



HARDWARE INSTALLATION GUIDE

RA641 WI-FI 6 SMART SERVICE POINT



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TRADEMARKS



The Relay2 logo is a trademark of Relay2, Inc. of the US.

COMPANY HEADQUARTERS

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PRODUCT OVERVIEW

The RA600 family is a cloud-managed Service-Ready Access Point (SR-AP) offering Edge Computing and storage capabilities with a high-performance wireless access point integrated. It enables businesses to deliver superior venue experiences, enhance business operations, and create competitive advantages. The RA600 family consists of various models—including the RA641, RA621, RA620, and RA620M—to support various capacity and deployment needs. For more information about the RA600 family, refer to www.relay2.com.



Opening the Package

- Please ensure that all ordered optional accessories are included in the separate accessory box.
- Please check the packaging list first. If there are any missing or broken parts, please contact the authorized distributor of Relay2, Inc.

Safety

- Read the Quick Installation Guide carefully before installation and power-up.
- To avoid overheating, make sure the AP allows for proper heat dissipation, and leave enough room for air circulation.
- Do not directly touch the bottom of the AP to avoid scalding. When the AP is in operation, depending on the environment's temperatures, the surface temperature of the back cover might get hot.
- Any unauthorized modification of the product structure and safety design is not allowed.

Before You Start

- Before installation, a signal detecting test can be used to determine the best installation position.
- Keep your body at least 20 cm away from the AP during installation and operation.
- Install the AP at least 1 m distance from any metal obstructions to avoid the radio signal being affected by metal shielding.
- To avoid radio interference, keep the device away from magnets or magnetic fields (e.g., do not place near a microwave, refrigerator, etc.).

Power Source Options

- The RA641 access point can be powered by using the external Relay2 AC Adapter, PoE Injector (both sold separately), or a third-party PoE+ switch.

Warranty

- Please provide the device model, MAC address, and serial number shown on the tag of the side panel.
- The warranty does not cover any product that has been opened without authorization from Relay2 Inc.
- Reasonable repair and shipping costs will be charged for product faults or damage caused by using non-Relay2 accessories or improper operation.

PACKAGE CONTENT - RA641

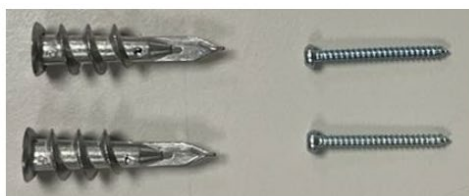


Access Point

15/16" T-Rail



9/16" T-Rail



Wall/Pole



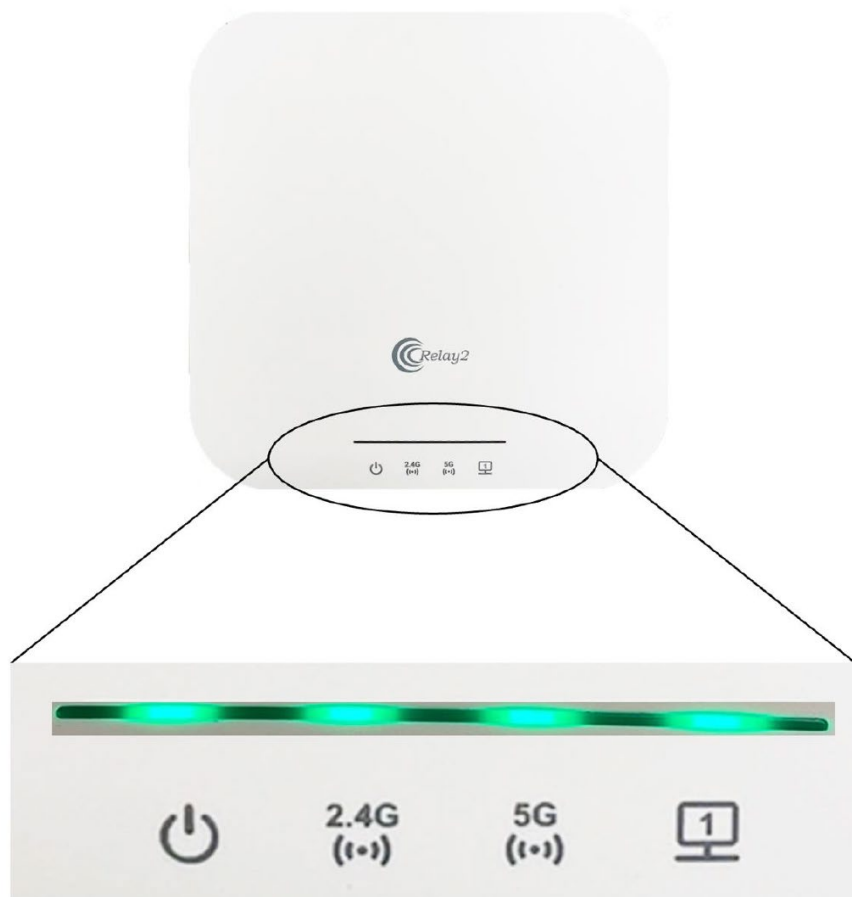
Wall/Pole/T-Rail - Mount kit screws and anchors for masonry and dry wall tie-wrap

