SmartAX MA5633

D-CCAP DOCSIS 3.1 CMC Device (Cable Outlets on a Single Side)

Issue 05
Date 2017-08-31

Product Overview

Huawei SmartAX MA5633 distributed converged cable access platform (D-CCAP) coaxial media converter (CMC) device is a full-service, highly intelligent digital cable network device designed for fiber deep migration. Installed at the edge of an HFC network, the MA5633 delivers a Gigabit bandwidth to a group of users at a lower cost than traditional HFC with centralized CMTS and FTTH. With the built-in EQAM or pluggable optical receiver, the MA5633 is fully backward compatible to existing QAM-based services. With Huawei OLT located at the head end aggregates up to several hundreds of distributed MA5633s. This solution provides space, power, and cooling efficiencies required for a large-scale transition toward fiber deep architectures. Positioning to support the SDN framework, the D-CCAP further evolves HFC.

Product Highlights

High-performance DOCSIS3.1

- ✓ DOCSIS3.1 performance improves significantly: Benefit from D-CCAP architecture, CNR improvement makes 4K QAM transmission possible. As a results, more D3.1 cable modems can achieve high throughputs.
- ✓ One step DOCSIS3.1 Deployment: MA5633 is hardware ready for DOCSIS3.1 – It supports 2*192 MHz DS and 2*96MHz US. Upgrading from D3.0 to D3.1, it is simply just a software upgrade.

Flexible Integration

- ✓ Modular optical receiver or transmitter provides flexible configuration options.
- ✓ Pluggable wavelength division multiplexing (WDM) to support RF overlay by single fiber core.
- ✓ Built-in edge quadrature amplitude modulation (EQAM).
- ✓ The power module is replaceable when it is faulty.

Converged Services

- ✓ Utilizing Huawei’s MA5800 OLT platform, both MA5633 and fiber to the home (FTTH) devices can share same platform for provisioning platform.
- ✓ Provides an integrated solution for video and data services using a built-in EQAM, which simplifies network deployment
- ✓ Broadcasting (BC) redundancy protects TV service flows so that when a service flow fails, the other service flow can be normally forwarded. This effectively ensures that users can watch TV programs when a network fault occurs.

Flexible Installation

Supports multiple installation scenarios, including aerial-mounted, wall-mounted, and network pedestal cabinet installation. The device powered by 60 V AC can be installed outdoors and the device powered by 220 V AC can only be installed indoors or in the cabinet.

Simple Maintenance and Management

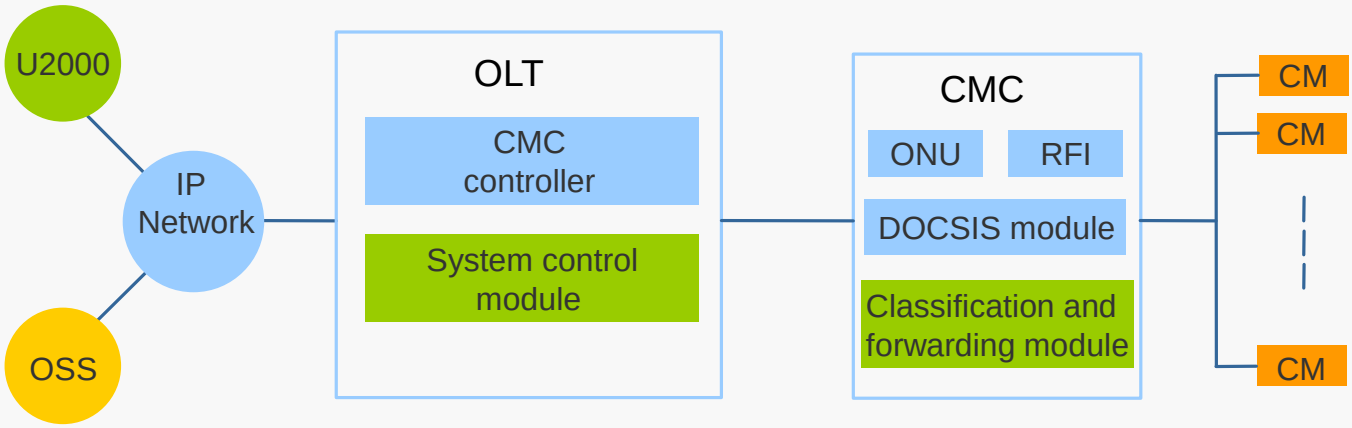
- ✓ Supports centralized management. In this mode, the MA5633 is plug-and-play and regarded as a service board of the OLT. Simple and efficient maintenance and operations are performed on the OLT. The OLT supports remote configuration, upgrades, and O&M of the MA5633.
- ✓ Smart RF adjustment. With this feature, the CLI or NMS can be used to pre-configure the downstream RF power and RF level tilting, and upstream attenuation and equalization of the MA5633. The mobile APP can be used to query, set or adjust the MA5633's RF parameters. This feature is simplifying MA5633 O&M and reducing O&M costs.
- ✓ Supports upstream spectrum scanning. Upstream cable channels are prone to interference from external noises, which adversely affect CMs and user services.
  - ■ Supports upstream spectrum scanning and its file storage for maintenance analysis.
  - ■ U2000 supports upstream spectrum scanning. Spectrum range from 0–204 MHz supports quiet noise scanning, carrier with noise scanning, and free running scanning. The sampling is performed at an interval of 100 ms and step of 60 kHz.
- ✓ Supports proactive network maintenance (PNM): Before a network fault adversely affects user services, the fault diagnosis system connected to the MA5633 detects this fault based on the analysis on the pre-equalization coefficients obtained between CMs and the MA5633. This function provides a preventive maintenance mode which decreases actual faults greatly, thereby reducing network O&M costs and improving carriers' service level agreement (SLA).

