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| Writer | HB Shin    | Doc. Ver  | V0.2   |
| Date   | 2024-12-24 | Doc. Type | Manual |



# **5G n48 4T4R 4W Outdoor ORAN RU (SJ-ORU4402-N48US)**

## **Operation Manual**

**SAMJI Electronic**

**24 Dec. 2024**

**HARMONY(人和) HONEST(真實) CREATIVITY(創意)**

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## Revision History

| Version | Date       | Author  | Description                    |
|---------|------------|---------|--------------------------------|
| 0.1     | 2024-12-19 | HB Shin | Draft version                  |
| 0.2     | 2024-12-24 | HB Shin | Added FCC Regulatory Statement |
|         |            |         |                                |
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# INTRODUCTION

This document explains how to use the WEB GUI and CLI to operate the O-RAN RU (O-RAN RU) linked to LG Electronics' O-RAN-based Private 5G network.

## 1. CONFIGURATION

To use the WEB GUI and CLI provided by the ORU, connect your PC and the ORU with UTP Cable.

- Refer to [Figure 1 Connection Configuration Chart] for IP settings

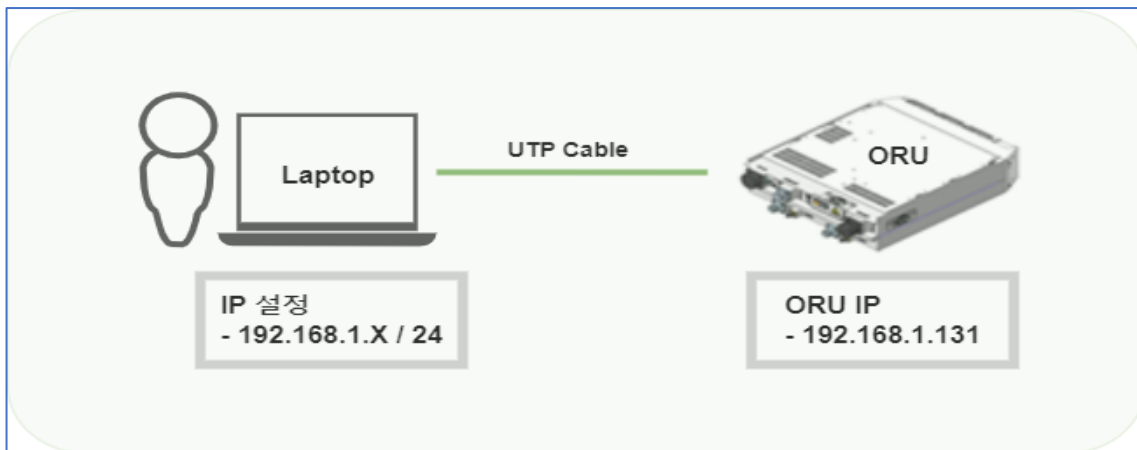


Figure 1. Connection Configuration Chart

### 1.1 How to access the WEB GUI

ORU provides a WEB GUI with control and monitoring functions for some functions for user convenience.

After connecting, run the WEB Browser (Chrome) as shown in [Figure 1 Connection Configuration Chart] and enter the ORU IP "192.168.1.131" in the address window. Enter User ID / Password when the WEB GUI login screen is displayed as shown in Figure 2 WEB GUI - Login Screen.

- Initial setting value : **admin / admin**

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The login screen for LGE RU MT features a white background with a blue border. At the top, the text "LGE RU MT" is displayed in a large, bold, black font. Below this, there are two input fields: "User ID" and "Password", each with a light gray background and a thin blue border. A blue "Login" button is positioned below the password field. At the bottom of the screen, there is a small gray box containing two lines of text: "• This application is only compatible with Google Chrome." and "• The optimal screen resolution is 1280 x 960."

Figure 1. WEB GUI – Login Screen

## 1.2 How to connect Terminal (Terminal)

The ORU provides CLI functionality for user maintenance.

After the connection, run Teraterm and select ORU IP "192.168.1.131" for HOST and "SSH" for Service as shown in [Figure 1 Connection Configuration Chart].

Type User name / Password when the Terrestrial login screen is displayed as shown in Figure 3 Terrestrial login screen.

- Initial setting value : **oranuser** / **o-ran-password**

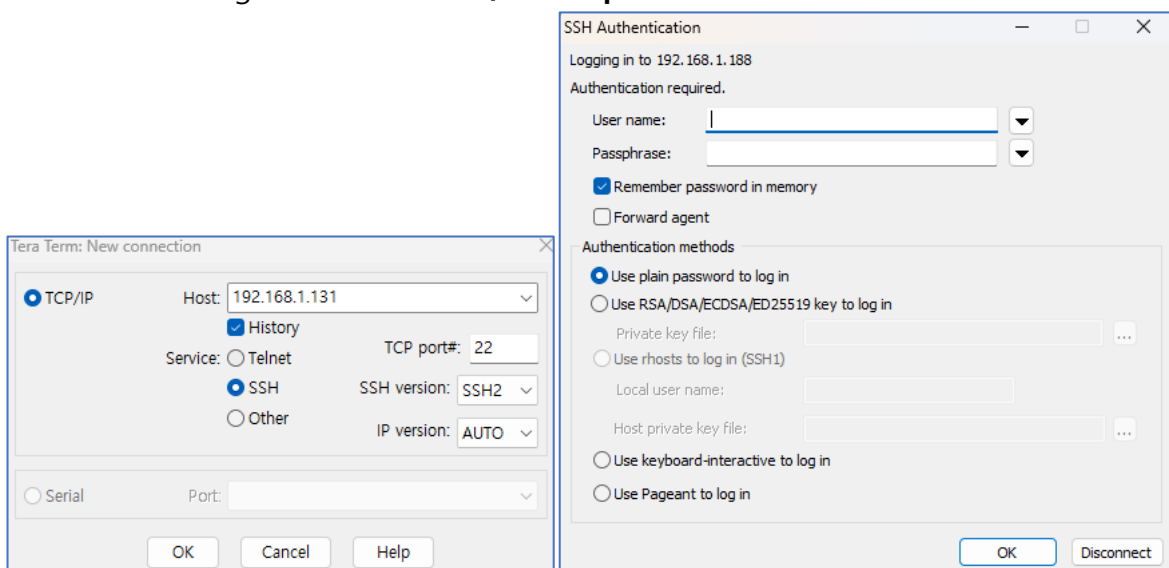


Figure 3. Teraterm login Screen

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## 2. WEB GUI FEATURE DESCRIPTION

