No.	Unit	Description	Remark
1	DOU	**DOU** Convert TX RF signals into optical signals; Convert RX optical signals into RF signals; Provide up to four optical ports per DOU	Max 2ea
2	2W	**2Way Divider** Divide TX RF signals into two; Combine two RX RF signals into one	
3	DU	**Distribution Unit** Distribute power and signals to DOU	
4	Shelf	19" rack, 1U	
5	Accessories	15PIN DSUB, Male to female 1pcs RF Coaxial Cable Assembly 2pcs	

4.2.4   Function by unit

1) Donor Optic Unit (DOU)

DOU makes electronic-optical conversion of TX signals and makes optical-electronic conversion of RX signals.

With an optic splitter in it, this unit divides optical signals from Laser Diode into four and then distributes them to each optical port. With a total of four Photo Diodes in RX, DOU makes optical-electronic conversion of signals received from each optical port. In addition, the unit is equipped with ATT for optical compensation made in case of optical cable loss.

With internal WDM, it uses only one optical cable to be connected with ROU.
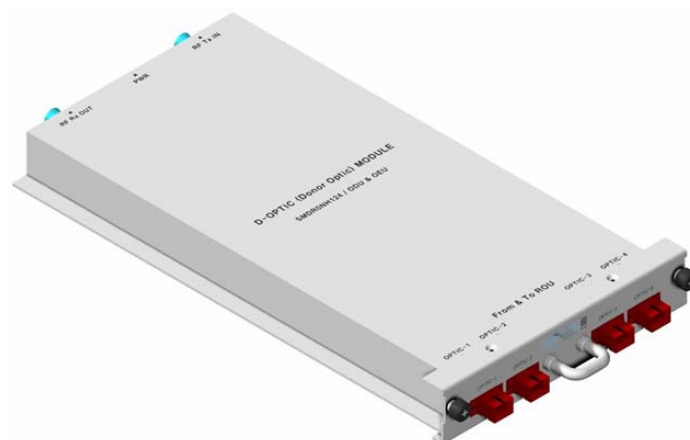

Figure 4.11 – MDBU Outer Look

2) 2Way Divider (2W)

2W is equipped with two 2-way splitters in a one-module form and the splitters work for TX/RX signals, respectively.

Designed in broadband type, the divider combines and divides 2GHz or higher of signals from FSK modem signals.
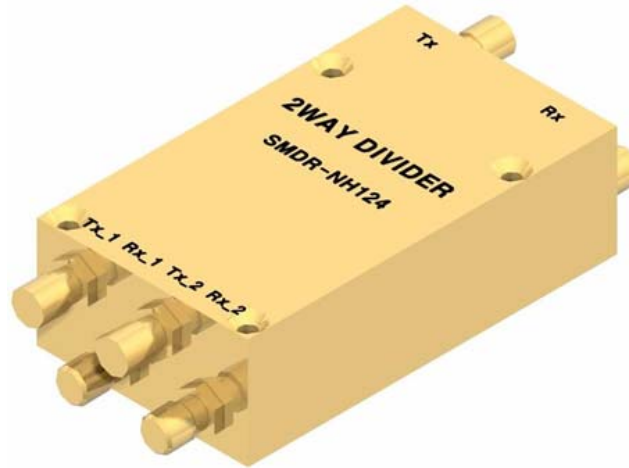

Figure 4.12 – 2Way Divider Outer Look

4.2.5   Front/rear panels of MHU

1) Front panel

Figure 4.13 – BIU front panel Outer Look

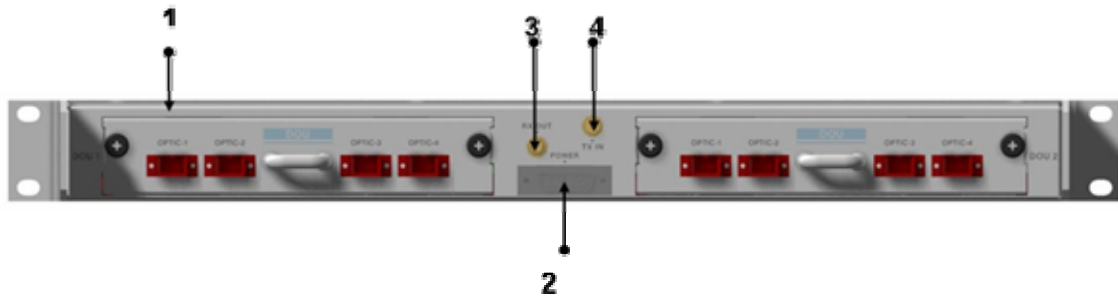| Item	Description
1,2	LED indicator to check DOU module state to see if it is abnormal

2) Rear panel

Figure 4.14 – Rear panel Outer Look

| Item	Description
1. Optic Port	SC/APC optical connector terminal; use one optical cable per ROU.
2. DC I/O Port	Terminal to deliver power and state values
3. RX RF Port	RX RF signal interface terminal
4. TX RF Port	TX RF signal interface terminal

## 4.2.6   Interface with BIU

Figure 4.15 – Interface between MHU and ODU

On the top of BIU, up to four ODUs can be stacked.