D-CCAP Network Structure

A D-CCAP network consists of an OLT, CMCs, and a U2000 network management system, complying with the remote MACPHY architecture requirements specified by CableLabs DCA (Data-Over-Cable Service Interface Specifications)

- ✓ OLT: an aggregation device (CMC controller) that terminates the PON protocol and locates in a central office (CO). The OLT manages CMCs in a centralized manner
- ✓ CMC: forwards data signals at Layer 2 between the upper-layer network and the HFC network
- ✓ U2000: virtually manages and maintains NEs and services in the D-CCAP network.

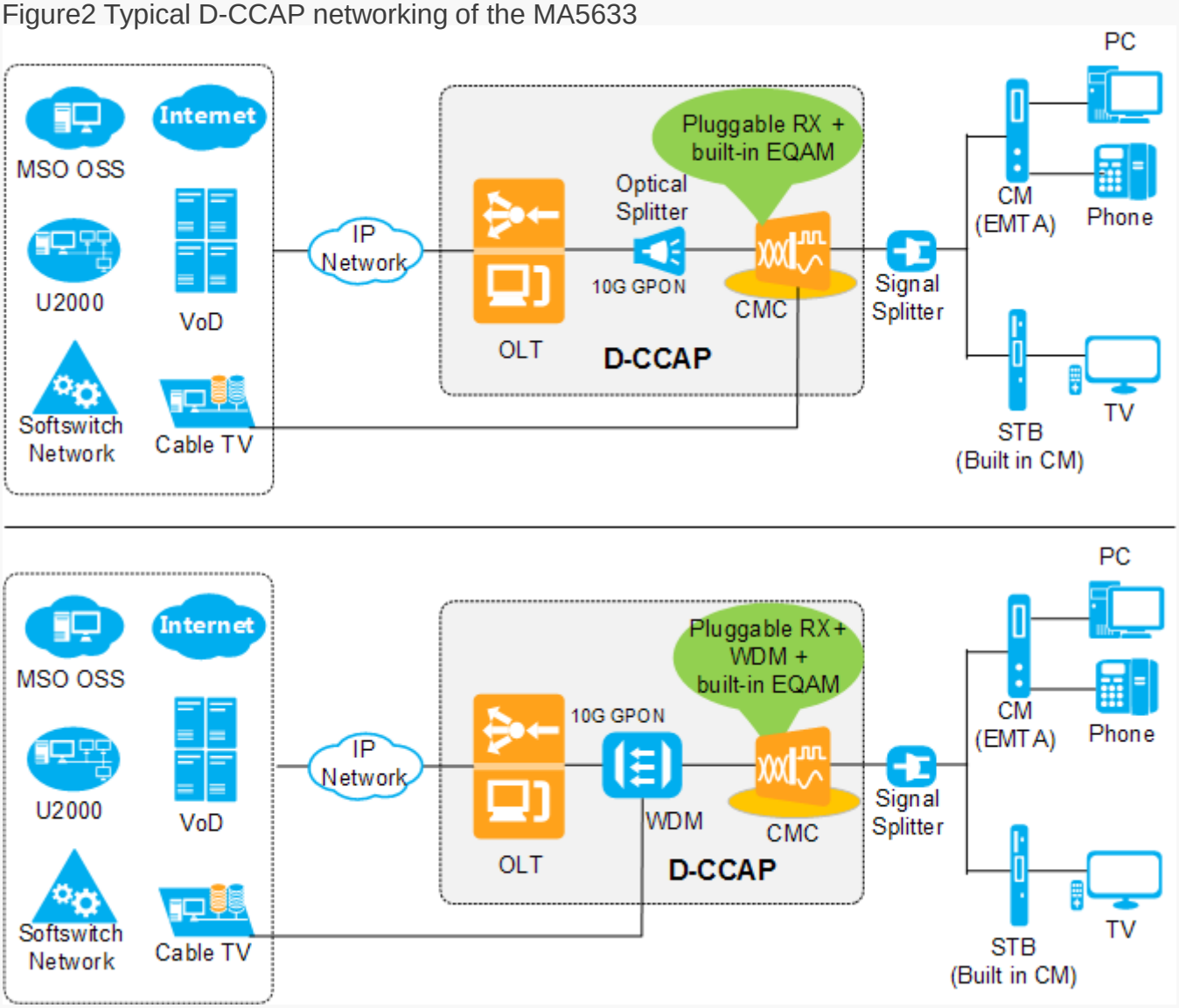
Figure 1 D-CCAP Network Structure.



Application Scenarios

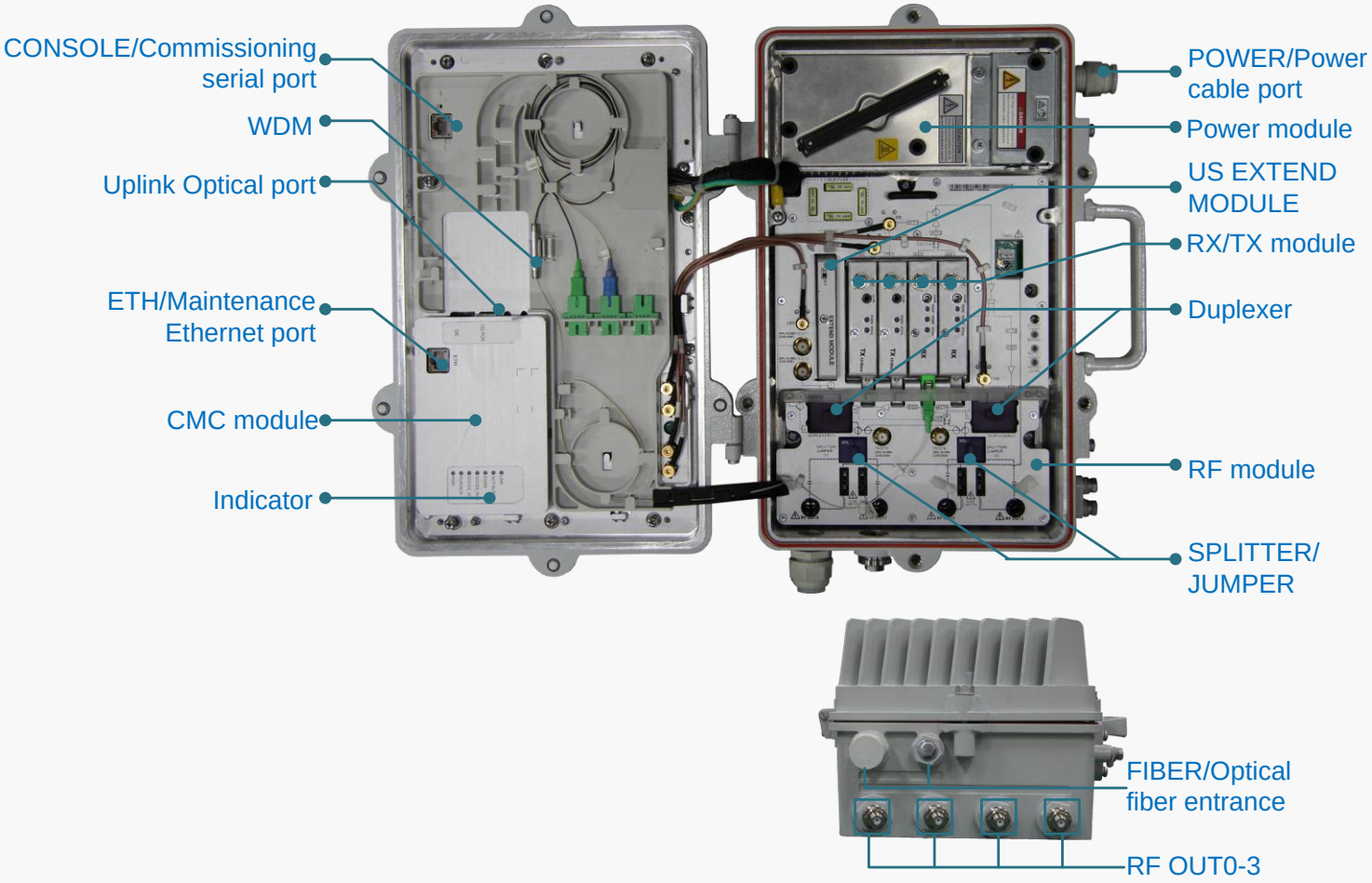
- ✓ Provides the HSI, VoD, BC, and dynamic voice services for residential users to meet multiple service operators (MSOs)' service requirements.
- ✓ Provides the L2VPN/L3VPN BSoD service for enterprise users.
- ✓ Provides the WLAN hotspot backhaul service using APs

