



Interface Specification

for the
passive Network Termination Point [pNTP]
in Cable Networks of
Antennentechnik Weser-Ems GmbH

ONLY for Industry-developers !

Version: 1.0

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2. Conventions

Throughout this document, the key words "**MUST**", "**MUST NOT**", "**SHALL**", "**SHOULD**", "**SHOULD NOT**", and "**MAY**" in this document are to be interpreted as described in [RFC2119]:

"MUST", "SHALL"	This word means that the item is an absolute requirement of this specification.
"MUST NOT"	This phrase means that the item is an absolute prohibition of this specification.
"SHOULD"	This word means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighed before choosing a different course.
"SHOULD NOT"	This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
"MAY"	This word means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.

3. Contact

For all questions regarding this document please contact:

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4. Scope

This document describes the basic requirements to be met by CPE equipment for using data and voice services at the passive network termination point (pNTP) of the Operator cable network according to Sec. 5 FTEG (German Act on Radio Equipment and Terminal Equipment).

The first part of this document (Part A) covers the basic physical as well as DOCSIS protocol requirements for using Internet protocol (IP) services over the Operator cable network. The second part (Part B) focuses on the Internet access service whereas the third part (Part C) lists the requirements for using Operator's telephony services.

The characteristics given in this interface specification are intended to be used to derive and specify requirements for equipment such as coaxial cables and cable modems to connect them to the dedicated data RF interface. The values in this interface specification take precedence over requirements in equipment product standards and in installation standards. The given characteristics are not intended to be used as electromagnetic compatibility levels or user emission limits in the Operator network.

This interface specification may be changed at any time to reflect changes made to the network as required by Sec. 5 para. 1 FTEG. Anyone using this specification is encouraged to regularly check for the newest version available from the Operator web site. (www.awe-oldenburg.de) This interface specification may be superseded in total or in part by the terms of a contract between an individual user of this specification and the Operator.





5. References

In the case of a conflict between specific requirements in this document with requirements in any of the directly or indirectly referenced documents, the specific requirements of this document take precedence.

5.1 Normative References

In order to claim compliance with this specification, it is necessary to conform to the following standards and other works as indicated, in addition to the other requirements of this specification. Notwithstanding, intellectual property rights may be required to use or implement such normative references.

All references are subject to revision, and parties to agreements based on this specification or other users of this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

[ANGA NTP]	ANGA, "Specification for the passive Network Termination Point in DOCSIS 3.0 Environment Network and Provisioning requirements, Version 1.01", ANGA 100 001 v1.01 (2016-07), July 2016.
[RFC1918]	Rekhter, Y. et al., „Address Allocation for Private Internets“, BCP 5, RFC 1918, February 1996.
[RFC2119]	Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
[RFC2131]	Droms, R., "Dynamic Host Configuration Protocol", RFC 2131, March 1997.
[RFC2132]	Alexander, S., and Droms, R., "DHCP Options and BOOTP Vendor Extensions", RFC 2132, March 1997.
[RFC2460]	Deering, S. and R. Hinden, "Internet Protocol, Version 6 (IPv6) Specification", RFC 2460, December 1998.
[RFC3315]	Droms, R., Bound, J., Volz, B., et al., "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", RFC 3315, July 2003
[RFC3633]	Troan, O. and R. Droms, "IPv6 Prefix Options for Dynamic Host Configuration Protocol (DHCP) version 6", RFC 3633, December 2003.
[RFC3646]	Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C., and M.Carney, "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", RFC 3315, July 2003.
[RFC6598]	Weil, J., Kuarsingh, V., Donley, C., Liljenstolpe, C., and M. Azinger, "IANA-Reserved IPv4 Prefix for Shared Address Space", BCP 153, RFC 6598, April 2012.
[CM-SP-MULPIv3.0]	DOCSIS-over-Cable Service Interface Specifications, Media Access Control and Upper Layer Protocols Interface Specification, CM-SP-MULPIv3.0-I29-160602, June 2, 2016, Cable Television Laboratories, Inc.
[CM-SP-SECv3.0]	Data-Over-Cable Service Interface Specifications, Security Specification, CM-SP-SECv3.0-I15-130808, August 8, 2013, Cable Television Laboratories, Inc.
[EuroDOCSIS BPI+Requirements]	EuroDOCSIS BPI+ Requirements, Version 7.0, October 23, 2007, Excentis.





