DCN WLAN Training – DCSE service

Contents

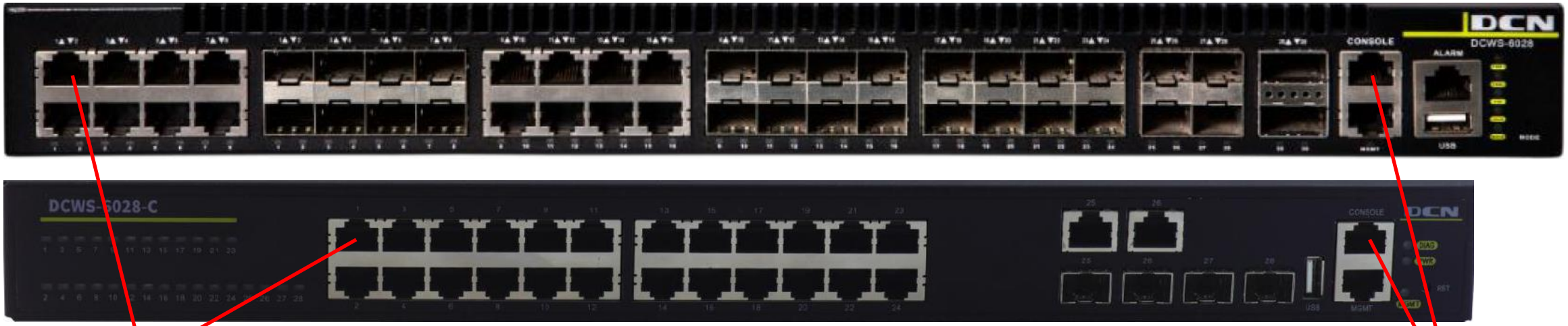
01 Basic operation of WLAN product

- Basic management of AC & AP
- Upgrade AC & AP firmware
- Prepare & Install license on AC

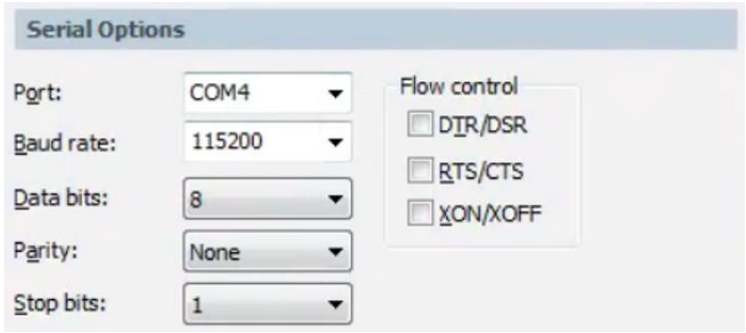
01 Basic operation of WLAN product

- **Basic management of AC & AP**
- **Upgrade AC & AP firmware**
- **Prepare & Install license on AC**

Basic management of AC - How to login AC CLI



Connect PC’s RJ-45 network interface to AC’s business port or MGMT port, to log in to the AC via Telnet.

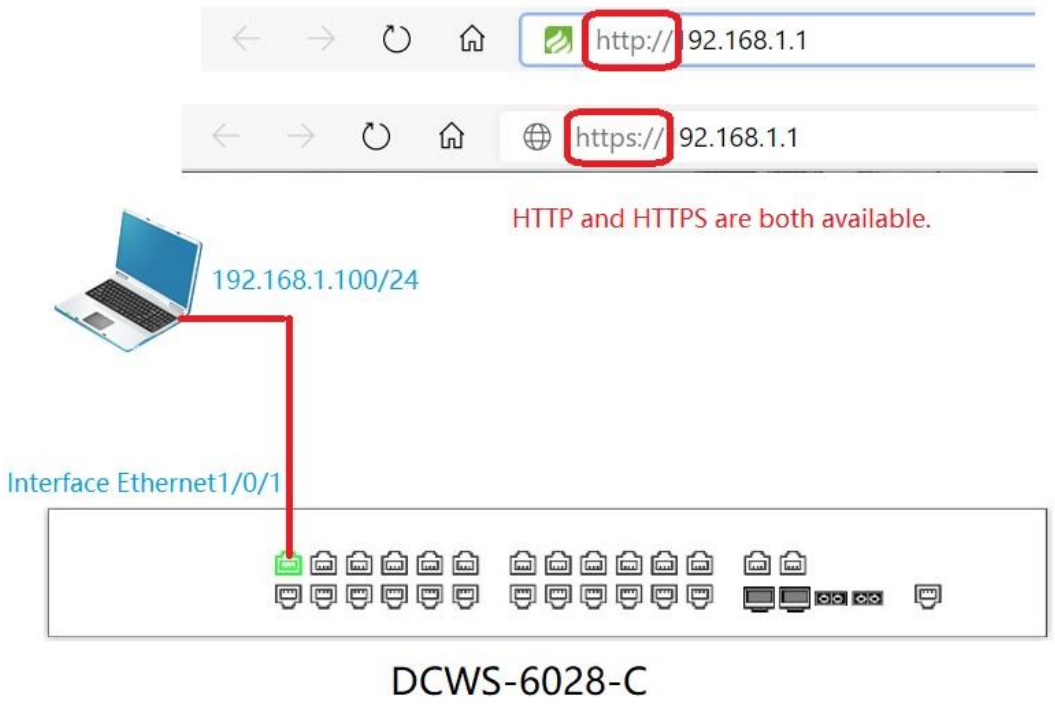


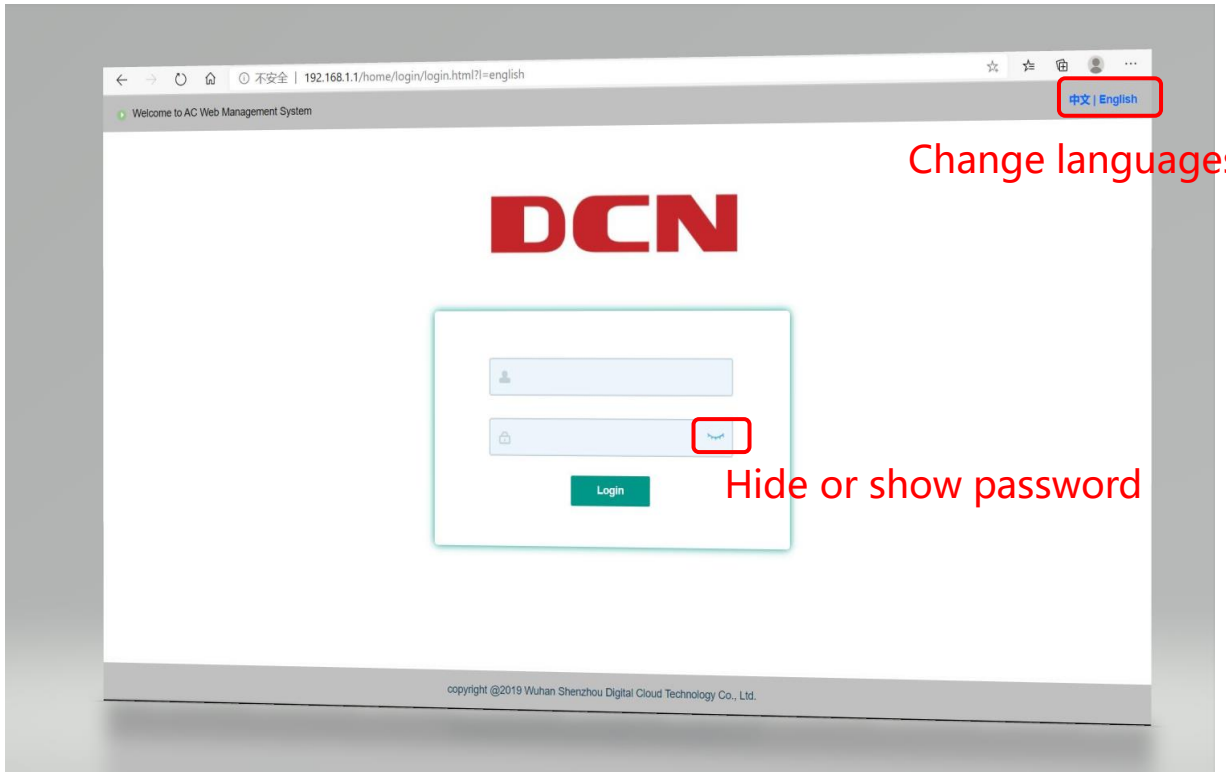
connect PC’s serial port to RJ-45 console port on AC.

Note:

1. Both methods require username and password verification.
2. The default IP address of AC is 192.168.1.1/24 on interface vlan 1
3. The default username and password both are “admin”
4. The TELNET service of AC is turned on by default, and the SSH service is turned off by default.

