DATA SHEET

V8106

## Issue History

Version	Date of Issue	Reason for Update
V1.0	11/2015	Initial release

1 Product Overview

The V8106 is a 6RU height chassis PON Optical Line Termination (OLT) supporting 96 GPON ports as well as a Layer 3 switch of supporting 8 1/10GbE ports Active Ethernet service. It terminates the traffic coming from the subscriber lines and consolidates it on one or more Gigabit Ethernet interfaces towards the metropolitan area.
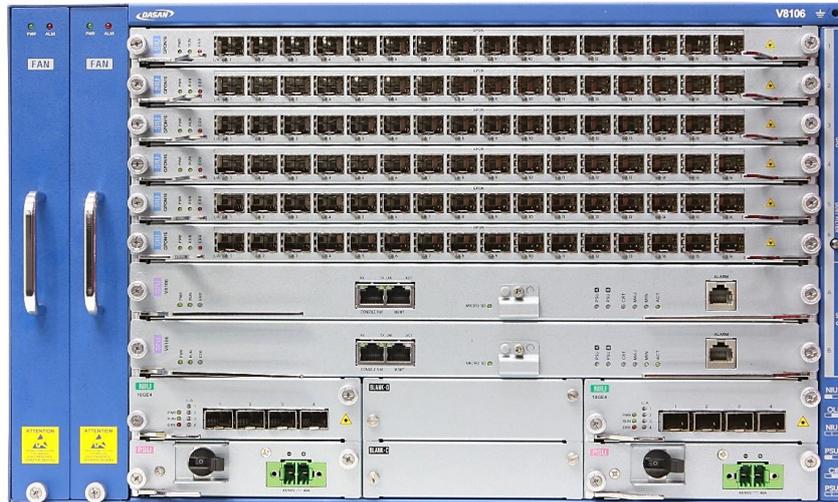
Figure 1   Front View of the V8106

The V8106 chassis has 17 slots. The 2 slots are reserved for SFU cards for control/switching, 6 slots for service interface card, 2 slots for uplink interface cards, 1 slot for OLP (Offload Processor) module, 1 slot for clock interface module, as well as 2 slots are reserved for dual power modules (PSUs), 2 slots for fan modules, 1 slot for dust filter, The V8106 is a carrier-class equipment, fully redundant, in a modular and high capacity architecture with 6 interface unit slots. These 6 slots can be used for subscriber interface units and two uplink interface units for full redundancy architecture.

It is a high-density chassis system that supports up to 12,288 residential and business sub-scribers with 96 GPON ports (1:128 split ratio). It also provides simultaneous services of GPON and Gigabit Ethernet. V8106 features flexible and high capacity PON access and 10GbE uplinks, scalability and line rate performance with a 640Gbps non-blocked switch fabric.

The V8106 guarantees equipment-level reliability with full redundancy design concept of SFU/Power/GPON ports. This is a substantial factor for aggregation switches to perform continuous traffic forwarding to core network without failure. The PON technology adds new features and functionality targeted at improving performance and interoperability, and adds support for new applications, services, and deployment scenarios.

The PON technology adds new features and functionality targeted at improving performance and interoperability, and adds support for new applications, services, and deployment scenarios. Among these changes are improvements in data rate and reach performance, diagnostics, and stand-by mode, to name a few.

The V8106 introduces a point-to-multipoint concept with the PON technology, which enables a cost-effective FTTx service. The reason why PON is considered as a cost-effective solution is its usage of a passive splitter rather than an active switching system.

The benefits of the passive splitter are as follows:

- No power supply is needed.
- No maintenance is needed.
- The splitter does not need any fiber optic transceiver. The number of fiber optic transceivers in the network is minimized.
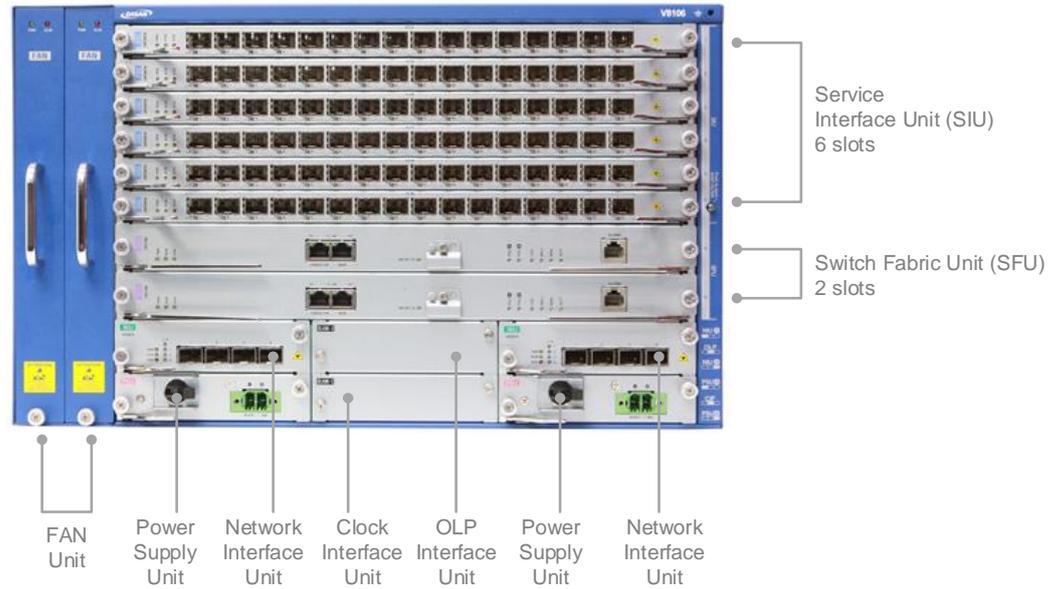
Figure 2   Front Interfaces of the V8106
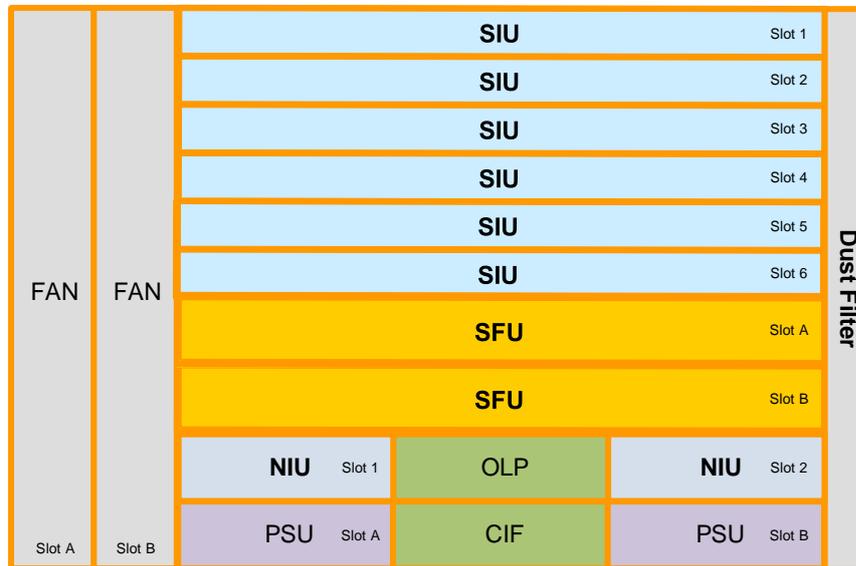
Figure 3   V8106 Slot Allocation