[CM-SP-OSSiv3.0]	DOCSIS-over-Cable Service Interface Specifications, Operations Support System Interface Specification, CM-SPOSSiv3.0-I29-160602, June 2, 2016 , Cable Television Laboratories, Inc.
[PKT-SP-NCS1.5]	PacketCable 1.5 Network-Based Call Signaling Protocol Specification, PKT-SP-NCS1.5-I04-120412, April 12, 2012, Cable Television Laboratories, Inc.
[PKT-SP-DQOS1.5]	PacketCable 1.5 Dynamic Quality of Service Specification, PKT-SP-DQOS1.5-I04-090624, June 24, 2009, Cable Television Laboratories, Inc.
[PKT-SP-SEC1.5]	PacketCable 1.5 Security Specification, PKT-SP-SEC1.5-I03- 090624, June 24, 2009, Cable Television Laboratories, Inc.
[PKT-SP-PROV1.5]	PacketCable 1.5 Provisioning Specification, PKT-SP-PROV1.5-I04-090624, June 24, 2009, Cable Television Laboratories, Inc.
[PKT-SP-CODEC1.5]	PacketCable 1.5 Audio/Video Codecs Specification, PKT-SPCODEC1.5-I04-120412, April 12, 2012, Cable Television Laboratories, Inc.
[EuroPacketCable Certificate Requirements]	Euro-PacketCable Certificate Requirements Version 9.0, November 15, 2006, Excentis
[EuroPacketCable L-PackageClarification]	Euro-PacketCable L-Package Clarification Version 9.0, November 15, 2006, Excentis
[PKTC-EXCENTIS-SIG-MIB]	EuroPacketCable Signaling MIB, PKTC-EXCENTIS-SIG-MIBdraft09, September 9, 2005, Excentis.
[ECL-SP-MIB-EXSIG]	EuroPacketCable Signaling Extension MIB, ECL-SP-MIBEXSIG-D04-090624, June 24, 2009, EuroCableLabs.
[PKTC-EXCENTIS-MTA-MIB]	EuroPacketCable MTA MIB, PKTC-EXCENTIS-MTA-MIBdraft06, January 21, 2005, Excentis.
[ECL-SP-MIB-EXMTA]	EuroPacketCable MTA Extension MIB, ECL-SP-MIB-EXMTAD01-051130, November 30, 2005, EuroCableLabs.
[DIN EN 50117]	Coaxial cables - Part 2-1: Sectional specification for cables used in cabled distribution networks - Indoor drop cables for systems operating at 5 MHz - 1000 MHz, DIN EN 50117-2-1:2008-08, 2008, DIN.

5.2 Reference Acquisition

ANGA specifications	http://www.anga.de , available from http://www.awe-oldenburg.de
Internet Engineering Task Force (IETF) RFCs	http://www.ietf.org
CableLabs specifications	http://www.cablelabs.com
Excentis EuroDOCSIS and EuroPacketCable requirements including MIBs	http://www.excentis.com
EuroCableLabs EuroPacketCable MIBs	http://www.excentis.com
DIN German Institute for Standardization	http://www.din.de





6. Definitions and Abbreviations

6.1 Definitions

The definitions in [ANGA NTP], subclause 3.1 apply.

6.2 Abbreviations

The abbreviations in [ANGA NTP], subclause 3.2 apply.

AD	Frequency dependant Amplitude Distortion (Peak to Peak)
BPI	Baseline Privacy Interface
C/(N+I)	Carrier (C) to Noise (N) and Intermodulation (I) ratio
CM	Cable Modem
DHCP	Dynamic Host Configuration Protocol
DOCSIS	Data-over-Cable Service Interface Specifications
DS	Downstream
E-MTA	Embedded Multimedia Terminal Adapter
HFC	Hybrid Fibre Coax
IP	Internet Protocol
MTA	Multimedia Terminal Adapter
NTP	Network Termination Point
PD	Frequency dependant Phase Distortion (Peak to Peak)
pNTP	passive Network Termination Point
QoS	Quality of Service
RF	Radio Frequency
UA	User Agent
US	Upstream
VSC	Vertical Service Code





Part A Cable Network

A.1. RF Interface connector

The mechanical coaxial connector and the connection requirements at the customer's pNTP in [ANGA NTP], clause 4 apply.

A.2. Network RF characteristics

A.2.1 Downstream RF characteristics

A.2.1.1 Downstream frequency range

The downstream frequency range specification at the customer's pNTP in [ANGA NTP], subclause 5.1.1 applies. The supported DOCSIS DS frequency range MUST be 112 to 1002 MHz (centre frequency).