In this case, it is recommended to stack the units at least 1U of an interval between BIU, for heat from BIU may climb up to ODU, which may cause flame.
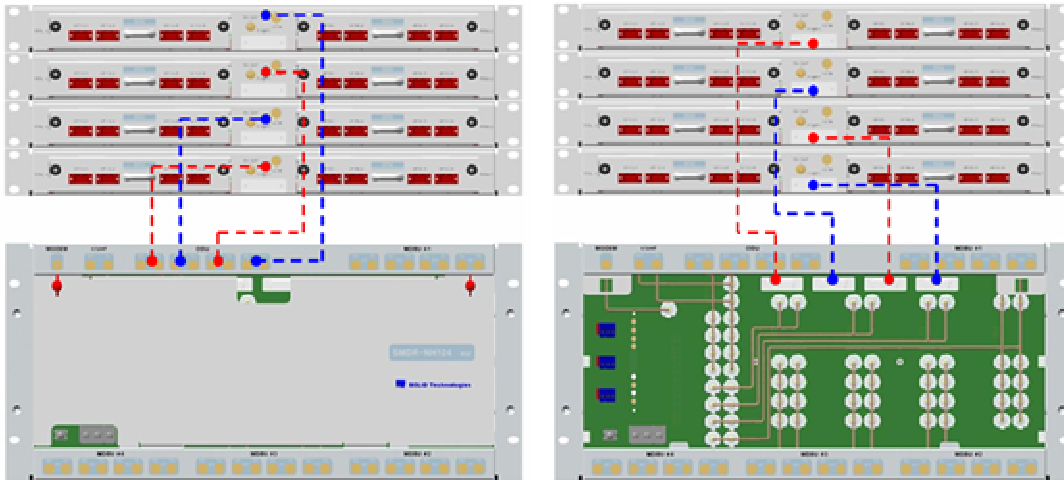
As seen in the figure below, connect the coaxial cable for TX and another coaxial cable for RX with corresponding ports at the rear of BIU. For power supply and communication, connect 15Pin D-Sub Connector cable with a corresponding port.
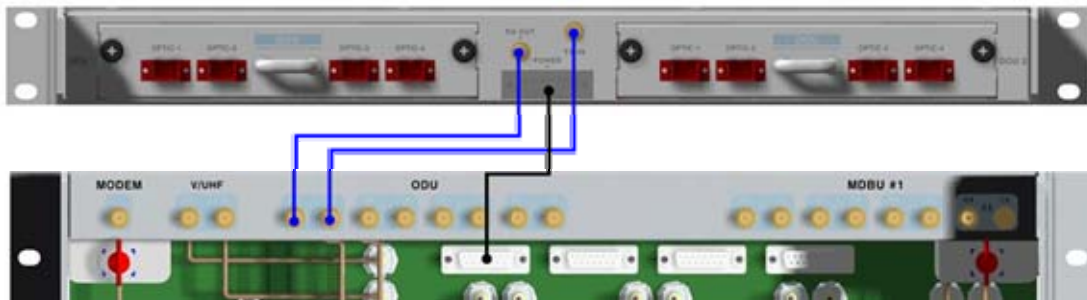
4.3 OEU (Optic Expansion Unit)

OEU is mainly used to remotely deliver signals for Campus clusters. At the upper part, this unit combines with ODU and receives TX optical signals to convert them into RF signals. Then, it regenerates the signals to secure S/N feature and converts them into optical signals. The signals are sent to ROU through optical cables. When it receives RX optical signals from ROU, the unit converts them into RF signals to regenerate the signals and then converts them into optical signals to send them to ODU.