Basic management of AC - How to login AC Web

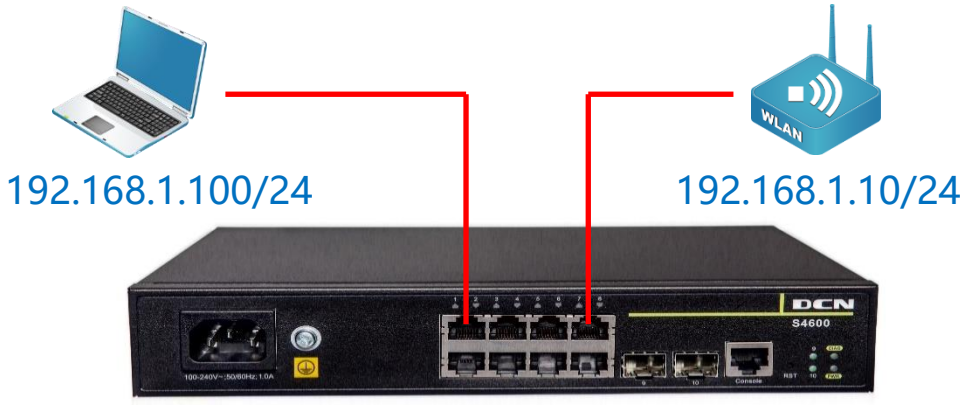


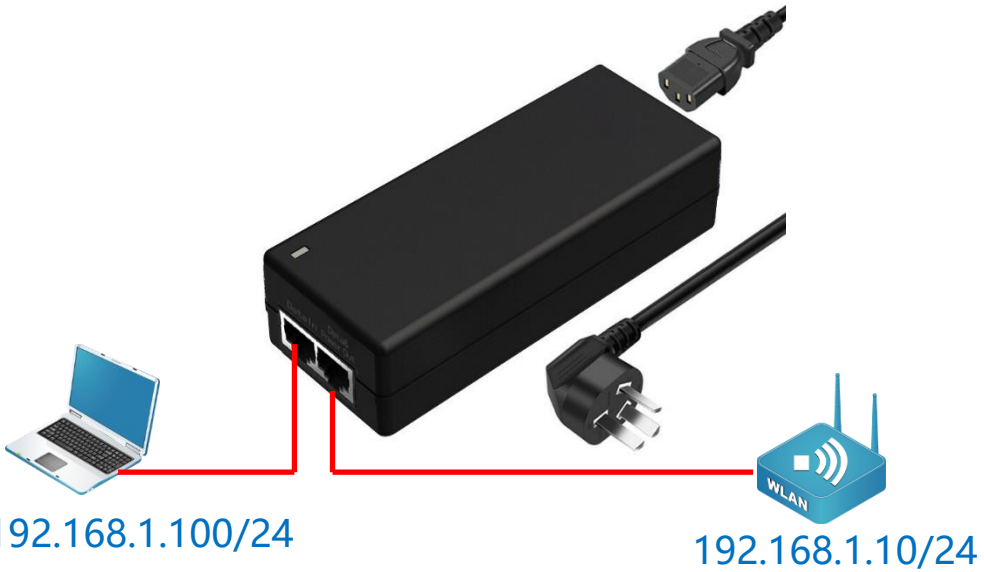


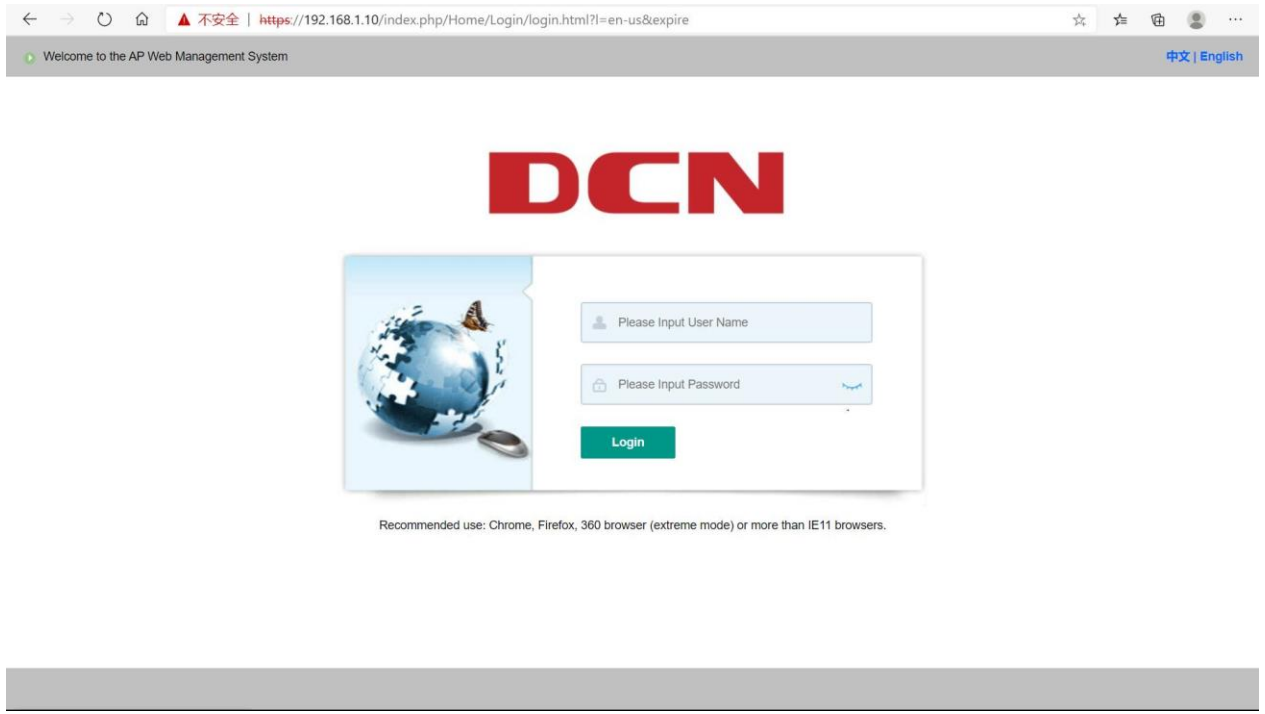
Note:

1. The default IP address of AC is 192.168.1.1/24 on interface vlan 1.
2. The default username and password both are ‘admin’.

Basic management of AP - How to login AP Web



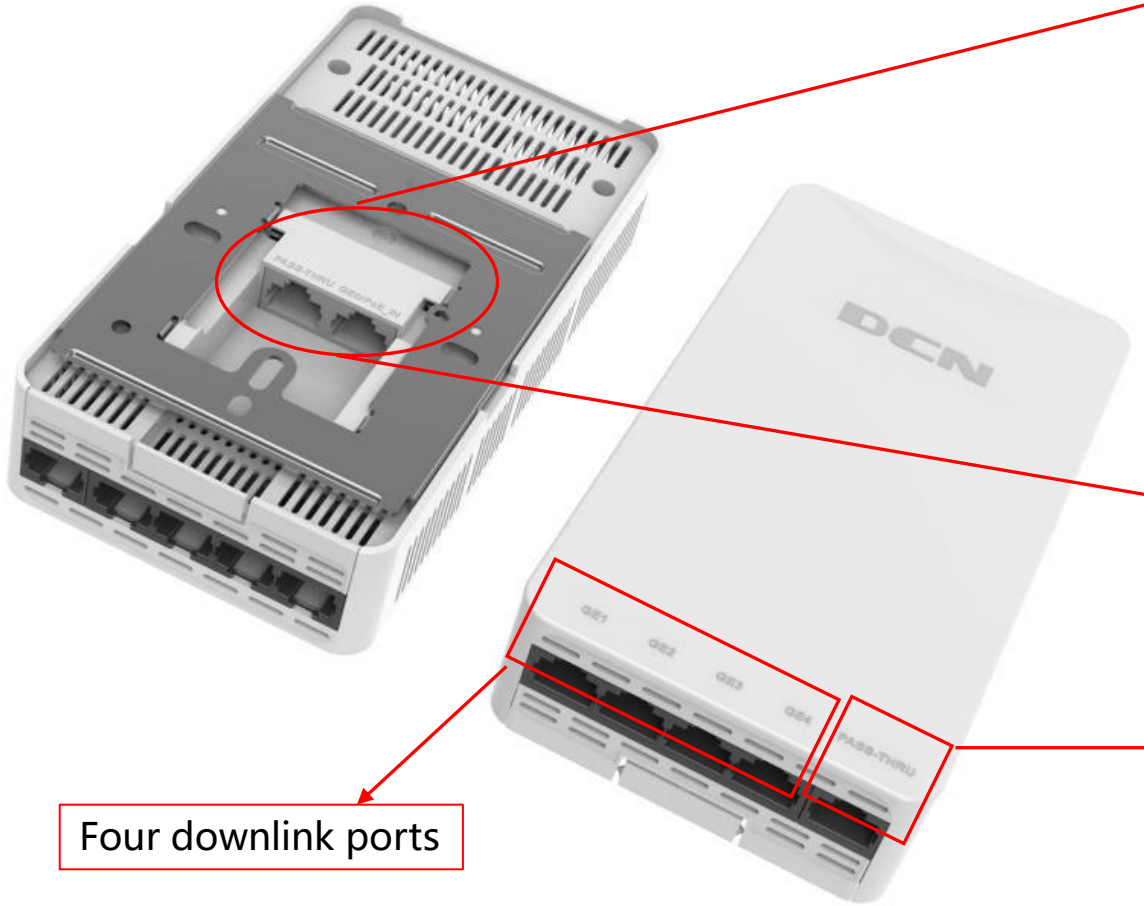


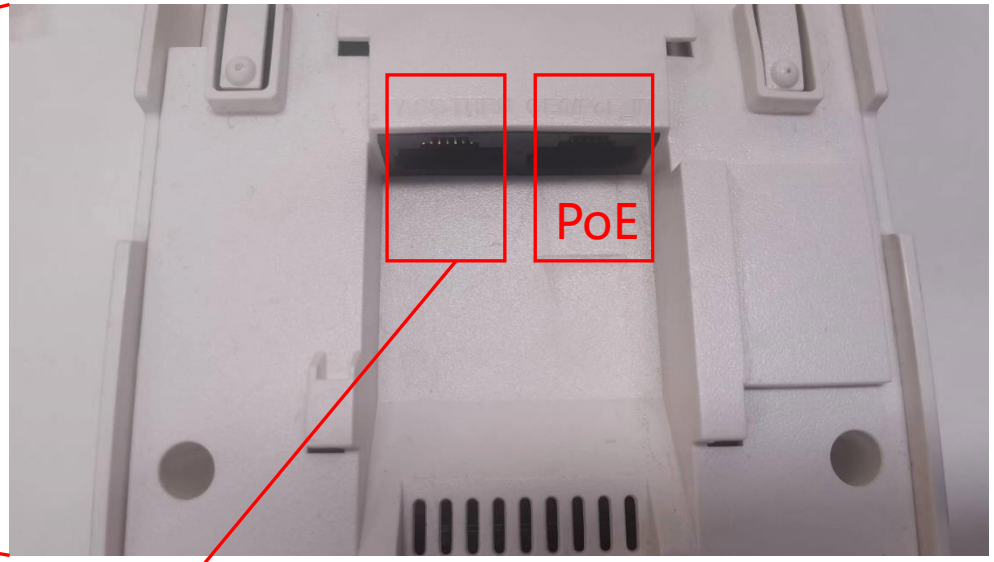


Note:

1. The default IP address of AP is 192.168.1.10/24.
2. The default username and password for logging in to the Web management page both are ‘admin’.
3. The TELNET service of AP is turned on by default. If the FIT AP is unmanaged, the login username and password are ‘admin’ and ‘dcn_debug’. If the AP is already managed, the login username and password are ‘admin’.

Basic management of AP – In-wall AP uplink and downlink ports





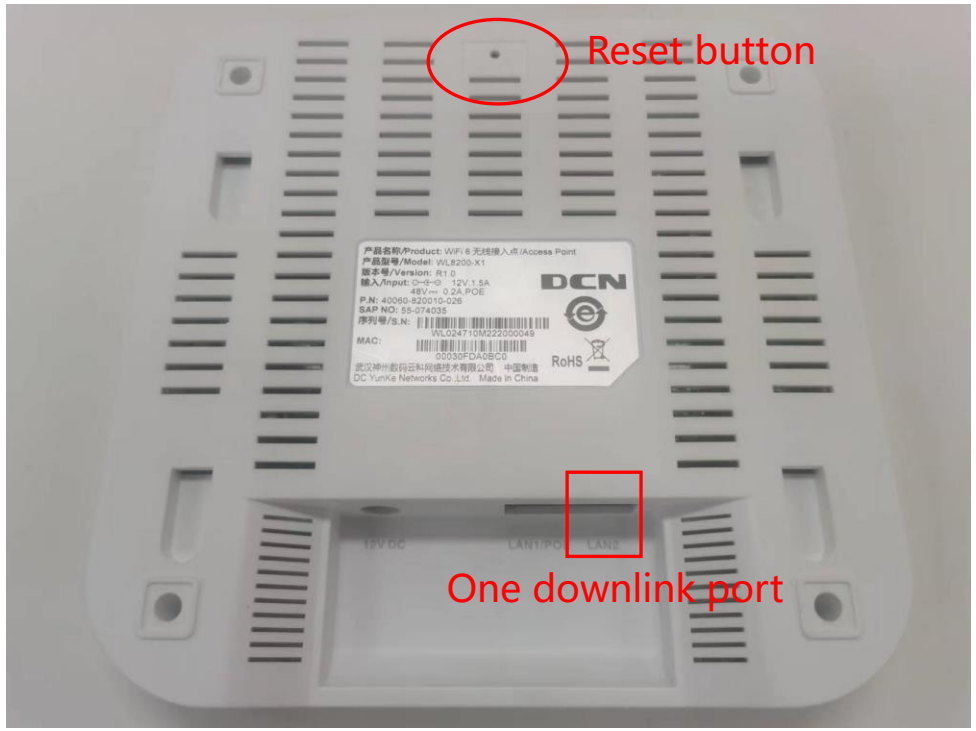
A pair of Pass-through ports is equivalent to a network cable. They are connected whether the AP is powered on or not.