A.2.1.2. Downstream RF performance

The downstream RF performance characteristics at the customer's pNTP in [ANGA NTP], subclause 5.1.2 apply.

A.2.2. Upstream RF characteristics

A.2.2.1. Upstream Frequency Range

The upstream frequency range specification at the customer's pNTP in [ANGA NTP], subclause 5.2.1 applies. The usable upstream frequency range MUST be 10 MHz to 65 MHz.

A.2.2.2. Upstream RF Performance

If not listed otherwise in this subclause the upstream RF performance characteristics at the customer's pNTP in [ANGA NTP], subclause 5.2.2 apply. The reference channel bandwidth is 3.2 MHz. Nominal values valid for 99,5 % of time. The table in [ANGA NTP] is being clarified as follows:

Parameter	Nominal ratings and characteristics at installation time	Absolute maximum ratings and characteristics
per channel US level range	98.1 to 110 dB(μV)	≤ 114 dB(μV)
C/(N+I)	≥ 64.5 dB	≥ 62.5 dB
MER (16QAM in 3,2 MHz Channel)	≥ 32 dB	≥ 30 dB
AD	≤ 1.1 dBpp	≤ 2.4 dBpp
PD	≤ 1.1 dBpp	≤ 2.4 dBpp

Table: 862 MHz Network Upstream Characteristics at the pNTP

Parameter	During Burst transmission	Between Bursts
Inband	-43 dBc	-72 dBc

Table: Spurious Emissions in 5.12 MHz upstream channel

A.3. Physical Interface Requirements

The physical interface requirements at the customer's pNTP in [ANGA NTP], clause 6 apply.





Part B Internet Access Service

B.1. Cable Modem requirements

B.1.1. MAC and Upper Layer

The modem MUST comply with [CM-SP-MULPIv3.0].

The following minimum requirements apply:

The modem MUST support DS channel bonding of at least 8 DS channels; the modem SHOULD support DS channel bonding of 16 DS channels. The modem MUST support US channel bonding of at least 4 US channels. The modem MUST support at least 8 US service flows.

B.1.2. Security layer

The modem MUST comply with [CM-SP-SECv3.0].

The cable modem certificate requirements are defined in [EuroDOCSIS BPI+ Requirements]. Requirements specified in that document take precedence over requirements in [CM-SPSECv3.0].

B.1.3. OSS layer

The modem MUST comply with [CM-SP-OSSv3.0].

B.2. IP Addressing

B.2.1. IP addresses for devices connected to the cable modem

The Operator provides a native IPv4/IPv6 dual-stack Internet access service to its customers. Each allowed IP capable device/ interface behind the cable modem will on request receive a native IPv4 address and a global IPv6 address as well as a delegated IPv6 prefix and other corresponding configuration to use for inbound/outbound IPv4 and IPv6 ([RFC2460]) traffic, respectively.

Devices/interfaces behind the cable modem MUST support IPv4.

Devices/interfaces behind the cable modem SHOULD request an IPv6 address and an IPv6 prefix.

The number of devices/ interfaces concurrently supported behind the cable modem depends on the actual tariff booked by the customer. In the most common setup there is one single IPv4 capable device/interface, e.g. a real or logical router instance, which provides Internet access to its clients by the means of network address translation (NAT) techniques. The real or logical router instance MAY also request an IPv6 address as well as an IPv6 prefix to address other clients and to provide direct routed IPv6 Internet access to these clients.

Depending on tariff and/or available IPv4 address space supported IPv4 devices/interfaces receive either a public IPv4 address out of the Operator's RIPE assigned IPv4 address space or an IPv4 addresses out of the [RFC1918] address space or an IPv4 addresses out of the [RFC6598] address space. In case of [RFC1918] or [RFC6598] addressing, IPv4 Internet access is provided centrally through Carrier Grade NAT (CGN).

If DHCPv4 [RFC2131] is used for configuration, the following information MUST be requested by the DHCP client and will then be provided by the DHCP server in accordance with [RFC2132]:

- IPv4 address
- DNS server
- Subnet mask
- Gateway address (router)





If DHCPv6 [RFC3315] is used for configuration, the following information MUST be requested by the DHCP client and thus will be provided by the DHCPv6 server:

- IPv6 address
- DNS server

If DHCPv6 [RFC3315] is used for configuration, the following information MAY be requested by the DHCP client and thus will be provided by the DHCPv6 server:

- Delegated IPv6 prefix

In order to avoid configuration conflict, the configuration of the device/interface (e.g. router instance) behind cable modem MUST be done via respective DHCP. Other procedures such as static configuration MUST NOT be used.