AP OVERVIEW

Interfaces

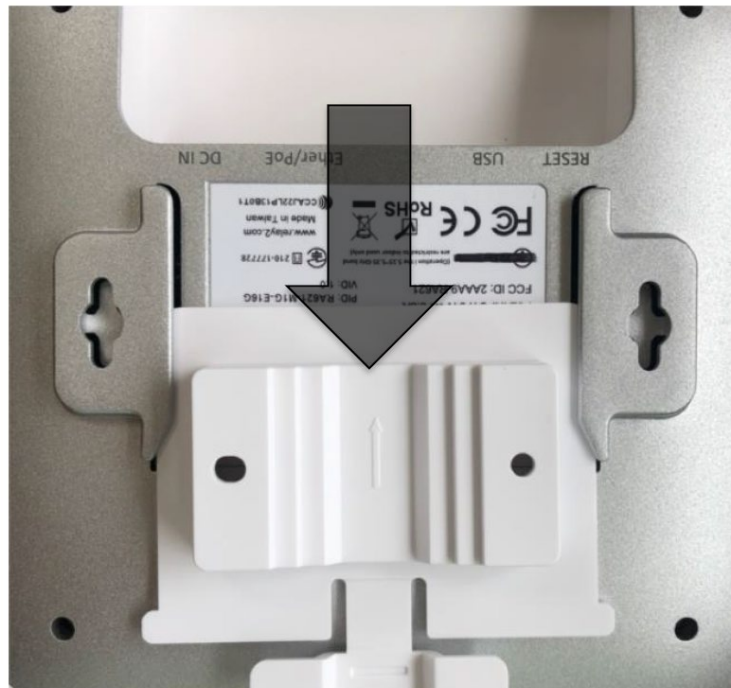
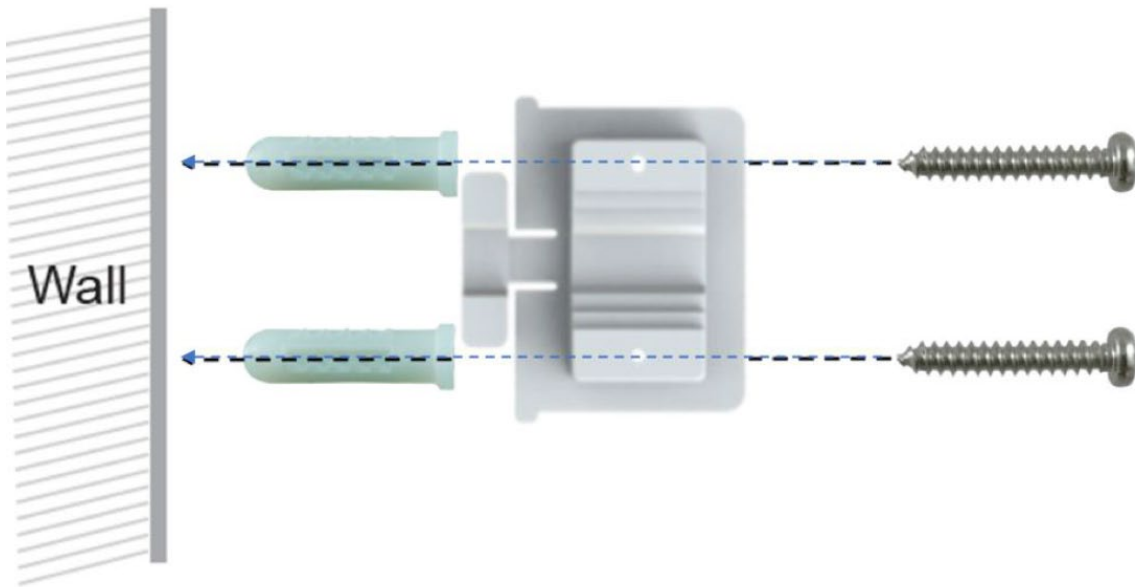


