terms re-initialization and reboot. The term can describe either a full device reset (a Hard Reset) or the re-initialization of an individual eSAFE's software application (a Soft Reset) and any associated routines necessary to notify connected clients or other nodes of the device becoming temporarily unavailable.

**Service Discovery:** set of protocols and methods that are used to discover services that are made available by hosts and nodes within the customer network

**Soft Reset:** reset operation in which the software layer of the eRouter eSAFE application is re-initialized without impacting other eSAFEs or the embedded CM within an eDOCSIS device

Subnet: portion of a network that shares a common address component

NOTE: The meanings of the terms Prefix and Subnet are interchangeable. The term Prefix is favored in the present document.

**TR-069:** term used to refer to the CPE WAN Management Protocol suite defined in [62]

**TR-069 CPE:** term used to refer to the CPE managed using the CPE WAN Management Protocol suite defined in [62]