| Items	# of Slot	Unit name	Connector type	Description
Basic Shelf	-	-		17-slot chassis with front access
Switching card (SFU)	2 slots	SFU	-	Switch fabric unit - Switching capacity: 640Gbps per unit - MGMT/ Console
Interface Unit (IU)	6 slots	SIU_GPON16	SFP	16 GPON ports per service module
	2 slots	NIU_10GE4	SFP+	4 optical 10GE ports per uplink module
Power unit (PSU)	2 slots	PSU_DC	-	DC Power Supply Unit - DC48/60V, maximum 40A
Clock unit *Available in the future	1 slot	CIF	-	Clock Interface unit
OLP unit *Available in the future	1 slot	OLP		Offload Processor
Fan unit	2 slots	FAN	-	Fan unit
Dust Filter	1 slot	Dust Filter	-	To prevent an inflow of dust into the shelf

Table 1   System Structure of the V8106

1.1   Plug-in Units

1.1.1   Switch Fabric Unit (SFU)

The switch fabric unit (SFU) is a central switching fabric unit, which is equipped in the front mounting slot of the shelf. The SFU holds a switching fabric, system internal data interfaces to the interface units within the shelf, and also management interfaces such as console/MGMT and LEDs indicating the status of system and SFU.

Figure 4 shows the front view of the SFU
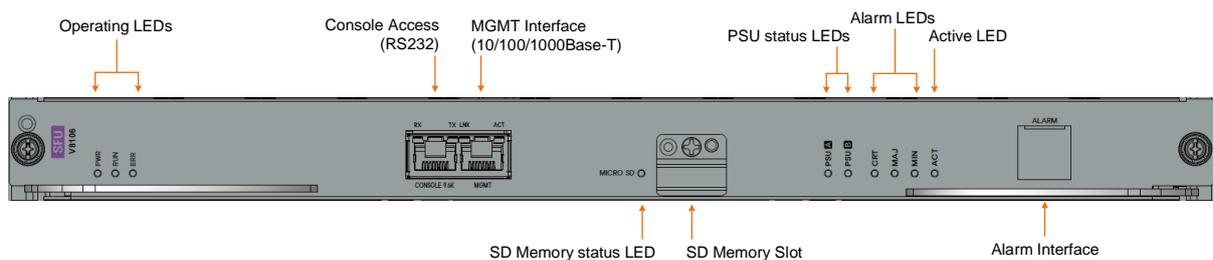
Figure 4   Front View of SFU

Item	Function	Connector Type
Operating LEDs	Indicator for system operating status including power, fault detection and booting state.	-
CONSOLE	CLI access to configure the functions for system operation	RJ45 (RS232)
MGMT	Out of band TMN-OS Interface	RJ45
SD Memory Status LED	Indicator for SD memory status	-

SD Memory Slot	Slot for SD memory card	Micro SD
PSU LEDs	Indicator for power status (PSU A/B)	-
Alarm LEDs	Indicator for alarm status (critical/major/minor)	-
Active LED	Indicator for SFU status whether active or standby.	-
Alarm	Alarm interface	RJ45

Table 2 Front Access Interfaces of SFU

Operating Status LEDs on SFU

PWR (Green)	RUN (Green)	ERR (Red)	Meaning of LED state
On	On	Off	SFU is operational and providing the service, no fault present.
		On	SFU is operational and providing the service, but there is a partial failure. It detects the abnormal operation of IBC or IPC.
	Blinking	On	Power-up diagnostics or loading in partial failure mode.
		Off	Loading after self-diagnostics has been completed without an error
Off	Off	Off	SFU is not supplied with power

Table 3 Operating Status LEDs on SFU

Console Interface LEDs

Label	Color	Status	Description
TX	Amber	Blinking	A transmit activity is present on the console.
		Off	No transmit activity is present on the console.
RX	Green	Blinking	A receive activity is present on the console.
		Off	No receive activity is present on the console.

Table 4 Console Status LEDs on SFU

MGMT Interface LEDs

Label	Color	Status	Description
LNK	Green	On	Link Up
		Off	Link Down
ACT	Amber	Blinking	A transmit or receive activity is present on the MGMT Interface.
		Off	No transmit or receive activity is present on the MGMT Interface.

Table 5 MGMT Status LEDs on SFU

Micro SD Status LED

Label	Color	Status	Description
SD Memory Status	Green	On	A transmit or receive activity is present on the SD memory Interface.
		Off	No transmit or receive activity is present on the SD memory Interface.

Table 6   Micro SD Status LED

PSU Status LED

Label	Color	Status	Description
PSU A/B	Green	On	The V8106 is supplied with PSU A or PSU B.
		Off	The V8106 is not supplied with PSU A or PSU B.
	Amber	On	PSU is not supplied with PSU A or PSU B, but PSU is installed in the slot A or PSU B.
		Off	The V8106 is not supplied with PSU A or PSU B.

Table 7   PSU Status LED

Alarm Status LEDs on SFU

| Label	Color	Status	Description
CRT	Red	On	The system detects critical error; (User configuration). - Overheating
		Off	The system has no critical error.
MAJ	Red	On	The system detects major error; (User configuration).
		Off	The system has no major error. - Over temperature
MIN	Amber	On	The system detects minor error; (User configuration).
		Off	The system has no minor error.