In OEU, one shelf can be equipped with up to two DOUs. The DOU is the same as the module used for ODU. Up to two OEUs can be connected with ODU.
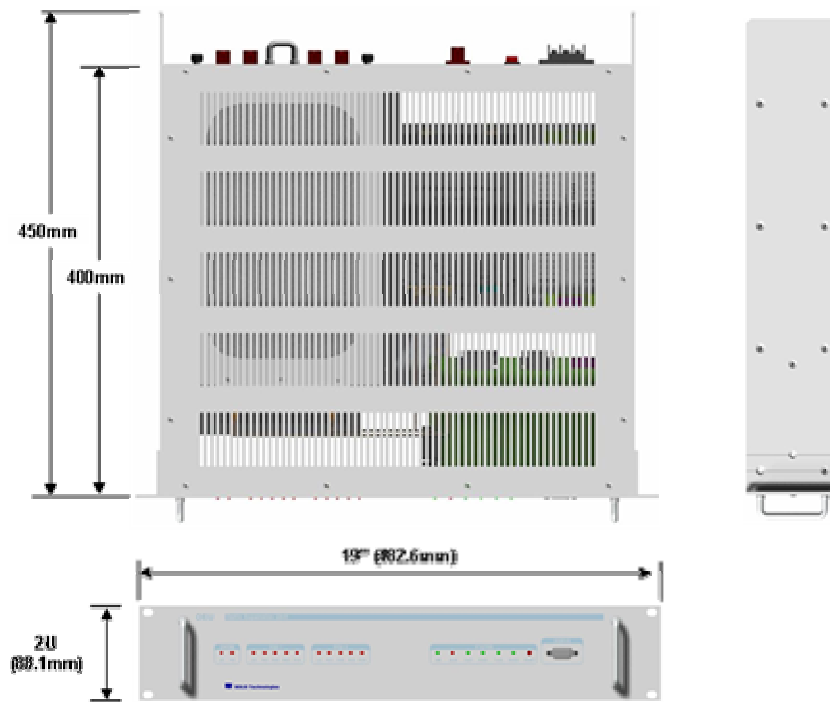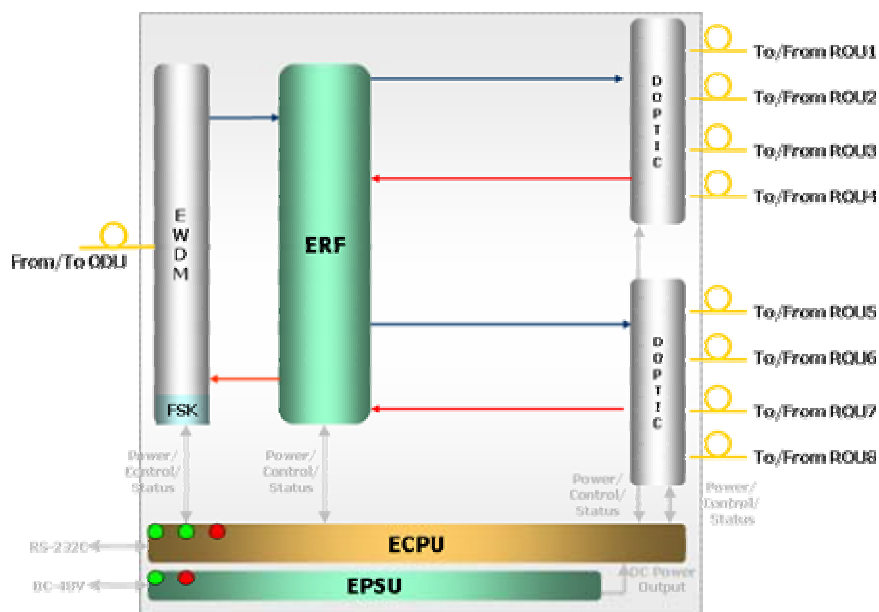
Figure 4.16 – OEU Outer Look

4.3.1 Specifications of OEU

Item	Spec.	Remark
Size	482.6(19") x 88.1(2U) x 450	mm
Weight	9.3 Kg	Full Load
Power consumption	48 W	

4.3.2 Block Diagram of OEU

4.3.3　OEU parts
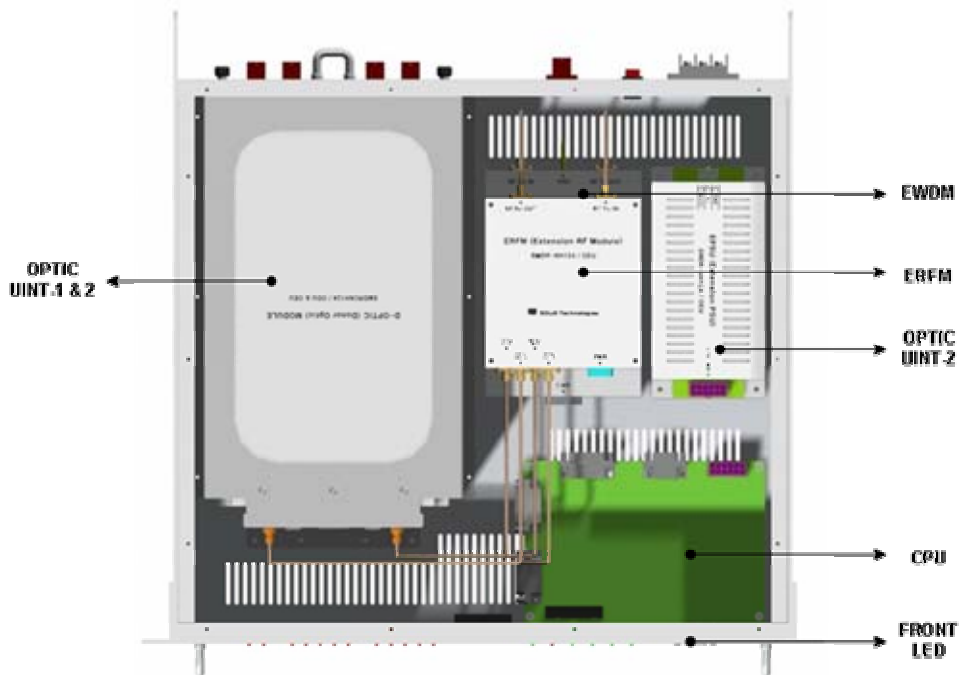
Figure 4.17 – OEU Inner Look

No.	Unit	Description	Remark
1	DOU	**Donor Optic Unit** Convert TX RF signals into optical signals; Convert RX optical signals into RF signals; Provide up to four optical ports per DOU	Max 2ea
2	EWDM	**Expansion Wavelength Division Multiplexer** Convert TX optical signals into RF signals; Convert RX RF signals into optical signals; Compensate for optical cable loss with ODU	
3	ECPU	**Expansion Central Processor Unit** Control and monitoring system status Control and monitoring with RS232 Relay state values of ROU to BIU	
4	EPSU	**Expansion Power Supply Unit** Input power: DC -48V, Output power: 9V, 6V	

| 5 | ERFM | **Expansion Radio Frequency Module**
Regenerate TX signals and transmit FSK modem signals;
Regenerate RX signals and receive FSK modem signals | |
| 6 | Shelf | 19" rack, 2U | |