### 2.1 Menubar



Figure 4. WEB GUI - Menubar

- System : Go to the System window on the ORU.
- Download : Go to the PKG download window on the ORU.
- Log : Go to the log window of the ORU.
- User : Go to the User Account Settings window.
- My info : Displays information about the currently connected user.
- Logout : Exits the connection and goes to the login window.

### 2.2 Alarm Status

Displays the alarm items monitored by the ORU, and the alarms generated are Major, Critical, depending on the rating

| Alarm status |                                     |            |                                         |        |                                         |        |                                         |        |                                        |
|--------------|-------------------------------------|------------|-----------------------------------------|--------|-----------------------------------------|--------|-----------------------------------------|--------|----------------------------------------|
| Alarm        | Critical                            | Alarm mask | OFF                                     |        |                                         |        |                                         |        |                                        |
| Status       | Name                                | Status     | Name                                    | Status | Name                                    | Status | Name                                    | Status | Name                                   |
| 2            | Unit dangerously overheating        | 9          | VSWR dangerous levels [tx-array3:1]     | 19     | TX input IQ digital power [tx-array1:1] | 19     | Too high VSWR [tx-array2:1]             | 31     | Unexpected C/U-plane msg [tx-link:0]   |
| 4            | Temperature too low [SJEOSQA]       | 11         | Configuring failed [SJEOSQA]            | 19     | TX input IQ digital power [tx-array2:1] | 19     | Too high VSWR [tx-array3:1]             | 31     | Unexpected C/U-plane msg [tx-link:1]   |
| 9            | DPD fail [tx-array0:1]              | 12         | Critical file not found [SJEOSQA]       | 19     | TX input IQ digital power [tx-array3:1] | 20     | RX out of order [tx-array0:1]           | 31     | Unexpected C/U-plane msg [tx-link:2]   |
| 9            | DPD fail [tx-array1:1]              | 15         | Temp sensor failure [SJEOSQA]           | 19     | TX Outputpower high [tx-array0:1]       | 20     | RX out of order [tx-array1:1]           | 31     | Unexpected C/U-plane msg [tx-link:3]   |
| 9            | DPD fail [tx-array2:1]              | 15         | RFIC faulty [SJEOSQA]                   | 19     | TX Outputpower high [tx-array1:1]       | 20     | RX out of order [tx-array2:1]           | 31     | Unexpected C/U-plane msg [rx-link:0]   |
| 9            | DPD fail [tx-array3:1]              | 17         | No external sync source [SJEOSQA]       | 19     | TX Outputpower high [tx-array2:1]       | 20     | RX out of order [tx-array3:1]           | 31     | Unexpected C/U-plane msg [rx-link:1]   |
| 9            | too low gain in TX [tx-array0:1]    | 17         | No external sync source [FH interface]  | 19     | TX Outputpower high [tx-array3:1]       | 23     | FPGA SW update failed [SJEOSQA]         | 31     | Unexpected C/U-plane msg [rx-link:2]   |
| 9            | too low gain in TX [tx-array1:1]    | 18         | Synchronization Error [FH interface]    | 19     | TX Outputpower low [tx-array0:1]        | 26     | Power Supply Faulty [SJEOSQA]           | 31     | Unexpected C/U-plane msg [rx-link:3]   |
| 9            | too low gain in TX [tx-array2:1]    | 19         | PA out of order [tx-array0:1]           | 19     | TX Outputpower low [tx-array1:1]        | 26     | RF Module overvoltage protection faulty | 21100  | Forced alarm [SJEOSQA]                 |
| 9            | too low gain in TX [tx-array3:1]    | 19         | PA out of order [tx-array1:1]           | 19     | TX Outputpower low [tx-array2:1]        | 26     | RF Module overcurrent protection faulty | 21101  | Overheat - Power reduced [tx-array0:1] |
| 9            | VSWR dangerous levels [tx-array0:1] | 19         | PA out of order [tx-array2:1]           | 19     | TX Outputpower low [tx-array3:1]        | 29     | Transceiver Tx Fault [sfp0]             | 21101  | Overheat - Power reduced [tx-array1:1] |
| 9            | VSWR dangerous levels [tx-array1:1] | 19         | PA out of order [tx-array3:1]           | 19     | Too high VSWR [tx-array0:1]             | 29     | Transceiver uninstall [sfp0]            | 21101  | Overheat - Power reduced [tx-array2:1] |
| 9            | VSWR dangerous levels [tx-array2:1] | 19         | TX input IQ digital power [tx-array0:1] | 19     | Too high VSWR [tx-array1:1]             | 30     | LOS Fault [FH Interface]                | 21101  | Overheat - Power reduced [tx-array3:1] |

Figure 5. WEB GUI – Alarm status

### 2.3 System Status

Provides the system status of the connected ORU.

