

sDAS

Installation Guide



Content

1.	Introduction.....	2
1.1	sDAS Introduction & Application.....	2
1.2	Advantage & benefits of sDAS system.....	3
1.3	Limitation of sDAS system.....	6
2.	Preparation.....	8
2.1	Safety Guidelines.....	8
2.2	Installation Precautions	8
2.2.1	Indoor Installation Guidelines	8
2.2.2	Connection Precautions	9
2.2.3	Electrostatic Discharge Precautions.....	10
2.2.4	Grounding and Lightning Protection Precautions.....	11
2.2.5	Antenna Precautions	13
2.3	Site Requirements	14
3.	Hardware Installation.....	16
3.1	Preparation	16
3.1.1	Determine Radio Signal Source	16
3.2	HEU Hardware Overview	19
3.2.1	HEU Front Panel.....	19
3.2.2	HEU Rear Panel	21
3.3	RAU Hardware Overview	21
3.3.1	LED Display	22
3.3.2	RAU Connector Interface	23
3.4	sDAS HEU & RAU Connection Steps	23
3.4.1	Connecting HEU	23
3.4.2	Connecting RAU	24
4.	Initial Configuration.....	25
4.1	HEU & RAU Initial Configuration	28
4.1.1	DAS Topology Setting	29
4.1.2	DAS Setting	32
4.1.3	DAS Reboot.....	37

4.2	Monitor HEU & RAU	38
4.2.1	System Information.....	38
4.2.2	Firmware Version	41
4.3	System Log.....	42
4.3.1	System Log Display	42
4.3.2	System Log Snapshot	43
4.4	Firmware Upgrade.....	43

1. Introduction

1.1 sDAS Introduction & Application

sDAS is based on Radio-over-Fiber (RoF) technology, which entails the use of optical fiber links to distribute RF signals from a central location (headend unit, HEU) to Remote Antenna Units (RAUs). In the communication systems, RF signal processing functions such as frequency up-down-conversion, carrier modulation, and multiplexing, are performed at the BS, and immediately fed into the antenna. sDAS makes it possible to centralize the RF signal processing functions in one shared location (headend), and then to use optical fiber, which offers low signal loss to distribute the RF signals to the RAUs, as shown in Figure 1.1. By so doing, RAUs are simplified significantly, as they only need to perform optoelectronic conversion and amplification functions. The centralization of RF signal processing functions enables equipment sharing, dynamic allocation of resources, and simplified system operation and maintenance. These benefits can translate into major system installation and operational savings, especially in wide-coverage broadband wireless communication systems.

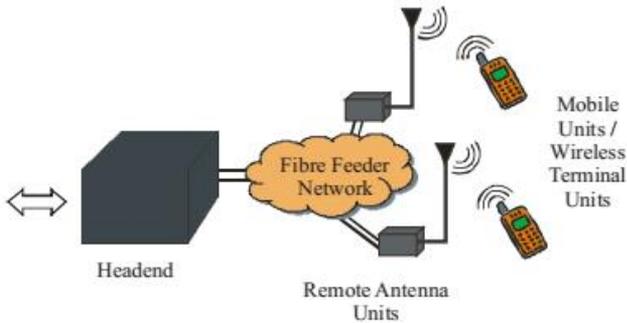


Figure 1.1 sDAS System Concept

sDAS system network architecture design is depicted as Figure 1.2. Such a system architecture may be used to distribute 3rd Generation, or LTE / Wimax mobile network signals, for example. The RF signal is used to directly modulate the laser diode in the

central site (HEU). The resulting intensity modulated optical signal is then transported over the length of the fiber to the RAU. At the RAU, the transmitted RF signal is recovered by direct detection in the PIN photodetector. The signal is then amplified and radiated by the antenna. The uplink signal from the mobile phone is transported from the RAU to the headend (HEU) in the same way.

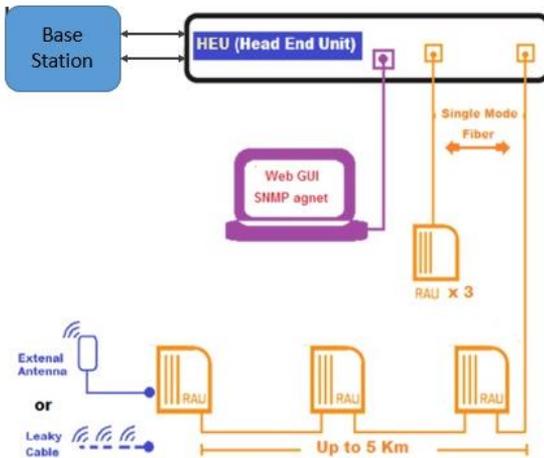


Figure 1.2 sDAS System Concept

1.2 Advantage & benefits of sDAS system

Compared with electronic signal distribution system, i.e., passive DAS, sDAS system are given below advantage & benefits:

- Low Attenuation Loss

Electrical distribution of high-frequency mobile network radio signals either in free space or through transmission lines is problematic and costly. In free space, losses due to absorption and reflection increase with radio frequency. In transmission lines, impedance rises with radio frequency as well, leading to very high losses. Therefore, distributing high

frequency radio signals electrically over long distances requires expensive regenerating equipment.

Commercially available standard Single Mode Fibers (SMFs) have attenuation losses below 0.2 dB/km and 0.5 dB/km in the 1550 nm and the 1300 nm windows, respectively, it offers very low transmission loss. sDAS system implemented optics technology to achieve both low-loss distribution of mobile network signals, and simplification of HEU/RAUs design at the same time. Therefore, by transmitting mobile network signals in the optical form, transmission distances are increased several folds and the required transmission powers reduced greatly.

- Large Bandwidth

Optical fibers offer enormous bandwidth. There are three main transmission windows, which offer low attenuation, namely the 850 nm, 1310 nm, and 1550 nm wavelengths. For a single SMF optical fiber, the combined bandwidth of the three windows is in the excess of 50 THz. However, today's state-of-the-art commercial systems utilize only a fraction of this capacity (1.6 THz). But developments to exploit more optical capacity per single fiber are still continuing. sDAS system is only applied 1310 nm, and 1550 nm wavelengths per system implementation.

The enormous bandwidth offered by optical fibers has other benefits apart from the high capacity for transmitting mobile network signals. The high optical bandwidth enables high speed signal processing. In sDAS systems is possible to be used to increase optical fiber bandwidth utilization, which is several mobile network subcarriers can be modulated and combined, then carried on a single fiber. This makes sDAS system is more cost-effective.