4.3.4 Function by unit

1) Donor Optic Unit (DOU)

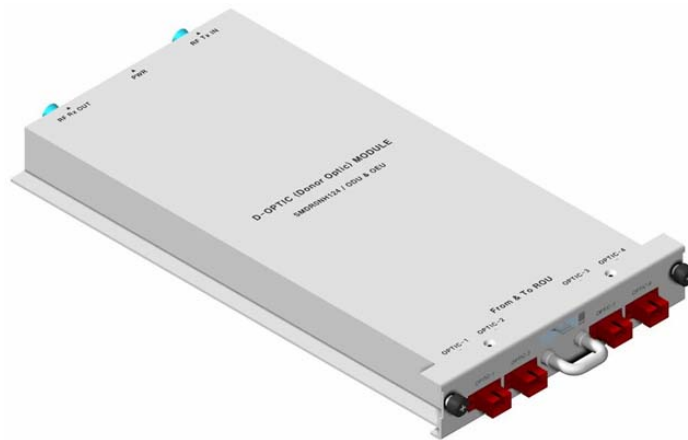DOU is the same as the module used for ODU.

Figure 4.18 – MDBU Outer Look

2) Expansion Wavelength Division Multiplexer(EWDM)

EWDM module makes optical-electronic conversion of TX signals and makes electronic-optical conversion of RX signals. With an FSK modem in it, this multiplexer communicates with BIU. It also has ATT for optical compensation to compensate for optical cable loss between ODUs. Furthermore, it has internal WDM, and so, it needs only one optical cable to work with ROU.
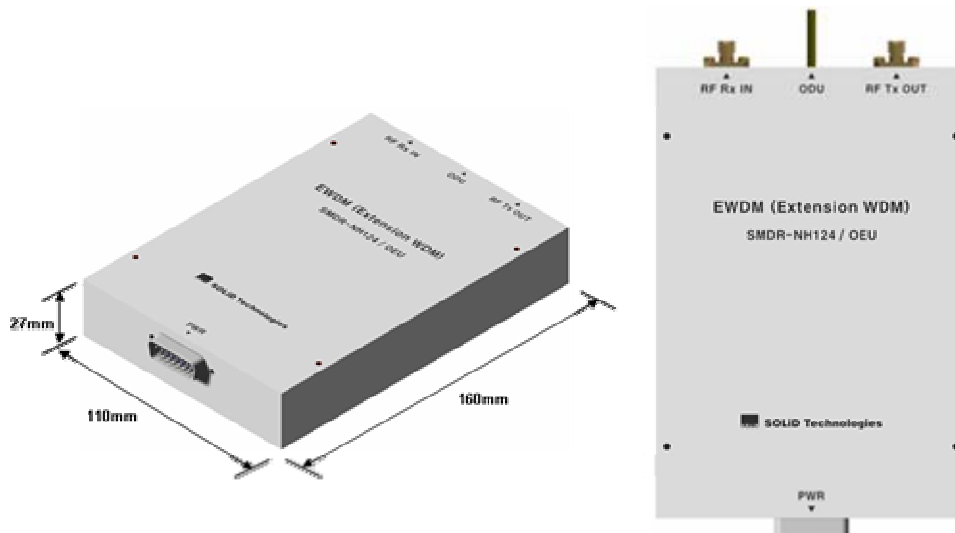
Figure 4.19 – EWDM Outer Look

3) Expansion Central Processor Unit(ECPU)

ECPU can inquire and control state of modules to be installed into OEU. This unit communicates with upper BIU while communicating with lower ROU. It also acts as communication bridge between BIU and ROU.

In addition, the unit has RS-232C port for serial communication, which enables inquiry and control of devices thorugh PC. At the front panel, communication LED indicator indicates communication state with upper BIU and lower ROU. It also has ALM LED indicator to show if a device gets faulty.
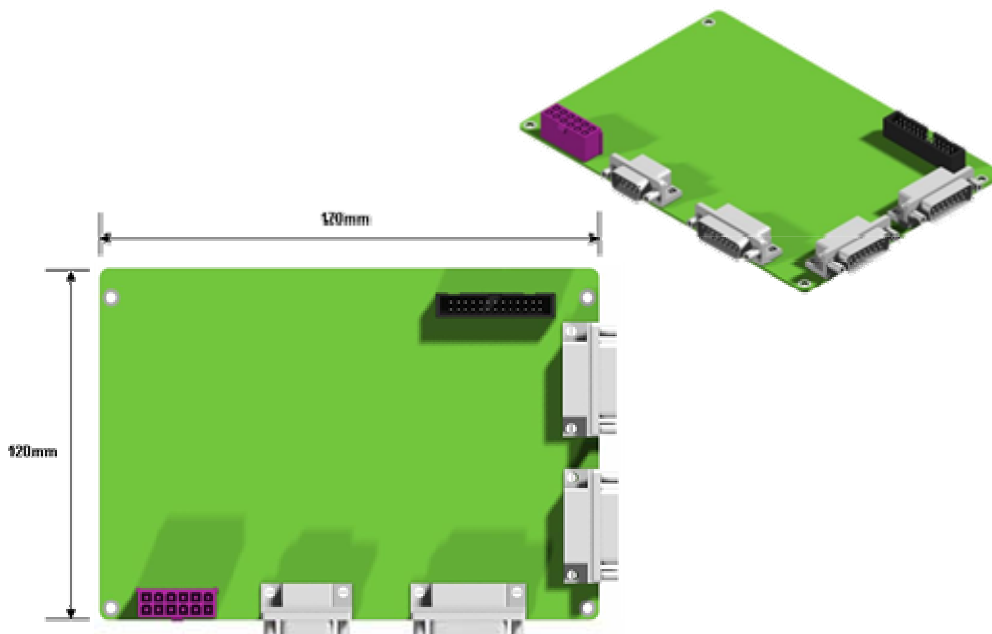