Table 8   Alarm Status LEDs on SFU

1.1.2   Interface Units (IUs)

The Interface Unit (IU) is used to concentrate traffic originated from access infrastructures through its Gigabit Ethernet ports and carries traffic delivery to the uplink core network.

Each IU can be equipped in up to 8 slots of V8106 basic shelf.

SIU_GPON16
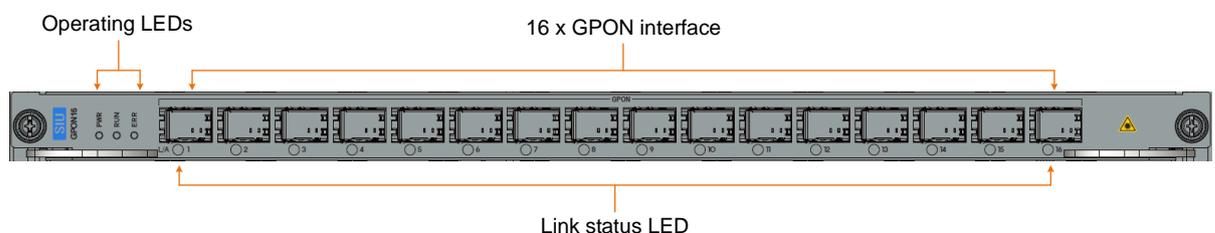
Figure 5   Front View of SIU_GPON16

Item	Function	Connector Type
Operating LEDs	Indicator for system operating status including power, fault detection and booting state.	-

Connections	16 x GPON ports	SFP
L/A LEDs	Indicator for port's link status and traffic activity.	-

Table 9   Front Access Interfaces of SIU_GPON16

Power Status LEDs on SIU_GPON16

Label	Color	Status	Description
PWR	Green	On	The IU is supplied with power source.
		Off	The IU is not supplied with power source.

Table 10   Power Status LEDs on SIU_GPON16

System Operating Status LEDs on SIU_GPON16

| RUN (Green)	ERR (Red)	Meaning of LED state
On	Off	The plug-in unit is operational and providing the service, no fault present.
	On	The plug-in unit is operational and providing the service, but partial failure present.
Blinking	On	Power-up diagnostics or loading in partial failure mode.
	Off	Loading after self-diagnostics found fault-free.
Off	Off	'locked' ('PWR'=OFF indicates power failure)

Table 11   System Operating Status LEDs on SIU_GPON16

Link Status LEDs on SIU_GPON16

Label	Color	Status	Description
L/A	Green	On	The GPON port link is up. If type_B redundancy is supported, The IU is in an active state.
		Blinking	A transmit or receive activity is present on the port.
		Off	The port link is down.
	Amber	On	If type_B redundancy is supported, The IU is in a standby state.
		Off	The port link is down.

Table 12   Link Status LEDs on SIU_GPON16

NIU_10GE4
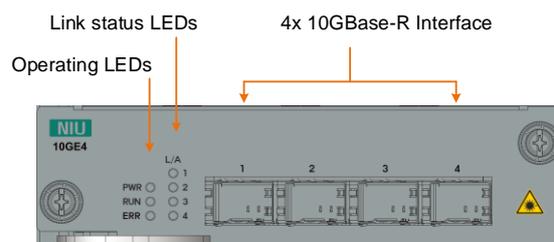
Figure 6   Front View of NIU_10GE4

Item	Function	Connector Type
Operating LEDs	Indicator for system operating status including power, fault detection and booting state.	-
L/A LEDs	Indicator for port's link status and traffic activity.	-
Connections	4 x 10GBase-R ports.	SFP+

Table 13   Front Access Interfaces of NIU_10GE4

Power Status LED on NIU_10GE4

Label	Color	Status	Description
PWR	Green	On	The NIU is supplied with power source.
		Off	The NIU is not supplied with power source.

Table 14   Power Status LED on NIU_10GE4

System Operating Status LEDs on NIU_10GE4

RUN (Green)	ERR (Red)	Meaning of LED state
ON	OFF	The plug-in unit is operational and providing the service, no fault present
ON	ON	The plug-in unit is operational and providing the service, but partial failure present.
Blinking	ON	Power-up diagnostics or loading in partial failure mode.
Blinking	OFF	Loading after self-diagnostics found fault-free.
OFF	OFF	'locked' ('PWR'=OFF indicates power failure)

Table 15   System Operating Status LEDs on NIU_10GE4

Link Status LEDs on NIU_10GE4

| Label	Color	Status	Description
L/A	Green	On	The port link is up and the Ethernet transmit rate is 10Gbps.
		Blinking	A transmit or receive activity is present on the Ethernet port at 10Gbps transmit rate.
	Amber	On	The port link is up and the Ethernet transmit rate is 1Gbps.
		Blinking	A transmit or receive activity is present on the Ethernet port at 1Gbps transmit rate.
	Off		The port link is down.

Table 16   Link Status LEDs on NIU_10GE4

1.1.3   Power Supply Unit (PSU)

The power supply unit (PSU) feeds the proper power voltage to the V8106. Dual PSUs could be mounted into front side of the shelf. You can choose proper power supply unit according to installation environment.

The power supply unit (PSU) feeds the proper power voltage to the V8106 and power connector (DC type) for main power supply is located on the front panel of the PSU. For redundant power feeding, the second PSU has to be used.

All plug-in units in the V8106 are supplied with a voltage of -48/60V regulated by the PSU.
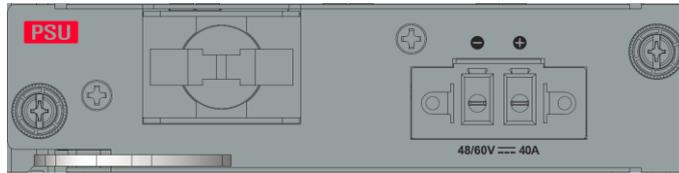
Figure 7   Front View of PSU_DC

1.1.4   FAN Unit

The V8106 is equipped with two fan units, which each contain four independent fans respectively. The fan unit will be mounted inside at the left of the shelf. You can insert fan unit into a fan slot by slowly adjusting them to fit into the slot guidance. The air inlet is at the right of the chassis. To prevent an inflow of dust into the shelf, the dust filter is mounted at the right of the shelf. Also, two fan units supply fan 1:1 redundancy.

