COORDINATOR / ROUTER
User Manual

Rev6

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■8F., No.20, Chenggong 13th St. Zhubei City, Hsinchu County 30264, Taiwan

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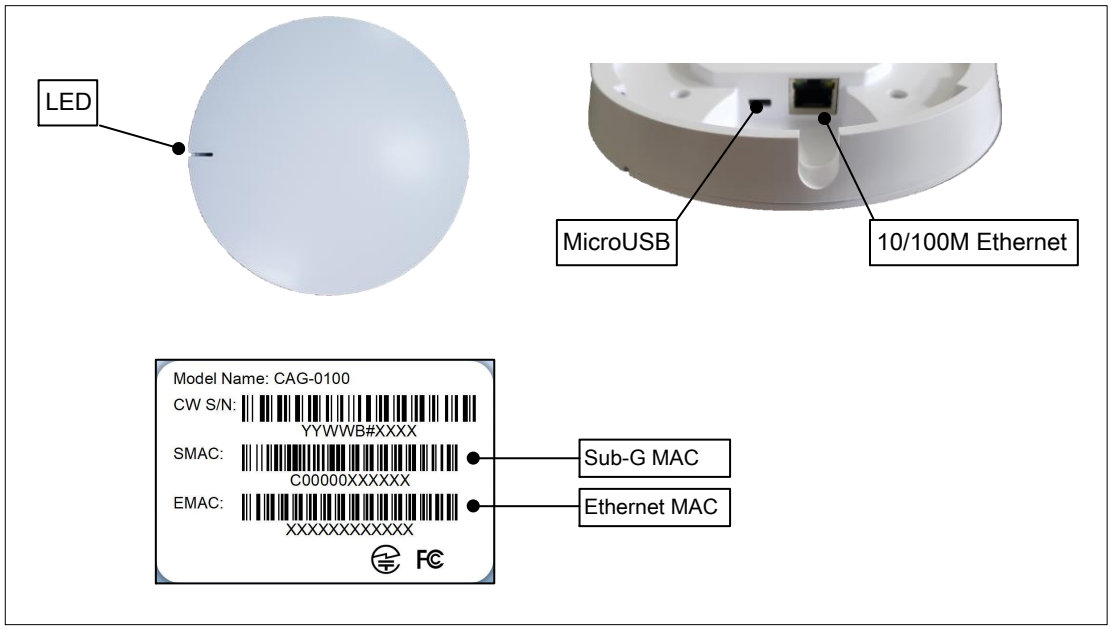
1 Specifications

1.1 Coordinator Specifications

Model Name	CAG-0100
Dimensions	■ 160 * 160 * 33 mm
Weight	■ 190g
Transmission Range	■ ~ 30m indoors
Connectivity	■ 10/100 Mbps Ethernet ■ Sub-1G wireless
Power Supply	■ MicroUSB: 5V/1A ■ POE
Operating Temperature	■ -10℃~50℃
LED	■ Green / Blue / Red
Security	■ Authentication ■ AES128 encryption and dynamic key exchange



LED Status Indicator

All Off	Power off or OS is not running
Green On	Software is not yet running.
Blue Blinks	Software is running but connection with Concentrator is not yet established.
Blue On	Everything is working properly.
Red On	Sub-G RF error

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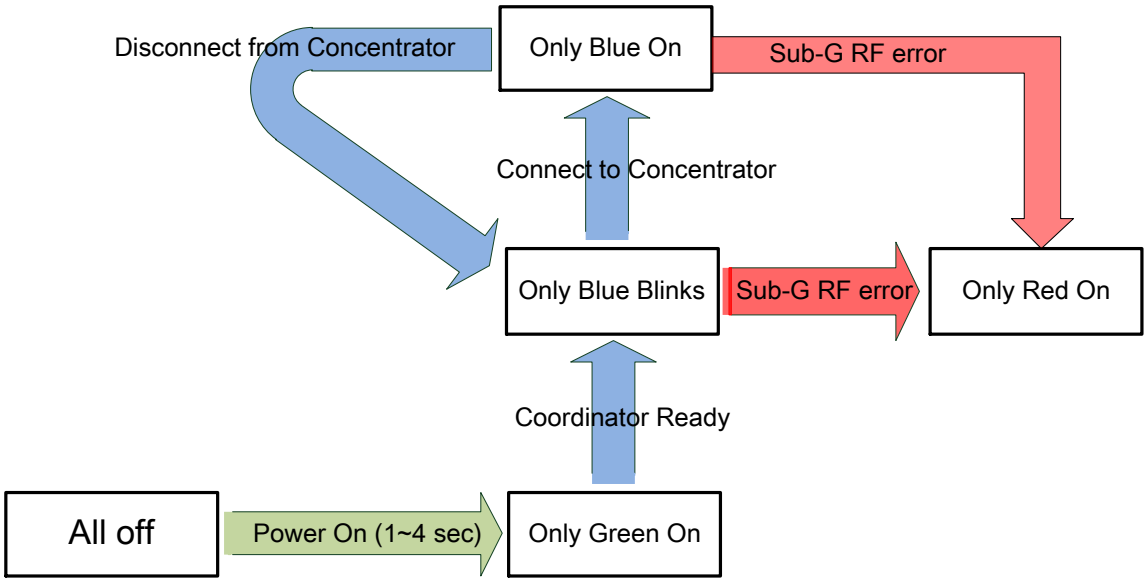

User only sees Green LED on means Coordinator software might encounter some problems.

1.2 Router Specifications

Model Name	CAP-0100
Dimensions	■ 160 * 160 * 33 mm
Weight	■ 180g
Transmission Range	■ ~ 30m indoors
Connectivity	Sub-1G wireless
Power Supply	■ MicroUSB: 5V/1A ■ POE (*)
Operating Temperature	■ -10℃~50℃
LED	■ Green / Blue / Red
Security	■ Authentication ■ AES128 encryption and dynamic key exchange

Router only uses POE as a power input. All LEDs on RJ45 will be off.