Figure 4.20 – ECPU Outer Look

4) Expansion Radio Frequency Module(ERFM)

ERFM reconstructs Signal to Noise degraded by optical modules. With an internal FSK modem, this module communicates with ROU.
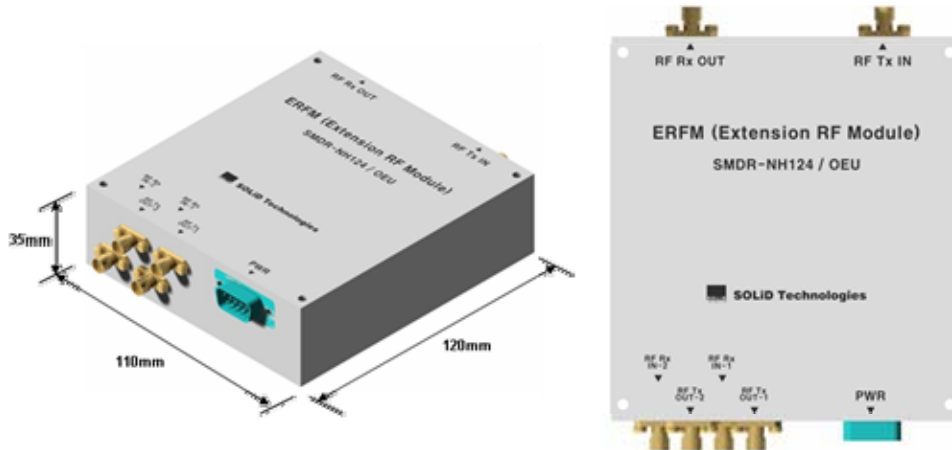

Figure 4.21 – ERFM Outer Look

5) Expansion Power Supply Unit(EPSU)

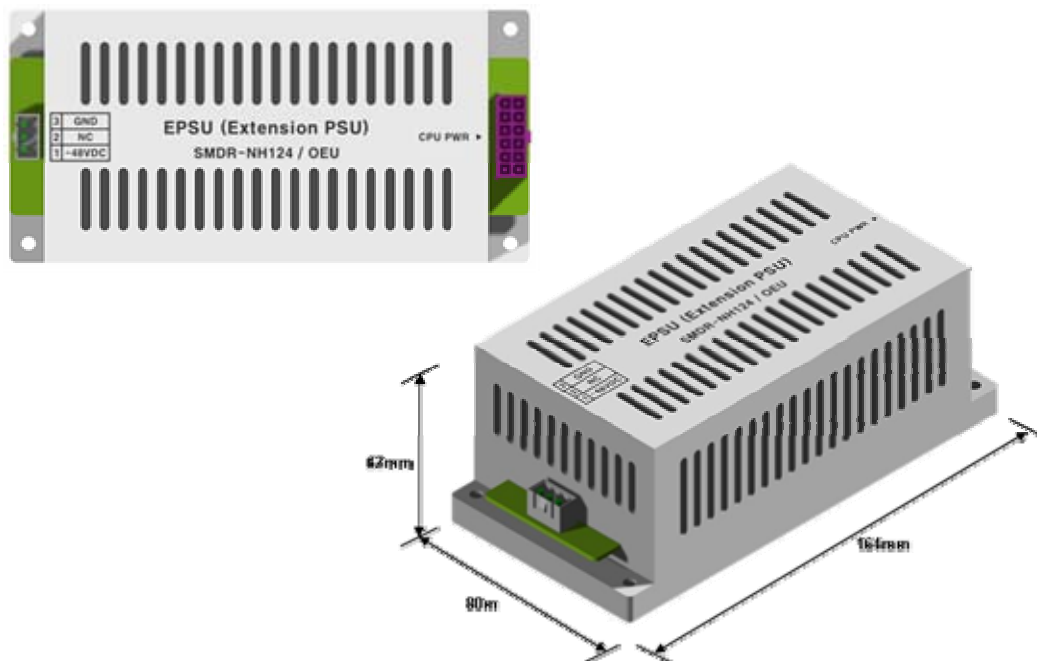As DC/DC Converter, EPSU receives -48V of input and provides +9V and +6V of DC power required for OEU.