Four downlink ports

Model	LAN port	Console port	Pass-through port	Reset button
WL8200-XW2	Yes	No	Yes	Yes

Note:
It is recommended that the debugging computer be connected to the downlink port or the default SSID ‘DCN_WLAN’ of AP for configuration.

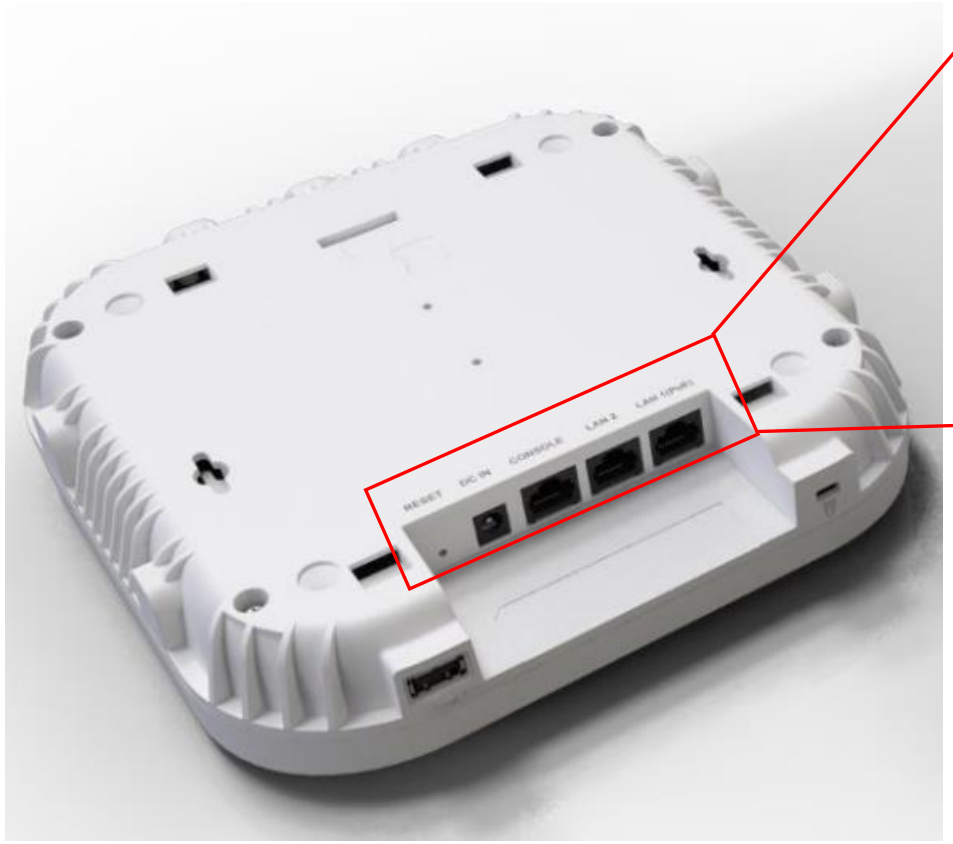
Basic management of AP - Indoor AP uplink and downlink port



Model	LAN port	Console port	Pass-through port	Reset button
WL8200-X1	Yes	No	No	Yes

Note:
1. Each model of AP has a hardware reset button to reset the software settings of the AP.
2. All APs of WIFI6 series have at least one downlink port.

Basic management of AP - Indoor AP uplink and downlink ports



Model	LAN port	Console port	Pass-through port	Reset button
WL8200-X10	Yes	Yes	No	Yes

Note:

1. PoE power supply to the AP must be connected to the uplink port.
2. Some APs have console port. In some cases, you can connect debugging computer to the console port of AP to repair the firmware or troubleshoot. The baud rate of the console port of the AP is 115200.

Basic management of AP - Outdoor AP uplink and downlink ports

Model	LAN port	Console port	Pass-through port	Reset button
WL8200-XIT2	Yes	Yes	No	Yes

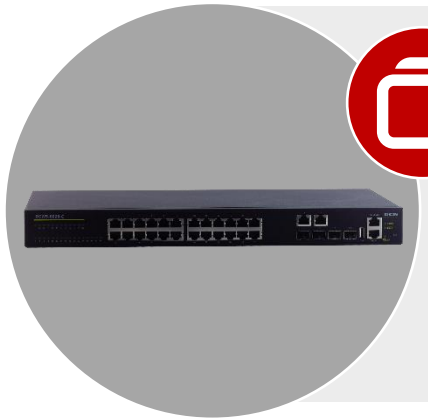
Note:

1. PoE power supply to the AP must be connected to the copper uplink port. Even if only SFP is used for uplink.
2. The reset key is inside the AP. If you need to use it, unscrew the waterproof screw first.

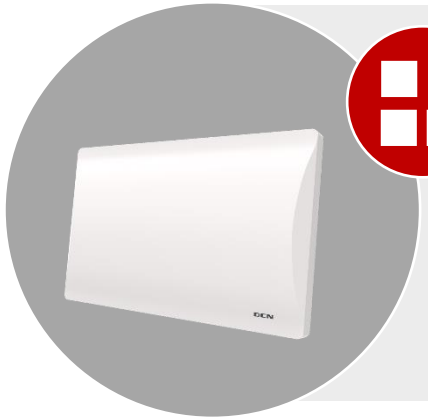
01 Basic operation of WLAN product

- Basic management of AC & AP
- Upgrade AC & AP firmware
- Prepare & Install license on AC

Upgrade AC & AP firmware - Available AC and AP versions



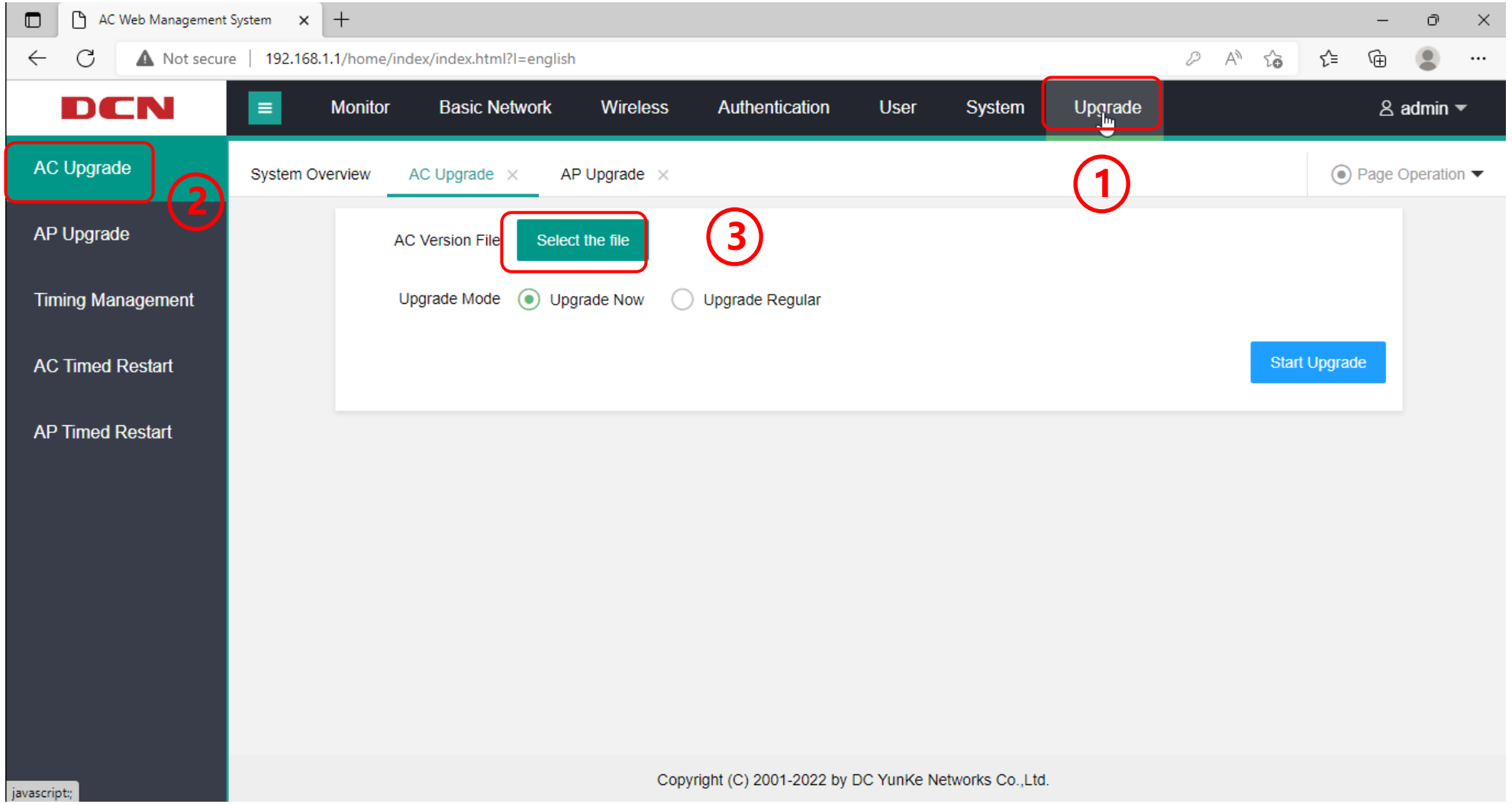
7.5.4.3 (R0002.0036)	7.5.4.3 (R0002.0047)	7.5.4.3 (R0002.0054)	7.5.4.3 (R0002.0057)
The CLI can be accessed through the MGMT port	Support NAT traversal scenario	Restrict the use of config mode in CLI	Improve online upgrading



3.9.3.1	3.9.4.4	4.1.1.8	5.1.1.23
Support dcnimcloud	Support dcnimcloud	Support dcnimcloud	Support dcnimcloud