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Figure 6. WEB GUI – Alarm status

- RU version : PKG version
- MT version : WEB GUI version
- Admin-state : Admin-state Lock / Unlock status
- VLAN ID:set VLAN ID
- Opt Link : DU와의 Optic Link Connected / Disconnected status

## 2.4 System Control

Supports the system setup of the connected ORU

Figure 7. WEB GUI – System Control

- Admin-state : Allows you to change the Admin-state to locked/unlocked state.
- Alarm masking On/Off: Set the alarm mask On: Set, Off: Turn off
- VLAN ID : Sets the VLAN ID search range: Lowest to High
- Tx 0 On/Off : Turn on/Off the output of TX Path #0.
- Tx 1 On/Off : Turn on/off the output of TX Path #1
- Tx 2 On/Off: Turn on/off the output of TX Path #2
- Tx 3 On/Off : Turn on/off the output of TX Path #3
- Tx 0 LVL : Set the gain for TX Path #0. (Range : -12.0dB to 0dB)
- Tx 1 LVL : Set the gain for TX Path #1 (Range : -12.0dB to 0dB)
- Tx 2 LVL : Set the gain for TX Path #2 (Range : -12.0dB to 0dB)
- Tx 3 LVL : Set Gain for TX Path #3 (Range : -12.0dB to 0dB)
- Upload setting : Gets the stored System Control setting value
- Save setting —Saves the currently set System Control settings.



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- Apply : After changing the System Control setting value, click the appropriate button to apply

## 2.5 System Reset

Initialize the system restart and Netconf setup of the connected ORU

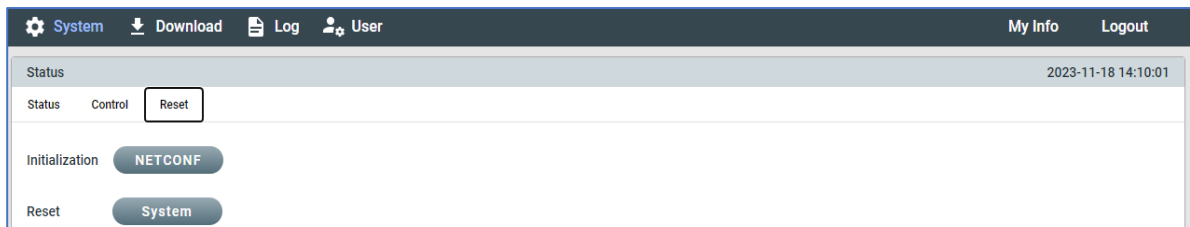


Figure 8. WEB GUI – System reset

## 2.6 PKG Download

Supports ORU PKG download functionality.

PKG to which the download is applied is applied to Slot whose Running status is FALSE

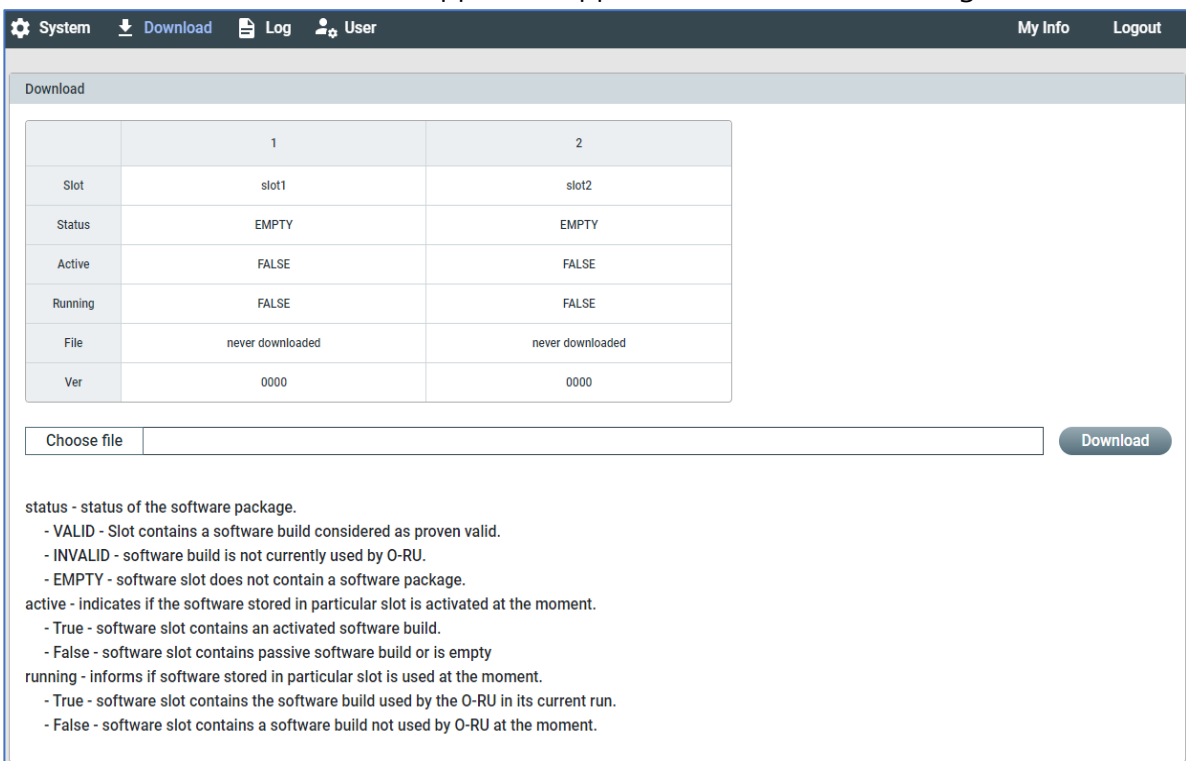


Figure 9. WEB GUI – Download PKG not installed

- ① Click Choose file and select PKG File (\*.zip) to apply
- ② Click the Download button