- Immunity to Radio Frequency Interference

Immunity to Electro Magnetic Interference (EMI) is a very attractive property of optical fiber communications, especially for microwave transmission, because signals are transmitted in the form of light through the fiber.

- Easy Installation and Maintenance

In sDAS system, complex and expensive equipment is kept at the headend, thereby making the RAUs simpler. This arrangement leads to smaller and lighter RAUs, effectively reducing system installation and maintenance costs. Easy installation and low maintenance costs of RAUs are very important requirements, because of the large numbers of the required RAUs. In applications where RAUs are not easily accessible, the reduction in maintenance requirements leads to major operational cost savings. Smaller RAUs also lead to reduced environmental impact.

- Reduced Power Consumption

Reduced power consumption is a consequence of having simple RAUs with reduced equipment. Most of the complex equipment is kept at the centralized headend. Reduced power consumption at the RAU is significant considering that RAUs are sometimes placed in remote locations not easily fed by the power grid.

- Multi-operator and Multi-Service Operation

sDAS offers system operational flexibility. Depending on the mobile network generation technique, sDAS can be made signal-format transparent. The same sDAS network can be used to distribute multi-operator and multi-service traffic, resulting in huge economic savings. The principle of Optical Frequency Multiplication (OFM), which is the focus of this thesis can also be used to achieve multi-service operation in

combination within one optical fiber, because it is tolerant to chromatic dispersion.

- **Dynamic Resource Allocation**

Since the switching, modulation, and other RF functions are performed at a centralized headend, it is possible to allocate capacity dynamically. For instance, in sDAS system for mobile network traffic (i.e., GSM, UMTS, or LTE), more capacity can be allocated to an area (e.g. shopping mall) during peak times and then re-allocated to other areas when off-peak (e.g. to populated residential areas in the evenings). Allocating capacity dynamically as need for it arises obviates the requirement for allocating permanent capacity, which would be a waste of resources in cases where traffic loads vary frequently and by large margins. Furthermore, having the centralized headend facilitates the consolidation of other signal processing functions such as mobility functions, and macro diversity transmission.

1.3 Limitation of sDAS system

Since sDAS involves analogue modulation, and detection of light, it is fundamentally an analogue transmission system. Therefore, signal impairments such as noise and distortion, which are important in analogue communication systems, are important in the system also. These impairments tend to limit the Noise Figure (NF) and dynamic range of the system links. Dynamic range is a very important parameter for mobile (cellular) communication systems because the power received at the BTS from the cellphone varies widely (e.g. 80 dB). That is, the RF power received from a cellphone which is close to BTS can be much higher than the RF power received from a cellphone which is several kilometers away, but within the same cell. The noise sources in analogue optical fiber links include the laser's Relative Intensity Noise (RIN), the laser's phase noise, the photodiode's shot noise, the amplifier's thermal noise, and the fiber's dispersion. In Single Mode Fiber (SMF) based system, chromatic dispersion may limit the fiber link

lengths and may also cause phase de-correlation leading to increased RF carrier phase noise.

2. Preparation

2.1 Safety Guidelines

To ensure the proper handling, operation, and reliability of the equipment, as well as the safety of service personnel, it is important to comply with the precautions outlined in this section.



Failure to comply with these guidelines, particularly the grounding requirements, may result in the equipment not performing according to the published specifications, premature failure, and may void your warranty.

2.2 Installation Precautions

sDAS equipment must be installed by qualified service personnel who are trained in the correct procedures for handling and installing the equipment. To ensure that sDAS equipment is not damaged during the installation of any components, the following guidelines are provided.

2.2.1 Indoor Installation Guidelines

The following guidelines are provided for indoor installations:

- Power up the equipment only after all components are installed and connected
- Keep all safety and operating instructions for reference when installing or replacing the equipment
- Pay attention to all warnings on the equipment, as well as in the documentation
- Pay attention to all service markings and ensure that sDAS equipment is only serviced by trained service personnel

- Do not use a telephone to report a gas leak while in the vicinity of the leak
- Do not connect or use a modem or telephone, other than the cordless type, during a lightning storm to avoid the remote possibility of electric shock from lightning
- Install sDAS in restricted access locations that are not accessible to the general public

2.2.2 Connection Precautions

When connecting to sDAS equipment, comply with the following precautions to minimize the danger of injury to service personnel and damage to the equipment.

Equipment Connection Guidelines

The following guidelines are provided for connecting the sDAS equipment:

- Check cables for damage
- Secure and neatly arrange wiring
- Tightly secure all connections
- Weatherproof the outdoor connections by wrapping two coats of vulcanized tape and electrical tape
- Weatherproof the grounding cable connections to prevent corrosion by wrapping two coats of sealant tape and electrical tape to all exposed nuts, bolts and junctions between dissimilar metals
- Affix cables and wires to walls, poles, or towers, and secure with tie wraps



Do not use vulcanized tape to weatherproof the outdoor sDAS RAU fiber optic connections. To ensure the proper operation of sDAS RAUs, as well as avoid weatherproofing problems.

Antenna Cable Connection Guidelines

The following guidelines are provided for connecting the sDAS antenna cables if have:

- Never install antenna cables during a lightning storm
- Never install antenna cables in damp or wet locations unless the connectors are specifically designed for use in these types of environments
- Always use caution when installing or modifying the sDAS cables

2.2.3 Electrostatic Discharge Precautions

To avoid damage to sDAS equipment, service personnel must be at the same electrical potential as the equipment. Before handling the equipment, it is important to safely discharge any static electricity by following these guidelines:

- Discharge your body and any metal objects, including tools, cable connectors and computer connectors, of static electricity by touching any unpainted metal part of the grounded equipment
- Always wear a grounded ESD wristband
- Ensure that you are properly grounded before you removing any component from its antistatic packaging or any installed component from sDAS system
- Avoid contact with printed circuit tracks or components on the equipment
- Return ESD-sensitive components to their antistatic bags when not in use

2.2.4 Grounding and Lightning Protection

Precautions

A well-constructed grounding system helps protect sDAS equipment from lightning strikes. To properly ground sDAS equipment, ensure that these guidelines are followed:

- A suitable grounding point is available where the electrical potential at the subscriber site is identical, and never exceeds a ground resistance of 10 Ω
- The lightning rods, antennas, and transmission lines are properly installed and grounded
- The transmission lines are installed as far as possible from the grounding wires
- The grounding wires are as straight as possible (no loops or sharp bends) and are routed toward the nearest common ground connection
- The lightning rods provide approximately a 45° cone of protection, which will protect all equipment under their field of coverage from direct lightning strikes
- All ground connections are tightly secured and made below the equipment being grounded
- All grounding wires are stripped and secured to bare metal using compression lugs at every 1 to 2 m (3 to 6 feet)
- The transmission lines are grounded after the top curve and before the bottom curve
- The transmission lines are grounded to the common ground of the structure (tower, pole, building)
- Every piece of equipment has a separate grounding wire that is grounded to a common point
- For towers and poles that are higher than 75 m (246 ft.) the transmission line must be grounded every 30 m (98 ft.)