LED Status Indicator

All Off	Power off

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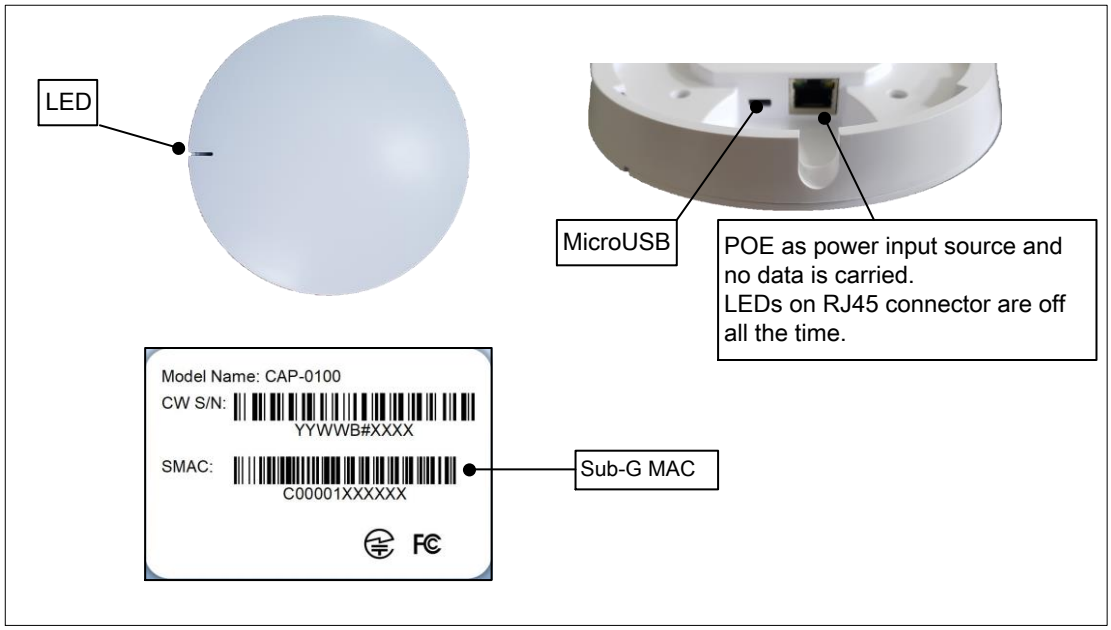
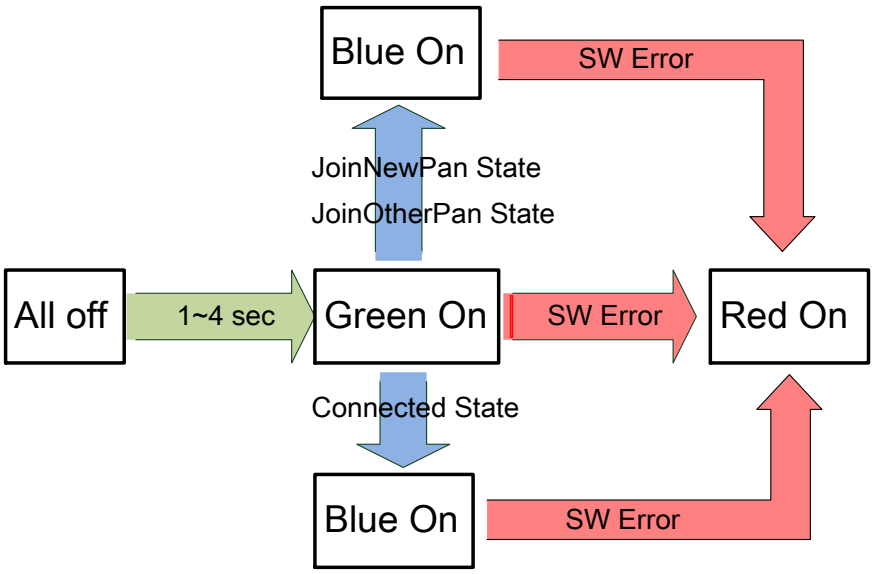
Green On	Router is in Standby state
Blue On	Router is in Connected state
Blue Blinks	Router is in JoinNewPan or JoinOtherPan state
Red On	Software error





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1.3 FCC Requirement

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.

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

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.

RF Exposure Information
This device has been tested and meets applicable limits for Radio Frequency (RF) exposure.
This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

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2 Configure Coordinator

> Router is a “zero configuration” device.

- Please download coordctl.zip from :

  Github: (Must have github account first)
  https://github.com/AllynkTechnology/coordctl/releases/latest

- Unzip coordctl.zip to your forder
- OS supported :
  Linux platform : coordctl_cust
  Windows platform : coordctl_cust.exe
- Execute configuration tool (Take windows platform for example)
  1. Run cmd.exe
  2. Enter the folder you unzip coordctl.zip

```
C:\WINDOWS\system32>d:

D:\>cd coordctl

D:\coordctl>
```

3. Execute coordctl_cust.exe

coordctl_cust.exe -config Enter

```
$ ./coordctl_cust.exe -config
```

When you see the output as the figure below the configuration tool is ready.

```
$ ./coordctl_cust.exe -config

Tool Version: 0.1.12

Connect Coordinator
        Coordinator's ip or hostname:
```

2.1 Connect to Coordinator

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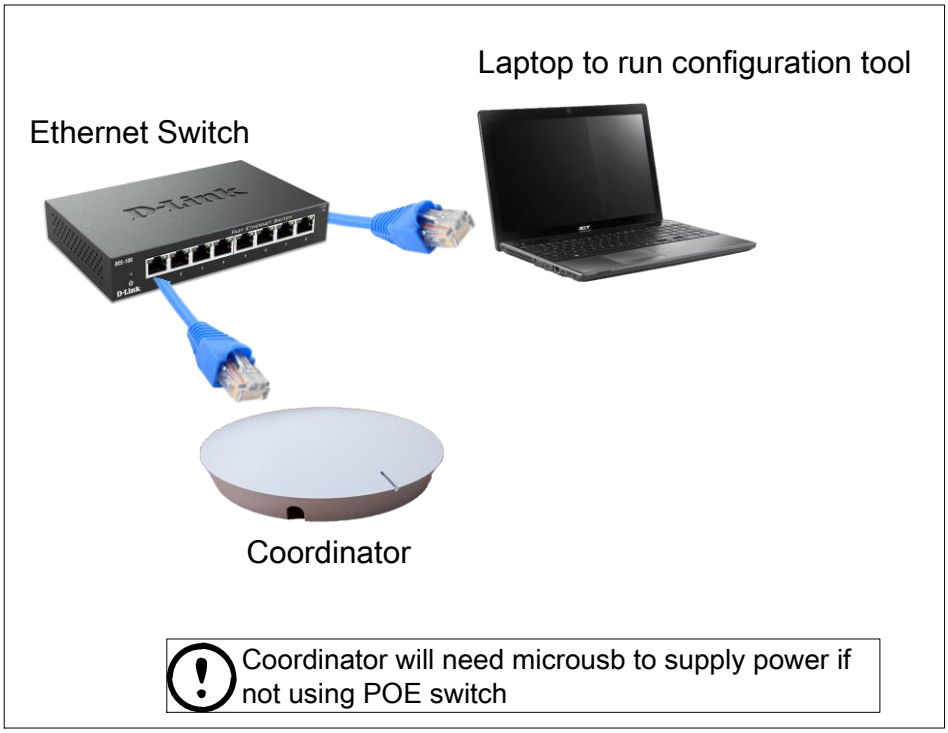
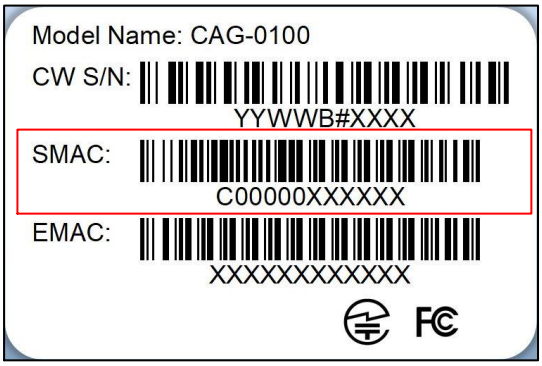
1. Setup the environment

Put coordinator to the same local network area (LAN) with your PC



2. Read Coordinator's hostname

Step1: Check the sticker on the bottom of Coordinator



Step2: Coordinator's hostname = SMAC
(Example) SMAC: C00000000050,
Coordinator hostname: C00000000050

3. Execute configuration tool and use hostname to connect your coordinator

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C00000000050 Enter

netlas Enter

netlas Enter

Username: netlas (User cannot modify)
Default Password: netlas (User can modify)

```
$ ./coordctl_cust.exe -wizard

Tool Version: 0.1.9

Connect Coordinator
        Coordinator's ip or hostname:  c00000000050
        username:netlas
        Password: ******

        connected!
```

