8.   IP (Internet) Services

The following section provides information regarding the IP and Internet Services which will be provided by the MSO. The following definition is set:

- IPv4 support is mandatory

- IPv6 support is mandatory

- DS-lite support is mandatory

The specification only references RFC's which must be supported in addition to the base RFC's which are mandatory to provide basic IPv4, IPv6 and DS-lite protocol operations.

8.1   IPv4 operations

Internet Protocol Version 4 is a widely used protocol in data communication over different types of networks. The logical connection between participating devices is set up by providing identification to each device.

In order to use the internet service, a compatible device must retrieve identification data (IP address) from the MSO backend systems. IPv4 addresses will only be assigned dynamically and may change on any network connect or device restart.

8.1.1   DHCP IPv4 Operation

The following RFC's must be supported for an address assignment performed via DHCP:

- RFC951, updated by 1395, 1497, 1532, 1542, 5494

- RFC2131, updated by 3396, 4361, 5494, 6842

- RFC2132

Any static or stateless configuration approach of IP address information, DNS services or routes on the WAN connection is incompatible with the MSO requirements and specifications.

8.1.2   PPPoE IPv4 Operation

The following RFC's must be supported for an address assignment performed via PPPoE:

- RFC 1661, updated by 2153

- RFC 1662, RFC 2516

Any static configuration of IP address information, DNS services or routes on the WAN connection is incompatible with the MSO requirements and specifications.

8.2   IPv6 operations

Internet Protocol Version 6 is the successor of IPv4 and supports a much larger number of nodes due to an increased address space. The logical connection between participating devices is set up by providing identification to each device.

In order to use the internet service, a compatible device must retrieve identification data (IP address / Ipv6 prefix) from the MSO backend systems. IPv6 addresses and IPv6 prefixes will only be assigned dynamically and are subject to change on any network connect or device restart.

IPv6 addresses on the WAN side are exclusively provided through DHCPv6, SLAAC is not supported and must remain disabled.

The following RFC's must be supported:

- RFC2131 (IPv4)

- RFC2132 (IPv4 and IPv6)

- RFC3315, updated by 4361, 5494, 6221, 6422, 6644, 7083, 7227, 7283, 7550

- RFC6221, RFC6422, RFC6644, RFC6842

Any static or stateless configuration approach of IP address information, DNS services or routes on the WAN connection is incompatible with the MSO requirements and specifications.

8.3   DS-lite operations

DS-lite is a very important IPv4 – IPv6 transition technology and must be supported by any router which connects to the MSO network. The MSO may drop single stack or dual stack operation at any time and move to an IPv6 only network where the customer owned network termination devices will operate as a B4 element.

The following RFC's must be supported for DS-Lite operation:

- RFC6233, updated by RFC 7335

9. Voice Services

9.1 PacketCable 1.x based Voice Services

Telephony services are provided leveraging the PacketCable Standard in Version 1.x. The following section describes the relevant PacketCable specifications for the voice service.

The PacketCable based voice services do not use any credentials due to the principle of centralized call logic and sophisticated device identification through certificates and provisioning.

The following PacketCable Specifications are relevant:

Specification	Title	IF spec relevant
PKT-SP-ASP1.5-I02-070412	Audio Server Protocol	
PKT-SP-ATPBX1.5-I01-060419	Analog Trunking for PBX Specification	
PKT-SP-BV16-Codec1.5-I01-031030	BroadVoice 16 Speech Codec Specification	x
PKT-SP-CMSPROV1.5-I02-070412	CMS Subscriber Provisioning	
PKT-SP-CMSS1.5-I07-120412	CMS to CMS Signaling	
PKT-SP-CODEC1.5-I04-120412	Audio/Video Codecs	x
PKT-SP-DQOS1.5-I04-090624	Dynamic Quality-of-Service	x
PKT-SP-EM1.5-I03-070412	Event Messages	x
PKT-SP-ESP1.5-I02-070412	Electronic Surveillance	x
PKT-SP-EVEMIB1.5-I02-050812	Management Event MIB Specification	x
PKT-SP-MEM1.5-I05-100527	Management Event Mechanism	x
PKT-SP-MIB-EXMTA1.5-I01-050128	MTA Extension MIB	x
PKT-SP-MIB-EXSIG1.5-I05-121030	Signaling Extension MIB	x
PKT-SP-MIB-MTA1.5-I01-050128	MTA MIB	x
PKT-SP-MIBS1.5-I03-090624	MIBs Framework Specification	x
PKT-SP-NCS1.5-I04-120412	Network-Based Call Signaling Protocol	x
PKT-SP-PROV1.5-I04-090624	MTA Device Provisioning	x
PKT-SP-SEC1.5-I03-090624	Security	x
PKT-SP-TGCP1.5-I04-120412	PSTN Gateway Call Signaling Protocol Specification	