Figure2 Typical D-CCAP networking of the MA5633



Product Appearance

Figure 3 Hardware structure



Product Specifications

Parameter		
Weight	9±2 kg	
Dimensions (height x width x depth)	365 mm x 220 mm x 175 mm	
Power Specifications		
Input AC voltage (typical)	220 V AC	60 V AC
Operating voltage	90 V AC to 300 V AC	35 V AC to 95 V AC
Input current	< 0.8 A	< 3 A
Power Consumption of the Integrated Device (Unit: W)		120 W to 175 W

Notes :
•The power consumption of the integrated device is related to the hardware model, environment temperature, operating voltage, and traffic. In the table, ranges of static power consumption, typical power consumption, and maximum power consumption are listed under operating voltage 220 V or 60 V and normal and high temperatures. The power consumption may increase if the operating voltage is lower than the rated voltage. Furthermore, Huawei would be happy to provide you detailed power consumption for a specific hardware model.
•The 220 V hardware model is recommended.

Environment Parameter			
Operating Temperature	Operating Humidity	Atmospheric Pressure	Altitude
–40°C to +55°C * The MA5633 can start at a lowest temperature of –25°C	5% RH to 95% RH	70 kP_a to 106 kP_a	< 4000 m**
*For the MA5633, the highest temperature supported at input voltage 53 V AC is 55°C, 50°C at 40-53 V, and 45°C at voltage lower than 40 V. * * The air density varies with the altitude, which affects the heat dissipation of the MA5633. Therefore, the operating temperature of the MA5633 varies with the altitude.			
Protection level	The MA5633 meets requirements of IP65 protection level for 60 V AC and IP20 for 220 V AC.		
Surge protection level	6 kV in both common and differentiated modes for the AC power port. 10 kA in common mode and 3 kA in differentiated mode for RF ports.		