To protect sDAS from lightning transients that travel down the inner conductor of the antenna cable, it is recommended

that a surge arrester be installed per antenna polarization and sector if needed.



To protect subscribers, as well as the power faults, and accidental contact with voltage sources, it is necessary that all equipment be sDAS equipment from lightning, installed and grounded in compliance with the national codes, or local safety codes and ordinances when they supersede the national codes.

Grounding Resistance Guidelines

The term ground is defined as a low-resistance conductive connection by which a circuit or piece of equipment is connected to earth. A ground consists of a grounding conductor, a bonding connector, the grounding electrodes, and the soil that is in contact with the electrodes.

The resistance of the grounding electrode has the following components:

- The contact resistance between the main ground conductor to the metal ground electrode (rod) itself
- The contact resistance of the surrounding earth to the electrode (rod)
- The resistance in the surrounding earth to current flow or earth resistivity, which is often the most significant factor

It is recommended that the resistance to ground must be 10 Ω or less. However, the closer this value is to 0 Ω , the better it is, providing greater protection against lightning strikes.

Accurate measurements of ground resistance can be achieved only with specially-designed test equipment. The majority of test equipment use the Fall-of-Potential principal of alternating current (AC) circulation between an auxiliary electrode and the ground electrode under test. The reading is provided in ohms (Ω), and represents the resistance of the ground electrode to the surrounding earth.

2.2.5 Antenna Precautions

When installing the antenna equipment, comply with the following precautions to minimize the danger of injury to service personnel and damage to the equipment.

Excess RF Energy Antenna Installation Precautions

The following precautions are provided to prevent the general public, as well as installation personnel, from exposure to RF energy in excess of the specified maximum permissible exposure levels:

- Install the antennas in a location that does not expose the general public to the direct beam path of the antenna at a distance of less than 4.5 m (15 ft.); it is recommended the antennas be installed in locations that are not accessible to the general public, such as on towers, masts, or rooftops
- Mount the antennas in a manner that prevents any person from entering the area within 4.5 m (15 ft.) from the front of the antennas
- Place RF hazard warning signs on the barriers that prevent access to the antennas
- Ensure that the power is adjusted to the settings specified in documentation before installing the antennas
- Ensure that the power to sDAS equipment is switched off during the antenna installations to prevent any energy presence on the coaxial connector

- Do not stand in front of the antenna assembly during the installation and alignment of the antennas
- Do not handle or touch the front of the antennas during the installation and alignment of the antennas

General Antenna Installation Precautions

To properly mount the antennas, ensure that the following precautions are followed:

- Antenna structures are securely anchored and vertical
- Galvanizing on the antenna structures is not damaged and there are no signs of rust
- Antennas are correctly oriented and polarized, and clear of transmission lines
- Antenna cables are long enough to connect the antennas to sDAS RAU

2.3 Site Requirements

Before unpacking and installing sDAS equipment, it is important to ensure that the site complies with sDAS environmental and power requirements. The following table shows the site requirements:

Environmental Characteristics	
HEU (Indoor Unit): <ul style="list-style-type: none"> ● Operating Range Temperature: 0° to +45°C (23° to 113°F) ● Relative Humidity: 5 to 95% 	RAU (Indoor Version): <ul style="list-style-type: none"> ● Operating Range Temperature: 0° to +45°C (23° to 113°F) ● Relative Humidity: 5 to 95%
Mechanical Characteristics	
HEU (Indoor Unit): <ul style="list-style-type: none"> ● Length: 218 mm 	RAU (Indoor Version): <ul style="list-style-type: none"> ● Length: 232 mm

<ul style="list-style-type: none"> ● Width: 146 mm ● Depth: 42 mm ● Weight: 1.4 Kg 	<ul style="list-style-type: none"> ● Width: 142 cm ● Depth: 80 cm ● Weight: 1.4 Kg
DC Power Characteristics	
<p>HEU (Indoor Unit):</p> <ul style="list-style-type: none"> ● Input Voltage: 48VDC (nominal), complied with IEEE 802.3at PD standards ● Input Operating Range: +36 to +58 VDC ● Power consumption: < 12 Watts 	<p>RAU (Indoor Version):</p> <ul style="list-style-type: none"> ● Input Voltage: 48VDC (nominal) through PoE Jack. ● Input Operating Range: +36 to +58 VDC ● Power consumption: < 20 Watts
Management Interface	
<ul style="list-style-type: none"> ● 1000Base-T (RJ-45) at HEU ● SNMP V2c Interface 	
Optical Interface	
<ul style="list-style-type: none"> ● SC-APC connector 	
RF Interface	
<ul style="list-style-type: none"> ● N-connector 	

3. Hardware Installation

3.1 Preparation

3.1.1 Determine Radio Signal Source

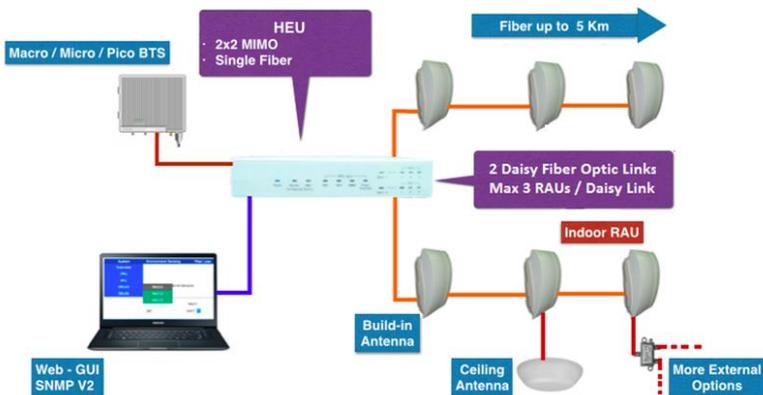
- ◆ From BTS/RRH RF ports
- ◆ Or over the air via RF repeaters