Figure 4.22 – ERFM Outer Look

4.3.5   Front/rear panels of OEU

1) Front panel

Figure 4.23 – OEU front panel Outer Look

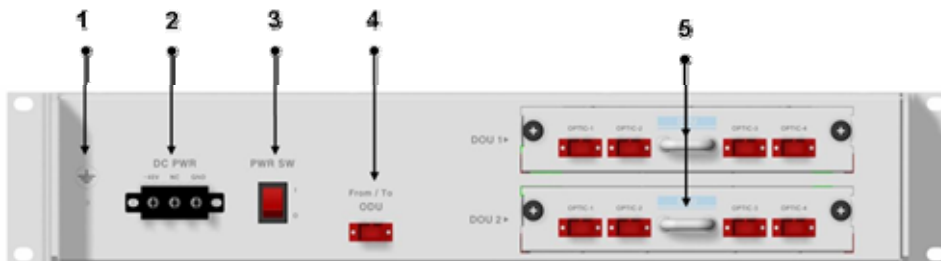| Item	Description
1.EWDM LED	LED indicator to check EWDM state to see if it is abnormal
2.DOU LED	LED indicator to check DOU module state to see if it is abnormal
3.System LED and Reset	Communication state with devices, alarm status of the system and reset switch
4. NMS(RS-232C port)	RS-232C port for communication and diagnosis of devices through PC/laptop. This equipment is indoor use and all the communication wirings are limited to inside of the building

2) Rear panel

Figure 4.24 – Rear panel Outer Look

Item	Description
1. GND Port	Terminal for system ground
2. DC Input Port	Input terminal for DC -48V
3.power switch	Power ON/OFF switch
4. To/From ODU Optic Port	SC/APC optical connector terminal
5. To/From ROU Optic Port	SC/APC optical connector terminal; use one optical cable per ROU.

4.4 ROU (Remote Optic Unit)

ROU receives TX optical signals from ODU or OEU and converts them into RF signals. The converted RF signals are amplified through High Power Amp in a corresponding RDU, combined with Multiplexer module and then radiated to the antenna port.

When receiving RX signals through the antenna port, this unit filters out-of-band signals in a corresponding RDU and sends the results to Remote Optic Module to make electronic-optical conversion of them. After converted, the signals are sent to a upper device of ODU or OEU. ROU can be equipped with up to three RDUs (Remote Drive Unit) and the module is composed of maximal Dual Band.
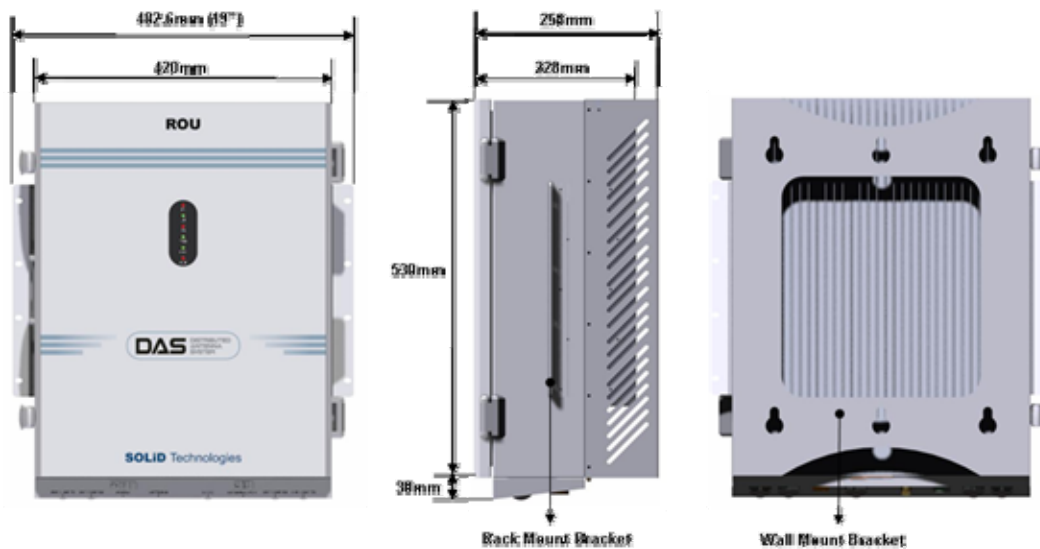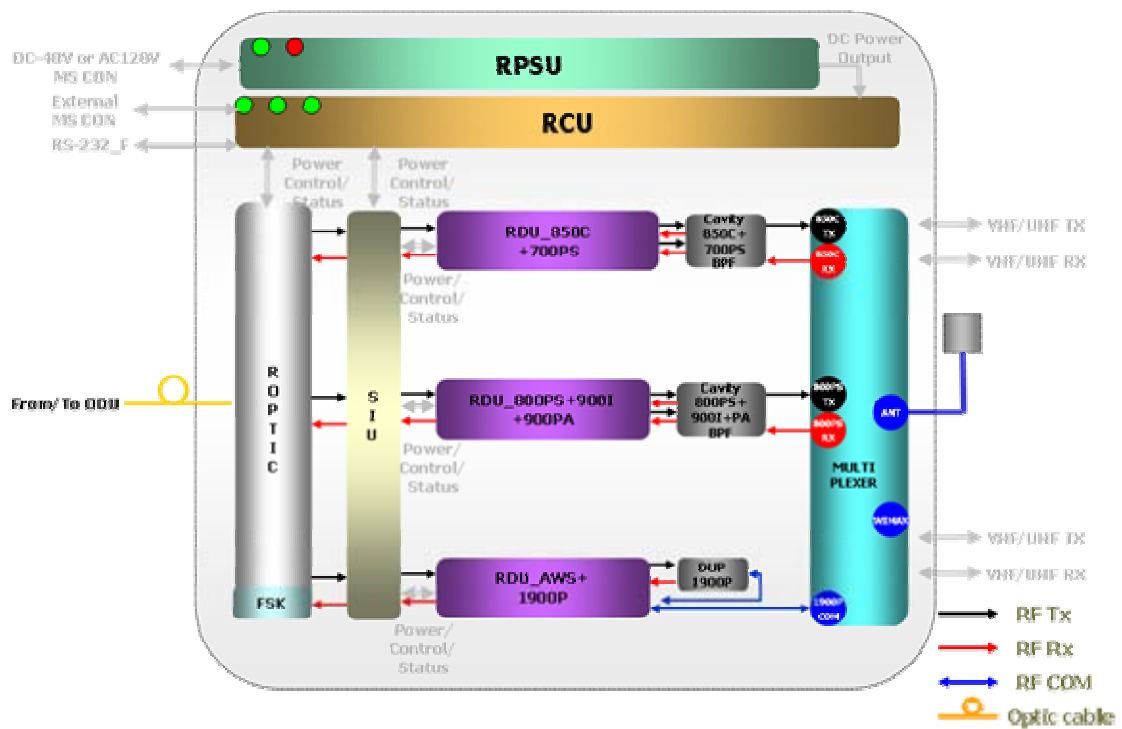