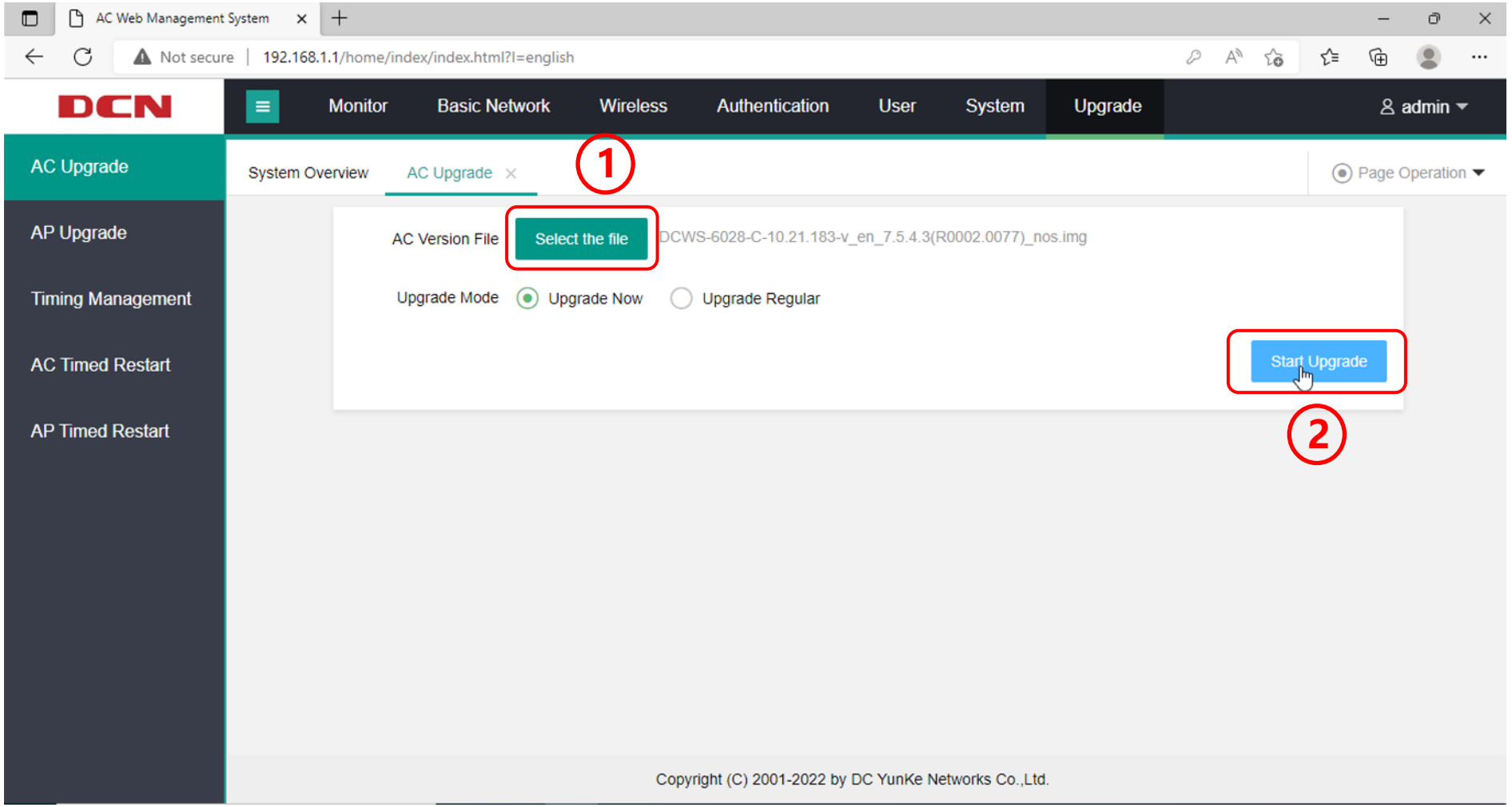
Upgrade AC firmware on AC Web

Select target AC firmware on AC web



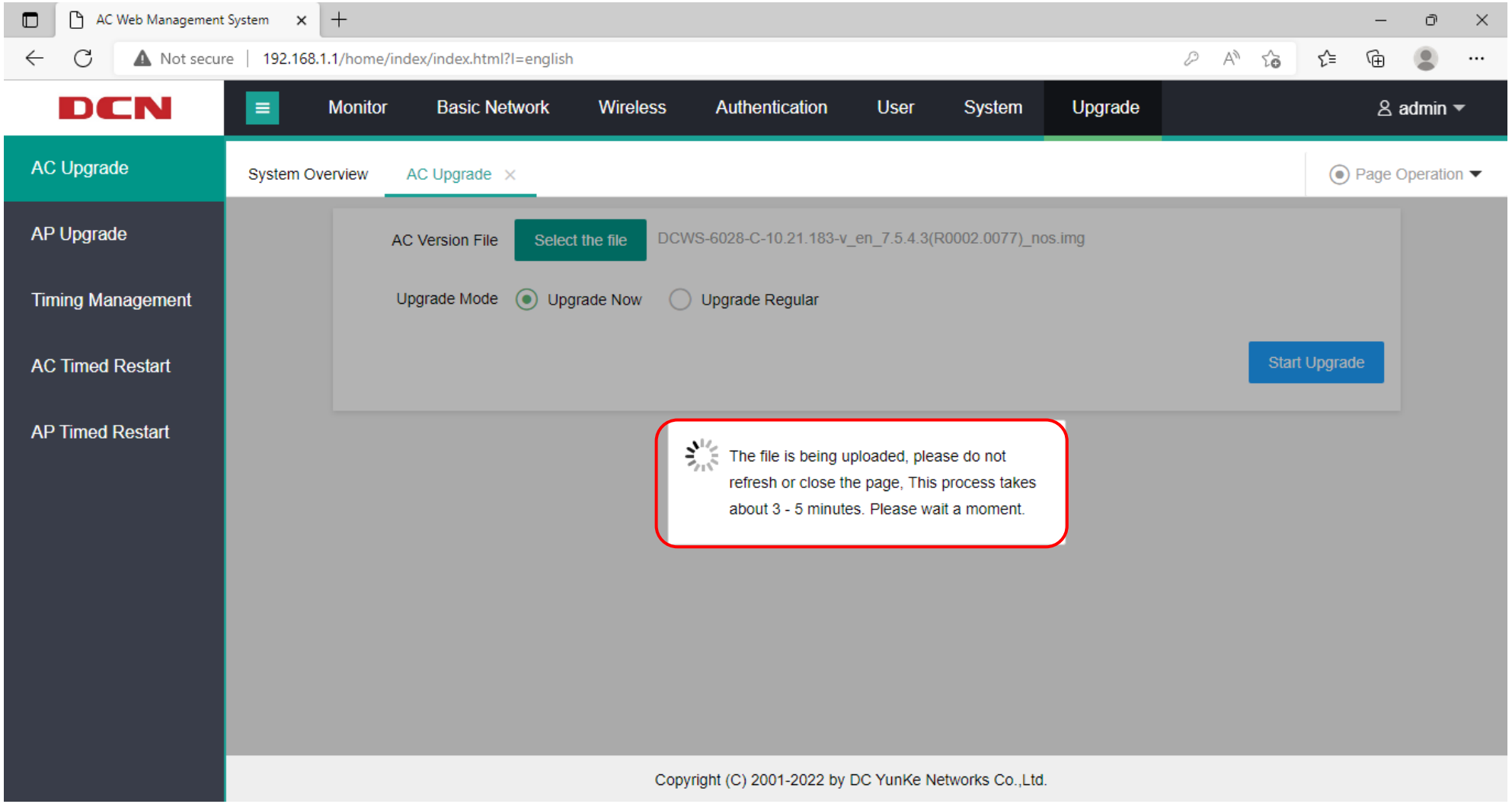
Upgrade AC firmware on AC Web

Upload target AC firmware to AC web

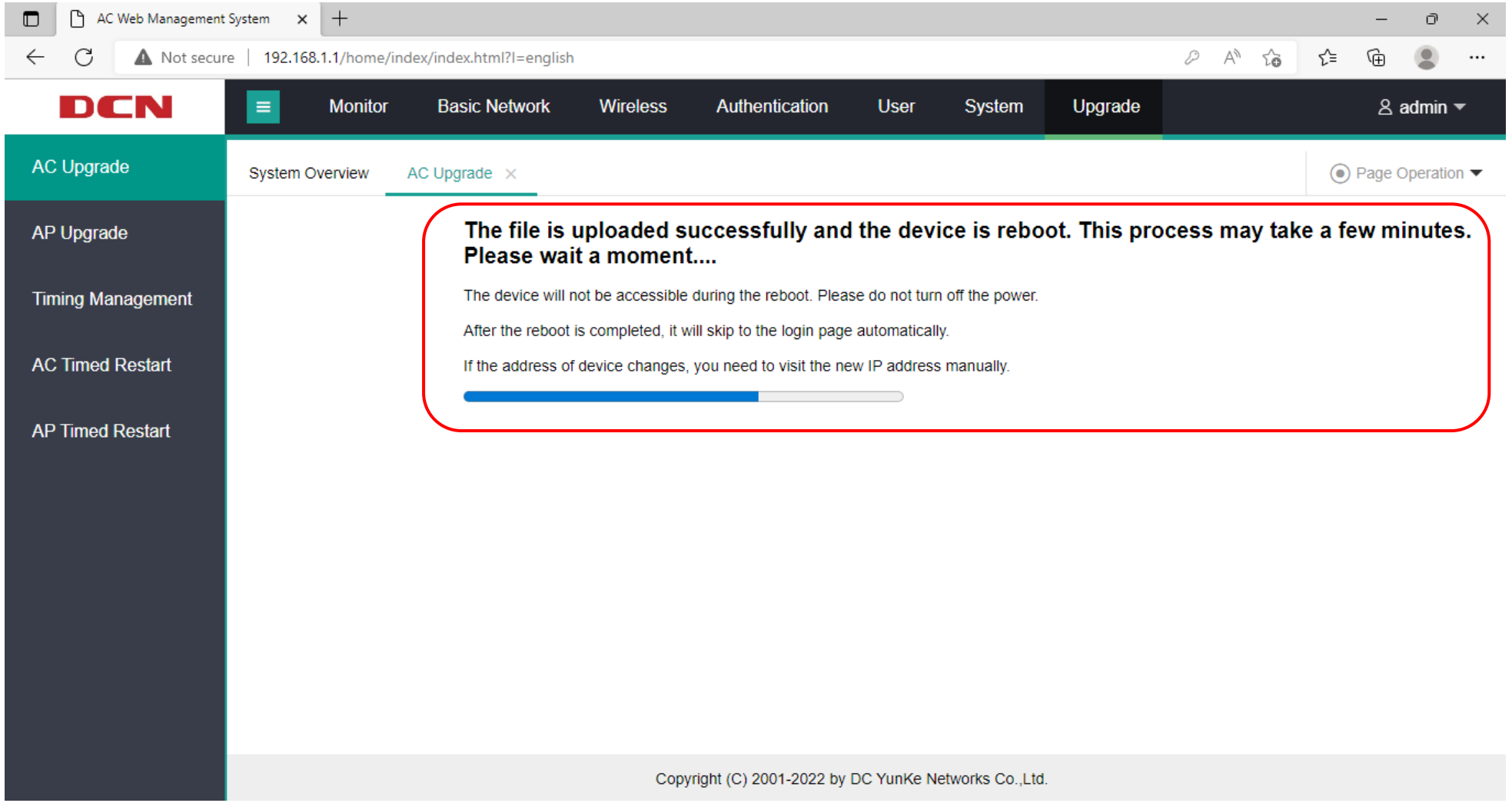


Upgrade AC firmware on AC Web