LED Indicators



Wall Mount the AP

- Determine where the AP is to be placed and mark the location on the surface for the two mounting holes. You may adjust the position with a level.
- Use the appropriate drill bit to drill two 4 mm wide and 37 mm deep holes and insert the screw anchors into the openings. Fasten the mounting plate with the provided screws.
- Slide the AP into the wall mounting plate.



VERIFY RA641 FUNCTIONALITY

First, check if the status LED is solid green. During the first boot, it is highly likely that the AP is automatically updating its firmware, indicated by green fast blinking Eth1. The Eth1 LED should turn solid green after the upgrade process has finished (normally within a few minutes). See LED indicator table below for more details.

Verify access point connectivity—use any 802.11 client device to connect to the RA641 AP and verify network connectivity using the client device web browser by going to a well-known web page.

Check network coverage and confirm good signal strength in the desired coverage area.





States	AP Status LED Display			
		2.4G 	5G 	
State 1: Power on (until kernel up)	Green solid	Off	Off	Off then green solid
State 2: R2OS starting	Green solid	Green solid	Green solid	Green solid
State 3: R2OS initializing	Green solid	Green slow blinking	Green slow blinking	Green slow blinking
State 4: Radio up and ready	Green solid	Green solid	Green solid	Green slow blinking
State 5: SCM connecting	Green solid	Green solid	Green solid	Green fast blinking
State 6: CWCL connecting	Green solid	Green solid	Green solid	Green fast blinking
State 7: AP up and running	Green solid	n/a	n/a	Green solid
State 8: Image upgrade	Green solid	n/a	n/a	Green fast blinking
State 9: AP connected	Green solid	n/a	n/a	Green solid

Table 1 RA641 LED booting states

FCC Disclaimer

§ 15.19 Labeling Requirements

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

§ 15.21 Information to User

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

§ 15.105 Information to the User

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, resolve the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to 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.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Operations in the 5.15–5.35 GHz band are restricted to indoor usage only.

CE Disclaimer



- **Manufacturer's Name:** Emplus Technologies, Inc.
- **Address:** 10F., Building B, No. 209, Sec. 1, Nangang Rd., Nangang Dist., Taipei City 11568, Taiwan
- **Product Name:** Smart Access Point
- **Trademark:** Relay2
- **Model Number:** RA641
- This device is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU. All essential radio test suites have been carried out.

Function	Operation Frequency	Max RF Output Power	Limit
Wi-Fi 2.4 G	2412–2472 MHz	20 dBm	≤20 dBm
Wi-Fi 5.2 G	5180–5240 MHz	23 dBm	≤23 dBm
Wi-Fi 5.8 G	5745–5825 MHz	13.95 dBm	≤13.98 dBm

RF Specification

The use for the 5.15–5.35 GHz RLAN band is restricted to indoor use. This restriction will be applied to all member states of the European Union.