The fan unit is connected to the backplane of the shelf and fed with a voltage of 12V. The LED indicators on the fan unit show the operating status of the fan.

The fans are controlled in accordance with the measured temperature inside the system. The temperature sensor is located in the system, and the measured values are evaluated and the operation of the fan controlled accordingly.

Figure 9   Front View of FAN Unit

Operating Status LEDs on Fan Unit

Label	Color	Status	Description
PWR	Green	On	The FAN is operating normally.
		Off	The FAN is not supplied with power source. The FAN is stopped by CLI command.
ALM	Red	On	The plug-in unit is operational and providing the service, but partial failure present.
		Off	The plug-in unit is operational and providing the service, no fault present

Table 17   Operating Status LEDs on Fan Unit

1.1.5   Dust filter

For the dust inflow filtering, V8106 basic shelf can be equipped with a 45PPI (Pixels Per Inch) dust filter. NEBS GR-078-CORE (R8-4 [671]: air-filter 80% dust resistant)

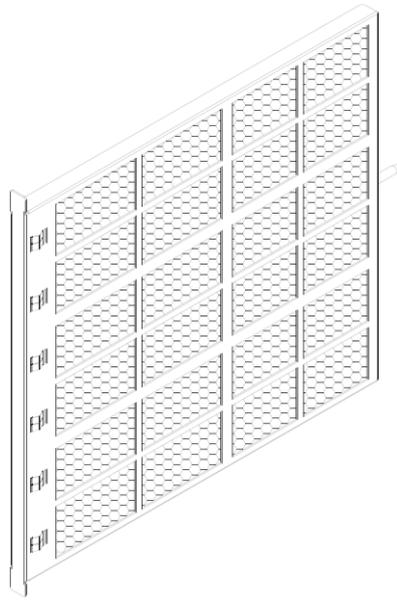The below shows the front view of the dust filter.

Figure 10   **Dust filter**

1.2 Component Options for V8106

Bases

Name	Description	Maximum quantity
V8106	Chassis for V8106 - 6-slot: Subscriber Interface Unit - 2-slot: Network Interface Unit - 2-slot: Switching Fabric Unit - 1-slot: Clock Interface Unit - 1-slot: Offload processor Unit - 2-slot: Power Supply Unit - 2-slot: Fan Module Unit - 1-slot: Dust Filter Unit	1

Table 18 Base Option

Switch Fabric Options

Name	Description	Maximum quantity
V8106_SFU	Switching Fabric Unit for V8106 - Switching capacity: 640Gbps - Flash: 136MB (Dual OS) - SDRAM: 2GB DDR3 - 1-port MGMT, 1-port Console - 1-slot SD memory	2

Table 19 Switch Fabric Options

Interface Units

Name	Description	Maximum quantity
V8106_SIU_GPON16	16-port GPON interface Unit for V8106	6
V8106_NIU_10GE4	4-port 10GBase-R interface Unit for V8106 - SFP+ optic module	2
V8106_SIU Blank Panel	Blank panel for SIU	6
V8106_NIU Blank Panel	Blank panel for NIU	2

Table 20 Interface Options

Clock Interface Options

Name	Description	Maximum quantity
V8106_CIF Blank Panel	Blank panel for Clock interface unit	1

Table 21   Clock Interface Options

Offload Processor Options

Name	Description	Maximum quantity
V8106_OLP Blank Panel	Blank panel for OLP unit	1

Table 22   Offload Processor Options

SFP Options

The following different optical SFP modules are available and can be inserted into the dedicated slots of the SIU. Each SFP module contains one port.

SFP Module	Description
SFP-GPON-OLT20	SFP GPON OLT20 - Wavelength: 1490nm/1310nm / Distance: 20 km / Mode: single-mode - Connector: SC/PC / Data rate: 2.488Gbit/s(Down), 1.25Gbit/s(Up) / - Core type: Single Core - Operating Temperature: -40 °C ~ 85 °C
SFP-GE-LX10	SFP GE LX10 - Wavelength: 1310 nm / Distance: 10 km / Mode: single-mode - Connector: LC / Data rate: 1.25Gbit/s / Core type: Dual Core - Operating Temperature: 0 °C - 70 °C
SFP-GE-LX20	SFP GE LX20 - Wavelength: 1310 nm / Distance: 20 km / Mode: single-mode - Connector: LC / Data rate: 1.25Gbit/s / Core type: Dual Core - Operating Temperature: 0 °C - 70 °C
SFP-GE-LX40	SFP GE LX40 - Wavelength: 1550 nm / Distance: 40 km / Mode: single-mode - Connector: LC / Data rate: 1.25Gbit/s / Core type: Dual Core - Operating Temperature: 0 °C - 70 °C

Table 23   SFP Modules for IU

i   Other types of SFP module can be also available upon customer request.

SFP+ Options

The following different optical SFP+ modules are available and can be inserted into the dedicated slots of the NIU. Each SFP+ module contains one port.

SFP+ Module	Description
SFPP-10GE-SR	SFP+ 10GE SR - Wavelength : 850nm / Distance : 300m / Mode : Multimode - Connector : LC / Data rate : 10.3125 Gbit/s / Core type : Dual Core - Operating Temperature : 0°C ~ 70 °C - 10GBASE-SR (10G)

SFPP-10GE-LR	SFP+ 10GE LR - Wavelength : 1310nm / Distance : 10Km / Mode :Singlemode - Connector : LC / Data rate : 10.3125 Gbit/s / Core type : Dual Core - Operating Temperature : -5°C ~ 70 °C - 10GBASE-LR (10G)
SFPP-10GE-ER	SFP+ 10GE ER - Wavelength : 1550nm / Distance : 40Km / Mode :Singlemode - Connector : LC / Data rate : 10.3125 Gbit/s / Core type : Dual Core - Operating Temperature : 0°C ~ 70 °C - 10GBASE-ER (10G)
SFPP-10GE-ZR	SFP+ 10GE ZR - Wavelength : 1310nm / Distance : 70Km / Mode :Singlemode - Connector : LC / Data rate : 10.3125 Gbit/s / Core type : Dual Core - Operating Temperature : 0°C ~ 70 °C - 10GBASE-ZR (10G)

Table 24   SFP+ Modules for IU

Power, Fan, etc. Options

Name	Description	Maximum quantity
V8106_PSU_DC	DC Power Supply Unit	2
V8106_PSU_DC_Blank	Blank Panel for PSU DC	2
V8106_FAN	Fan unit for V8106	2
V8106_FAN_Blank	Blank Panel for FAN	2
V8106_Dust Filter	Dust filter for V8106	1
V8106_Cable Duct	Cable duct for V8106	1

Table 25   Power and Fan Options

1.3   System Architecture

The V8106 is a shelf based modular multi-platform L3 switch/GPON OLT. It features highly flexible hardware configurations with multiple GPON units as well as Gigabit Ethernet units, so that user can fully customize it for GPON OLT and fiber to the premises network can be achieved.