2.2 Configure Coordinator IP

Coordinator ip settings

1 Enter

```
*******************************
Coordinator IP Settings
*******************************
        [IP settings]:
①       Using DHCP Fallback IP (Effictive when no DHCP):
        static ip_address=192.168.1.20/24
②       static domain_name_servers=8.8.8.8
        static routers=192.168.1.254

        [Current IP]:
        eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.1.1.114  netmask 255.255.255.0  broadcast 10.1.1.255
        inet6 fe80::7675:fe47:fe0b:5c18  prefixlen 64  scopeid 0x20<link>
        ether 00:e0:4c:36:ff:14  txqueuelen 1000  (Ethernet)
        RX packets 1279941  bytes 105079133 (100.2 MiB)
        RX errors 0  dropped 291  overruns 0  frame 0
        TX packets 4844  bytes 477422 (466.2 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0



        Modify IP? (N/y):
```


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① DCHP fallback IP vs Static IP

DHCP Fallback IP

Ethernet Switch with DHCP enabled

IP: Dispatched by DHCP server
DNS: Dispatched by DHCP server
Gateway: Dispatched by DHCP server

Ethernet Switch with DHCP disabled

IP: User configured
DNS: User configured
Gateway: User configured

Fallback IP settings are only effective when DHCP server is not available

Static IP

Ethernet Switch (with or without DHCP)

IP: User configured
DNS: User configured
Gateway: User configured

② IP Setting Contents:

- IP Address
- Subnet Mask
- Domain Name Server Address
- Router (Gateway) Address

2. Current IP

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```
*******************************
Coordinator IP Settings
*******************************
        [IP settings]:
        Using DHCP Fallback IP (Effictive when no DHCP):
        static ip_address=192.168.1.20/24
        static domain_name_servers=8.8.8.8
        static routers=192.168.1.254

        [Current IP]:
        eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.1.1.114  netmask 255.255.255.0  broadcast 10.1.1.255
        inet6 fe80::7675:fe47:fe0b:5c18  prefixlen 64  scopeid 0x20<link>
        ether 00:e0:4c:36:ff:14  txqueuelen 1000  (Ethernet)
        RX packets 1279941  bytes 105079133 (100.2 MiB)
        RX errors 0  dropped 291  overruns 0  frame 0
        TX packets 4844  bytes 477422 (466.2 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0



        Modify IP? (N/y):
```

3. Modify IP

DHCP Fallback IP		Static IP	
y	Enter	y	Enter
n	Enter	y	Enter

```
*******************************
Coordinator IP Settings
*******************************
        [IP settings]:
        Using DHCP Fallback IP (Effictive when no DHCP):
        static ip_address=192.168.1.20/24
        static domain_name_servers=8.8.8.8
        static routers=192.168.1.254

        [Current IP]:
        eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.1.1.114  netmask 255.255.255.0  broadcast 10.1.1.255
        inet6 fe80::7675:fe47:fe0b:5c18  prefixlen 64  scopeid 0x20<link>
        ether 00:e0:4c:36:ff:14  txqueuelen 1000  (Ethernet)
        RX packets 1279941  bytes 105079133 (100.2 MiB)
        RX errors 0  dropped 291  overruns 0  frame 0
        TX packets 4844  bytes 477422 (466.2 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0



        Modify IP? (N/y):y
        Use static IP? (N/y):
```


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<New IP> Enter

<New Subnet> Enter

<New DNS> Enter

<Gateway> Enter

```
Modify IP? (N/y):y
Use static IP? (N/y):

[Using DHCP fallback IP (Effective when no DHCP server)]
IP address:192.168.1.20
SubnetMask:255.255.255.0
Domain Name Server:8.8.8.8
Gateway:192.168.1.254
```

Apply new IP settings to coordinator

```
[Using DHCP fallback IP (Effective when no DHCP server)]
IP address:192.168.1.20
SubnetMask:255.255.255.0
Domain Name Server:8.8.8.8
Gateway:192.168.1.254

[New IP settings]
Type:fallback
IP:192.168.1.20
SubnetMask:255.255.255.0
DNS:8.8.8.8
Gateway:192.168.1.254

Set DHCP fallback IP
Set ip_address=192.168.1.20/24
Set domain_name_servers=8.8.8.8
Set routers=192.168.1.254
Successfully

Done
```


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2.3 Configure Daemon Port

Daemon Port Settings

2 Enter

```
********************************
Daemon Port Settings
********************************
        [Current Settnigs]
        daemon Port = 7777

        Modify Daemon port? (N/y):
```

Daemon port is the TCP port for program running within Coordinator to communicate with Concentrator program

1. Current Daemon port

```
[Current Settnigs]
daemon Port = 7777
```

2. Modify Daemon Port

y Enter

<New Port> Enter

```
********************************
Daemon Port Settings
********************************
        [Current Settnigs]
        daemon Port = 7777

        Modify Daemon port? (N/y):y

        Port: 7575
        Restart Daemon done
        Set Daemon successfully
```


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2.4 Configure Time Zone

Time Settings

3 Enter

```
*******************************
Time Settings
*******************************
        [Current time information]:
      Local time: Tue 2021-10-05 11:26:10 JST
  Universal time: Tue 2021-10-05 02:26:10 UTC
        RTC time: Tue 2021-10-05 02:19:14
       Time zone: Asia/Tokyo (JST, +0900)
 Network time on: yes
NTP synchronized: yes
 RTC in local TZ: no


        Modify Time Zone? (N/y):
```

TimeZone parameter should follow the format of TZ database name (ex: Asia/Taipei 、Asia/Tokyo、America/New_York…..)

1. Current time information

```
        [Current time information]:
      Local time: Tue 2021-10-05 11:26:10 JST
  Universal time: Tue 2021-10-05 02:26:10 UTC
        RTC time: Tue 2021-10-05 02:19:14
       Time zone: Asia/Tokyo (JST, +0900)
 Network time on: yes
NTP synchronized: yes
 RTC in local TZ: no
```

2. Modify time zone

y Enter

<New TimeZone> Enter

```
Time Settings
        Modify Time Zone? (N/y):y
        Time Zone (ex: Asia/Tokyo):Asia/Taipei


      Local time: Tue 2021-07-06 12:41:19 CST
  Universal time: Tue 2021-07-06 04:41:19 UTC
        RTC time: Tue 2021-07-06 04:39:17
       Time zone: Asia/Taipei (CST, +0800)
 Network time on: yes
NTP synchronized: yes
 RTC in local TZ: no
```


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2.5 Configure NTP Server

NTP Settings

4 Enter

```
********************************
NTP Settings
********************************
        [NTP server setting]
        NTP=time.google.com

        [NTP synchronization status]
      Local time: Tue 2021-10-05 11:30:25 JST
  Universal time: Tue 2021-10-05 02:30:25 UTC
        RTC time: Tue 2021-10-05 02:19:14
       Time zone: Asia/Tokyo (JST, +0900)
 Network time on: yes
NTP synchronized: yes
 RTC in local TZ: no


        Modify NTP Server IP? (N/y):
```

NTP server help eliminate time drift between coordinator and Concentrator program

1. Current NTP Server

```
   Coordinator NTP Settings
       [NTP server setting]
       NTP=time.google.com