BE	BG	CZ	DK	DE	EE	IE	EL
ES	FR	HR	IT	CY	LV	LT	LU
HU	MT	NL	AT	PL	PT	RO	SI
SK	FI	SE	NO	IS	LI	CH	TR

EU Declaration of Conformity

- We, Relay2, Inc. (1525 McCarthy Blvd., Suite 209, Milpitas, CA 95035, USA) hereby declares that this Smart Access Point is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.
- According to Article 10(2) of Directive 2014/53/EU, RA641 can be used in Europe without restriction.

(APPENDIX A) DEVICE MANAGER USER INTERFACE

Introduction

The Relay2 Access Point (AP) starts functioning without preconfiguration under typical network condition. The AP is able to connect to the Relay2 NMS when the following prerequisites are met:

- The DHCP server is reachable, and the AP can get an IP address.
- The AP is able to reach the DNS server.
- The AP is able to send https packets to the internet directly.*
- Uplink packet, MTU = 1500, from the AP is accepted by the network.
- The L2 packet is accepted by the network without VLAN tagging.

In case any item in the list above is not supported—which is a special environment for Relay2 AP and requires manual preconfiguration—this document shows the procedure of such manual configuration through the Relay2 Device Manager UI.

The procedure in this document shows the example of the minimal environment in which the AP is only connected to a PC.

*No proxy between AP and NMS

Preparation

This section shows the preparation for the manual configuration.

Hardware

The required hardware for the configuration is listed below:

- Relay2 AP to configure
- AC adapter or POE+ connection
- PC (web browser used for the configuration)
- LAN cable (with RJ45 connectors)
- Ethernet hub (in case it is necessary to connect the AP and PC via the hub)

Additional Information Needed

The information listed below is used during the preconfiguration process:

- MAC address and serial number of the target AP (You can find them on the label at the bottom of the AP.)
- IP address for the target AP in case configuring AP is executed under a network with a DHCP server

IP Address of the AP

The IP address of the target AP is used to access DM GUI even at stand-alone.

Link-Local IP Address of RA641

The link-local IP address of the Relay2 AP, 169.254.0.0 network, is calculated from the right four digits of the AP MAC address. For example, if the MAC address is B4:82:C5:00:6B:E6, then the link-local IP address of that AP is 169.254.107.230. (i.e., hex: 6B => dec: 107 and hex: E6 => dec: 230).

IP Address for the PC

The Ethernet port of the AP shall be in the same VLAN for the AP.

In case the PC is connected with the AP directly, the AP assigns the link-local IP address to itself. Thus, the IP address of the PC shall be the same network.

A normal PC assigns its own IP address in the 169.254 network and in the same manner as the AP.

Connecting the AP with the PC

DM GUI Step 1: Connect between the AP LAN port and the PC with a LAN cable. Then power up by connecting the DC power unit to the power connectors.

Confirm that the Ethernet link is active with the LED at the LAN port or the LED on the AP.

- In the case that the AP and PC are connected directly for RA641, both nodes utilize the link-local IP address with the 169.254.0.0 network.

Accessing the DM GUI

DM GUI Step 2: Access to <https://<AP IP address>:9999> with any browser application on the PC.

E.g., in the case that the AP IP address is 169.254.107.230, then <https://169.254.107.230:9999>.

Note: Relay2 AP is not registered for CA certification, so a warning message for a privacy error could be seen upon the first DM GUI access, like below. Please continue the access.

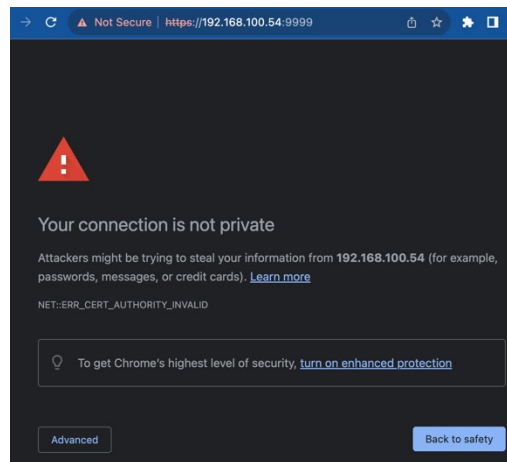


Figure 1: Example of privacy error (Microsoft edge)

DM GUI Step 3: In the case of MS Edge, continue by clicking “advanced.”