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- ③ When the Download progress is complete, check the status of the slot applied in the Download window.  
Status : VALID, Active : TRUE, File : PKGname, Ver : PKG version
- ④ Proceed with System Restart in Figure 8 WEB GUI – System reset
- ⑤ Verify that the running state of the PKG applied slot changes to TRUE after the restart is complete

|         | 1                    | 2                |
|---------|----------------------|------------------|
| Slot    | slot1                | slot2            |
| Status  | VALID                | EMPTY            |
| Active  | TRUE                 | FALSE            |
| Running | FALSE                | FALSE            |
| File    | SJ-RJ-4CRSJEP5GA0001 | never downloaded |
| Ver     | 0001                 | 0000             |

Figure 10. WEB GUI – Download PKG installed

## 2.7 Acquire Log

Supports the ability to store ORU log on your PC

System

Download

Log

User

My Info

Logout

Detail log

Save

Alarm log

Save

| No. | Date                | ID    | Type | Description                      | Detail     |
|-----|---------------------|-------|------|----------------------------------|------------|
| 1   | 2023/11/17 17:18:49 | 15    | SET  | Temperature sensor failure       |            |
| 2   | 2023/11/17 17:17:10 | 17    | SET  | No external sync source          | sync so... |
| 3   | 2023/11/17 17:17:02 | START | INFO | pkg_ver v07.60.0-0-gee962bdf ... | product... |
| 4   | 2023/11/17 17:17:01 | 30    | SET  | LOS Fault                        |            |
| 5   | 2023/11/17 17:17:01 | 29    | SET  | Transceiver uninstall            |            |
| 6   | 2023/11/17 17:17:01 | 29    | SET  | Transceiver Tx Fault             |            |
| 7   | 2023/11/17 17:17:01 | 18    | SET  | Synchronization Error            |            |
| 8   | 2023/11/17 17:17:01 | 17    | SET  | No external sync source          | LOCK_RE... |
| 9   | 2023/11/17 17:16:50 | 18    | SET  | Synchronization Error            |            |
| 10  | 2023/11/17 17:16:50 | 17    | SET  | No external sync source          | LOCK_RE... |
| 11  | 2023/11/17 17:16:49 | 30    | SET  | LOS Fault                        |            |
| 12  | 2023/11/17 17:16:49 | 29    | SET  | Transceiver uninstall            |            |
| 13  | 2023/11/17 17:16:49 | 29    | SET  | Transceiver Tx Fault             |            |
| 14  | 2023/11/16 12:11:17 | 15    | SET  | Temperature sensor failure       |            |
| 15  | 2023/11/16 12:09:39 | 17    | SET  | No external sync source          | sync so... |
| 16  | 2023/11/16 12:09:31 | START | INFO | pkg_ver v07.59.0-10-g3327f9db... | product... |
| 17  | 2023/11/16 12:09:30 | 30    | SET  | LOS Fault                        |            |
| 18  | 2023/11/16 12:09:30 | 29    | SET  | Transceiver uninstall            |            |
| 19  | 2023/11/16 12:09:30 | 29    | SET  | Transceiver Tx Fault             |            |
| 20  | 2023/11/16 12:09:30 | 18    | SET  | Synchronization Error            |            |
| 21  | 2023/11/16 12:09:30 | 17    | SET  | No external sync source          | LOCK_RE... |
| 22  | 2023/11/16 12:09:19 | 18    | SET  | Synchronization Error            |            |
| 23  | 2023/11/16 12:09:19 | 17    | SET  | No external sync source          | LOCK_RE... |
| 24  | 2023/11/16 12:09:18 | 30    | SET  | LOS Fault                        |            |
| 25  | 2023/11/16 12:09:18 | 29    | SET  | Transceiver uninstall            |            |

Control log

Save

| No. | Date                | Device    | Operation  | Parameters                            |
|-----|---------------------|-----------|------------|---------------------------------------|
| 1   | 2023/11/18 12:35:17 | MT        | Alarm mask | ON -> OFF                             |
| 2   | 2023/11/18 12:35:04 | MT        | Alarm mask | OFF -> ON                             |
| 3   | 2023/11/14 13:54:23 | MT        | Detailllog | Complete(detaillog_20231114_135407... |
| 4   | 2023/11/14 13:54:03 | MT        | Detailllog | Start                                 |
| 5   | 2023/11/14 09:44:46 | MT        | Detailllog | Complete(detaillog_20231114_094430... |
| 6   | 2023/11/14 09:44:26 | MT        | Detailllog | Start                                 |
| 7   | 2023/11/13 16:44:43 | MPALNE... |            | -4.0                                  |
| 8   | 2023/11/13 16:44:43 | MPALNE... |            | -4.0                                  |
| 9   | 2023/11/13 16:44:43 | MPALNE... |            | -4.0                                  |
| 10  | 2023/11/13 16:44:43 | MPALNE... |            | -4.0                                  |
| 11  | 2023/11/13 16:35:58 | MPALNE... |            | -4.0                                  |
| 12  | 2023/11/13 16:35:58 | MPALNE... |            | -4.0                                  |
| 13  | 2023/11/13 16:35:58 | MPALNE... |            | -4.0                                  |
| 14  | 2023/11/13 16:35:58 | MPALNE... |            | -4.0                                  |
| 15  | 2023/11/13 15:59:48 | MPALNE... |            | -4.0                                  |
| 16  | 2023/11/13 15:59:48 | MPALNE... |            | -4.0                                  |
| 17  | 2023/11/13 15:59:48 | MPALNE... |            | -4.0                                  |
| 18  | 2023/11/13 15:59:48 | MPALNE... |            | -4.0                                  |
| 19  | 2023/11/13 15:54:16 | MPALNE... |            | -4.0                                  |
| 20  | 2023/11/13 15:54:16 | MPALNE... |            | -4.0                                  |
| 21  | 2023/11/13 15:54:16 | MPALNE... |            | -4.0                                  |
| 22  | 2023/11/13 15:54:16 | MPALNE... |            | -4.0                                  |
| 23  | 2023/11/13 15:38:24 | MPALNE... |            | -4.0                                  |
| 24  | 2023/11/13 15:38:24 | MPALNE... |            | -4.0                                  |
| 25  | 2023/11/13 15:38:24 | MPALNE... |            | -4.0                                  |

Figure 11. WEB GUI – Lod

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- Detail log/Save: Download all LOGs of the ORU to your PC.
- Alarm log / Save: Download the Alarm log of the ORU as a csv file to your PC.
- Control log / Save : Download the ORU's Control log as a csv file to your PC.