Figure 4.25 – ROU Outer Look

ROU is designed in a cabinet, and provides the following functions and features.

4.4.1 Specifications of ROU

Item	Spec.	Remark
Size(mm)	482.6(19") x 258 x560,	Including Bracket
Weight	35.45 Kg	Full Load
Power consumption	265 W	

4.4.2   Block Diagram of ROU

4.4.3   ROU parts
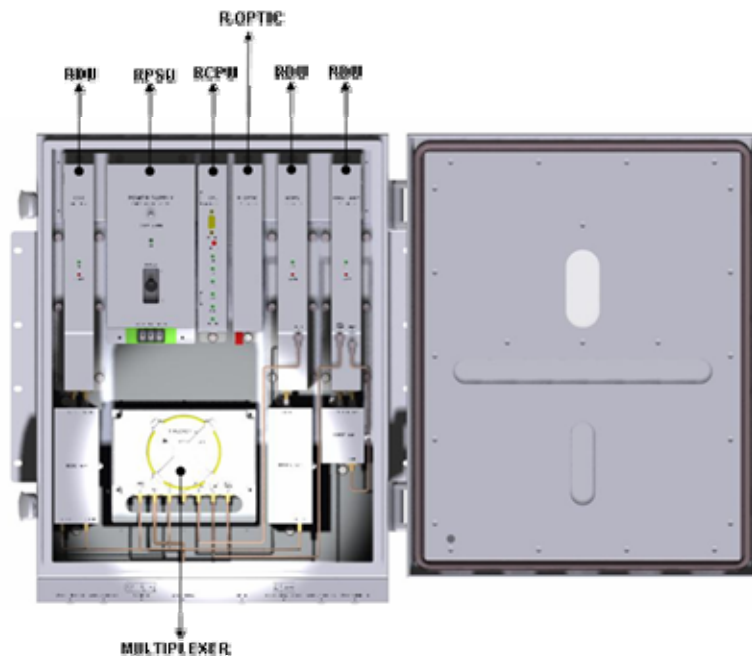
Figure 4.26 – ROU Inner Look

| No.	Unit	Description	Remark
1	RDU+BPF	**Remote Drive Unit** Filter and high amplify TX signals; Filter and amplify RX signals; Remove other signals through BPF	
2	RPSU	**Remote Power Supply Unit** Input power: DC -48V, Output power: 27V,9V, 6V For 120V input of AC/DC; For -48V input of DC/DC	
3	R-OPTIC	**Remote Optic** Make RF conversion of TX optical signals; Convert RX RF signals into optical signals; Compensates optical loss Communicates with BIU/OEU though the FSK modem	
4	RCPU	**Remote Central Processor Unit** Controls signal of each unit Monitors BIU/ODU/OEU status through FSK modem communication	
5	Multiplexer	**Multiplexer** Combine TX signals from 3 RDUs; Distribute RX signals to 3 RDUs; Enable you to use a single antenna port	
6	Enclosure	Enclosure to satisfy NEMA4; Enable Wall/Rack Mount; Check if the system is normal, through the front panel LED	
7	SIU	**System Interface Unit** Distribute power and signals of each module	

4.4.4 Function by unit

1) Remote Drive Unit (RDU)

When receiving TX signals from each band through Remote Optic, RDU filters the signals and amplifies them with High Power Ampifier. The unit also filters RX signals given through Multiplexer and amplifies them to send the signals to Remote Optic.