B.2.2. IPv6 Prefix delegation

IPv6 Prefix delegation according to [RFC3633] MUST be supported.





Part C Telephony Service

C.1. General

The Operator provides a voice service based on EuroPacketCable 1.5 specifications.

To use Operator's voice service, a EuroPacketCable 1.5 compliant E-MTA MUST be used. The E-MTA MUST comply to the following specifications normative for EuroPacketCable 1.5 MTAs:

[PKT-SP-NCS1.5]: This document defines the call signalling protocol. Some parts of appendix A of this document are redefined in [EuroPacketCable L-Package Clarification] (see below). If something is mentioned in both documents, it is the latter document that takes preference.

[PKT-SP-DQOS1.5]: This document defines the dynamic quality of service protocol.

[PKT-SP-SEC1.5]: This document defines the security protocols. Specific requirements for Euro-PacketCable certificates are defined in document [EuroPacketCable Certificate Requirements] (see below).

[PKT-SP-PROV1.5]: This document defines the provisioning interface. The following optional features MUST be supported: basic and hybrid provisioning flow, multiple grants per interval.

[PKT-SP-CODEC1.5]: This document defines the requirements for CODEC handling and support. Support for T.38 fax relay, DTMF relay and VoIP metrics is mandatory. The following features are optional:

CODECS other than PCMA and PCMU, silencesuppression.

[EuroPacketCable Certificate Requirements]: This document defines the requirements for EuroPacketCable certificates.

[EuroPacketCable L-Package Clarification]: This document defines the requirements for the L-package for EuroPacketCable MTAs. The L-package MUST be supported.

EuroPacketCable 1.5 MIB definitions:

[PKTC-EXCENTIS-SIG-MIB]: This document defines the requirements for the signaling MIB objects.

[ECL-SP-MIB-EXSIG]: This document defines extensions on the signalling MIBs.

[PKTC-EXCENTIS-MTA-MIB]: This document defines the requirements for the MTA MIB objects.

[ECL-SP-MIB-EXMTA]: This document defines extensions on the MTA Device MIBs.

Stand-alone MTAs MUST NOT be used.





C.2. Call features / Supplementary services

Supplementary services are controlled by Vertical Service Codes (VSC), for details see the user's manuals on the Operator website.

C.3. Quality of Service

Quality of Service (QoS) for voice calls (signalling and media) set up per this specification will be taken care of by the network.

C.4. Fax

Fax and other analogue modem transmission are sent in-band over the voice codec.





Annex

A: Coaxial cable assemblies

The screening effectiveness requirements for cable assemblies in the Operator network depend on the capabilities of the demodulator within the cable modem and the physical parameters like return loss and the length of the cable assembly itself. [ANGA NTP], annex 1.1 applies.

Coaxial cable assemblies to be used at the pNTP MUST fulfill the requirements of [DIN EN 50117] for Class A equipment.

B: Cardbord box

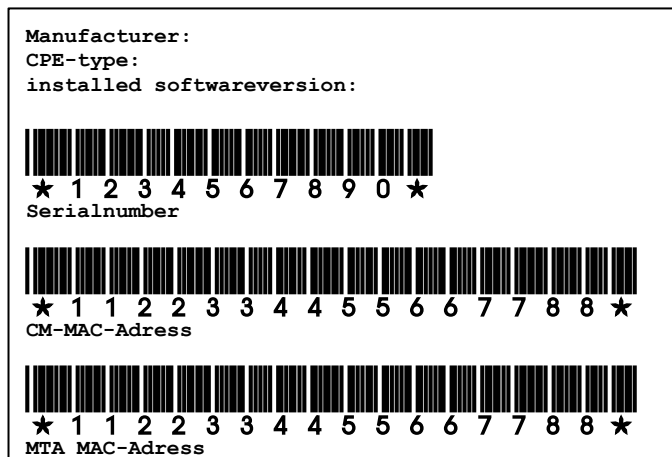
Five stickers MUST be applied outside on the cardboard box.

The stickers provide information about the manufacturer, CPE-type, installed softwareversion, serialnumber, CM-MAC-Address and MTA MAC-Address at least.

Typeface of the stickers MUST be "COURIER NEW" size 8 and BARCODE 39 size 16.

The serialnumber and the CM-MAC-Adresses MUST be covered by the character "*" in the same style and size.

Example:





C: Document History

Version	Date	Status
1.0	July 31, 2016	Online AWE Web-Site