- If radio signal source is from BTS/RRH RF ports
 - ◆ Confirm the total number of carriers to be connected to sDAS, up to four different carriers in the same frequency band are supported.
 - ◆ Make sure each BTS/RRH are operating in the same frequency band and with different channel frequencies and non-overlapped to each other carriers.
 - ◆ Make sure each BTS/RRH's RF output power from each carrier are at the similar output level, +/- 1dB recommended
 - ◆ Make sure the RF output power of the BTS/RRH is operating at 3dB or more back off from rated level to ensure a proper EVM characteristics if possible. Otherwise, the overall performance transfer rate (% of max. system DL throughput) may be degraded.
 - ◆ Select a RF coupler with proper coupling factor to ensure the coupled RF power is within HEU's rated RF input power level, +13dBm to +33dBm in total (or +10dBm to +30dBm per port) as specified, and +18dBm to +28dBm in total (or +15dBm to +25dBm per port) is recommended. Make sure the RF input power level at HEU input has added the multiple carriers correction factor as the result of the combined RF power from multiple RRH's, 3dB for two carriers, 5dB for three and 6dB for four carriers.
 - ◆ Make sure the PIM rating of the RF coupler meets the BTS' specification, -155dBc typical with two +43dBm RF inputs.

- If the signal is over the air via RF repeaters

- ◆ Identify a proper location which provide line of sight visual clearance for Repeater antenna installation.
- Prepare two each RF coax cable with N-type male connector (for BTS ant 1 & ant 2 connection)
- Power supply (please refer to technical Spec. – POE adaptor recommend)
- Computers with Windows , Macintosh, or Linux-based operating systems with an installed Ethernet adapter
- Internet Explorer 9, Firefox 4.0, Chrome 10.0, other compatible browser or above version (for configuration)
- Checking optical connections
 - Make sure all the optical connectors are SC/APC type
 - Smoothing fiber cable routing, and minimizing twisting and bending.
 - Carefully clean all the optical connections, refer to Appendix I for the details

Figure 3.1 shows sDAS Hardware Installation Diagram, which includes HEU, RAUs, and all possible components, as well as the possible network architecture.



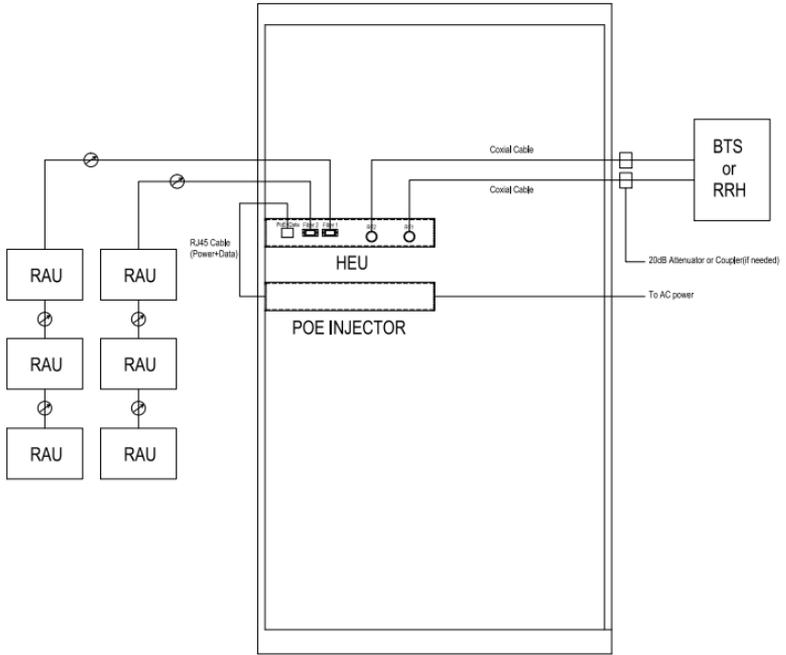


Figure 3.1 Hardware Installation Diagram

3.2 HEU Hardware Overview

Figure 3.2 shows HEU Hardware installation block diagram.

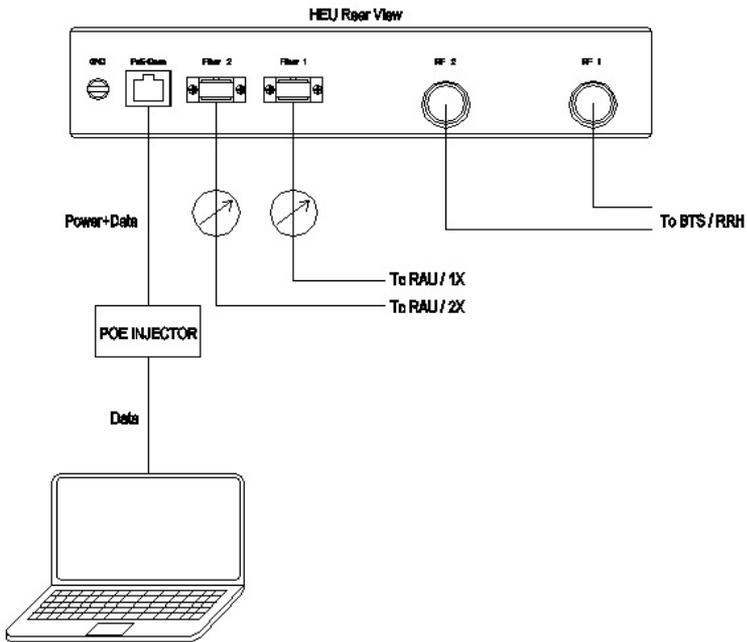


Figure 3.2 HEU Hardware Installation Diagram

3.2.1 HEU Front Panel



There are LEDs on HEU front panel, the definition of LED shows below.