       [NTP synchronization status]
     Local time: Thu 2021-05-20 01:44:34 CST
 Universal time: Wed 2021-05-19 17:44:34 UTC
       RTC time: Wed 2021-05-19 17:44:34
      Time zone: Asia/Taipei (CST, +0800)
Network time on: yes
NTP synchronized: no
RTC in local TZ: no
```

2. Modify NTP server

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y Enter

<New Time server> Enter

```
Modify NTP Server IP? (N/y):y

NTP Server address:time.windows.com
[Set NTP server IP]
Set NTP=time.windows.com
Restart NTP done!
Set NTP Successfully

[Restart NTP service]
```

2.6 Concentrator IP & Port

Concentrator IP Settings

5 Enter

```
********************************
Concentrator IP Settings
********************************
        [Current Concentrator Settings]
        Concentrator Address =
        Concentrator Port = 0
        TLS enabled

        Modify Concentrator configurations? (N/y):
```

Set Concentrator IP to Coordinator will help user to add coordinator to Concentrator program reversely

1. Current Concentrator IP & port settings

```
Concentrator IP Settings
    [Current Concentrator Settings]
    Concentrator Address = 10.1.1.83
    Concentrator Port = 7070
    TLS disabled
```

2. Modify Concentrator IP & port

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y Enter

<New Concentrator IP> Enter

<New Concentrator Port> Enter

y Enter

```
Concentrator IP Settings
    [Current Concentrator Settings]
    Concentrator Address = 10.1.1.83
    Concentrator Port = 7070
    TLS disabled

    Modify Concentrator configurations? (N/y):y

    Concentrator address:10.1.1.54
    Port: 7070
    Enable TLS? (N/y):y
    Restart Daemon done
    Set Concentrator successfully
```

2.7 Adjust User Account

User account Settings

6 Enter

```
********************************
User account Settings
********************************
        Configure user account? (N/y):y

                User list:
                Number of users:[0]
```

User list only shows users other than 'Default user'

Coordinator cannot be configured once user forgets all accounts' password.

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1. Modify current login user's password

y Enter

<Current Password> Enter

<New Password> Enter

<New Password again> Enter

y Enter

```
Password Settings
    Change password? (N/y):y

    Warning! User cannot login his account again if losing the password!

    Enter current password: ******

    Enter new password: ******

    Retype new password: ******

    Are you sure? (N/y):y

    Set new password [netlas] done. Please use new password immediately
```

2. Add new account(s)

> In addition to default account, User can add up to 2 new accounts

y Enter

<new username> Enter

<new password> Enter

<retype password> Enter

y Enter

y: add another / n: quit Enter

```
Add user? (N/y):y
        New UserName:tester
        Enter password: ****
        Retype password: ****
        Are you sure to add user <tester>? (N/y):y
Add new user [tester] done.

        User list:
        default user: [netlas]
        other user: [tester]

Add user? (N/y):
```


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3. Delete existing account(s)

Default user cannot be deleted

y Enter

<username to delete> Enter

y Enter

y: delete another / n: quit Enter

```
Delete user? (N/y):y
        UserName to be deleted:tester
        Are you sure to delete user <tester>? (N/y):y
Delete user [tester] done.

        User list:
        default user: [netlas]

Delete user? (N/y):
```


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3 Install Coordinator and Router

Screw the attachment on the ceiling.

Plug in the Ethernet cable

Put coordinator or router on the top of attachment, and rotate in the clockwise direction.

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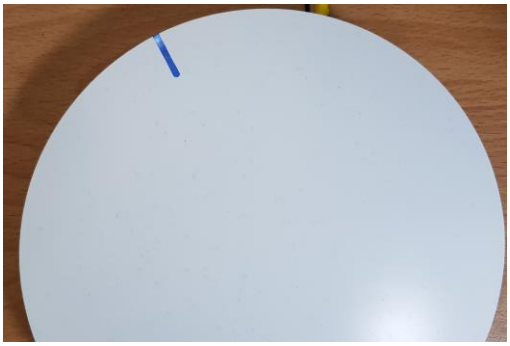
Coordinator is ready to connect to Concentrator when Blue LED is blinking.



Next, Coordinator should be added and enabled in Concentrator program . Please refer to Concentrator documents for more information

Router is ready when Green LED is on.

Next, Router should be added to Sub-G network for further usage. Please refer to Concentrator documents for more information

4 Use Coordinator to do site evaluation

- Control you devices via coordctl tool or Concentrator ?

	Concentrator	control mode in coordctl tool
Purpose	Full commercial operation	Simple operation for environment evaluation (Not recommended for commercial use)
Functions	All functions are available	Only necessary functions are available
Target	Multiple coordinators	One coordinator
Control panel	Customized client is needed.	Control devices directly

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- Execute configuration tool (Take windows platform for example)
  1. Run cmd.exe
  2. Enter the folder you unzip coordctl.zip

```
C:\WINDOWS\system32>d:

D:\>cd coordctl

D:\coordctl>
```

3. Execute coordctl_cust.exe

coordctl_cust.exe -control Enter

```
$ ./coordctl_cust.exe -control
```

When you see the output as the figure below the configuration tool is ready.

```
$ ./coordctl_cust.exe -control

Tool Version: 0.1.12

Connect Coordinator
        Coordinator's ip or hostname:
```

4.1 Connect to Coordinator

For setting up the connection between Coordinator and your PC, please refer to section 2.1 Connect to Coordinator

Execute configuration tool and use hostname to connect your coordinator

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C00000000050 Enter

netlas Enter

netlas Enter

Username: netlas (User cannot modify)
Default Password: netlas (User can modify)

```
$ ./coordctl_cust.exe -control

Tool Version: 0.1.12

Connect Coordinator
        Coordinator's ip or hostname:  c00000000050
        username:netlas
        Password: ******

        connected!
        grpc connected!
```

4.2 PAN control

PAN is the network controlled by Coordinator

1 Enter

```
************* (Main) *************
(1) Pan
(2) Device
(3) Reconnect
(q) Quit
[1-3 or q]:1


************* (Pan) *************
(1) Info
(2) Start
(3) Stop
(4) Awake
(5) Purge
(q) Quit
[1-5 or q]:
```

4.2.1 Check PAN information

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1 Enter

```
************ (Pan) ************
(1) Info
(2) Start
(3) Stop
(4) Awake
(5) Purge
(q) Quit
[1-5 or q]:1

        [PanID]: 37, [Enabled]: true, [Channel]: 50, [Power]: 7
                [BeaconInterval]: BEACON_INTERVAL_8, [Awake]: false
```

Field	Descriptions
[PanID]	Unique ID for this PAN
[Enabled]	✓ true: PAN is on. (Can be stopped by Stop PAN) ✓ false: PAN is off. (Can be started by Start PAN)
[Channel]	The radio frequency this PAN is using.
[Power]	Transmission power (Unit: dbm)
[BeaconInterval]	The frequency of batch processing.
[Awake]	✓ true: PAN is awakening device. ✓ false: PAN is not awakening device.

4.2.2 Start PAN

Procedures: (1) List Channel ➔ (2) Scan channel ➔ (3) Start pan

- List channel

1 Enter