With performance of a non-blocking switching capacity of up to 640Gbps switching capacity, the V8106 provides high speed networking environment.

For GPON, the PON layer is terminated on the interface unit and translated to Ethernet uplink to be transported through an Ethernet/IP environment. The V8106 can be equipped with up to 6 Service Interface Units (SIUs) and 2 Network Interface Units (NIUs). For improved system reliability, it adopts the design of full redundancy architecture with dual SFUs, PSUs and FANs.

When dual SFUs are used, the system decides the running mode of SFUs between active and standby. The above system architecture illustrates SFU redundancy scheme used for the V8106.

Active SFU is internally linked to all interface units (IUs). They receive traffic from IUs and update their own Forwarding Database (FDB) in the same manner so that they can keep identical data to make a forwarding decision. Active SFU can send traffic back to the IUs and receive traffic from the IUs for address learning.

The power feeding of the V8106 is provided by Power Supply Unit (PSU). Dual PSUs can be installed to guarantee constant system running. In terms of hardware architecture, the V8106 has two slots for PSUs; the active/active resilient architecture with dual redundant power supplies provides extremely high redundancy for non-stop operations.
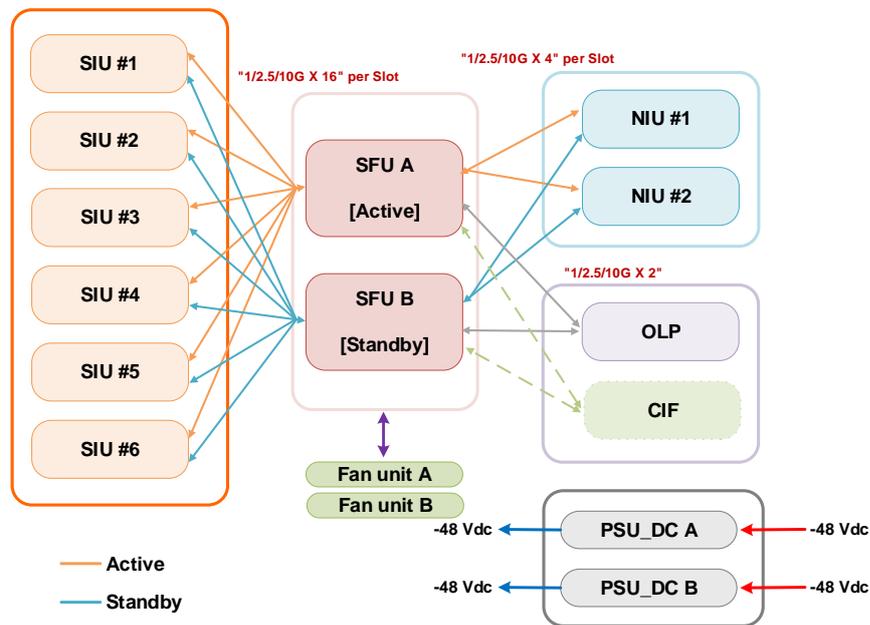

Figure 11 V8106 System Architecture

1.4 Service Scenario

A PON consists of an Optical Line Termination (OLT) located at the Central Office and a set of Optical Network Units (ONUs) or Optical Network Terminals (ONTs) located at the customer's premises. Between them is the optical distribution network (ODN) comprising of fibers and passive optical splitters or couplers. A splitter is a device that divides an optical signal into two or more signals. OLT connects the PON to the IP network, controls and manages the PON clients. ONU (ONT) connects the user specific network to PON. The ONT can be occupied by a single subscriber and also can be a gateway of the local network.
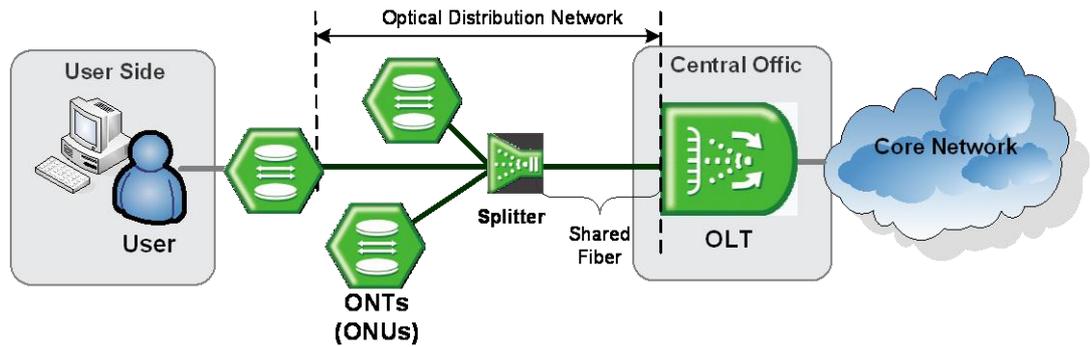
Figure 12   Optical Distribution Network by PON Architecture

The V8106 is a network element, which includes the necessary service adaptation functions to support the delivery of all types multiple services, such as Ethernet, IP telephony, and video services.

The PON service is not affected when the ONU is added into and removed from the splitter.

The V8106 GPON OLT system is one element of this end-to-end solution, however Dasan Networks is able to provide the complete next generation broadband access network and video integration solution, where full interoperability is ensured. Up to 128 termination points for GPON can be attached to an OLT via passive optical splitter.

