axing®
Competence in
Communication
Technologies

# CMTS 2-00
# Cable Modem Termination System

## Product specifications


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## ⚠ WARNING

- ➔ Observe the safety instructions supplied with the device! They are also available at the following Internet address: https://download.axing.com/BAs/Sicherheitshinweise_9sprachig.pdf
- ➔ Use the device only as described in these operating instructions and in particular in accordance with the state of the art. If the device is used for other purposes, no warranty will be assumed!

CE

Herewith AXING AG declares that the marked products comply with the valid guidelines.

WEEE Nr. DE26869279 | Electrical and electronic components must not be disposed of as residual waste, it must be disposed of separately.

# 1. CMTS 2-00 Introduction

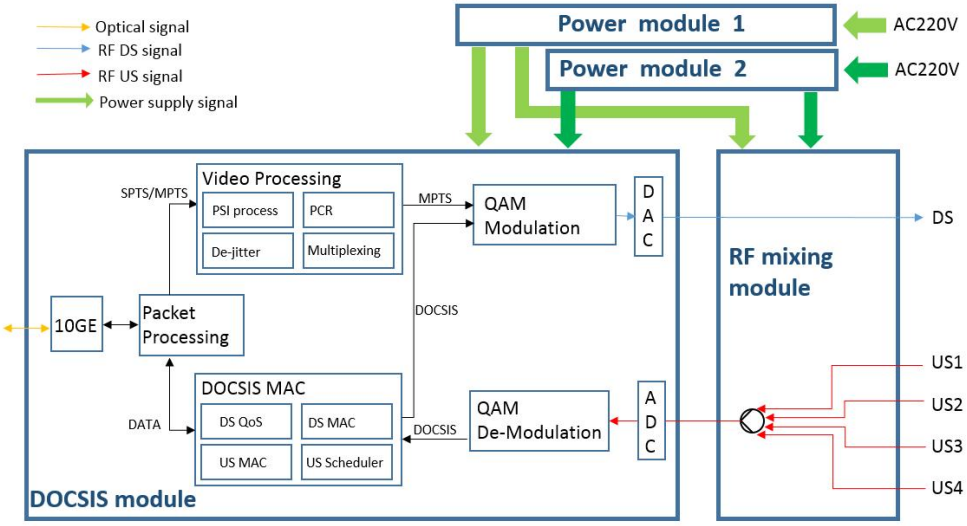
AXING CMTS 2-00 is based on DOCSIS 3.0/EuroDOCSIS 3.0. The CMTS 2-00 is a high-performance and cost-effective cable network edge device.

CMTS 2-00 equipment cabinet type, supports GPON/EPON/GE uplink, EQAM function, end-to-end QoS and unified network management.

## 1.1. Product Features

- Allows service providers to rapidly and cost effectively deliver broadband services over the existing coax plant
- Fully compatible with standard DOCSIS provisioning systems, fully compatible with existing DOCSIS 2.0/3.0 cable modems, thus the existing investment is protected
- Smooth evolution: compatible with existing headend provisioning platforms, CM terminals and supports network evolution smoothly
- High bandwidth: Gigabit level access device, higher bandwidth on next generation product, can satisfy the future network requirements
- Better cost-effectiveness: the unit price per bandwidth has greatly reduced compared with traditional CMTS
- Supports PacketCable/PCMM, and multi-service applications including internet, video and interactive VOD application

## 1.2. Function




The main function is to converts data between the upper-layer network and the HFC network.

- In the downstream direction, the DOCSIS module modulates data signals to RF signals and sends the signals to the RF module.
- In the upstream direction, the DOCSIS module demodulates the RF signals sent by the RF module to data signals for data conversion.

### 1.2.1. 10GE Uplink Module

The 10GE uplink module implements data transmission from the CMTS 2-00 to the access network/aggregation network. When 10GE optical signals are connected, the 10GE SFP+ optical module can be directly connected to the SFP+ uplink interface of the CMTS 2-00.

### 1.2.2. Packet Processing Module

All data packets entering from the aggregation network will be differentiated as MPEG video streams or IP Data packets according to their IP/UDP header.

The IP packets are forwarded to the **DOCSIS 3.0 MAC module** for QoS scheduling and framing. The MPEG video transport streams are forwarded to **video processing module**.

For Upstream, the Packet Processing Module has implemented a mapping protocol between the DOCSIS service flows and VLAN tags, to support QoS requirements and seamless connection with different types of connection networks. The CMTS 2-00 also supports subnet VLAN and supports adding VLAN based on device types in DHCP Snooping, L2 Relay, and L3 Relay modes.

### 1.2.3. DOCSIS MAC Module

The data packets are forwarded to the DOCSIS MAC module for QoS scheduling and framing.