## 2.8 User Settings

You can add/delete the WEB GUI user account of the connected ORU.

| No. | ID     | Type          | Created             | Last login          |
|-----|--------|---------------|---------------------|---------------------|
| 1   | admin  | administrator | 2103-11-05 09:00:01 | 2023-11-18 03:36:06 |
| 2   | dkkumt | guest         | 2103-11-05 09:00:01 |                     |
| 3   | sjuser | guest         | 2023-10-26 06:58:38 | 0000-00-00 00:00:00 |

Figure 12. WEB GUI – User

## 3. CLI FEATURE DESCRIPTION

### 3.1 Run Application Shell mode

The CLI is supported only in the Application Shell and runs when you enter "app\_sh".

```
File Edit Setup Control Window Help
username@rru:/$ app_sh
app_sh: connected to app.
Run '/exit' to exit me.
@rru#
```

Figure 13. Run app\_sh

The command to exit the Application Shell and return to the Linux Shell is "/exit"

```
File Edit Setup Control Window Help
@rru# /exit
username@rru:/$
```

Figure 14. End of app\_sh

### 3.2 ORU Restart Command

- CLI : reboot

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```
File Edit Setup Control Window Help
@rru# reboot
warn: ptp log backup started
warn: ptp log backup finished
fatal: reboot with reason 1 (Reboot by User Cmd)
```

Figure 15. CLI - Reboot

### 3.3 Check PKG Version

PKG (.zip) downloaded from the DU is managed as Slot1 and Slot22Copy and inquires about PKG information applied to the ORU

- CLI : mt -s

```
File Edit Setup Control Window Help
@rru# mt -s
-----
|          | slot1 | slot2 |
-----
|status |      EMPTY |      EMPTY |
-----
|active |      FALSE |      FALSE |
-----
|running |     FALSE |     FALSE |
-----
|file   | never downloaded | never downloaded |
-----
|ver    |      0000 |      0000 |
-----
```

Figure 16. CLI – mt -s

- Slot1: Displays the status, active, running, file name, and version information of the PKG installed in Slot1
- Slot 2: Displays the status, active, running, file name, and version information of the PKG installed in Slot2
- Status : Displays the PKG status of the corresponding slot.  
VALID : installed PKG is valid  
INVALID : installed PKG is invalid  
EMPTY: PKG not installed
- Active : Displays the active status of the corresponding slot. The active set slot is marked TRUE and is applied as running slot after restarting.
- Running: The slot of the PKG in operation is marked as TRUE.
- File : Displays the file name of the PKG installed in the corresponding slot.
- Ver : Displays the version of the PKG installed in the corresponding slot.

PKG (.zip) files consist of three files: bl.pkg, os.pkg, and ap.pkg, and you can inquire the application information of those files.

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When PKG is applied, the PKG (Idx1) in operation is moved to Idx2, and the newly installed PKG is set to Idx1 and operates as the PKG of Idx1 after restarting.

- CLI : ver

| Package      | Idx | ID | Attr | Version                     | Date             |
|--------------|-----|----|------|-----------------------------|------------------|
| rru_ap.pkg   | 0   | AP | ro   | v00.35.0-0-g064c58e         | 2022-01-05 22:15 |
| rru_ap.pkg.1 | 1   | AP | rw   | v00.01.0-45-ga66dcc5e-dirty | 2023-11-17 16:28 |
| rru_ap.pkg.2 | 2   | AP | rw   | v00.01.0-45-ga66dcc5e-dirty | 2023-11-17 16:25 |
| image.ub     | 0   | OS | ro   | v0.2.0-0-g25f39b8           | 2021-10-13 23:22 |
| rru_os.pkg.1 | 1   | OS | rw   | v1.3.0-0-g0b20344           | 2023-09-18 16:38 |
| BOOT.BIN     | 0   | BL | ro   | v0.0.1                      | 2021-07-29 23:18 |
| BOOT.BIN.1   | 1   | BL | rw   | v0.2.0                      | 2023-02-14 09:22 |

Figure 17. CLI – ver

- Idx 0 : Factory initialization package
- Idx1 : the package currently in operation
- Idx 2: Previous version of package currently in operation

### 3.4 Factory initialization Settings

Returns the ORU setting to the state it was shipped to.

- CLI : mt -f [option:1~4]

```

@rru# mt
usage: mt [options]
  -m @pkg : mt package upload *.zip)
            zip files should be placed in /tmp
  -s       : slot status
  -n 1     : netconf init
  -d 1     : detaillog collection
  -f 1|2|3|4 : factory reset
              1 : conf files & pkg
              2 : conf files
              3 : set as default(factory) account
              4 : delete all user info with factory account

```

Figure 18. CLI – mt -f

- mt -f 1: Initializes all configuration information of the ORU and installed PKG information
- mt -f 2: initializes only all the configuration information of the ORU
- mt -f 3 : account ≡ factory default account (oranuser / o-ran-password)
- mt -f 4: Delete all registered accounts (including factory default accounts).

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Used to change the default account of the equipment to a new default account, and the default account stored in the S/W PKG is applied as the default account of the ORU.

### 3.5 Check Account

Query the account information set in the ORU.

The default account set when the equipment is shipped is [oranuser : o-ran-password].

- CLI : user -s