```
************ (Pan Start) ************
(1) List Channel
(2) Scan Channel
(3) Start Pan
(q) Quit
[1-3 or q]:1
        [0] 902000
        [1] 902200
        [2] 902400
        [3] 902600
        [4] 902800
        [5] 903000
        [6] 903200
```


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> **[Channel number]** Physical radio frequency

- Scan channel

> Scan channel can only be executed when PAN enabled = false

2 Enter

<start channel number> Enter

<end channel number> Enter

```
************ (Pan Start) ************
(1) List Channel
(2) Scan Channel
(3) Start Pan
(q) Quit
[1-3 or q]:2
        Start Number:
        Channel:  96
        End Number:
        Channel:  100
        [Scan channel 96]: value:true
        [Scan channel 97]: value:true
        [Scan channel 98]: value:true
        [Scan channel 99]: value:true
        [Scan channel 100]: value:true
```

- Return value: true: This channel is available.
- Return value:<Blank>: This channel is occupied.

- Start pan

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3 Enter

<channel num> Enter

<tx power> Enter

```
************ (Pan Start) ************
(1) List Channel
(2) Scan Channel
(3) Start Pan
(q) Quit
[1-3 or q]:3
        Channel:  110
        Tx Power (0-14):  7
        [Result]: value:true
        [PanID]: 50, [Enabled]: true, [Channel]: 110, [Power]: 7
                [BeaconInterval]: BEACON_INTERVAL_32, [Awake]: false
```

Tx Power should be lower than 8 when coordinator is used in Japan

- Return value: true: PAN has been started successfully
- Return value: false: Error happened during starting PAN.

4.2.3 Stop PAN

3 Enter

```
************ (Pan) ************
(1) Info
(2) Start
(3) Stop
(4) Awake
(5) Purge
(q) Quit
[1-5 or q]:3

        Prepare to execute operation...
        [Result]: value:true
        [PanID]: 50, [Enabled]: false, [Channel]: 110, [Power]: 7
                [BeaconInterval]: BEACON_INTERVAL_32, [Awake]: false
```

- Return value: true: PAN has been stopped successfully
- Return value: false: Error happened during stopping PAN.

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4.2.4 Awake devices within the PAN

4 Enter

```
************ (Pan) ************
(1) Info
(2) Start
(3) Stop
(4) Awake
(5) Purge
(q) Quit
[1-5 or q]:4
```

- Start Awakening

1 Enter

<Awake time> Enter

```
************ (Pan Awake) ************
(1) Start Awakening
(2) Stop Awakening
(q) Quit
[1-2 or q]:1

        minutes (1-256):  2
        Prepare to execute operation.....
        [Result] Pan Awakening is started
```

- Stop Awakening

2 Enter

```
************ (Pan Awake) ************
(1) Start Awakening
(2) Stop Awakening
(q) Quit
[1-2 or q]:2

        Prepare to execute operation.....
        [Result] Pan Awakening is stopped
```

4.2.5 Expel devices from the PAN

Before executing this operation, user should know the difference between activated and non-activated devices.

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	Activated device	Non-activated device
Device will save PAN's information	Yes	No
Device will search PAN's signal if disconnecting from PAN	Yes	No
PAN needs to execute awake PAN to make device connect	No	Yes
Device will leave this PAN when user executes Purge PAN operation.	No	Yes

So, Purge Pan is the operation to ask non-activated device to leave the PAN.

5 Enter

```
************* (Pan) *************
(1) Info
(2) Start
(3) Stop
(4) Awake
(5) Purge
(q) Quit
[1-5 or q]:5

        Prepare to execute operation.................
        [Purged]: C000020004C0
```

The list of purged device's address will be returned when this operation is completed.

4.3 Device control

2 Enter

```
************* (Main) *************
(1) Pan
(2) Device
(3) Reconnect
(q) Quit
[1-3 or q]:2
```

4.3.1 Check device information

1 Enter

```
************* (Device) *************
(1) List
(2) Ping
(3) Tx
(q) Quit
[1-3 or q]:1
```


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- List the specific device's information

1 Enter

<Device MAC> Enter ※ Press Enter to leave without changing current value

```
************ Device List ************
[Target Device]:
(1) Change Extended Address
(2) List One
(3) List All
(4) List All (Sorted by RSSI)
(5) List All (Sorted by Voltage)
(q) Quit Device List
[1-5 or q]:1
        Device's extended address (press enter to keep):  c00002000285

************ Device List ************
[Target Device]: C00002000285
(1) Change Extended Address
(2) List One
(3) List All
```

Target Device will be kept until user modifies it again. So this step can be skipped if user wants to list the same device

2 Enter

```
************ Device List ************
[Target Device]: C0000200045B
(1) Change Extended Address
(2) List One
(3) List All
(4) List All (Sorted by RSSI)
(5) List All (Sorted by Voltage)
(q) Quit Device List
[1-5 or q]:2