HEU Panel LED		
LED	Color	Description
Power	Green	On
	Red	Error (DC alarm)
	Dark	No Power
HEU	Green	On
	Flash Green	1. Calibrating
		2. FW upgrading
Red	Error	
RF1	Green	RF signal detected
	Dark	No RF signal
RF2	Green	RF signal detected
	Dark	No RF signal
RAUx (x= 1, 2 or 3)	Flash Green	1. RAU has been detected
		2. Calibrating
		3. FW upgrading
	Green	Calibration done
	Red	1. RAU disconnection
		2. RAU optic module error (Rx)
3. RAU PA failed (Tx)		
Dark	1. RAU has not been detected	
	2. RAU non-existent	

3.2.2 HEU Rear Panel

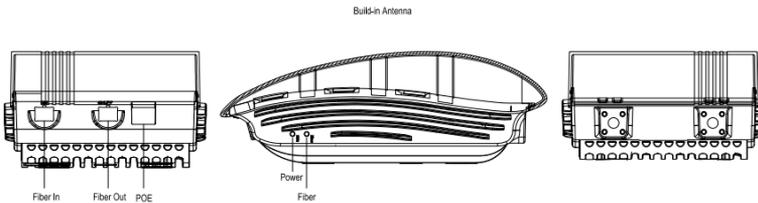


No.	Item	Interface	Description
1	GND	Screw	Connect to Power Ground for safety
2	PoE+DATA	RJ45	Connect with POE injector for Power & Control
3	Fiber 2	SC/APC	Daisy to 1 st RAU by fiber
4	Fiber 1	SC/APC	Daisy to 1 st RAU by fiber
5	RF 2	N-Female	Connect with BTS RF Signal 2 (Diversity)
6	RF 1	N-Female	Connect with BTS RF Signal 1 (Main)

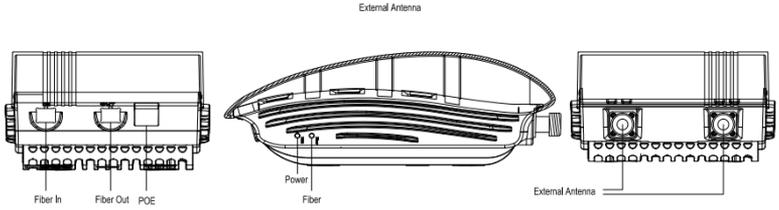
3.3 RAU Hardware Overview

There are 2 types of RAU hardware configuration options:

- Built-in Antenna option : the system has built-in embedded antenna inside the cover. The antenna spec. can be found in Attachment#2.



- External Antenna option : the system also supports external antenna port option when the customer has the specific needs to fulfill. The RF connector is N-female connectors.



 All the RF connector shall be terminated via antenna or terminator to confirm the system calibration/setup, and system performance.

3.3.1 LED Display



RAU Panel LED		
LED	Color	Description
Power	Green	On
	Dark	No Power
Fiber	Green	Fiber link OK
	Dark	1. HEU & RAU disconnected 2. Optic power below threshold

3.3.2 RAU Connector Interface



No.	Item	Interface	Description
1	PoE	RJ45	Connect with PoE injector for Power
2	OUT	SC/APC	Fiber Daisy (cascade) Out
3	IN	SC/APC	Fiber Daisy (cascade) In

3.4 sDAS HEU & RAU Connection Steps

Before connecting HEU and RAU, please make sure all the other system requirements are prepared and ready. Please make sure all the optic interfaces are cleaned. Optic interface inspection and clean process please refer to “ Pre-installation Fiber Optic Inspection & Clean “

3.4.1 Connecting HEU



1. Connect PoE injector to AC power source
2. Connect PoE DC output (“P+D/OUT” or “Data & Power Out”)to HEU “PoE+Data” input
 - a. Power LED should be turned on as green after PoE DC applied
3. Connecting NB or PC’s Ethernet port to “Data In” port on PoE for system configuration
4. Plug a single mode fiber with SC/APC connector into “Fiber 1” of HEU, which is referred to Fiber 1 of GUI, or “Fiber 2” of HEU (“Fiber 2” is referred to Fiber 2 of GUI).
5. Start system provisioning process when RAU’s are ready.

3.4.2 Connecting RAU



1. Connecting PoE injector to AC power
2. Connect PoE DC output (“P+D/OUT” or “Data & Power Out”) to RAU “PoE”
3. Check “Power” LED, turns green when DC input is OK
4. Plug the optical fiber connected to either “Fiber 1”/ “Fiber2” of HEU, or fiber “Out” port of the preceding RAU located in a same daisy chain.
5. Check “Fiber” LED, flashing green when HEU turned on, fiber connected, and the optical loss of preceding stages is within acceptable range, the received optical power level is higher than the min. required optical power level.
6. RAU is ready for system provisioning

4. Initial Configuration

Configure computer's TCP/IP setting

Configuring your computer's TCP/IP setting under the same subnet as the Default IP Address of sDAS (**192.168.100.20**), for example, 192.168.100.2.

Check Access to sDAS

Use "Ping" utility of DOS mode to check the access to sDAS.

- 1) Go to DOS mode
- 2) Type command:
ping 192.168.100.20

sDAS shall respond your ping request.