Upload target AC firmware to AC web

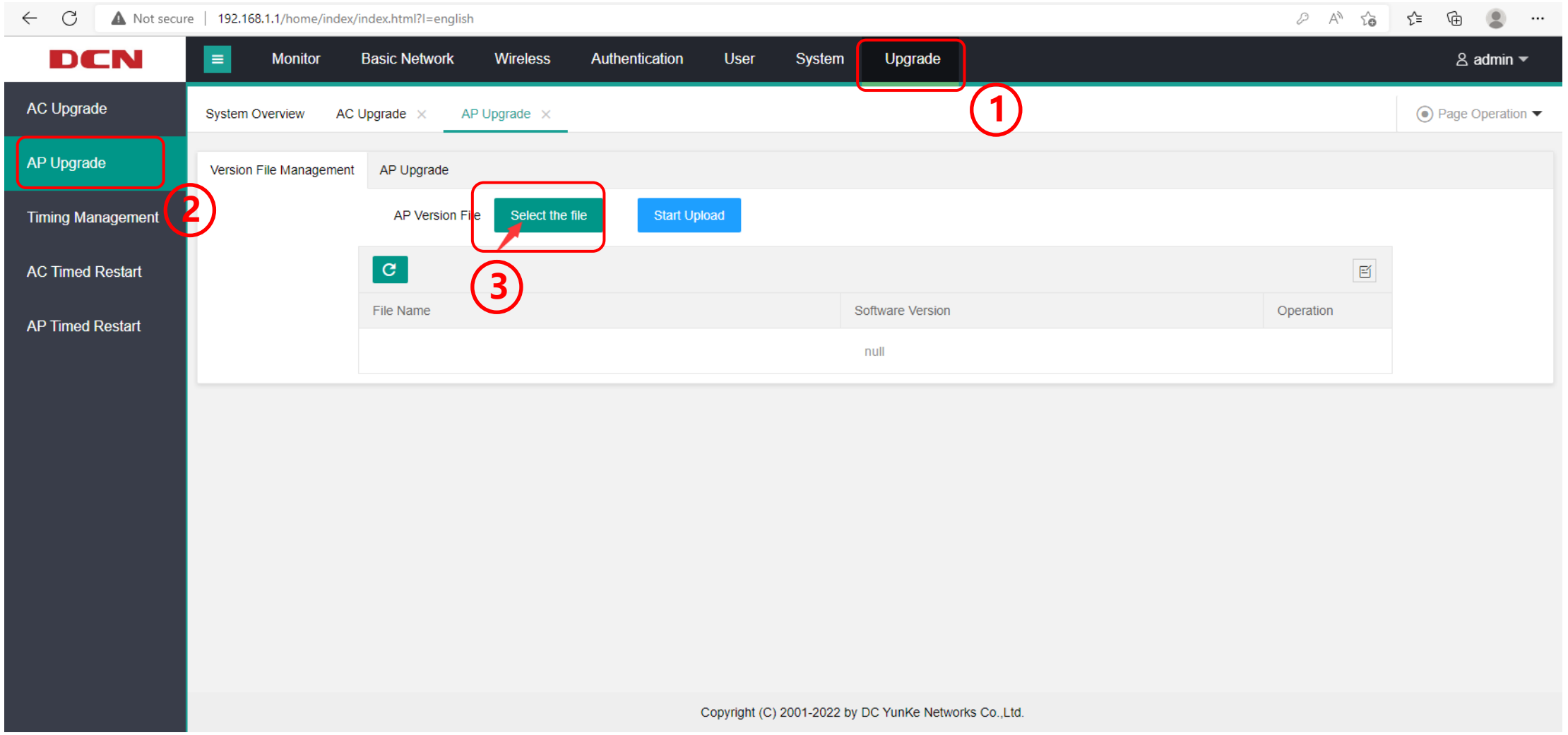


Upgrade AC firmware on AC Web



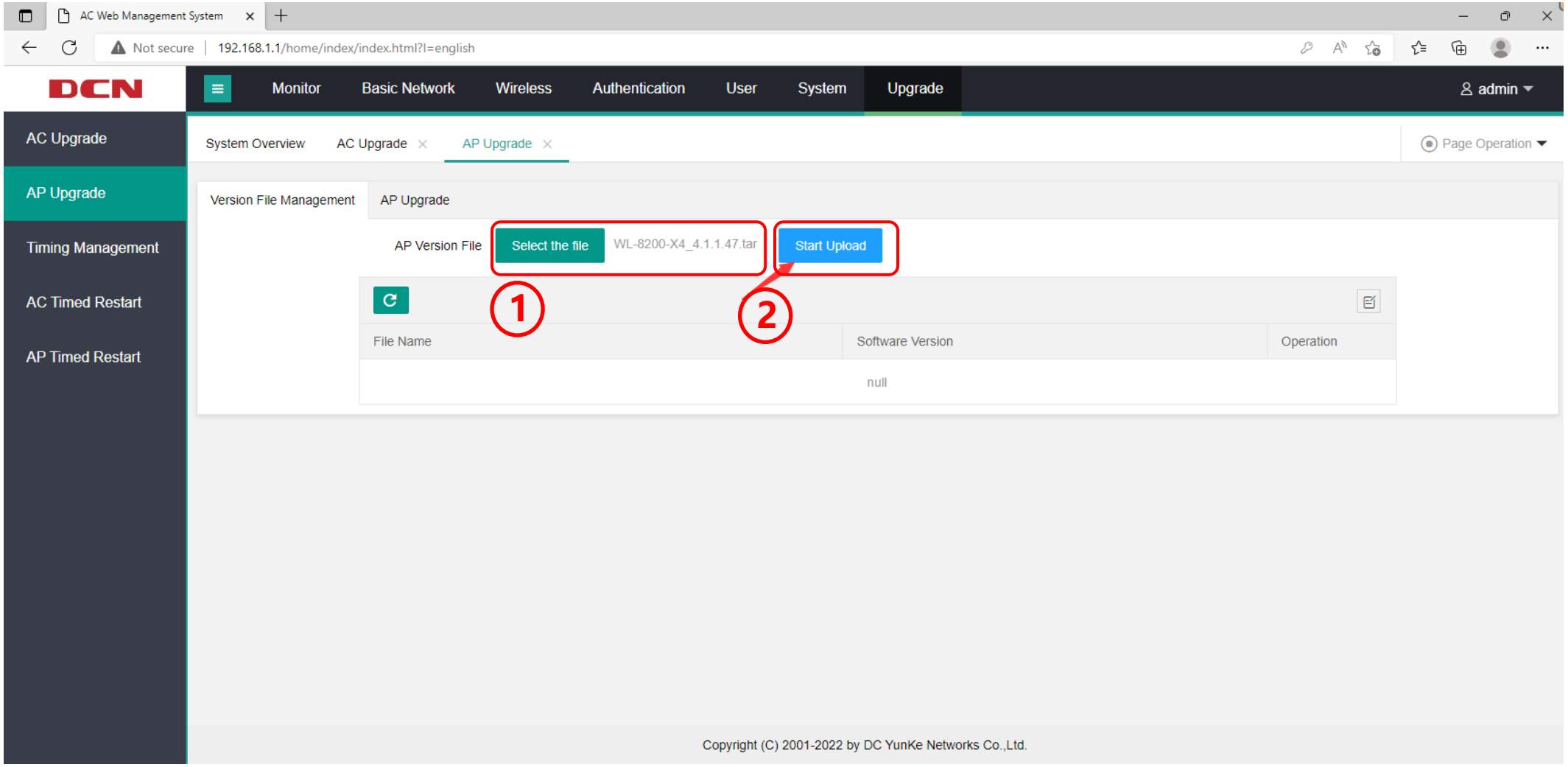
Upgrade AP firmware on AC Web

Select target AP firmware on AC web



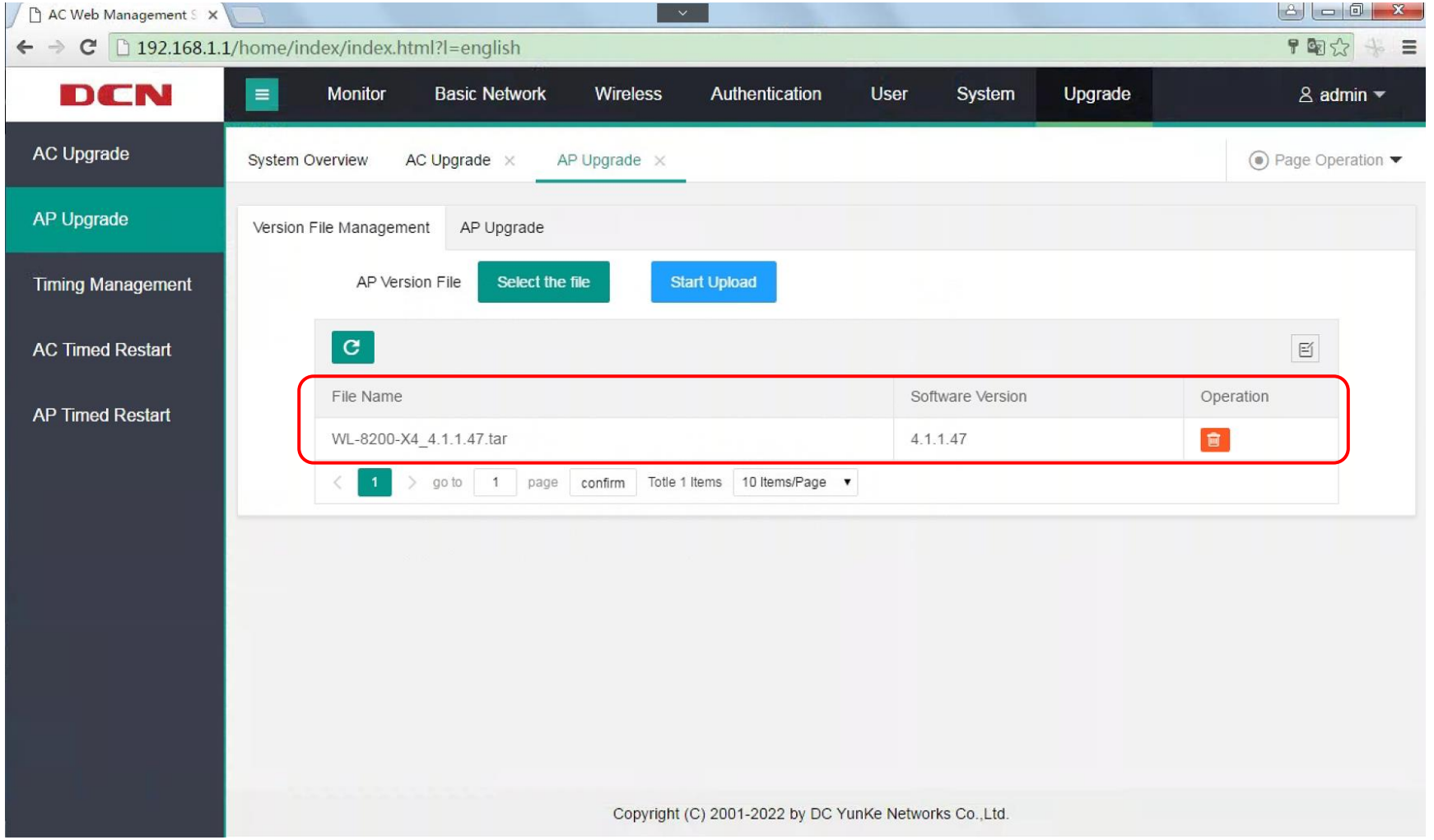
Upgrade AC & AP firmware - Upgrade AP firmware via AC Web