        C0000200045B    [END_DEVICE] , [Activated]: true
                [Time]:2021-10-25 03:13:18 PM [Type]: TRANSMISSION_TYPE_UNICAST_COMMAND [Status]:STATUS_OK
                [RSSI]: -49 , [Voltage]: 2.96, [FirmwareVersion]: 0.1.15
                [ScanInterval1]: 600, [ScanInterval2]: 60, [ScanIteration]: 20
                [UserDefinedBehavior]: fffff9f1fafafefe
```

Field	Descriptions
C0000200045B	Device's extended address
[END_DEVICE]	Device type
[Activated]	✓ true: Activated ✓ false: Non-activated See Activated vs Non-activated for more information.
[Time]	Last operation time.
[Type]	Last operation type. Ex: PING
[Status]	Last operation status.
[RSSI]	Received signal strength. -30~-85 (dbm). Bigger number represents better signal strength. (Ex: -30 is better than -40)
[Voltage]	Battery voltage.
[FirmwareVersion]	Device's firmware version
[ScanInterval1]	Device's long sleep time (second)
[ScanInterval2]	Device's short sleep time (second)

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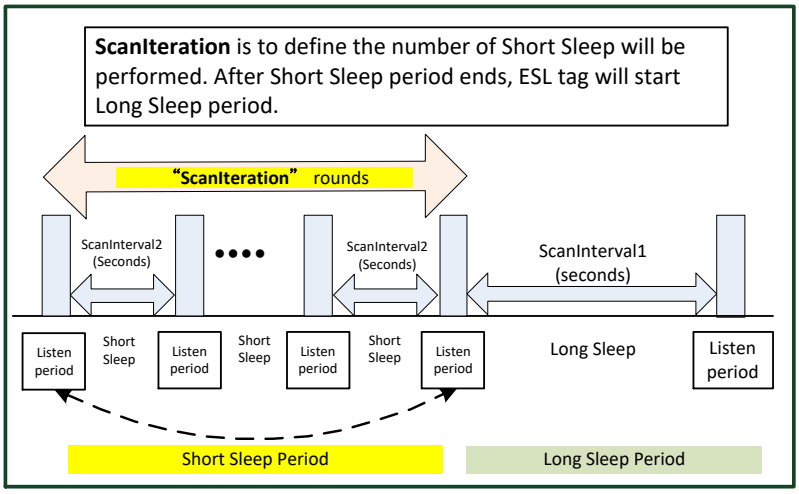
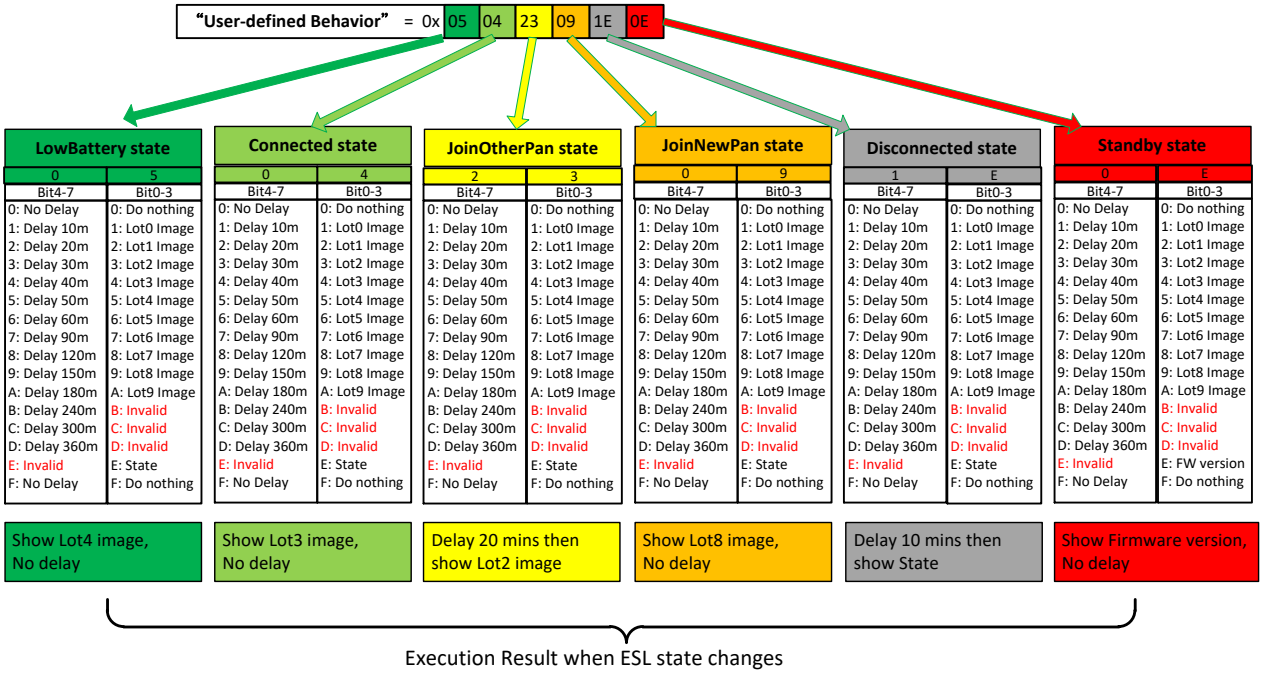
[ScanIteration]	The number of Short Sleep repeated in the Short Sleep Period
[UserDefinedBehavior]	Image action when device's state changes

➢ Sleep time and Sleep Period



➢ UserDefinedBehavior



About ESL states, please see ESL technical guide for more details

- List all devices' information (Sorted by device address)

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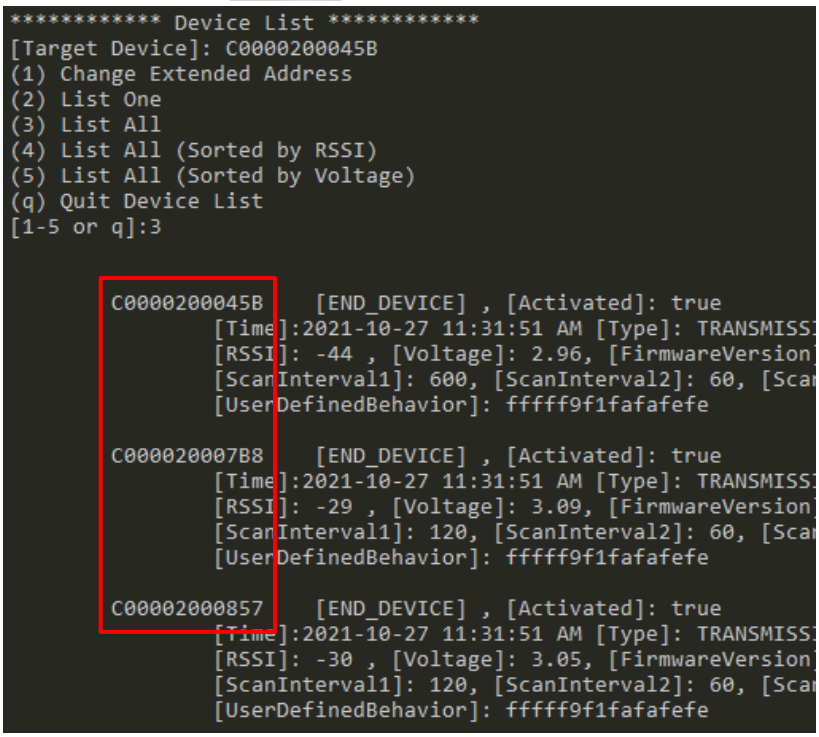
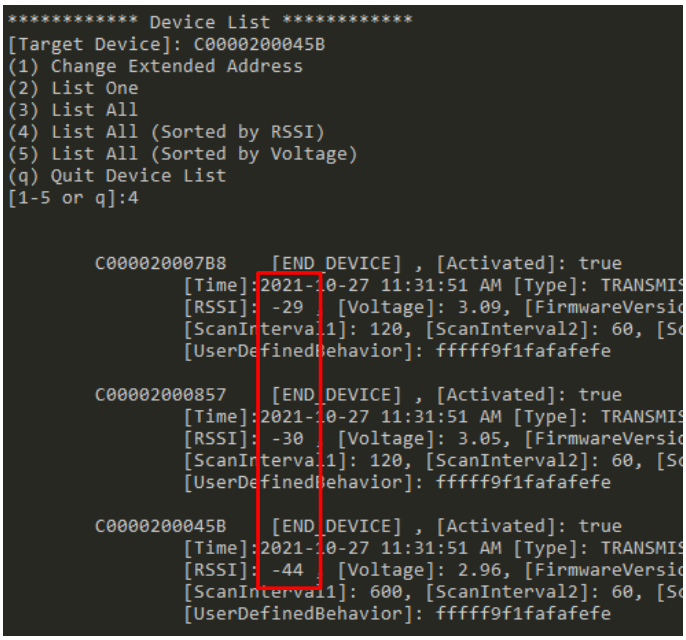
3 Enter



- List all devices' information (Sorted by device's RSSI)

4 Enter



- List all devices' information (Sorted by device's battery voltage)

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5 Enter

```
************ Device List ************
[Target Device]:
(1) Change Extended Address
(2) List One
(3) List All
(4) List All (Sorted by RSSI)
(5) List All (Sorted by Voltage)
(q) Quit Device List
[1-5 or q]:5
        C0000200045B    [END_DEVICE] , [Activated]: true
                [Type]: TRANSMISSION_TYPE_PING [Status]:STATUS_OK
                [RSSI]: -53 , [Voltage]: 3.01, [FirmwareVersion]: 0.1.15
        C0000200090A    [END_DEVICE] , [Activated]: true
                [Type]: TRANSMISSION_TYPE_PING [Status]:STATUS_OK
                [RSSI]: -52 , [Voltage]: 3.01, [FirmwareVersion]: 0.1.15
        C000020007B8    [END_DEVICE] , [Activated]: true
                [Type]: TRANSMISSION_TYPE_PING [Status]:STATUS_OK
                [RSSI]: -30 , [Voltage]: 3.09, [FirmwareVersion]: 0.1.15
        C00002000857    [END_DEVICE] , [Activated]: true
                [Type]: TRANSMISSION_TYPE_PING [Status]:STATUS_OK
                [RSSI]: -35 , [Voltage]: 3.09, [FirmwareVersion]: 0.1.15
```

4.3.2 Ping device(s)

2 Enter