```
File Edit Setup Control Window Help
@rru# user -s
=====
||  IDX  ||      USER NAME      ||      USER PASSWORD      ||  DF  ||  ENABLED  ||
=====
||    1  ||      oranuser  ||      o-ran-password  ||   *  ||      true  ||
=====
[default user name : oranuser]
```

Figure 19. CLI – user -s

### 3.6 Check Inventory

Check the mac, production date, serial number, hw revision, etc. of the ORU.

- CLI : inven -s

```
File Edit Setup Control Window Help
@rru# inven -s
ethaddr = 4c:f7:37:00:0c:d8
eth1addr = 4c:f7:37:00:0c:d9
production_date = 20231118
serial_num = SJE0000000001
hw_rev = 0100
```

Figure 20. CLI – inven -s

### 3.7 Check Alarm

Check the alarm status that occurred in the ORU.

- CLI : alm -s

|        |            |           |        |
|--------|------------|-----------|--------|
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```

File Edit Setup Control Window Help
@rru# alm -s
time: Dec 16 2071 07:46:33.224572
alm: occur=1, mask=0, alarm_stop=normal
      group[0] (ID: 0~31) = 0x0003a000
      group[1] (ID: 32~63) = 0x00001c00

id severity source      name
15 CRITICAL SJEP5GA     Temperature sensor failure
17 MAJOR     SJEP5GA     No external sync source
17 MAJOR     sfp0        No external sync source
18 CRITICAL SJEP5GA     Synchronization Error
29 CRITICAL sfp0        Transceiver Tx Fault
29 CRITICAL sfp0        Transceiver uninstall
30 CRITICAL sfp0        LOS Fault

```

Figure 21. CLI – alm -s

## 3.8 LOG Level Settings and Check

If you set the LOG Level high to analyze the cause of the problem, it provides the ability to record more information needed for cause analysis and can query the logged logs.

- CLI : log [option]

```

File Edit Setup Control Window Help
@rru# log
usage: log [options]
-m #kind : toggle mplane log level,saved at config file & applied after restarting
          (0:mpinfo 1:mpdbg 2:sync 3:detail)
-l #no   : set netopeer2_server log level (applied after reboot)
          0 - err
          1 - err, warn
          2 - err, warn,verbose
          3 - err, warn,verbose,debug,sysrepo(be careful)
          4 - err, warn,verbose,debug,lowlevel(be careful)
-o #line(1~100) : set xlm maxium line
-i #no   : set rpt_app libssh log level(default:INFO)
          0:NONE 1:WARN 2:INFO 3:DEBUG 4:TRACE 5:PUBKEY
-k #no   : set netopeer2 libssh log level (applied after reboot)
          0:NONE 1:WARN 2:PROTOCOL 3:PUBKEY (default:WARN)
-v #no   : toggle yang,sysrepo,msg,xpath..etc log level
          0 - ALL : ALL log on/off
          1 - DICT : Dictionary additions and deletions
          2 - XPATH : XPath parsing and evaluation
-p #no   : toggle ptp log level
          0: Environment 1: PORT 2: BMC Algorithm
          3: State Machine 4: Frame Analyser 5: General Infos
          6: Timer 7: Header 8: Messages
          9: Management 10: Multicast 11: Port Interface
          12: Timestamp ITF 13: Current DS 14: Clock ITF
          15: Loopcontrol 16: Port DS 21: GPS ITF
          22: Signaling
-d : show log activation status
-a : show ancient log first [recent first]
-c @name : clear @name log
-f @str : find this @str [all]
-s @name : show @name log
-n #cnt : show count [20]
-k : set ssh log level
-x : create cli log

@name : winfo, alm, detail, power, oran

```

Figure 22. CLI – log

|        |            |           |        |
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- log -m [0-3]: Sets the level of the mplane log and is applied after ORU restart.
- log -l [0-4]: Set the level of netperer2\_server log and will be applied after ORU restart.
- log -i [0-5]: Sets the level of the application libssh log.
- log -k [0-3]: Set the level of netperer2 libssh logs.
- log -c @name : Clears the log of the @name.
- log -s @name : Look up the log of @name.  
@name  
winfo - webgui log  
alm - alarm log  
detail - detail log  
power - rf power log  
oran - m-plane log
- log -n #cnt : Outputs as much as #cnt entered during log query. Used only for log query. (Example, "log-salm-n 100" )
- log -d : The set log level is output.

```

File Edit Setup Control Window Help
@rru# log -d
mpinfo : enabled
mpdbg  : disabled
sync   : disabled
detail : disabled
rpt_app libssh log level = 2
netopeer2 libssh log level = 1
netopeer2 log level      = 1
netopeer2 xml max line   = 1
[15]PTP LOOPCONTROL is on

```

Figure 23. CLI – log -d

### 3.9 Setup and Check of network-related information

Provides the ability to change and query the settings of vlan, m-plane.