Upload target AP firmware to AC web



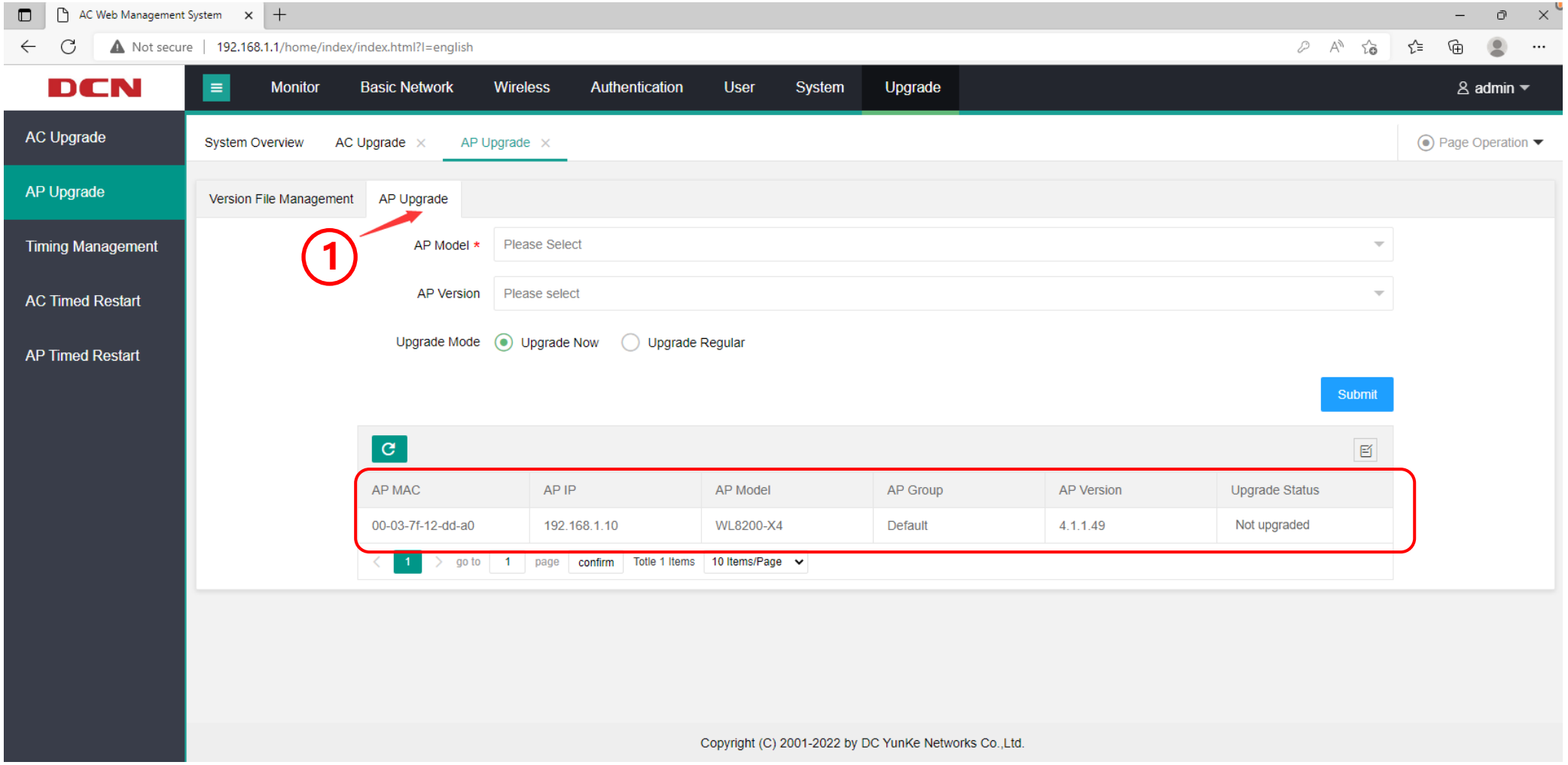
Upgrade AP firmware on AC Web

Check AP firmware already uploaded on AC web



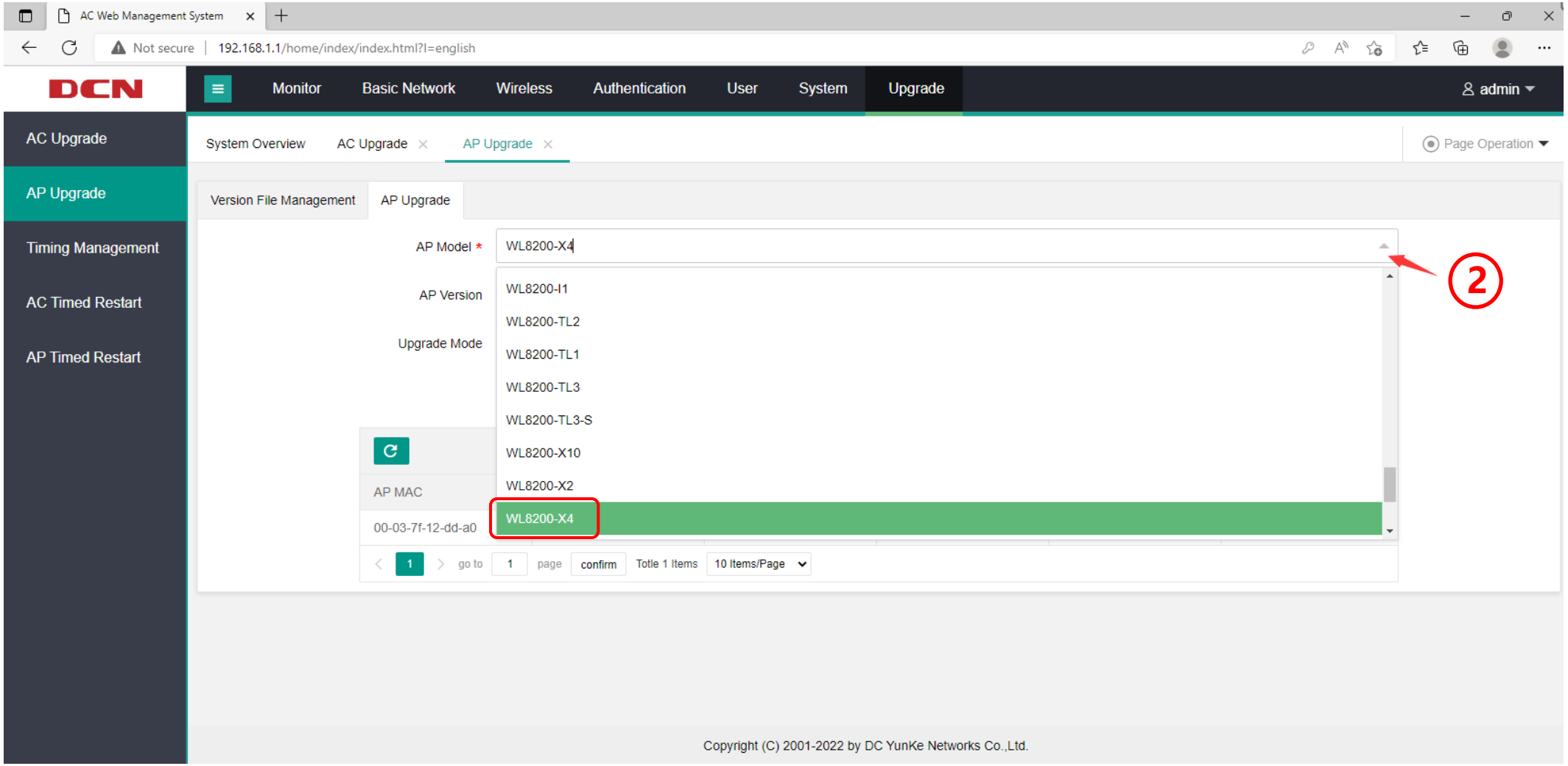
Upgrade AP firmware on AC Web

Select target APs to be upgraded on AC web



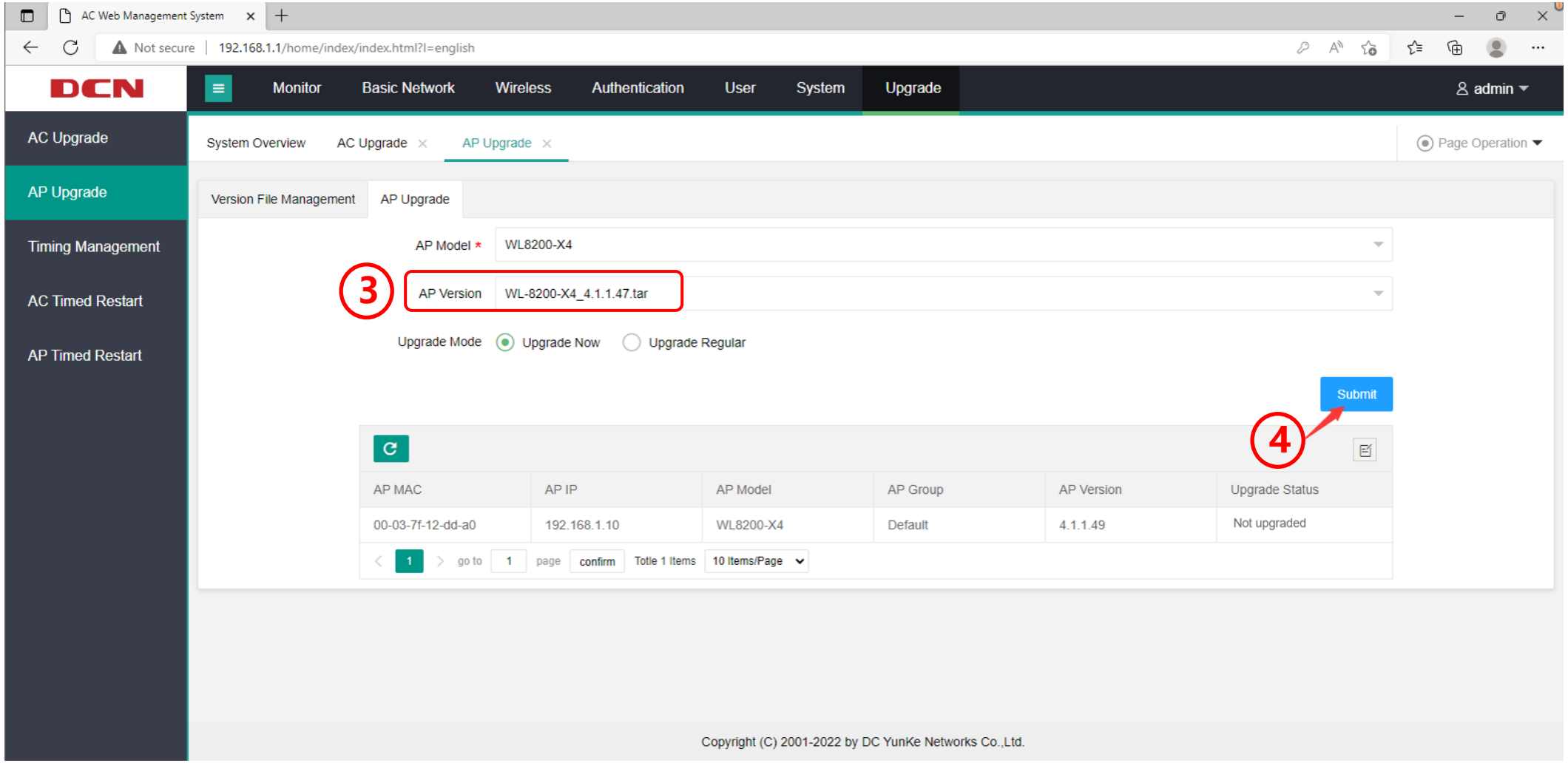
Upgrade AP firmware on AC Web

Select target AP firmware to be upgraded on AC web



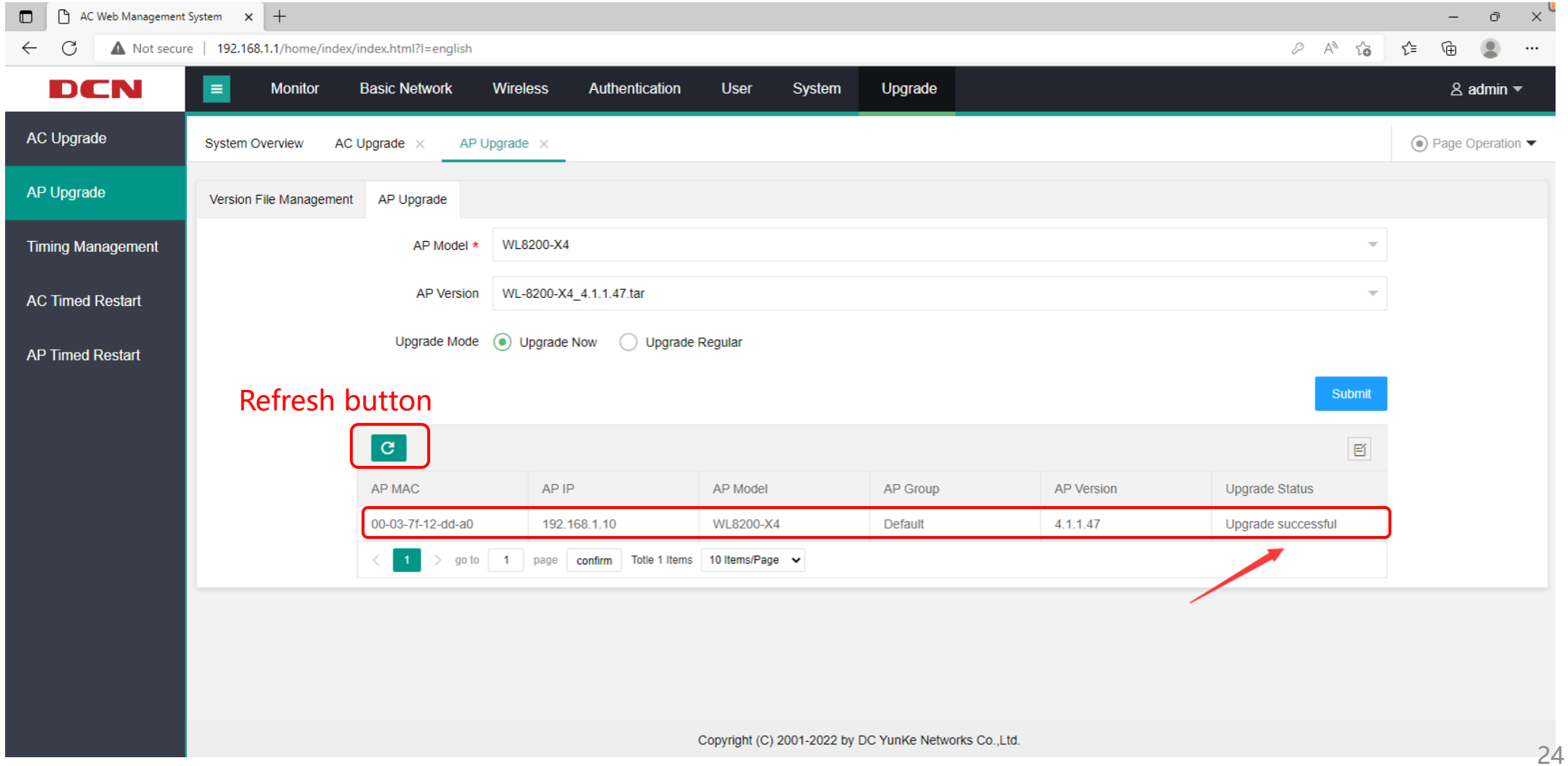
Upgrade AP firmware on AC Web

Confirm firmware version selected on AC web



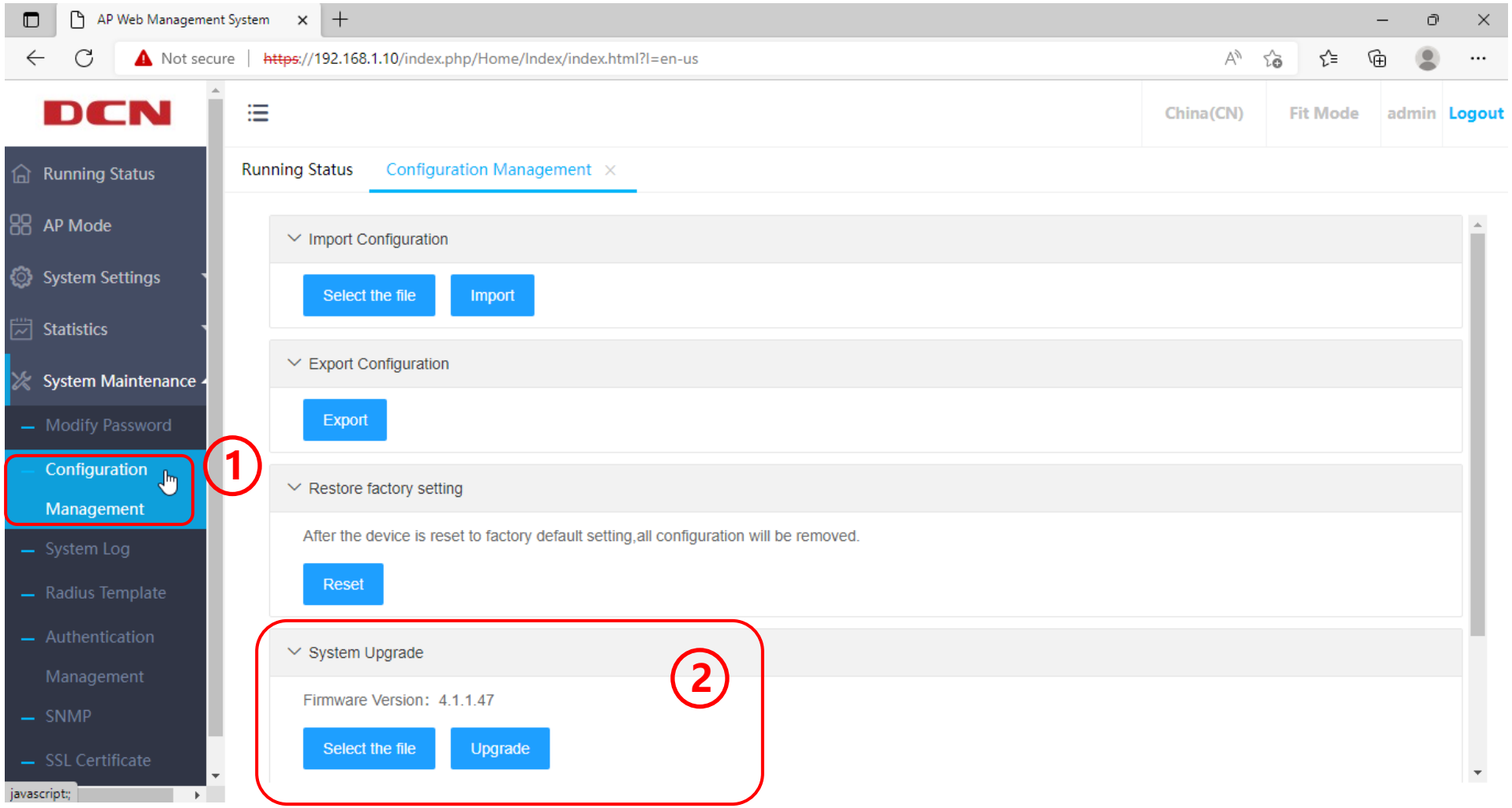
Upgrade AP firmware on AC Web

Confirm AP status after upgrading on AC web



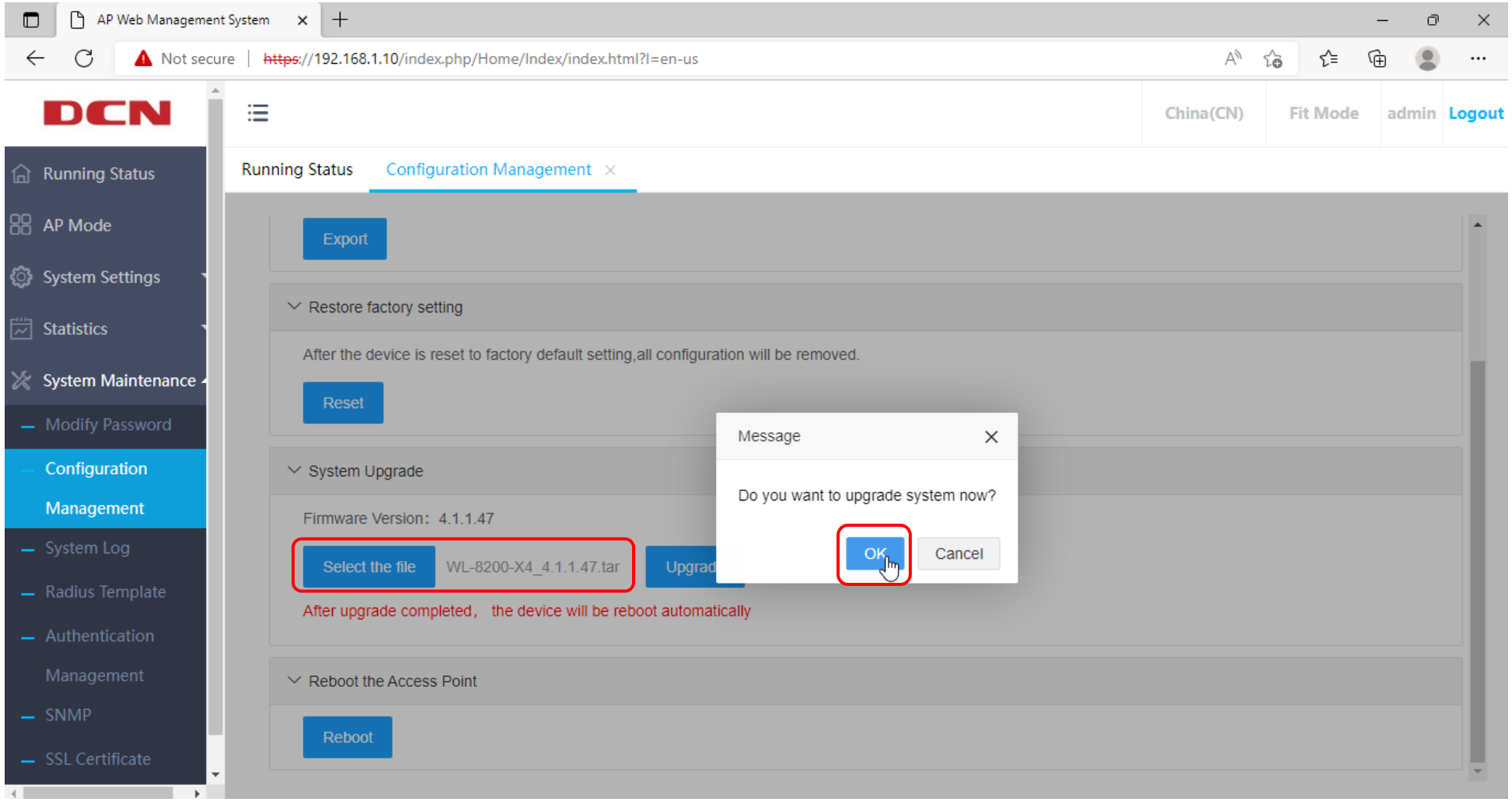
Upgrade AP firmware on AP Web

Select and Upload target AP firmware to AP web



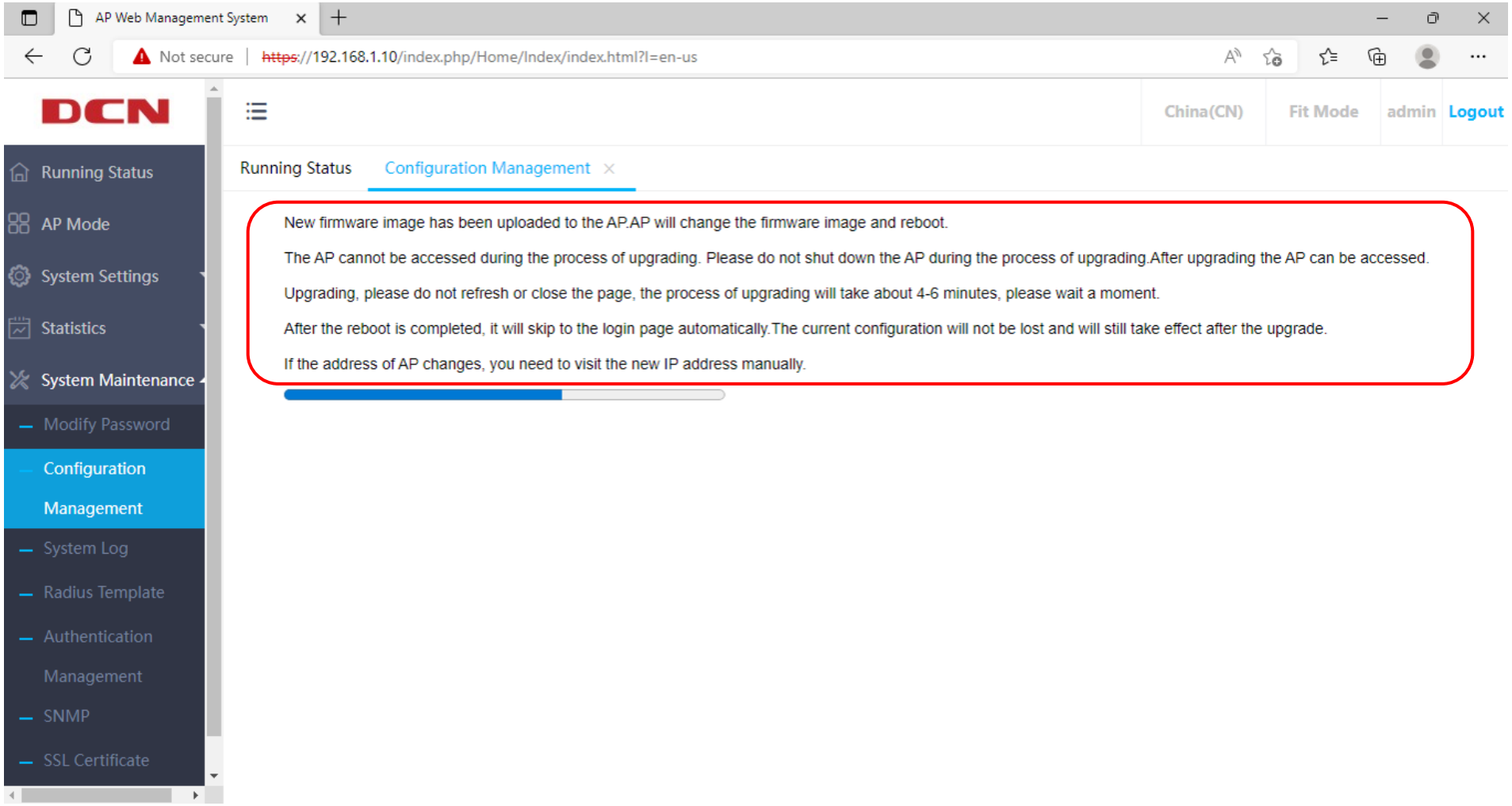
Upgrade AP firmware on AP Web

Confirm firmware version and upgrade on AP web



Upgrade AP firmware on AP Web

Writing firmware to AP



Introduction of user manual- Common Wireless Product Manual

Manual Name	Version	Description
DCWS-6028(R2) Smart Wireless Integrated Controller Web Operation Manual	v3.1.1	DCWS-6028C and DCWS-6028R2 refer to it.
DCWS-6028(R2) Smart Wireless Integrated Controller Function Commands Manual	v3.1.1	DCWS-6028C and DCWS-6028R2 refer to it.