9.2   SIP based voice services

SIP based voice service are provided based on the IETF RFC 3261 standard and its extensions. SIP services, opposite to PacketCable based voice services, are not auto provisioned, the customer must enter and apply the data manually. The SIP credentials follow the schema shown below, equipment vendors should provide a compatible input interface for data entry into the device:

SIP username:	(^0|^0049)([2-9])(\d{5,}).{10,20}
SIP authname:	(^0|^0049)([2-9])(\d{5,}).{10,20}
SIP password:	(?=.*\d)(?=.*[a-z])(?=.*[A-Z]).{6,10}
SIP registrar:	<host>.<domain>.tld
SIP proxy:	<host>.<domain>.tld

10.   Other services

There are no other services supported by the MSO.

11.   Management, service and support

The management, service and support responsibility for the network termination device will shift from the MSO to the customer and respectively to the equipment supplier. Nevertheless, the MSO may require access to the CoNT under some circumstances. The customer must actively permit this support access and may open it to the MSO personnel on a case by case or permanent basis. Any use of this support access and any data retrieval should be controllable and auditable by the customer.

It is therefore recommended that equipment vendors implement certain control mechanisms which enable the customer to limit management and support access.

The following Management OID's shall be accessible by the MSO if the customer permits the remote management operation. Any other MIB access is not required and should be blocked on the CoNT.

RF Parameter Modem

Index OID	1.3.6.1.2.1.2.2.1.1
Sequence	2
MIB Name	RFC1213-MIB
is Table	Y
TableName	ifTable

RF Parameter Modem DS 1

Index OID	1.3.6.1.2.1.2.2.1.1
Sequence	3
MIB Name	RFC1213-MIB
is Table	Y
TableName	ifTable

RF Parameter Modem US 1

Index OID	1.3.6.1.2.1.2.2.1.1
Sequence	4
MIB Name	RFC1213-MIB
is Table	Y
TableName	ifTable

RF Parameter Modem DS n (bonding)

Index OID	1.3.6.1.2.1.2.2.1.1
Sequence	[48-79]
MIB Name	RFC1213-MIB
is Table	Y
TableName	ifTable

RF Parameter Modem US n (bonding)

Index OID	1.3.6.1.2.1.2.2.1.1
Sequence	[80-87]
MIB Name	RFC1213-MIB
is Table	Y
TableName	ifTable

Modem Serial Number

Index OID	1.3.6.1.2.1.69.1.1.4
Sequence	0
MIB Name	DOCS-CABLE-DEVICE-MIB
is Table	N
TableName	N/A

Time and Date

Index OID	1.3.6.1.2.1.69.1.1.2
Sequence	0
MIB Name	DOCS-CABLE-DEVICE-MIB
is Table	N
TableName	N/A

Current SW Version

Index OID	1.3.6.1.2.1.69.1.3.5
Sequence	0
MIB Name	DOCS-CABLE-DEVICE-MIB
is Table	N
TableName	N/A

System Description

Index OID	1.3.6.1.2.1.1.1
Sequence	0
MIB Name	RFC1213-MIB
is Table	N
TableName	N/A

DOCSIS HF Downstream Parameters

Index OID	1.3.6.1.2.1.2.2.1.1
Sequence	any
MIB Name	DOCS-IF-MIB
is Table	Y
TableName	docsIfDownstreamChannelTable

DOCSIS HF Upstream Parameters	
Index OID	1.3.6.1.2.1.2.2.1.1
Sequence	any
MIB Name	DOCS-IF-MIB
is Table	Y
TableName	docsIfUpstreamChannelTable

DOCSIS HF Quality Parameters	
Index OID	1.3.6.1.2.1.2.2.1.1
Sequence	any
MIB Name	DOCS-IF-MIB
is Table	Y
TableName	docsIfSignalQualityTable

DOCSIS HF TX Power	
Index OID	1.3.6.1.2.1.10.127.1.2.2.1.3
Sequence	0
MIB Name	DOCS-IF-MIB
is Table	N
TableName	N/A

12.   Safeguard clause

If any of the information provided in this document are invalid or otherwise, then to the extent and within the jurisdiction which that information is illegal, invalid or unenforceable, it shall be severed and deleted from this clause and the remaining information shall survive, remain in full force and effect and continue to be binding and enforceable.

Appendix A