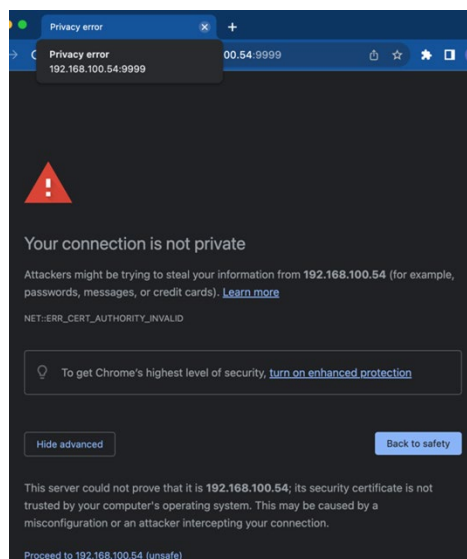


Figure 2: Advanced window at privacy error (edge)
(Proceed to 192.168.100.54 (unsafe)
at the bottom line)

DM GUI Step 4: Click “Proceed to <IP address> unsafe” for the DM GUI page to be shown.

(Refer to Figure 3 below)

The image shows the DM GUI login window. At the top is the Relay2 logo. Below it is the title "AP Device Management (b482c5006be6)". There are two input fields: "Username" and "Password". Below these fields is a "Login" button. At the bottom, there is a copyright notice: "© 2011-2021 Relay2, Inc."

Figure 3: DM GUI login window

DM GUI Login

Fill in the username and password, then click “Login.” At default,

Username: AP mac address without colons (“:”)

Password: AP S/N with capital letters

E.g., MAC address = B4:82:C5:00:7D:DB, S/N = EMP6610100C00617

Username: b482c5007ddb

Password: EMP6610100C00617

If login is successful, the initial page, as below, is shown.

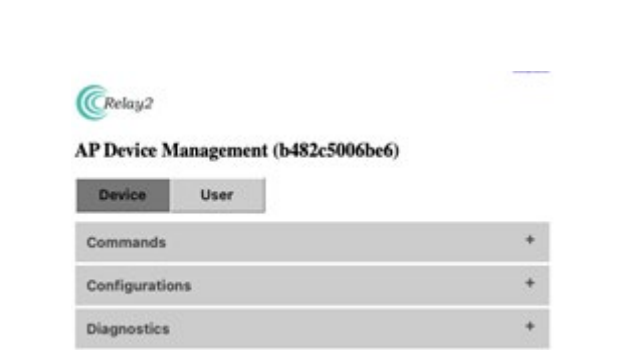
The image shows the DM GUI initial page. At the top is the Relay2 logo. Below it is the title "AP Device Management (b482c5006be6)". There are two tabs: "Device" and "User". Below the tabs is a table with three rows: "Commands", "Configurations", and "Diagnostics". Each row has a "+" button on the right side.

Figure 4: DM GUI initial page

Error Case

In case the PC and AP are in different segments, the browser will display a time-out error.

- Please double-check the AP IP address and that there is no typo in the browser input.
- Please check that the PC IP address and AP IP address are in the same VLAN.
- Please check that there is no IP address conflict in the network.