There are different possible deployment topologies for PON networks, which differentiate from each other basically from the place the optical fiber is terminated. Depending on the subscriber type and desired topology to the network, the operator may adopt: FTTH (fiber to the Home), FTTB (fiber to the Building), FTTN (fiber to the neighborhood) or FTTC (fiber to the Curb). In case of very high bandwidth requirement per user, scenarios without splitters offering 2.5Gbps/1.25Gbps or 1.25Gbps/1.25Gbps (downstream/upstream) data rate can also be deployed by connecting only the single user on a GPON port.
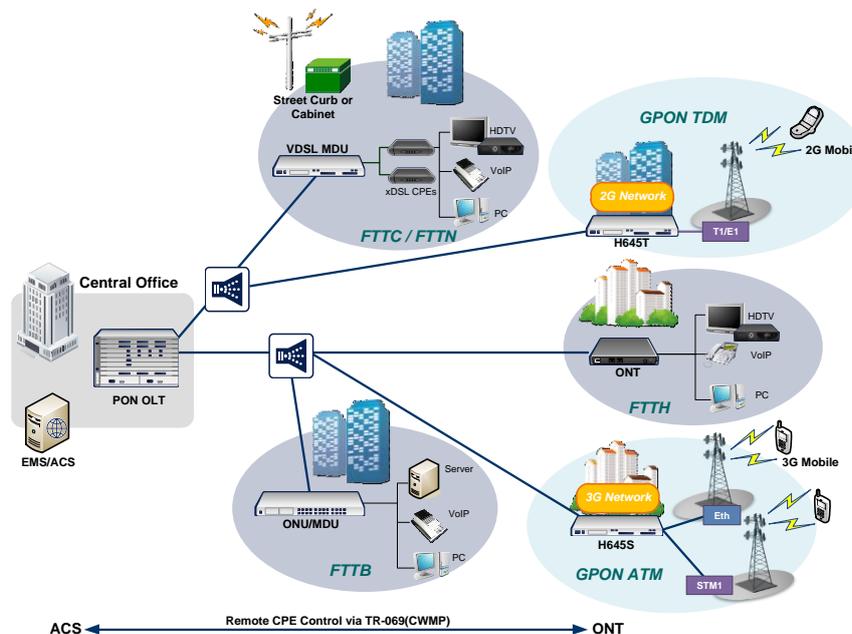
Figure 13   FTTx Service Deployments of GPON OLT

2 Product Specification

2.1 System

The V8106 supports the following system features:

- Shelf with 6/2 slots for SIUs/NIUs for a maximum of interfaces per shelf
- 640Gbps switching capacity per unit
- Service Interface units (SIU):
- 16-port of GPON interfaces (SIU_GPON16)
- Network Interface units (NIU):
- 4-port of 1/10GbE optical interfaces (NIU_10GE4)
- Dual switch fabric units (SFU)
- Redundant and load-balanced dual power supply unit (PSU)
- Hot Swappable for all plug-in units (SFU, SIU, NIU, PSU, FAN)
- LED alarm indicator
- Visible alarm indicator

2.2 Physical Specification

V8106 Base Chassis

Number of slots	17
Number of IU slots	6 for SIU, 2 for NIU
Dimensions (W x H x D)	482.6mm x 265.9mm x 280.0mm
Weight	9.1 kg
Minimum free space above shelf	100 mm
Minimum free space below shelf	100 mm
Heat transfer	
Air inlet	− at the right side of the shelf
Air outlet	− at the left side of the shelf
Operating temperature	-25 to 55 °C (-13 to 131°F)
Storage temperature	−40 to 80 °C (-40 to 176°F)
Operating humidity	0 to 90 % (non-condensing)
DC power voltage	−48/60VDC

SFU

Dimensions (W x H x D)	362.0 mm x 30.2 mm x 252.3 mm
Weight	2.0 kg
Ethernet i/f for local management	10/100/1000Base-T (RJ45)
Serial i/f, CLI	RS232

SIU_GPON16

Dimensions (W x H x D)	362.0 mm x 20.5 mm x 252.3 mm
Weight	1.3 kg
Interface Parameter	16 x GPON
Maximum Power Consumption	63.4W (per unit)

NIU_10GE4

Dimensions (W x H x D)	122.3 mm x 33.2 mm x 252.3 mm
Weight	0.6 kg
Interface Parameter	4 x 10GBase-R (SFP+)
Maximum Power Consumption	39.7W (per unit)

Power Supply Unit (PSU)

Dimensions (W x H x D)	122.3 mm x 30.2 mm x 252.3 mm

PSU_DC

DC input voltage	-48/60VDC (From -40.5V to -72VDC)
Input current	max. 40A
Output voltage	-48/60VDC

FAN

Dimensions (W x H x D)	31.6 mm x 262.1 mm x 257.9 mm
Weight	1.2 kg (with four Fans)
Number of fans	4pcs per unit (total 8pcs at two FAN units)
Maximum power consumption	42.6W (per unit)

Dust Filter

Dimensions (W x H x D)	11.4 mm x 261.8 mm x 266.0 mm
Weight	0.26 kg

2.3 SW Capabilities

Product Benefits

- SFU/PON/FAN/Power Redundancy (1:1)
- In Service Software Upgrade (ISSU)
- Non Stop Forwarding (NSF) with graceful restart
- Network synchronization support Mobile Backhaul over PON (ToD/1PPS, SyncE) using Clock Interface Unit (*future release)

GPON

- Support ITU-T G.984.4 ONT Management & Control Interface (OMCI)
- Remote ONT/ONU management
- Automatic ONT ranging
- GPON OLT Class B+ compliant with ITU-T G.984.2
- GPON OLT Class C+ compliant with ITU-T G.984.2
- Full-duplex operation
- 2.488Gbps downstream and 1.244Gbps upstream applications
- 2.488Gbps continuous-mode transmitter(1.49um-DFB) with automatic output power control

- BER: under 10^{-10}
- Receiving Wavelength: 1260 ~ 1360nm (Typ: 1310nm)
- Input sensitivity: Max -28dBm (Measured with a PRBS 2^{23}-1 pattern)
- Input Saturation Power(Overload): -8dBm (min)
- Transmitter wavelength: 1480 ~ 1500nm (Typ: 1490nm)
- Mean launched power: +1.5 ~ +4.5dBm (End of life)
- Spectral width (-20dB): 1nm (max)
- Extinction Ratio: 8.2dB (min)
- Support DDM (Digital Diagnostics Monitoring)
- Transmission distance: 20km with single-mode fiber
- Laser type: laser diode class 1 (defined in IEC 60825-1)

Layer 2

- Standard Ethernet Bridging
- 32K(Max. 288K)s MAC entries
- 4k active VLANs for 802.1q tagged frame
- Port/Subnet/Protocol-based VLAN
- VLAN stacking/translation
- Spanning tree (STP, RSTP, MSTP)
- Link aggregation
- Jumbo frame 9k