Note that use the same PC to ping different sDAS Product may cause ping failure. This is because the entire sDAS Product has the same default IP address but different MAC addresses. To prevent from ping failure, you need type command "arp -d" to clear ARP table on PC before each ping.

```
C:\Documents and Settings\970601>ping 192.168.100.20

Pinging 192.168.100.20 with 32 bytes of data:

Reply from 192.168.100.20: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.100.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Figure 4.1 PING Command

Access to Web Pages

- 1) Launch a Web Browser.
- 2) Key in the default IP Address as URL (Default IP Address: “**192.168.100.20**”) and then the initial home page will appear.
- 3) The login window will appear. Enter User Name (default username is “**Admin**”) and Password (default password is “**Wireless**”).



Note:

1. You need to use the default Username and Password when you sign in for the first time.
2. Capital and letter are different during login.



Figure 4.2 User Name and Password Web Page

- 4) The “**System Status -> System Panel**” page will come up after successful log in.



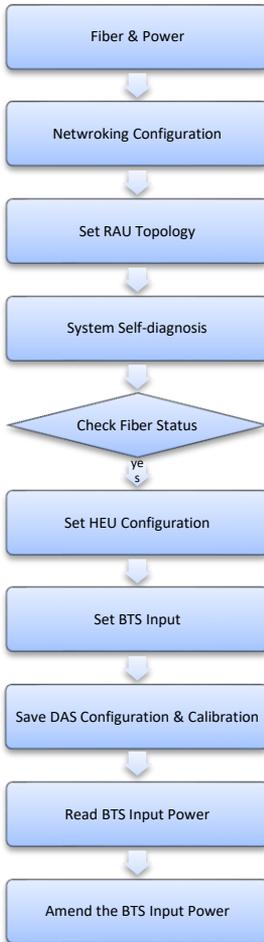
Note: refer to Section 3.2.1 for LED display definition. The LED status on webpage will be sync. w/ HEU LED.



Figure 4.3 System Status -> System Panel

4.1 HEU & RAU Initial Configuration

The HEU & RAU initial configuration shall follow the flowchart to check the configuration and set the required parameter into the system. It shall be followed step by step.



1. Check the fiber loss is in required range
2. Connect the DC power feeder & fiber to HEU/RAU respectively. The Power LED of both HEU & RAU is in green light.
3. RAU fiber LED will be blinking if the fiber connection is normal. Otherwise, RAU fiber LED will be turned off.
4. Set Network Configuration
5. After RAU topology setting done, the system will in the self-diagnostic. The HEU Fiber 1/2 RAU LED start to blink.
6. When the self-diagnostic has been done, DAS configuration will be saved, and both HEU Fiber 1/2 RAU LED and RAU fiber LED will be turned on.

There are 3 configuration setting information shall be provision step by step when the first time setup:



Figure 4.4 Configuration

4.1.1 DAS Topology Setting

- 1) Find “**DAS Topology Setting**” as Figure 4.5, by clicking “**Configuration -> DAS Topology Setting**”
- 2) Provision the network topology for each Fiber link by selecting RAU S/N per fiber link.

 Note: before DAS topology setting, all RAU shall be connected via fiber and powered up. Otherwise, the fiber loss detection may be incorrect.

- 3) Press “**SET**” button to confirm the topology provision. Then, the system will configure DAS topology, and perform automatic self-diagnostic test as Figure 4.6. shown.

 Note: During the system self-diagnostic test period, please do not perform calibration.

- 4) Once finished topology setting, the system will report the measured Fiber loss as Figure 4.7.

Home > Configuration > DAS Topology Setting

Fiber1	RAU1 T150400040004	RAU2 3230000110	RAU3 -
Fiber2	RAU1 -	RAU2 -	RAU3 -

Set

Figure 4.5 DAS Topology Setting

Home > Configuration > DAS Topology Setting

Do Not Calibrate During RAU Diagnostic Test!
RAU11 Diagnostic Test Is Ongoing
RAU12 Diagnostic Test Is Ongoing

Fiber1	RAU1 T150400040004	RAU2 3230000110	RAU3 -
Fiber2	RAU1 -	RAU2 -	RAU3 -

Set

Figure 4.6 DAS Topology Self-Diagnostic

Home > Configuration > DAS Topology Setting

	RAU1	RAU2	RAU3
Fiber1	<input type="text" value="T15040040004"/>	<input type="text" value=""/>	<input type="text" value=""/>
	RAU1	RAU2	RAU3
Fiber2	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>

Set

[Fiber Loss]

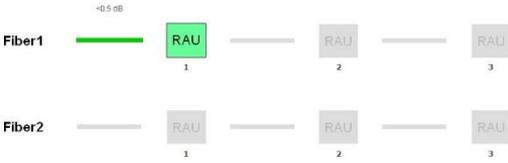


Figure 4.7 DAS Topology Status

4.1.2 DAS Setting

TRANSYSTEM

Configuration - Monitor - Syslog - FW Upgrade

Home > Configuration > DAS Setting

[HEU Configuration]

ID:

Address:

Location:

Remark:

HEU SN: 000 00

[RF Input]

RF SOURCE: BTS RF Repeater

BTS Number:

BTS #1: BTS #2: BTS #3: BTS #4:

BTS DI / IU Frequency (MHz):

BTS Power (dBm):

[Fiber 1]

	RAI/1	RAI/2	RAI/3
ID:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Address:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Location:	<input type="text"/>	<input type="text"/>	<input type="text"/>
SN:	<input type="text" value="T1504000004"/>	<input type="text"/>	<input type="text"/>
Total Output Power (dBm):	<input type="text" value="21"/>	<input type="text"/>	<input type="text"/>

[Fiber 2]

	HAU1	HAU2	HAU3
ID:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Address:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Location:	<input type="text"/>	<input type="text"/>	<input type="text"/>
SN:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Total Output Power (dBm):	<input type="text"/>	<input type="text"/>	<input type="text"/>

Save Cancel

Figure 4.8 DAS Setting

- 1) Find **“DAS Setting”** as Figure 4.8, by clicking **“Configuration -> DAS Setting”**