DCWS-6028(R2) Smart Wireless Integrated Controller Function Operation Manual	v3.1.1	DCWS-6028C and DCWS-6028R2 refer to it.
DCN Wireless AP Web Operation Manual	v1.8	All AP models refer to it.

01 Basic operation of WLAN product

- Basic management of AC & AP
- Upgrade AC & AP firmware
- Prepare & Install license on AC

How to prepare AP license for DCWS-6028

Collect license SN, valid code and AC information, send to dcn_technicians@digitalchina.com

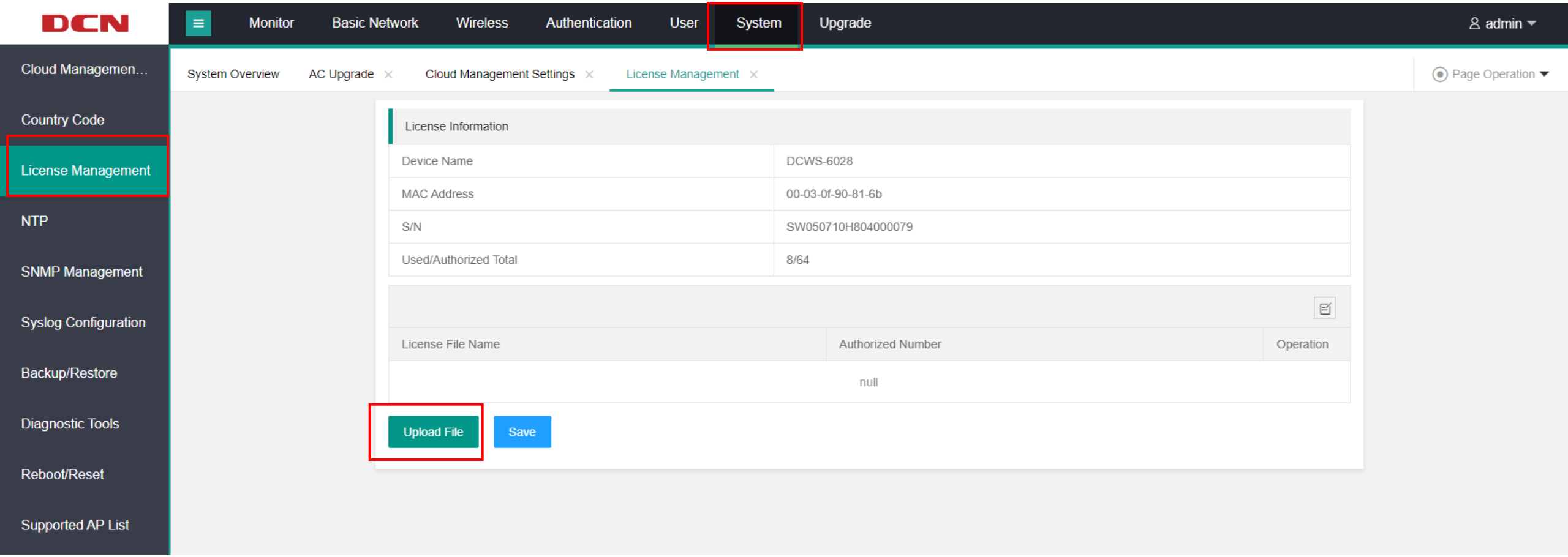
DCWS-L16
DCWS-L32
DCWS-L128

SN & Valid Code

DCWS-6028#show device information
Controller serial number:SW050710H804000079
Controller mac:00-03-0f-90-81-6b

How to install and check AP license – AC Web

Select target lic file and upload to AC web



How to install and check AP license – AC Web

Check uploaded lic files on AC web

License File Name	Authorized Number	Operation
sunkz_512_1.lic	512	
sunkz_512_2.lic	512	
sunkz_512_3.lic	512	

Upload File Save

AC rebooting is required after installing new AP license

How to install AP license – AC CLI

Upload lic file to AC

```
DCWS-6028#copy license ?
  WORD  Copy source file name(local-filename or ftp://user:password@ip|host-name/remote-filename or tftp://ip|host-name/remote-filename)

DCWS-6028#
DCWS-6028#copy license tftp://172.30.78.13/6028r1-new-128.lic 6028r1-new-128.lic
Begin to receive file, please wait...