Layer 3

- 16k/8k routing entries for IPv4/IPv6
- Static routing
- RIPv1/v2
- OSPFv2
- BGPv4
- Virtual Router Redundancy Protocol (VRRP)

Multicast

- IGMPv1/v2/v3
- 4k L2 multicast entries
- 4k L3 multicast entries
- IGMP snooping
- IGMP proxy
- IGMP static join
- Multicast VLAN Registration (MVR)

QoS

- Traffic scheduling (SP, WRR, DWRR)
- 8 queues support per port
- Port rate limit with the ingress/egress shaping
- Conditional rate limiting
- Queue mapping according to ingress/egress port, MAC, 802.1q, 802.1p, ToS/DSCP, IP SA/DA, TCP/UDP
- Access control lists based on port, MAC address, Ether type, IP SA/DA, IP multicast

address, TCP/UDP

Security

- 802.1x MAC/port based authentication
- Storm control for broadcast, multicast and unknown unicast packets
- DoS protection
- Outband management
- IP source guard
- Secure Shell (SSH)

Management

- Serial/Telnet (CLI)
- SNMPv1/v2/v3
- DHCP server, client, relay with option 82
- Single IP management
- RMON
- Syslog
- Link layer discovery protocol (LLDP)

3 Product Features and Benefits

3.1 GPON Functionality

The Gigabit Passive Optical Network (GPON) is a high-speed optical access method that has been defined in ITU-T Recommendation G.984.x GPON carries a two-fold promise of both higher bit rates and higher efficiency when carrying multiple services over the PON.

The V8106 GPON system provides additional network services at no extra cost, while EPON systems require additional equipment for TDM. It also offers more available bandwidth for the entire range of applications. The V8106 introduces a point-to-multipoint concept the several GPON mechanisms, which enables efficient and flexible FTTx services.

ONT Management over OMCI

OMCI (ONT Management and Control Interface) protocol defined in ITU-T G.984.4, specifies the format of interactive messages, and the mechanism of information exchange between the OLT and ONT. Based on the OMCI protocol, GPON terminal management enables an OAM service to provide a standard way to discover ONT capabilities, and to manage and control them. OMCI operates on a dedicated bidirectional Port-ID between the management station and the ONT. In addition, OMCI subdivides the ONT service module, and defines a series of management entities used for service description.

The V8106 manages and configures various GPON terminals such as ONTs, MDUs or ONUs through the OMCI protocol. It provides MIB access that replicates the OLT information database and connected ONTs. The management information between OLT and connected ONTs flow is exchanged via an OMCI channel. The ONTs send upstream a PLOAM message with the serial number of the ONT. Both PLOAM and OMCI channel provide full control of the optical network and the management of the customers' ONTs.

User Data Encapsulation

GPON Encapsulation Method (GEM) is a scheme of encapsulating user frame data for transport of the GPON network. Although any type of data can be encapsulated, actual types depend on service situation. The GEM protocol is used to provide delineation of the user data frames inside the GPON partitions and the port identification for multiplexing. It can also permit fragmentation of frames over partition boundaries.

PON Aware QoS

QoS schemes in a GPON network. ONT plays a key role in ensuring QoS for all traffic because it is the ingress and egress point for all network traffic. The ONT can have different types of service ports, including one or more analog voice ports and one or more Ethernet ports. It can also perform service classification based on the physical port and map it to 802.1p p-bits. For example, traffic flows from voice ports can be assigned the highest priority.

As part of this service differentiation, the ONT associates different traffic flows with a specific GPON Encapsulation Method (GEM) Port ID. Each physical port in a given ONT can have a maximum of eight GEM-ports. 802.1p allows a maximum of eight classes of service (CoS) based on p-bit marking. The GEM-Port IDs and the p-bit marking together define a specific service. Traffic from each physical port can be queued up to eight separate queues after traffic flow classification. Traffic scheduling is done to serve these queues based on their priority levels.

In the upstream direction, the traffic is classified at the ONT and then mapped into one out off 4 T-CONT types supported. All the traffic flows from the ONTs are identified by their GEM-Port IDs.

The GPON upstream QoS provides the following advantages:
♦ Bandwidth grant is out-of-band (No effect on revenue BW)
♦ SLA based on T-CONT
    - No BW effect with having T-CONT per service per ONT
♦ Supports fragmented payloads (good for delay and efficiency)

Dynamic Bandwidth Allocation (DBA)

The V8106 supports both NSR and SR DBA (G.984.3), piggy-back DBRu report mode 0, including concurrent support for DBR mode 0 and "idle GEM" mode.

Through Dynamic Bandwidth Allocation (DBA), a PON can be oversubscribed for upstream traffic. In GPON, DBA algorithms are based on two kinds of methods: Non Status Reporting (NSR) and Status Reporting (SR).

♦ Status reporting DBA
The OLT requests information about the status of each MDU (or ONU) when applying status reporting. SR DBA is based on MDU (or ONU) reports via the Dynamic Bandwidth Report upstream (DBRu) field.

The V8106 uses the piggy-back reporting mode in the DBRu:
• Allows MDUs to continuously update the traffic status of a specific T-CONT
• Consists of a message that specifies the amount of data waiting in the T-CONT
  buffer corresponding to the Alloc-ID that triggered the DBRu transmission
• Mode 0: single field reports that use the number of ATM cells or GEM blocks waiting in the T-CONT buffer as its basic unit

♦ Non status reporting DBA
When applying non status reporting, the OLT determines the bandwidth demands indirectly. Each MDU sends Idle GEM frames to fill its whole time slot, if there is not enough user data to be transmitted.

3.2   SIU_GPON16 Functionality

OLT Controller Board

The SIU_GPON16 contains the OLT controller unit that consists of integrated GPON device (DBA engine, embedded CPU, DDR controller, etc). This unit manages overall GPON process and controls the SIU_GPON16 on-board components.