- 2) Provision the network element inventory information, such as **“ID”**, **“Address”**, **“Location”**, **“Remark”** for HEU & RAU.
- 3) BTS Input Power:
 - ◆ Select BTS input signal is come from either **“BTS”** or **“RF repeater”**. The system can determine RF input

power imbalance tolerance range according to the RF signal source, and report the symptom.

- ◆ The system supports up to 4 BTS to be connected. It can be provisioned by **“BTS number”**.
- ◆ Each BTS frequency can be provisioned by **“BTS DL/UL Frequency (MHz)”**.

For example, for 1800MHz FDD system:

DL Frequency Range: 1807.5MHz ~ 1877.5MHz

UL Frequency Range: 1712.5MHz ~ 1782.5MHz

- ◆ Each BTS's TX power can be provisioned by **“BTS Power (dBm)”**.

4) RAU Output Power:

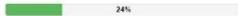
- ◆ Each RAU TX power can be provisioned by **“Total Output Power (dBm)”**.

RAU TX power Range: +15 ~ +21dBm

5) Press **“Save”** button to confirm the provision.

6) Press **“Calibrate”** button, then the system will automatic to calculate & provision the required parameter setting for better performance. It will take a couple minutes. The calibration progress can be observed via web page as Figure 4.9.

Calibrating...



Home > Configuration > DAS Setting

[HEU Configuration]

ID:

Address:

Location:

Remark:

HEU SN: E90-02

[BTS Input]

BTS Number: 4

BTS #1	BTS #2	BTS #3	BTS #4
BTS DL/UL Frequency (MHz): 1840.0 / 1745.0	1820.0 / 1725.0	1830.0 / 1735.0	1850.0 / 1755.0
BTS Power (dBm): 15.0	15.0	15.0	15.0

[Fiber 1]

	RAU1	RAU2	RAU3
ID:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Address:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Location:	<input type="text"/>	<input type="text"/>	<input type="text"/>

Figure 4.9 DAS Setting – during calibration

- 7) After calibration, the result can be observed via web page as Figure 4.10.

[Calibration Result]

	RAU1	RAU2	RAU3
Fiber1	Pass	Pass	-
	RAU1	RAU2	RAU3
Fiber2	-	-	-

HEU	UL Gain		
	0		
RAU	DL Output Power	DL Param.	UL Param.
fiber1-RAU1	21	28 / 24	24 / 33
fiber1-RAU2	21	25 / 34	34 / 38
fiber1-RAU3	-	-	-
fiber2-RAU1	-	-	-
fiber2-RAU2	-	-	-
fiber2-RAU3	-	-	-

[Hide Details](#)

[Back to DAS SETTING](#)

Figure 4.10 DAS Setting – calibration result

TRANSYSTEM
 Configuration - Monitor - Syslog - FW Upgrade

Home > Configuration > Network Setting

IP Address: 192.168.100.20
 Subnet Mask: 255.255.255.0
 Gateway:

Local Time: Fri, 24 Jun 2016 04:03:11
 NTP: Enable Disable
 NTP Server IP: 192.168.100.161
 Time Zone: UTC+8
 Daylight Saving Time: Enable Disable

Read Community: public
 Write Community: private
 Trap Receiver IP: 192.168.100.161
 Trap Receiver Port: 162
 Trap Community: public

Cloud Server: Enable Disable
 Cloud Server IP: 192.168.100.161
 Cloud Server Port: 154
 Cloud Period (Sec): 15 (15 - 21600)

Syslog Server IP: 192.168.100.161
 Syslog Server Port: 514
 Syslog MASK: 0

New Web Password:
 Confirm Web Password:

Figure 4.11 Network Setting

8) Find “**Network Setting**” as Figure 4.11, by clicking “**Configuration -> Network Setting**”

9) **IP Address / Subnet Mask / Gateway**
 Note that each HEU in the same network must be assigned an unique IP address.

10) **NTP**

The Network Time Protocol (NTP) is a protocol and software implementation for synchronizing the clocks of device with NTP server over packet-switched, variable-latency data networks. Enable this feature and specific the IP address of NTP server to get the system date & time through NTP protocol.

Time zone: specify the time zone that the product located. This setting is based on the GMT (Greenwich Mean Time).

Daylight Saving Time: Many countries, and sometimes just certain regions of countries, adopt daylight saving time (DST) during part of the year. It needs to enable or disable based on the product located countries or area.

11) SNMP

SNMP Community name is a string for administrator to read and write the SNMP MIB from external SNMP manager. The default SNMP community name is “public” for read community, and “private” for write community, and “public” for trap community. It is able to change the community name.

12) Trap receiver

The trap receiver IP & port also must be assigned an unique IP address & port number. The default IP address is 127.0.0.1, and port number is 162, or leave as blank.

13) Cloud Server

It needs to enable or disable cloud server feature for periodically report the system status to the server.

The Cloud Server IP & port also must be assigned an unique IP address & port number.

The system will report the status periodically in 15 ~ 21,600 seconds, it can be set by **Cloud Period (Sec)**.

14) Password

Change **Password** by typing new password, and confirm new password. User will be asked to login again use new password after reboot.

Note: the password is case sensitive

15) Press “Save” button to confirm the provision. After

clicking save button, reboot button will display, and after clicking reboot button, sDAS use new configuration.