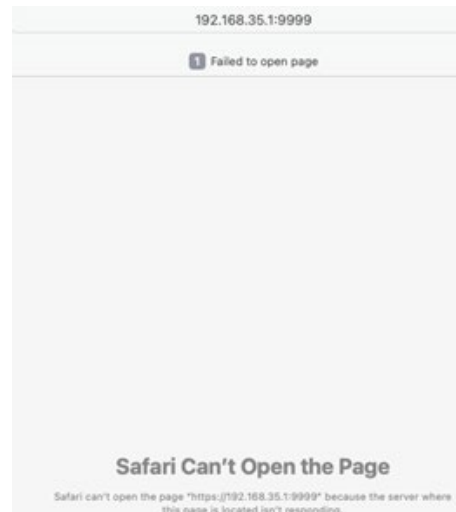


Figure 5: Sample of error case (Safari)

DM GUI Device Operation

DM GUI provides commands, configurations, and diagnosis.

Commands

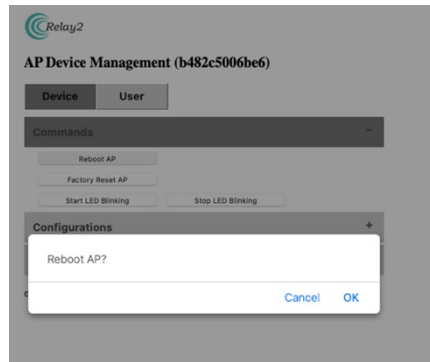
By clicking the “+” mark to right of the Commands tab, the list of available commands opens.



Figure 6: Commands

Reboot AP

By clicking “Reboot AP” and “OK” on the confirmation pop-up window, the AP is rebooted.



Note: A confirmation pop-up window will appear for all “command” actions. Designated action is triggered by clicking “OK.”

Figure 7: Confirmation pop-up window for reboot action

Factory Reset AP

Factory reset is initiated by clicking “Factory Reset AP” followed by “OK” on the confirmation window.

Note that the AP configuration, including AP logs, will be cleared by a factory reset.

Start LED Blinking

By clicking “Start LED Blinking” followed by “OK” on the confirmation window, the three LEDs below will start blinking. This feature can be used to identify deployed APs easily at the site.

Note that LEDs do not show the AP status when this command is active.



LEDs

Stop LED Blinking

This is to stop the “blinking” triggered in the previous section and set the LEDs back to normal.

Configurations

All configurable parameters via DM GUI are shown by clicking the “+” mark to the right of Configuration.

Input designated values in “New Config” while “Current Config” shows the setting in the AP.

After the input is completed, click “Apply and Reboot AP.” Then click “OK” in the confirmation pop-up. A new configuration will be valid once the reboot is completed.

You can leave the parameters empty in case you want to keep the current values.

	Current Config	New Config
LAN Network		
Protocol	dhcp	dhcp
Address	-	
Netmask	-	
Gateway	-	
DNS Server	-	
VLAN	-	
MTU	0	0
HTTP Proxy		
Server Address	-	
Port	-	
Username	-	
Password	-	
Cellular		
PIN		
APN	lte-d.ocn.ne.jp	lte-d.ocn.ne.jp
Auth	chap	chap
Username	mobileid@ocn	mobileid@ocn
Password	mobile	mobile
Modes		
Local NTP Server		
Server Address	-	
Port	-	
Version		
R2OS	3.1.1-20220114_ra6xx	
Device Mgmt GUI	0-1.6	

Apply and Reboot AP Cancel

Figure 8: AP configuration

LAN Network

These are the AP LAN-related configuration parameters for the target network:

Protocol	IP address allocation for that AP (DHCP or Static)
IP Address	(Valid for "Static" only) AP IP address
Netmask	(Valid for "Static" only) netmask of the network
Gateway	(Valid for "Static" only) Gateway address of the network
DNS Server	(Valid for "Static" only) DNS server address of the network
VLAN	VLAN ID for tag on AP management packet (if unnecessary, set "0")
MTU	Packet length of the network

HTTP Proxy

These are the parameters of proxy in case the network requires it for communication with NMS:

Server Address	IP address of HTTP proxy server
Port	Port number of http packets toward the proxy server
Username	Username for authentication for the proxy server access if it is required
Password	Password for authentication for the proxy server access if it is required
Cellular	(not applicable for RA641)

USIM Parameters for LTE Module in RA620M and LTE Dongle (NCXX-UX302NCR) for RA621 and RA620