The GPON OLT controller consists of the following components:
• Integrated GPON control plane
• Optics diagnostics and management
• In-band management
• Two independent Inter-Integrated Circuit (I2C)
• Embedded CPU subsystem switch provides two independent I2C, SPI and UARTs.
• Clock Unit
• DDR II Controller

- DBA engine for fairness algorithm bandwidth allocation per T-CONT
- CBA MAP engine for static T-CONTs bandwidth assignments
- ITU-T G.984 compliant MAC

The GPON OLT controller board provides the following features:
- Enable low-cost, high density OLTs
- Low power consumption
- PON aware QoS traffic management features
- Flexible Ethernet/GPON interworking
- FEC for upstream and downstream
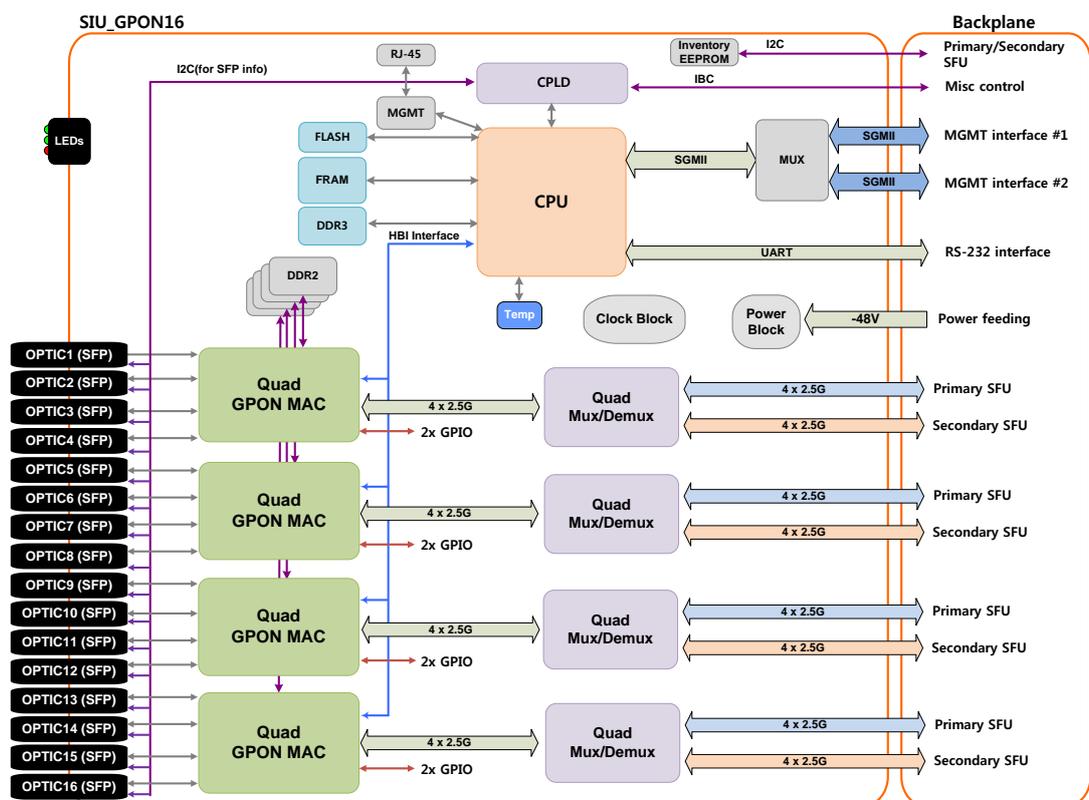- Downstream AES encryption and key exchange process

Figure 14 SIU_GPON16 Block Diagram

3.3 NIU_10GE4 Functionality

The NIU_10GE4 contains four 10GbE Base-R SFP+ (10 Gigabit Small Form Factor Pluggable) ports. Each 10GbE port can be equipped with different SFP+ module. Table 24 shows the available SFP+ module types.

The NIU_10GE4 consists of the following components:
- 4 x 10GbE interface
- Layer 2 switching fabric
- 10G PHY
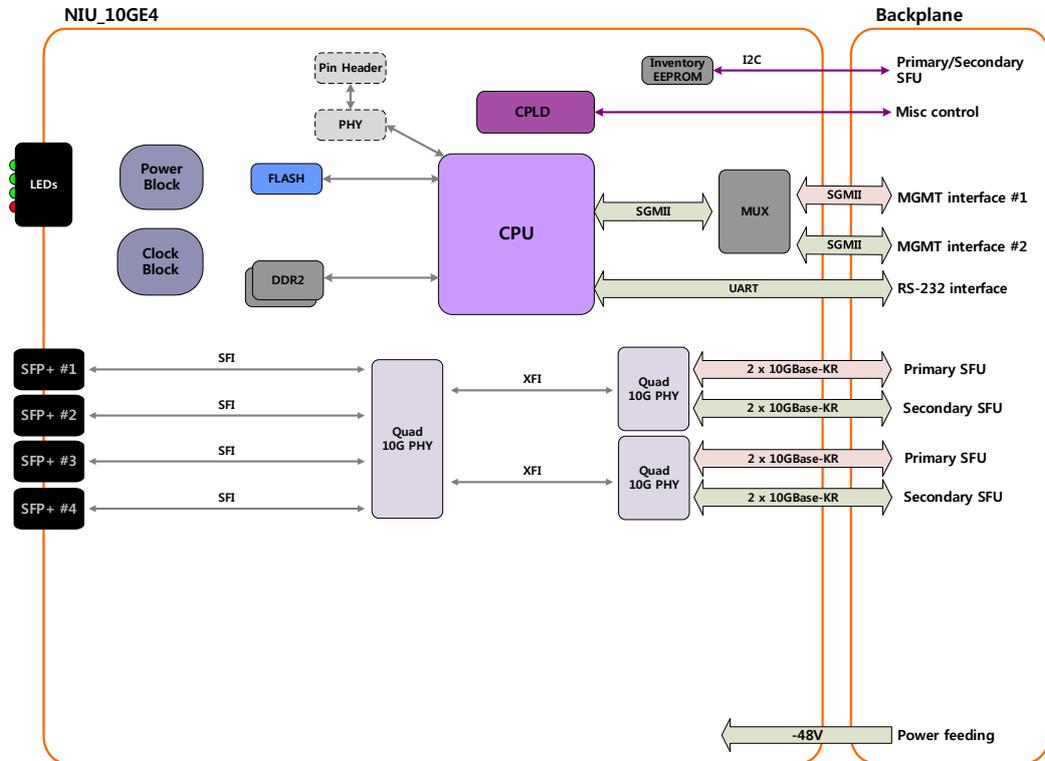- SerDes interface
- I²C control

- LED control
- Power logic

Figure 15   NIU_10GE4 Block Diagram