4.1.3 DAS Reboot



Figure 4.12 DAS Reboot

- 1) Find “**DAS reboot**” as Figure 4.12, by clicking “**Configuration -> DAS reboot**”, and confirm the setting. Then, the setting will be provisioned in the system, as well as IP address setting.

Click reboot button on configuration menu will reboot sDAS system.

4.2 Monitor HEU & RAU

The system information & Firmware version can be retrieved as Figure 4.13 shown.



Figure 4.13 Monitor

4.2.1 System Information

- 1) Find “System Info” by clicking “Monitor -> System Info”.
- 2) As Figure 4.14 shown, the webpage shows all HEU/RAU inventory information, as well as the system status.

1	Display HEU panel
2	Display Fiber1 loss value of connected RAUs (in dB), if fiber loss over 3dB will display in red color. Then, please check the fiber loss, and maintain the fiber loss is less than 3dB.
3	Display Fiber1 connected RAUs status(on line is green, off line is gray)
4	Display Fiber2 loss value of connected RAUs (in dB), if fiber loss over 3dB will display in red color. Then, please check the fiber loss, and maintain the fiber loss is less than 3dB.
5	Display Fiber2 connected RAUs status(on line is green, off line is gray)
6	Display HEU ID
7	Display HEU Address
8	Display HEU Location
9	Display HEU hardware serial number

10	Display number of BTS		
11	Display BTS Downlink frequency		
12	Display BTS Uplink frequency		
13	Display BTS power setting		
14	Display BTS Downlink input power reading		
15	Display BTS main / diversity input power, power limits depend on the number of BTS		
	# of BTS	Acceptable Range per BTS	Maximum total HEU input power
	1 BTS	● 13dBm ~ 33dBm	+33dBm
	2 BTS	● 13dBm ~ 30dBm	+33dBm
	3 BTS	● 13dBm ~ 28dBm	+33dBm
4 BTS	● 13dBm ~ 27dBm	+33dBm	
16	Display RAU ID		
17	Display RAU Address		
18	Display RAU Location		
19	Display RAU hardware serial number		
20	Display RAU Uplink gain		
21	Display RAU output power setting		

Home > Monitor > System Info



[Fiber Loss]



[HEU]

ID:
 Address:
 Location:
 Remark:
 SN: E10.02
 Hw Ver: E10
 UL Gain (dB): 0
 BTS Number: 4

BTS #1	BTS #2	BTS #3	BTS #4
BTS DL Frequency (MHz): 1840.0	1820.0	1830.0	1850.0
BTS UL Frequency (MHz): 1745.0	1725.0	1735.0	1755.0
BTS Power (dBm): 15	15	15	15
BTS DL Input Power (dBm): -5.9(-7.7, -8.4)	-7.5(-10.3, -10.8)	-5.8(-8.6, -8.1)	-4.9(-7.4, -8.5)
BTS Power Over Range: ●	●	●	●

[Fiber 1]

	RAU1	RAU2	RAU3
ID:			
Address:			
Location:			
SN:	T150400040004	-	-
Hw Ver:	-	-	-
UL Gain (dB):	0	-	-
Total Output Power (dBm):	21	-	-

[Fiber 2]

	RAU1	RAU2	RAU3
ID:			
Address:			
Location:			
SN:	-	-	-
Hw Ver:	-	-	-
UL Gain (dB):	-	-	-
Total Output Power (dBm):	-	-	-

Figure 4.14 System Information

4.2.2 Firmware Version

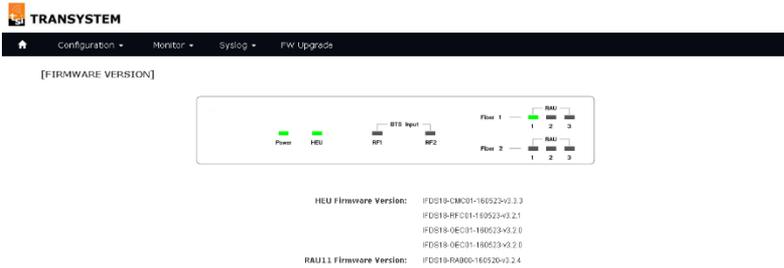


Figure 4.15 programmed firmware version

- 1) Find **“Firmware Version”** by clicking **“Monitor -> Fw Version”**.
- 2) As Figure 4.15 shown, the webpage shows all programmed HEU/RAU firmware version.

4.3 System Log

The system log server can be set & the system log information can be retrieved or displayed as Figure 4.16 shown.



Figure 4.16 Syslog

4.3.1 System Log Display

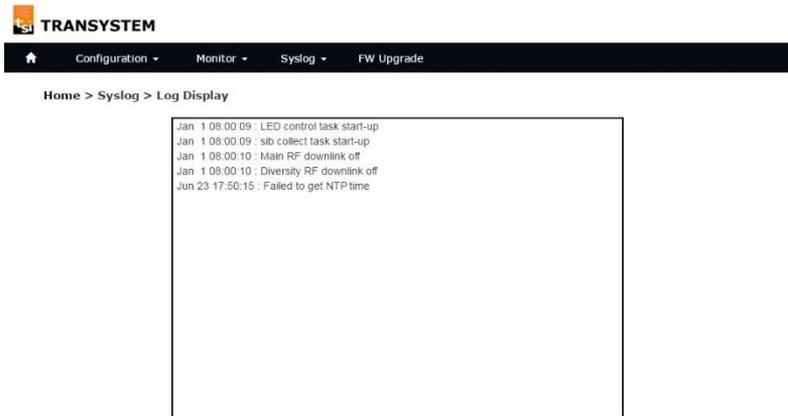


Figure 4.17 System Log Display

- 1) Find “**log display**” by clicking “**Syslog -> Log Display**”.
- 2) As Figure 4.17 shown, the historical of syslog can be retrieved & displayed.

4.3.2 System Log Snapshot

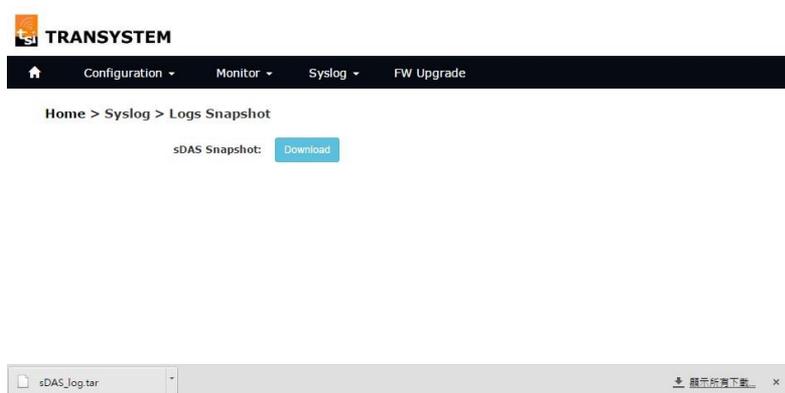


Figure 4.18 System Log Snapshot

- 1) Find **“log snapshot”** by clicking **“Syslog -> Log snapshot”**, as Figure 4.18 shown, click **“Download”** button to download the snapshot. The snapshot file will be automatic downloaded, and the default file name is **“sDAS_log.tar”**.



Note: the snapshot file is the system data for analysis purpose.

4.4 Firmware Upgrade

The firmware upgrade function can be applied by clicking **“FW Upgrade”** at the top menu as Figure 4.19 shown. When the new version of firmware has been received, the new firmware can be uploaded via the web interface.

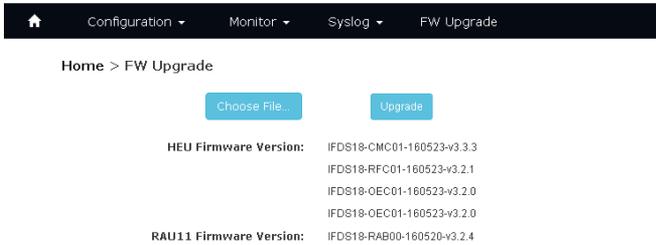


Figure 4.19 Firmware Upgrade

- 1) Click **“Choose File”** button and select the firmware files to be uploaded from the PC. Then, the firmware version before/after upgrade also can be observed.
- 2) Click **“Upgrade”** to confirm the upgrade process.
- 3) During the firmware upgrade, the progress can be observed as Figure 4.20 shown.
- 4) When firmware upgrade is completed, system will prompt the successful message! Then reboot to perform the new version of firmware.

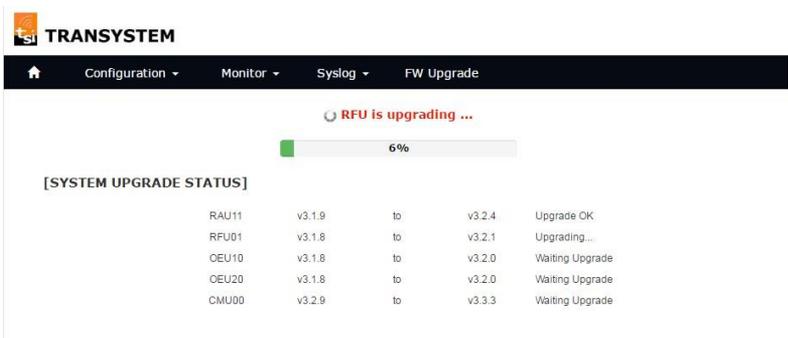


Figure 4.20 Firmware Upgrade



Note:

- Before upload the new version of firmware, please read the new firmware release note to confirm the new firmware features, upgrade environment, and procedures can meet the upgrade requirements.
- In case network disruption happens during file uploading, system will still keep on running with current active firmware. It needs to perform the file upload again when network is back to normal.