```
************ (Device) ************
(1) List
(2) Ping
(3) Tx
(q) Quit
[1-3 or q]:2
```

- Ping single device

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1 Enter

<Device MAC> Enter ※ Press Enter to leave without changing current value

```
************ (Device Ping) ************
[Target Device]:
(1) Change Extended Address
(2) Ping One
(3) Ping All
(q) Quit
[1-3 or q]:1
        Device's extended address (press enter to keep):  c0000200045b

************ (Device Ping) ************
[Target Device]: C0000200045B
(1) Change Extended Address
(2) Ping One
(3) Ping All
(q) Quit
[1-3 or q]:
```

Target Device will be kept until user modifies it again. So this step can be skipped if user wants to ping the same device

2 Enter

```
************ (Device Ping) ************
[Target Device]: C0000200045B
(1) Change Extended Address
(2) Ping One
(3) Ping All
(q) Quit
[1-3 or q]:2
        Prepare to execute operation..

        C0000200045B    [END_DEVICE] , [Activated]: true
                [Time]:2021-10-27 11:46:42 AM [Type]: TRANSMISSION_TYPE_PING [Status]:STATUS_OK
                [RSSI]: -44 , [Voltage]: 2.96, [FirmwareVersion]: 0.1.15
                [ScanInterval1]: 600, [ScanInterval2]: 60, [ScanIteration]: 20
                [UserDefinedBehavior]: fffff9f1fafafefe
                [JobId]: 197,  [JobStatus]: JOB_STATUS_OK_NOVALUE
                [JobId]: 2,  [JobStatus]: JOB_STATUS_OK_NOVALUE
                [JobId]: 3,  [JobStatus]: JOB_STATUS_INPROGRESS
                [JobId]: 196,  [JobStatus]: JOB_STATUS_OK_NOVALUE
```

Field	Descriptions
C0000200045B	Device's extended address
[END_DEVICE]	Device type
[Activated]	✓ true: Activated ✓ false: Non-activated See Activated vs Non-activated for more information.
[Time]	Last operation time
[Status]	Last operation status.
[Type]	Last operation type. Ex: PING
[RSSI]	Received signal strength. -30~-85 (dbm). Bigger number represents better signal strength. (Ex: -30 is better than -40)
[Voltage]	Battery voltage.
[FirmwareVersion]	Device's firmware version
[ScanInterval1]	Device's long sleep time (second)
[ScanInterval2]	Device's short sleep time (second)
[ScanIteration]	The number of Short Sleep repeated in the Short Sleep Period
[UserDefinedBehavior]	Image action when device's state changes

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[JobId]	The identifier of previous executed operation (ESL will keep the last 4 operations.)
[JobStauts]	The status of previous executed operation. (ESL will keep the last 4 operations.)

If [Status] is not STATUS_OK, it means ping operation is not completed successfully

- Ping all devices

3 Enter

```
************ (Device Ping) ************
[Target Device]: C0000200045B
(1) Change Extended Address
(2) Ping One
(3) Ping All
(q) Quit
[1-3 or q]:3
        Prepare to execute operation.....

        C0000200045B    [END_DEVICE] , [Activated]: true
                [Time]:2021-10-27 11:49:27 AM [Type]: TRANSMISSION_TYPE_PING [Status]:STATUS_OK
                [RSSI]: -44 , [Voltage]: 2.96, [FirmwareVersion]: 0.1.15
                [ScanInterval1]: 600, [ScanInterval2]: 60, [ScanIteration]: 20
                [UserDefinedBehavior]: fffff9f1fafafefe
                [JobId]: 197,  [JobStatus]: JOB_STATUS_OK_NOVALUE
                [JobId]: 2,  [JobStatus]: JOB_STATUS_OK_NOVALUE
                [JobId]: 3,  [JobStatus]: JOB_STATUS_INPROGRESS
                [JobId]: 196,  [JobStatus]: JOB_STATUS_OK_NOVALUE

        C000020007B8    [END_DEVICE] , [Activated]: true
                [Time]:2021-10-27 11:49:27 AM [Type]: TRANSMISSION_TYPE_PING [Status]:STATUS_OK
                [RSSI]: -28 , [Voltage]: 3.09, [FirmwareVersion]: 0.1.16
                [ScanInterval1]: 120, [ScanInterval2]: 60, [ScanIteration]: 20
                [UserDefinedBehavior]: fffff9f1fafafefe
                [JobId]: 49,  [JobStatus]: JOB_STATUS_OK_NOVALUE
                [JobId]: 196,  [JobStatus]: JOB_STATUS_OK_NOVALUE
                [JobId]: 197,  [JobStatus]: JOB_STATUS_OK_NOVALUE
                [JobId]: 48,  [JobStatus]: JOB_STATUS_OK_NOVALUE

        C00002000857    [END_DEVICE] , [Activated]: true
                [Time]:2021-10-27 11:49:27 AM [Type]: TRANSMISSION_TYPE_PING [Status]:STATUS_OK
                [RSSI]: -30 , [Voltage]: 3.05, [FirmwareVersion]: 0.1.16
                [ScanInterval1]: 120, [ScanInterval2]: 60, [ScanIteration]: 20
                [UserDefinedBehavior]: fffff9f1fafafefe
                [JobId]: 195,  [JobStatus]: JOB_STATUS_OK_NOVALUE
                [JobId]: 70,  [JobStatus]: JOB_STATUS_OK_NOVALUE
                [JobId]: 196,  [JobStatus]: JOB_STATUS_OK_NOVALUE
                [JobId]: 197,  [JobStatus]: JOB_STATUS_OK_NOVALUE
```

4.3.3 Send image or command to device

3 Enter

```
************* (Device) *************
(1) List
(2) Ping
(3) Tx
(q) Quit
[1-3 or q]:3
```

- Set parameters
  - Target device: Device's extended address.

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1 Enter

<Device MAC> Enter ※ Press Enter to leave without changing current value

```
************ (Device Tx) ************
[Target Device]:
[Target Image File]:
[Target Image Header]:
[Target Command]:
(1) Change Extended Address
(2) Change Image File
(3) Change Command
(4) Send Image
(5) Send Command
(q) Quit
[1-5 or q]:1
        Device's extended address (press enter to keep):  c0000200045b

************ (Device Tx) ************
[Target Device]: C0000200045B
[Target Image File]:
[Target Image Header]:
[Target Command]:
(1) Change Extended Address
```

- Target file: Image file (Please use image file generated by Allynk's tool.)

2 Enter

<File Path> Enter ※ Press Enter to leave without changing current value

<Header Value> Enter ※ Press Enter to leave without changing current value

```
************ (Device Tx) ************
[Target Device]: C0000200045B
[Target Image File]:
[Target Image Header]:
[Target Command]:
(1) Change Extended Address
(2) Change Image File
(3) Change Command
(4) Send Image
(5) Send Command
(q) Quit
[1-5 or q]:2
        Image file (press enter to keep:):  266_6.png
        Image header (hex number, ex: 0x1234) or press enter to keep:  0x010400