- CLI : net [option]



|        |            |           |        |
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```

File Edit Setup Control Window Help
@rru# net
usage: net [options]
    -s                : show network status
    -v #val[0/1]      : set vlan mode      1(vlan) 0(no_vlan)
    -f #vlanid[0:disabled] : set force vlanid [1..4094]
    -a #lowest vlanid  : set lowest vlanid
    -b #highest vlanid  : set highest vlanid
    -p #time(msec)      : set duration searching prev vlanid
    -r #time(msec)      : set duration searching range(low~high) vlanid
    -u #time(msec)      : set duration searching untagged vlanid
    -g #time(msec)      : set duration searching full range vlanid
    -w #vlanid[1..4094] : toggle searchable vlanid list[if 0:unset all]
    -i #scan_interval(sec) : set scan_interval[more than 2sec]
    -m #val[0/1]        : set m-plane enable/disable
    -o #val[0/1]        : set o-ran-studio interworking mac_address
    -h #val[0/1]        : set reset by call-home hello timeout
    -x @str              : test netmask to prefix-length
    -z #val[0..32]       : test prefix-length to netmask
    -d #val[0/1]         : xml config file save & restore[val, save:1 / restore:0]
    -k [1,2,3,4]         : apply modules configuration without m-plane
                        1:normal 2:w/o ecpri 3:w/o dhcp 4:w/o ecpri&dhcp

```

Figure 24. CLI – net

- net -v [0/1]: Set whether to enable vlan.
- net -f #vlanid : Force vlanid to the value of #vlanid set.
- net -a #valid : Sets the lowest value to be used for vlanid retrieval.
- net -b #vlanid : Sets the height value to be used for the vlanid search.
- net -m [0/1]: Set m-plane activation/deactivation to 0 in a without m-plane environment.
- net -o [0/1]: Set it to 1 for an interlocking test with oran studio.
- net -k [1 to 4]: Apply the m-plane setting value (xml file) in the out m-plane environment.
- net -d : You can save & restore the changed xml file to flash.
- net -s —Displays the set status

|        |            |           |        |
|--------|------------|-----------|--------|
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```

File Edit Setup Control Window Help
@rru# net -s
vendor_class_id      = o-ran-ru2/SJ/SJEP5GA/
m_plane_enabled      = 0
vlan mode            = enabled
previous vlanId      = 2
m-plane vlanId       = 2
scan_interval        = 60 sec
m-plane interface     = m-vlan0
ip address           = 192.168.2.6
mac address          = 4c:f7:37:00:0c:e9
subnet               = 24
client ip address     = 192.168.2.1
call_home ssh port    = 4334
force vlanId         = 0
lowest vlanId        = 2
highest vlanId       = 2
next_search_idx       = 0
searchable vlanId list(cnt:1)
  2,
search duration
  previous vlanId     = 5000 msec
  range(lowest~highest) = 2500 msec
  untagged            = 2500 msec
  full range 1~4094   = 2500 msec
-----
Interface Table
[IF:0] name          = eth1
[IF:0] vlanId        = not set
[IF:0] mtu           = 9000
[IF:1] name          = mplane-ip
[IF:1] vlanId        = not set
[IF:2] name          = m-vlan0
[IF:2] vlanId        = 2
[IF:2] mtu           = 1500
[IF:3] name          = vlan_0_1
[IF:3] vlanId        = not set
[IF:3] mtu           = 9000

```

Figure 25. CLI – net -s

- Prevalent vlanid : vlanid of m-plane searched before restart, search time 5 sec
- Range: vlan id range (lowest to height) set by DU, change to next vlan id at 2.5sec interval in search time
- Untagged: vlan untagged, search time 2.5 sec
- Full range : Change range from 1 to 4094 to next vlan id at 2.5sec search time interval. Scan-interval (default : 60sec) search
- Repeat steps 1 through 5 after scanning during scan-interval

### 3.10 Check Sync Information

Check the setting and status values of PTP, Sync.

- CLI : sync -s

|        |            |           |        |
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```

[synce]reporting_period      = 10
[synce]lock_state            = STATE_UNLOCKED
[synce]state                 = DISABLED
[synce]ssm_code              = INVALID
[synce]timeout               = 5
[synce]port_id               = 0
[synce]esmc_port_state       = HOLDOVER
[synce]holdoverReason        = 0
-----
                        config
-----
[ptp]reporting_period        = 10
[ptp]domain_number           = 24
[ptp]domain_number           = 24
[ptp]accepted_clock_classes_cnt = 2
[ptp]accepted_clock_classes   = 7, 6,
-----
[synce]reporting_period      = 10
[synce]acceptance_ssm_count  = 1
[synce]acceptance_ssm_code   = 02,
[synce]acceptance_list_of_ssm = PRC,
[synce]ssm_timeout           = 5
-----
virtual_hold_over_timeout    = 0
-----

```

```

File Edit Setup Control Window Help
@rru# sync -s
-----
time: Dec 16 2071 11:06:44.359743
sync_check_enabled          = 1
    1:enable 1pps after sync locked
    0:enable 1pps before sync locked
pll_check_enabled           = 1
-----
sync lock_state              = SYNC_FREERUN
-----
[ptp]reporting_period        = 10
[ptp]lock_state              = STATE_UNLOCKED
[ptp]currentClockDrift        = 0.00000 ns/s
[ptp]clock_class              = 255
[ptp]clock_identity           = 0x4CF737FFFE000CD9
[ptp]port_num                 = 0
[ptp]partial_timing_supported = 0
[ptp]state                   = DISABLED
[ptp]priority1                = 128
[ptp]priority2                = 255
[ptp]two_step_flag            = 1
[ptp]leap61                   = 0
[ptp]leap59                   = 0
[ptp]current_utc_offset_valid = 1
[ptp]delay_asymmetric         = 0 ns
[ptp]ptp_timescale            = 1
[ptp]time_traceable           = 0
[ptp]frequency_traceable      = 0
[ptp]current_utc_offset       = 37
[ptp]ptp_time_sec             = 3217457238
[ptp]steps_removed            = 0
[ptp]time_source              = 160
[ptp]clockSynchronized        = NO
[ptp]clock_state              = FREE
[ptp]multicast_mac_address    = FORWARDABLE
-----
[ptp]grandmaster_clock_identity = 0x4CF737FFFE000CD9
[ptp]source_clock_class         = 255
[ptp]source_port_number        = 0
[ptp]source_priority1          = 128
[ptp]source_priority2          = 255
[ptp]offset_scaled_log_variance = 65535
-----

```

Figure 26. CLI – sync -s

|        |            |           |        |
|--------|------------|-----------|--------|
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## 3.11 RF System Monitoring

Check ORU RF system information.

- CLI : sm