DOCSIS3.0 downstream channel bonding and upstream channel bonding is also supported by this module. The bonding feature enables high-speed broadband access and helps cable operators to offer more bandwidth-intensive services.

Data link encryption between CMTS and CM, such as BPI+, is supported by this module.

Bonded multicast is supported by this module. It enables cable operators to offer various IP Multicast-based multimedia services, such as Internet Protocol Television (IPTV) over the DOCSIS network.

DOCSIS MAC Module is also responsible for handling QoS function between the cable modems and the CMTS 2-00. QoS function characterizes the service flows by a set of parameters such as latency, jitter, and throughput assurances. If a packet matches the specified packet matching criteria of a QoS Classifier, it is delivered to the specific service flow. The downstream packets are classified by CMTS 2-00, and the upstream packets are classified by zhe cable modems. CMTS 2-00 supports L2-L4 classifiers.

### 1.2.4. Video Processing Module

The Video processing module receives IP-encapsulated AVS / H.265/ HEVC/ H.264 /MPEG-4 /MPEG-2 transport data streams (unicast/multicast) from the Packet Processing Module, it supports all mainstream video streams such as SD, HD, 4K, etc., and upgrade to support higher bit rates in the future.

The Video processing module provides the functions as PSI processing, PCR processing, de-jittering and multiplexing, then sends MPTS bitstream to QAM modulation module.

### 1.2.5. QAM Modulation and Demodulation Module

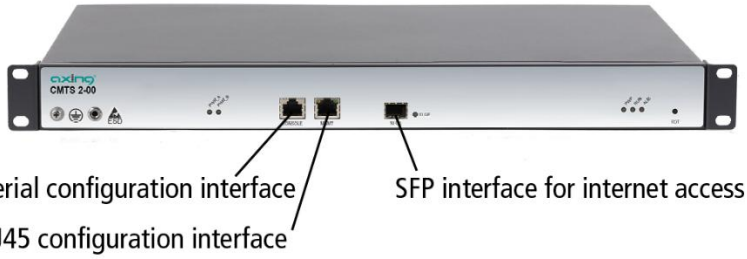
The modulation and demodulation module modulates and multiplexes DOCSIS MAC MPEG data and MPTS MPEG packets to RF signals in downstream direction, and demodulates DOCSIS RF signals back to DOCSIS MPEG data packets in upstream direction.

### 1.2.6. RF mixing module

The RF module provides the functions of DOCSIS signal's combination, separation, amplification and detection.