Performance Parameter of the Integrated Device	Description	Notes
Maximum throughput	**DOCSIS 3.1:** ✓Downstream: 3.6G @4096 QAM ✓Upstream: 1.5G@ 2048 QAM **European DOCSIS 3.0:** ✓Downstream: 1600 Mbit/s@256QAM ✓Upstream: 300 Mbit/s@64 QAM **North American DOCSIS 3.0:** ✓Downstream: 1280 Mbit/s@256QAM ✓Upstream: 300 Mbit/s@64 QAM **BC+VoD:** 64*50 Mbit/s	1 and 2
Number of supported service flows	4000 in both downstream and upstream directions	-
Number of concurrent online CMs	1023 DOCSIS 3.0-compliant and DOCSIS 3.1-compliant CMs	-
System reliability specifications	System availability for the typical configuration: > 99.999% Mean time between failures (MTBF): about 35 years.	3

Notes:
1: The rate is obtained at the PHY layer.
2: DOCSIS 3.1: The test is performed under the conditions of 2*192 MHz OFDM channels and 2*96 MHz OFDMA channels.
DOCSIS 3.0: The test is performed under the conditions of 32 downstream channels (8 MHz/6 MHz per channel) and 10 upstream channels (6.4 MHz per channel).
3. Due to different network environments and different configurations used by devices, the preceding MTBF(35 years) of the MA5633 is only for reference. The preceding values are only for reference. For details, contact the related Huawei engineers.

Standards Compliance

CMTS

DOCSIS 2.0

DOCSIS 3.0

European DOCSIS 2.0

European DOCSIS 3.0

DOCSIS 3.1

GPON

ITU-T G.984.1

ITU-T G.984.2

ITU-T G.984.3

ITU-T G.984.4

ITU-T G.983.3

ITU-T G.983.3 Amendment 1

ITU-T G.987

XG-PON

ITU-T G.987.1

ITU-T G.987.2

ITU-T G.987.3

ITU-T G.988

GE

IEEE 802.z

IEEE 802.3

IEEE 802.3x

10G GE

IEEE 802.3ae

MPE System Standards

ETSI 300 119

Other Standards

BELLCORE TR-332/SR-332

ISTA Procedure 2A/2B

Environment Standards

ETS 300 019-1-1

ETS 300 019-1-2

ETS 300 019-1-4

ETS 300 019-2-1

ETS 300 019-2-2

ETS 300 019-2-4

Electromagnetic Compatibility Standards

CISPR 22

CISPR 24

EN 50083-2

EN 55022

EN 55024

ETSI EN 300 386

ETSI ES 201 468

Security Standards

EN 60065

EN 60728-11

IEC 60950-1

EN 60950-1

IEC 60950-22

EN 60950-22

EN 41003

EN 60825-1

EN 60825-2

IEC 60825-1

IEC 60825-2

Primary Function List

Cable Access

Channel management
Load balancing
Channel bonding
Spectrum management policy group
Upstream 2SG
Dynamic voice service creation using PacketCable

Video Service

EQAM
NGOD D6

CM Management

CM registration and management
Limitation on the number of CPEs connected to a CM
CM admission control
CM information query
Periodic statistics for CMs
CM event reporting

DOCSIS Multicast *

DOCSIS multicat authentication
DOCSIS multicast encryption
DOCSIS multicast QoS

Layer 2 Management

MAC address management
Layer 2 forwarding policy (VLAN+MAC address)

QoS

Priority processing
Traffic management
Congestion management
Access control list (ACL) policies
Traffic burst
QoS adjustment

IPv6

IPv6 ACL
DHCPv6 Option 18 or 37
IPv6 neighbor discovery (ND)

User Security

DHCP Option 82
Relay agent info option (RAIO)
MAC address anti-spoofing
MAC address anti-duplication
Source address verification (SAV)
User isolation
BPI+
X.509 authentication
Message integrity check
TFTP proxy

System Security

Destination IP address filtering (IP address access list)
DoS anti-attack
ICMP or IP address anti-attack
Destination MAC address filtering
Source route filtering
Firewall and blacklist
Setting of permitted or denied source IP address segments

O&M Security

Simple Network Management Protocol (SNMP)
Secure shell (SSH)
Operator management
Remote connection security
Serial port shutdown
Log management
Centralized management
DHCP dialup emulation

System Reliability

GPON type B protection

* Supported by V800R018C00 and later versions