In the unit, there is ATT to adjust gain. RDU devices are varied for each frequency band, including the following:

| No	Unit naming	Description	BPF	
			TX	RX
1	RDU 800PS	Single,	External BPF	Internal BPF
2	RDU 850C	Single,	External BPF	External BPF
3	RDU 1900P+AWS-1	Dual,	External BPF(1900P) Internal BPF(AWS-1)	External BPF(1900P) Internal BPF(AWS-1)
4	RDU 800PS+900I+PA	Dual,	External BPF(800PS) Internal BPF(900I+PA)	Internal BPF(800PS) External BPF(900I+PA)
5	RDU 850C+700PS	Dual,	External BPF(850C) Internal BPF(700PS)	External BPF(850C) Internal BPF(700PS)
6	TBD			

800PS

800PS+900I+PA
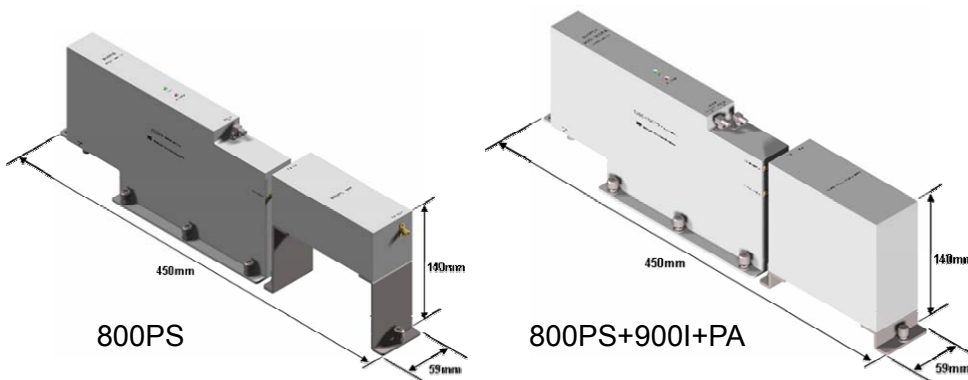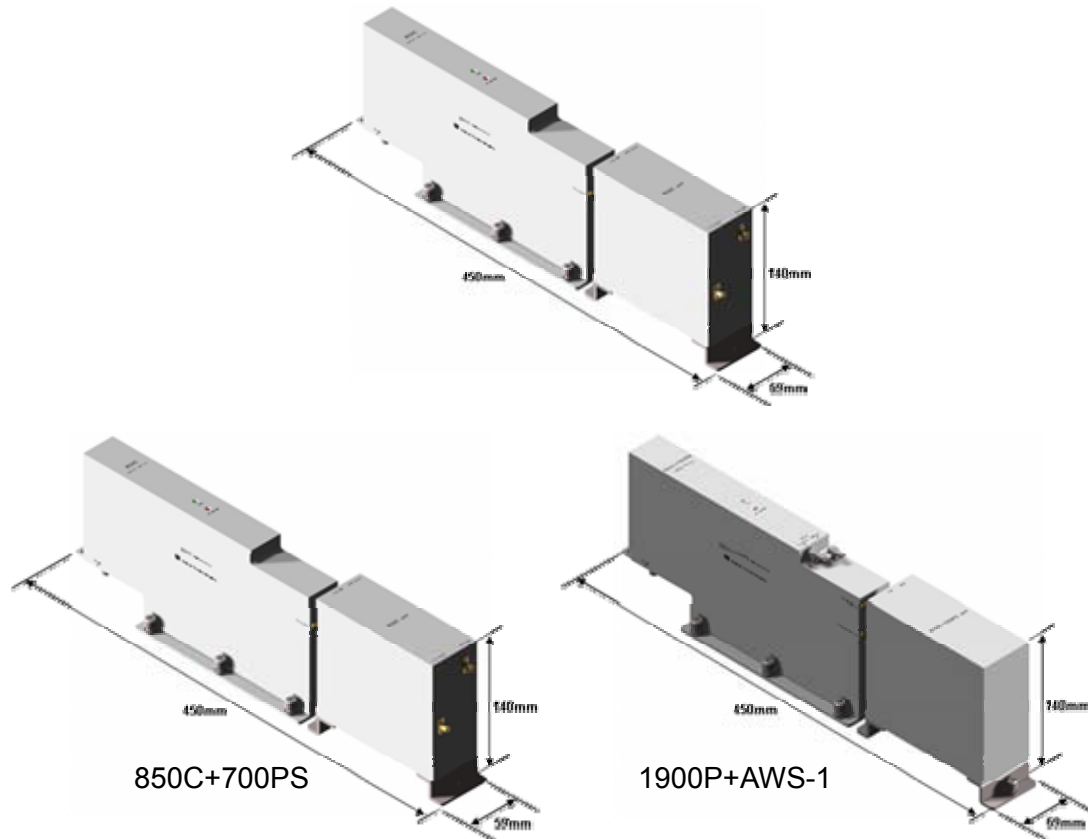
Figure 4.27 – RDU Outer Look

2) Remote Power Supply Unit (RPSU)

RPSU receives -48V of input. This unit is divided into DC/DC type to output +6V, +9V and +27V of DC power and AC/DC type to receive 120V of AC input and to output +6V, +9V and +27V of DC power.

Upon order, either of the two types should be decided. MS Connector, which uses ports to receive inputs, is designed to accept any of AC and DC. Only in this case, the input cable is different.

RPSU has a circuit brake to turn the power ON/OFF and has LED indicator at the top to check if input power is normally supplied.