PIN	PIN for USIM access if PIN is enabled (PIN is recommended for disabling the operation. There is a risk of locking the USIM by using the wrong PIN if the AP retries many times in the case of a failed authentication.)
APN	APN for USIM
Auth	Authentication mode of network access via USIM (both, chap or pap) (small letters only)
Username	Username for authentication of network access

Password	Password for authentication of network access
Modes	Target cellular mode LTE or "" (blank: WCDMA + LTE)
Local Subnets	Local subnet via LAN1 (With RA620M only, the Wi-Fi user is able to access the local network subnet connected with LAN1 port. This parameter defines that subnet.)

Local NTP Server

In the case that access to the NTP server in the internet is blocked by a firewall, and in the case that the NTP server is located in an intranet, these parameters are configured to make the AP access to the server for calendar clock sync:

Server Address	NTP server address
Port	Port for NTP access

Versions

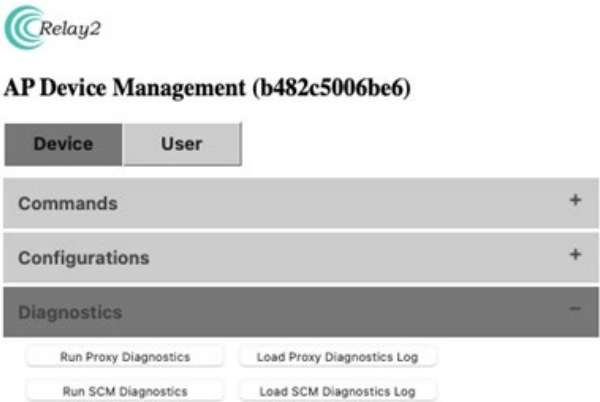
This is the information of the AP software image and DM GUI:

R2OS	AP software image version
Device Mtmt GUI	DM GUI version

Diagnostics

Diagnostics help to identify the issue when the AP fails to reach NMS.

Available diagnostics options are shown by clicking the “+” mark to the right of Diagnostics.



Note: The results of diagnostics appear in a pop-up window. Please allow pop-ups on this site (IP address) before the execution.

Figure 9: Diagnostics

Proxy Diagnostics

This is the test script to check proxy server access.

By clicking “Run Proxy Diagnostics,” the script is executed, and the messages are seen on a pop-up window.

SCM Diagnostics

This is the test script to check SCM server access. The SCM server is one server in NMS and the first server when the AP starts communication with NMS.

By clicking “Run SCM Diagnostics,” the script is executed, and the messages are seen on a pop-up window.



Figure 10: Example of SCM diagnostics results

Load Proxy Diagnostics Log, Load SCM Diagnostics Log

The log shows the latest test result.

By clicking “Load Proxy Diagnostics Log” or “Load SCM Diagnostics Log,” the latest results of “Proxy Diagnostics” or “SCM Diagnostics,” respectively, are shown on the pop-up window.

The pop-up window page supports “Re-run Diagnostics” and “Re-load Diagnostics” for re-execution.

User

DM GUI supports adding user access and changing user passwords.

Changing Default User Password

By clicking the “User” tab on the DM GUI initial page (refer to Figure 8: DM GUI Initial Page), the page for password change will open. Input the new password twice (Password and Confirm Password) and click “Apply,” followed by “OK” at the confirmation window, and the password is changed.



Figure 11: User Management

Adding Administrators

By clicking “Add New Users,” a window for new-user registration pops up.

Input the username and password (twice), then click “Apply.”

By clicking “-” on the right, the defined user is deleted.

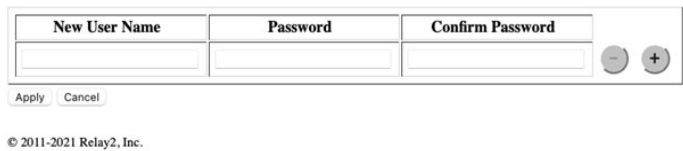


Figure 12: User Management (Add New User)