```

File Edit Setup Control Window Help
@rru# sm
time: Nov 20 2023 15:53:16.198644
state: admin unlock, awake, all port critical alarm, mplane disable
system power monitor (unit: DTU)
[P:0]: none, tx_gain:(du:0.00 mt:0.00 sum:0.00)
[P:1]: none, tx_gain:(du:0.00 mt:0.00 sum:0.00)
[P:2]: none, tx_gain:(du:0.00 mt:0.00 sum:0.00)
[P:3]: none, tx_gain:(du:0.00 mt:0.00 sum:0.00)
(f:freq_domain t:time_domain p:peak r:rms i:dig_in o:dig_out)
      dl_fpi dl_fri dl_ti dl_alc dl_o dl_pwr ul_pwr ul_o dl_agc ul_temp ul_alc tx_diff v_pwr(VSWR)
0: -150.31 -150.31 -150.31 0.00 -150.31 -19.95 -103.4 -150.3 -0.6 -1.5 0.0 0.0 -3.1(-)
1: -150.31 -150.31 -150.31 0.00 -150.31 -19.71 -102.7 -150.3 -0.6 -1.5 0.0 0.0 -2.9(-)
2: -150.31 -150.31 -150.31 0.00 -150.31 -20.36 -104.0 -150.3 -0.6 -1.5 0.0 0.0 -3.6(-)
3: -150.31 -150.31 -150.31 0.00 -150.31 -20.41 -102.6 -150.3 -0.6 -1.5 0.0 0.0 -3.7(-)

```

Figure 27. CLI – sm

- dl\_fpi : DL frequency domain peak input power
- dl\_fri: DL frequency domain RMS(Root Mean Square) input power
- dl\_ti: DL time domain input power
- dl\_alc: DL input ALC(Auto Level Control) value
- dl\_o: DL time domain output power
- dl\_pwr: DL PA(Power Amplifier) output power
- ul\_pwr: UL RFU(Radio Frequency Unit) input power
- ul\_o: UL Digital output power
- dl\_agc: DL AGC(Auto Gain Control) value
- ul\_temp: UL Temperature adjust level
- ul\_alc: UL ALC(Auto Level Control) value
- tx\_diff: tx output high/low alarm
- v\_pwr : vswr return power (dl\_pwr – v\_pwr = return loss)  
(VSWR) : VSWR(x:1)

## 3.12 Temperature

Check the temperature for the DTU, FPGA, and RFU modules of the ORU.

- CLI : temp [option]

|        |            |           |        |
|--------|------------|-----------|--------|
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```

File Edit Setup Control Window Help
@rru# temp
usage: temp [options]
      -D @str : change debug flags (@str=help|status|...)
      -d: show dtu temperature
      -f: show fpga temperature
      -r: show rfu temperature

```

Figure 28. CLI – temp

- temp -d : Check DTU temperature
- temp -f : Inquire FPGA temperature
- temp -r : Check the temperature of the RFU module

### 3.13 RF level setting

Set the Downlink Gain Level for the ORU. The setting range is 0.0 to -12.0.

- CLI : level [option] [port] [val]

```

File Edit Setup Control Window Help
@rru# level
usage: level [options]
      -m port val : mt dl gain levle set.(0.0 ~ -12.0)
      -n port val : mplane dl gain levle set.(0.0 ~ -12.0)
      [para] port: 0 ~ 3, -1=all port
      level status
          dl_gain_level mplane_dl_gain_level
      0 :                0.0                0.0
      1 :                0.0                0.0
      2 :                0.0                0.0
      3 :                0.0                0.0

```

Figure 29. CLI – level

- Level -m [port] [val]: Set the DL level set to the Web GUI (MT) with the CLI
- Level -n [port] [val]: Set the DL level set to M-plane to the CLI

### 3.14 On/Off control

Control the ORU's Downlink, Uplink Path to ON or OFF on a port basis.

- CLI : onoff [option]

|        |            |           |        |
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```

File Edit Setup Control Window Help
@rru# onoff
usage: onoff [options]
  -m port val : dl on/off set.
  -n port val : ul on/off set.
  -p port val : pa on/off set.
  -q port val : ul rfu on/off set.
  -o port val : ul alc on/off set.
  -t port val : mt tx on/off set.
  -a          : admin lock/unlock set.(toggle)
  -d val      : dpd alarm check on/off set.(curr: off)
[para] port: 0 ~ 3, -1=all port
[para] val : on 1, off 0
state: admin unlock, awake, all port critical alarm, mplane disable
onoff status
  MT_TX DL_ONOFF UL_ONOFF PA_ONOFF UL_RFU_ONOFF UL_ALC
0:  ON    OFF      ON      OFF      OFF      ON
1:  ON    OFF      ON      OFF      OFF      ON
2:  ON    OFF      ON      OFF      OFF      ON
3:  ON    OFF      ON      OFF      OFF      ON

```

Figure 30. CLI – onoff

- onoff -m [port] [val] : DTU DL path on/off 설정
- onoff -n [port] [val] : DTU UL path on/off 설정
- onoff -p [port] [val] : RFU(amp) DL path on/off 설정
- onoff -q [port] [val] : RFU UL path on/off 설정
- onoff -o [port] [val] : UL ALC on/off 설정
- onoff -t [port] [val]: WEB GUI TX on/off setting (same as WEB GUI "Tx on/off" function)

DTU DL path and RFU DL path on off cannot be controlled during WEB GUI TX off

|        |            |           |        |
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## FCC Regulatory Statement

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance Information