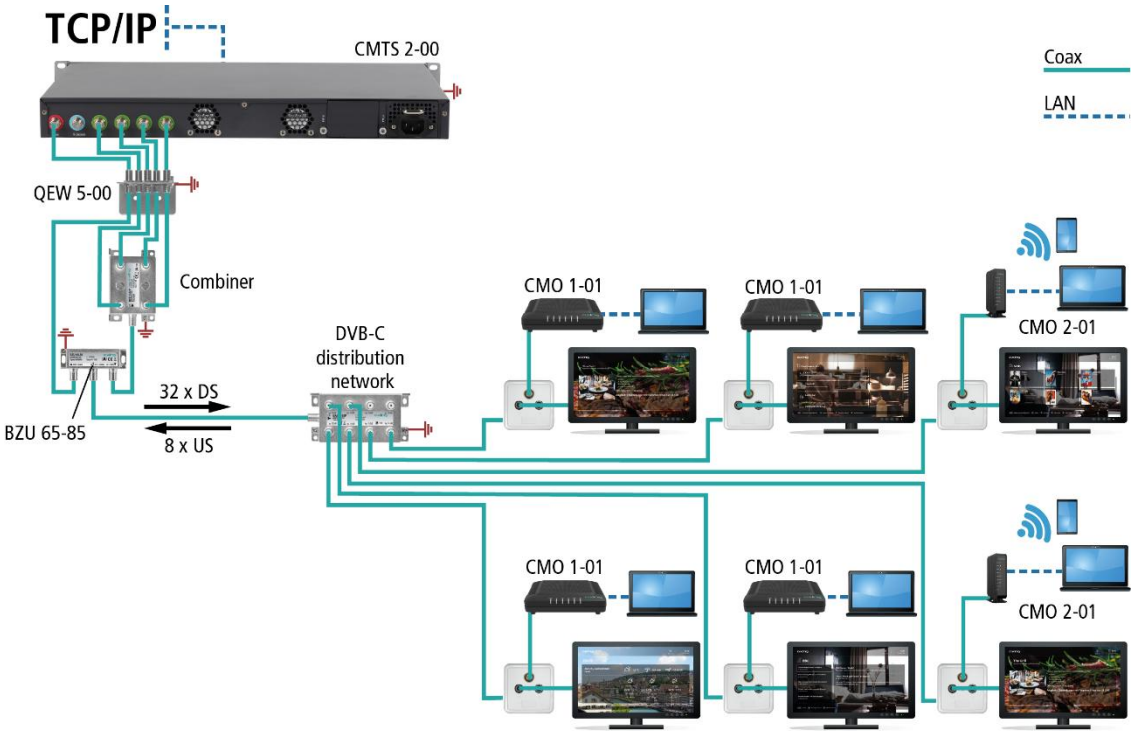
## 1.3. Product Views

### Front




### Rear


## 1.4. Application Example



# 2. Performance and Specifications

## 2.1. Overall Characteristic

| Parameter | Specification |
|---|---|
| Dimension | 483 mm × 300 mm × 44 mm |
| Product form | Indoor type/1RU equipment cabinet type |
| Weight | <5.5 kg (rough weight) |
| Operating temperature | 0~+40 °C |
| Operating humidity | 10%-90% (non-condensing) |
| Power supply | 1 x plug-pull redundant power supply module<br>(redundant power supply unit available as accessory) |
| Plug-pull power supply module | AC 220 V/AC 110 V, 90V-264V, 50/60Hz |
| Power supply plug | European standard plug (Type E, Length 1.8 m) |
| Power consumption | 70 W |
| Number of RF ports | US: 4 |
| | DS: 1 |
| Maximum output level | 40 dBmV = 100 dBµV @ 32 chs |
| | 43 dBmV = 103 dBµV @ 16 chs |
| | 46 dBmV = 106 dBµV @ 8 chs |
| | 49 dBmV = 109 dBµV @ 4 chs |
| | 52 dBmV = 112 dBµV @ 2 chs |
| | 55 dBmV = 115 dBµV @ 1 ch |
| MER[1] | |
| Equalizer off | ≥39 dB |
| Equalizer on | ≥43 dB |
| Return loss forward | ≥13 dB |
| Return loss reverse | ≥13 dB |
| Output impedance | 75 Ohm |
| Default RF port type | F type |
| Standard | DOCSIS 3.0 / EuroDOCSIS 3.0 |
| | DOCSIS 2.0 / EuroDOCSIS 2.0 |
| Internet interface | 1 × 10GE SFP+ |
| Configuration interface | 1 × RJ45, IEEE 802.3ah, 1000 Base-T |
| | 1 × Serial, 115200 bps |
| Number of cable modems supported (DOCSIS 2.0/3.0) | ≤1000 |
| Communication protocol | ATDMA |

## 2.2. Working Channels

| | DS | US |
|---|---|---|
| Channel frequency range | 87…1002 MHz | 5…65 MHz |
| Number of channels | 32 | 8 |
| Number of service flows | 4k | 4k |
| Band width | 6 MHz / 8 MHz | 1.6 MHz / 3.2 MHz/ 6.4 MHz |
| Modulation mode | QAM64/QAM256 | QPSK/QAM16/QAM32/QAM64 |
| Reception level range | / | -7…+23 dBmV @ 6.4 MHz<br>-10…+20 dBmV @ 3.2MHz<br>-13…+17 dBmV @ 1.6MHz |

## 2.3. PON features

| | |
|---|---|
| Standard | Supports IEEE 802.3ah, CTC 3.0 |
| | Supports the standard OAM, CTC 3.0 extended OAM |
| Safety | Supports CTC triple churning and AES-128 encryption |
| DBA | Supports fixed-bandwidth/guaranteed-bandwidth/maximum-bandwidth DBA |
| Authentication method | Supports MAC/LLID/password authentication |
| | Supports silence mechanism |
| | Supports laser-always-on detection |

## 2.4. System function

| | |
|---|---|
| MTU | 1532 Byte |
| IP Stack | Supports IPv4 and IPv6 dual-stack |
| DHCP | Supports DHCP relay/snooping |
| | Supports DHCP bundle |
| | Supports DHCP lease query |
| | Supports according to Option 60 to identify equipment type |
| | Supports insert Remote-ID, Interface-ID, CMTS capabilities and CM MAC |
| DHCPv6 | Supports DHCPv6 relay/snooping |
| | Supports DHCPv6 bundle |
| | Supports DHCPv6 lease query |
| | Supports DHCPv6-PD |
| | Supports according to vendor class string to identify equipment type |
| | Supports insert Remote-ID, Interface-ID, CMTS capabilities and CM MAC |
| VLAN & L2VPN | Supports 802.1ad/ 802.1q/subnet VLAN |
| | Supports service flow-based VLAN addition or deletion |
| | Supports VLAN addition according to device type |
| | Supports the L2VPN |
| | Supports VLAN conversion |
| MAC domain management | Supports MDD & MDF enable and disable |
| | Supports MTC & MRC enable and disable |
| | Supports UDC enable and disable |
| | Supports upstream automatic frequency hopping |
| | Supports piggyback, shared-secret, channel bonding |
| Multicast | Supports multicast authentication |

| | |
|---|---|
| | Supports static multicast |
| | Supports IGMP V2/V3 Snooping |
| | Supports MLD V1/V2 |
| Load balance | Supports RLBG/GLBG Support RLBG/ GLBG |
| | Support load balance priority |
| QoS | Supports static/ dynamic service flow |
| | Supports service class |
| | Supports best effort, UGS, UGS-AD, RTPS, NRTPS |
| | Supports the DOCSIS 3.0 USCB scheduling |
| | Supports PowerBoost |
| Packetcable | Supports Packetcable 1.5 & PCMM |
| | Supports DQoS |