************ (Device Tx) ************
[Target Device]: C0000200045B
[Target Image File]: 266_6.png
[Target Image Header]: 0x010400
[Target Command]:
```

The usage of image header:

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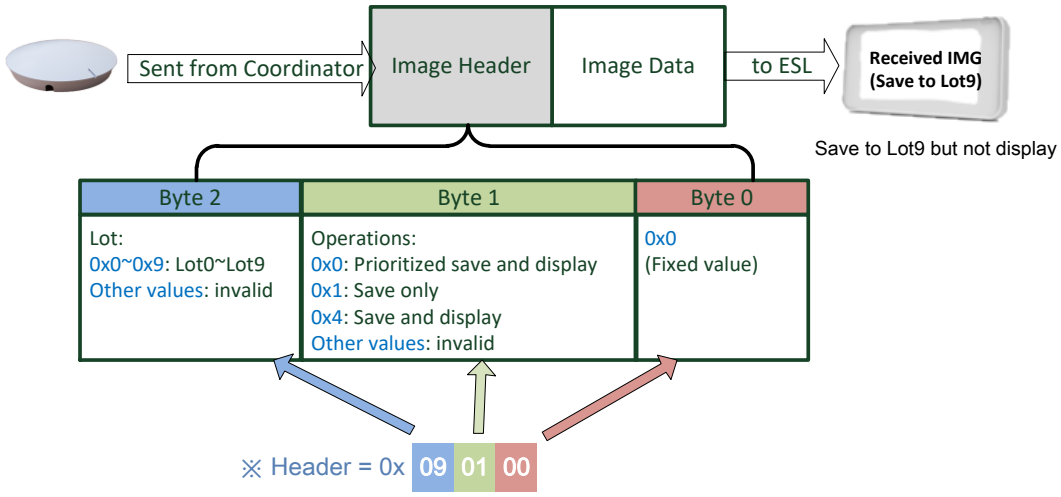
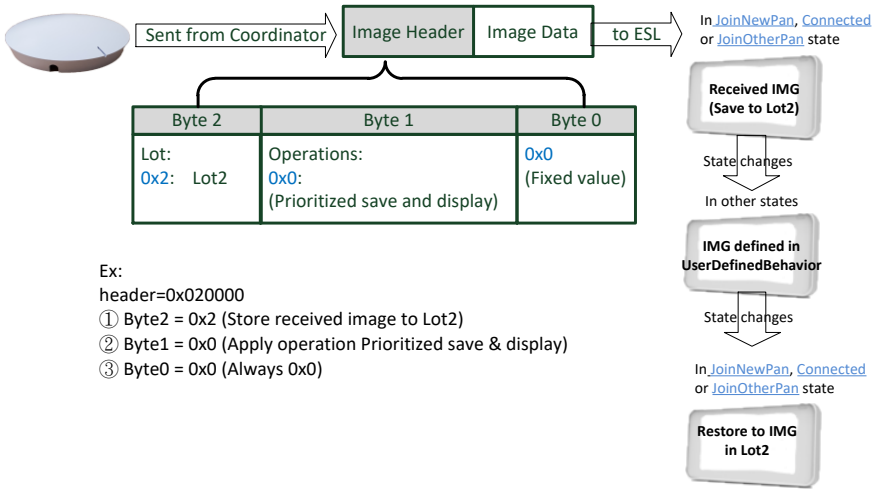


Operation:	Descriptions
Prioritized save & display	Save and display this image with priority. This image will be displayed with priority when ESL enters JoinNewPan, JoinOtherPan or Connected state. The related actions defined in UserDefinedBehavior will be ignored. 
Save Only	Save the given image to indicated lot but not display the image.
Save and display	Save and display this image.

About header, please see ESL technical guide for more details

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- Target command: Command contents

3 Enter

<command contents> Enter

```
************* (Device Tx) *************
[Target Device]: C0000200045B
[Target File]: 266_6.png
[Target Command]:
(1) Change Extended Address:
(2) Change File
(3) Change Command
(4) Send Image
(5) Send Command
(q) Quit
[1-5 or q]:3
        Command:  ledon
        command: ledon

************* (Device Tx) *************
[Target Device]: C0000200045B
[Target File]: 266_6.png
[Target Command]: ledon
```

Available command:

Command	Descriptions
activate	Activate device
config -inv1 <sec> -inv2 <sec> -iter <num> -epd <action> (※ inv1 / inv2 / iter / epd parameters are optional, user can use all of them or one of them)	Modify ESL's configurations ✓ inv1: ScanInterval1. ESL long sleep time (0~65534 sec) ✓ inv2: ScanInterval2. ESL short sleep time (0~254 sec) ✓ iter: ScanIteration. ESL short sleep rounds (0~254 rounds) ✓ epd: UserDefinedBehavior. Control image display when ESL's state changes.
deactivate	Deactivate device
imgshow -current	Refresh current image
imgshow -index <0~9>	Fetch previously stored image. Ex: imgshow -index 1 (Fetch image from slot 1)
ledon	Turn on LED
ledoff	Turn off LED
ledblink -on <ms> -off <ms> -interval <sec> (※ on / off / interval parameters are all needed)	Specify how to blink the LED ✓ on: time (millisecond) to keep LED on (Must be multiply of 250, ex: 250/500/750..) ✓ off: time (millisecond) to keep LED off (Must be multiply of 250, ex: 250/500/750..) ✓ interval: time (second) for whole operation (1~256) Ex: ledblink -on 250 -off 500 -interval 20

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	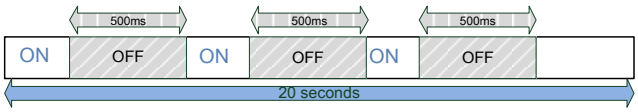

- Send image

> (1) Check if target device is correct. Modify it if not correct.
> (2) Check if target file is correct. Modify it if not correct.
> (3) Send image

4 Enter

```
************ (Device Tx) ************
[Target Device]: C0000200045B
[Target File]: 266_6.png
[Target Command]: ledoff
(1) Change Extended Address:
(2) Change File
(3) Change Command
(4) Send Image
(5) Send Command
(q) Quit
[1-5 or q]:4
        Prepare to execute operation.....
        [Status]: STATUS_OK
        [PostActionStatus]: POST_ACTION_STATUS_OK
        [JobId]: 0, [JobStatus]: JOB_STATUS_OK_NOVALUE
```

- Send command

> (1) Check if target device is correct. Modify it if not correct.
> (2) Check if target command is correct. Modify it if not correct.
> (3) Send command

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5 Enter

```
************ (Device Tx) ************
[Target Device]: C0000200045B
[Target File]: 266_6.png
[Target Command]: ledoff
(1) Change Extended Address:
(2) Change File
(3) Change Command
(4) Send Image
(5) Send Command
(q) Quit
[1-5 or q]:5
        Prepare to execute operation...
        [Status]: STATUS_OK
        [PostActionStatus]: POST_ACTION_STATUS_OK
        [JobId]: 1, [JobStatus]: JOB_STATUS_OK_NOVALUE
```

4.4 Reconnect

Reconnect can check and repair TCP/IP connection when it is broken in the middle of operation.

3 Enter

```
************ (Main) ************
(1) Pan
(2) Device
(3) Reconnect
(q) Quit
[1-3 or q]:3

        grpc connected!
```


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