## 2.5. Management & Monitor

| | |
|---|---|
| CM management | Supports CM status review |
| | Supports CM steer |
| | Supports CM blacklist |
| | Supports CM discrete degree |
| | Supports remote query |
| | Supports flaplist |
| | Supports admission control |
| CPE management | Supports CPE query and clear |
| Network management | Supports SSH/telnet |
| | Supports SNMP V1/ V2c/V3 |
| | Supports SYSLOG |
| | Supports graphical standalone WEB management |
| | Supports NM3000 (graphical EMS) |
| | Supports integrate to NMS |
| System diagnostic and monitor | Supports system information acquisition and monitoring, |
| | Supports optical receiver information monitoring |
| | Supports showtech |
| | Supports ping, DOCSIS ping, tracert |
| | Supports spectrum monitor |
| IPDR | Supports IPDR/SP over TCP |
| | Supports DOCSIS IPDR |
| | Supports based on the data IPDR/XDR encoding |
| | Supports time interval/ event-based/adhoc data acquisition method |
| Security guarantee | Support AAA (TACACS+, RADIUS) |
| | Support RA guard |
| | Support ACL |
| | Support BPI+ |
| | Support EAE |
| | Support source verify |
| | Support prevent DoS attack |
| | Support blacklist, white list, the firewall |
| Software upgrade | Supports through the CLI/graphical WEB/graphical NM3000 upgrade |
| | Supports remote upgrade, version reversion when upgrade failure |

## 2.6. EQAM functions

| | |
|---|---|
| Channel frequency range | 54/87/108~1002MHz |
| Channel width | 8MHz/6MHz |
| Symbol rate | 6.875/6.900/6.952 MSymb/s, 5.057/5.361 MSymb/s |
| Modulation mode | QAM64/QAM256 |
| Working channels | ≤32 |
| Phase noise | |
| 1KHz | ≤75dBc/Hz |
| 10KHz | ≤-85dBc/Hz |
| >100KHz | ≤100dBc/Hz |
| Network delay jitter tolerance | 1000ms |
| PCR jitter tolerance | ≤500ns |
| Transmission technology | Supports UDP/IP/GE transmission |
| Control protocol | Compatible with NGOD specification, D6/R6 standard |
| Multiplexing capability | Supports PMT PID, and other PSI/SI multiplexing capabilities |
| TS multiplexing | 1) VOD service, single frequency supports 32 programs, with each program supporting 16 PIDs simultaneously by default<br>2) A single program can be configured to transmit 50 PIDs<br>3) The whole device supports 1K UDP ports, and 16K PIDs<br>4) Supports DATA stream of a single frequency multiplexing with other frequency |
| Stream parameters | 1) Supports the streaming of a variety of signal source formats such as MPEG2, MPEG4, H.264, H.265, HEVC, AVS, DATA (including VBR and CBR formats)<br>2) In a single frequency, supports unicast stream, multicast stream and DATA stream simultaneously<br>3) Each frequency supports 32 business UDP ports<br>4) The service port (UDP port) can be configured with PMT PID and service flow type information according to different frequencies<br>5) Supports stream overflow protection<br>6) In data broadcasting service, Supports PID value offset in the transport stream (remapping) |
| Status monitoring | Supports real-time traffic statistics<br>Supports concurrent traffic statistics |
| Regular ARP | Report EQAM business IP ARP packet every 2s |
| Network management | 1) Supports web-based graphic management interface<br>2) Supports SSH, telnet and R232 serial port management |

Note:

1, MER is only CMTS signals performance of station, not include any CATV signals

# 3. Product & Accessories Ordering Information

### Ordering Information

| Product module | Part Number |
|---|---|
| CMTS 2-00 | CMTS00200 |
| CZU 2-00 Additional power supply unit CMTS 2-00 | CZU00200 |
| CMO 1-01 DOCSIS/EuroDOCSIS cable modem | CMO00101 |
| CMO 2-01 DOCSIS/EuroDOCSIS cable modem \| WiFi | CMO00201 |
| BZU 65-85 Diplexer 65/85 MHz | BZU06585 |
| Suitable SFP modules (GPON/EPON/GE) | on request |

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