File transfer complete.
Recv total 48 bytes

Please wait as the new firmware is loaded. It may take a few minutes. Please do not reboot during this period until the process shows that it is completed.
License Install Success!

Write ok.
close tftp client.
DCWS-6028#
```

How to check AP license – AC CLI

Check lic files uploaded to AC

```
DCWS-6028#dir

-rwx      48          6028-2.lic
-rwx      48          6028r1-new-128.lic
-rwx      256          boot.conf
-rwx      255          bootip.conf
-rwx      2.8K         chenjj.cfg
-rwx      3.2K         client.pem
--rwx      15.5M          nos.img
-rwx      482.7K         nos.img.ecc
-rwx      24          portal-locale.cfg
-rwx      1.7K         startup.cfg
-rwx      3.2K         startup.cfg_fangcheng
-rwx      1.8K         vendor.cfg.ecc
-rwx      52.8K         verdor.cfg
-rwx      1.4K         wangxjaf.cfg
-rwx      932          wlan.pem
-rwx      245          wsdh1024.pem
-rwx      156          wsdh512.pem
-rwx      928          wssl2_cert.pem
-rwx      916          wssl2_key.pem

Drive : flash:
Size:26.5M  Used:16.2M  Available:10.3M  Use:61%
```

How to install CLI license for DCWS-6028-C

Collect AC information by “show device information”, send to dcn_technicians@digitalchina.com

DCWS-6028-C#config
Not support CLI CONFIG，please contact vendor if needed!

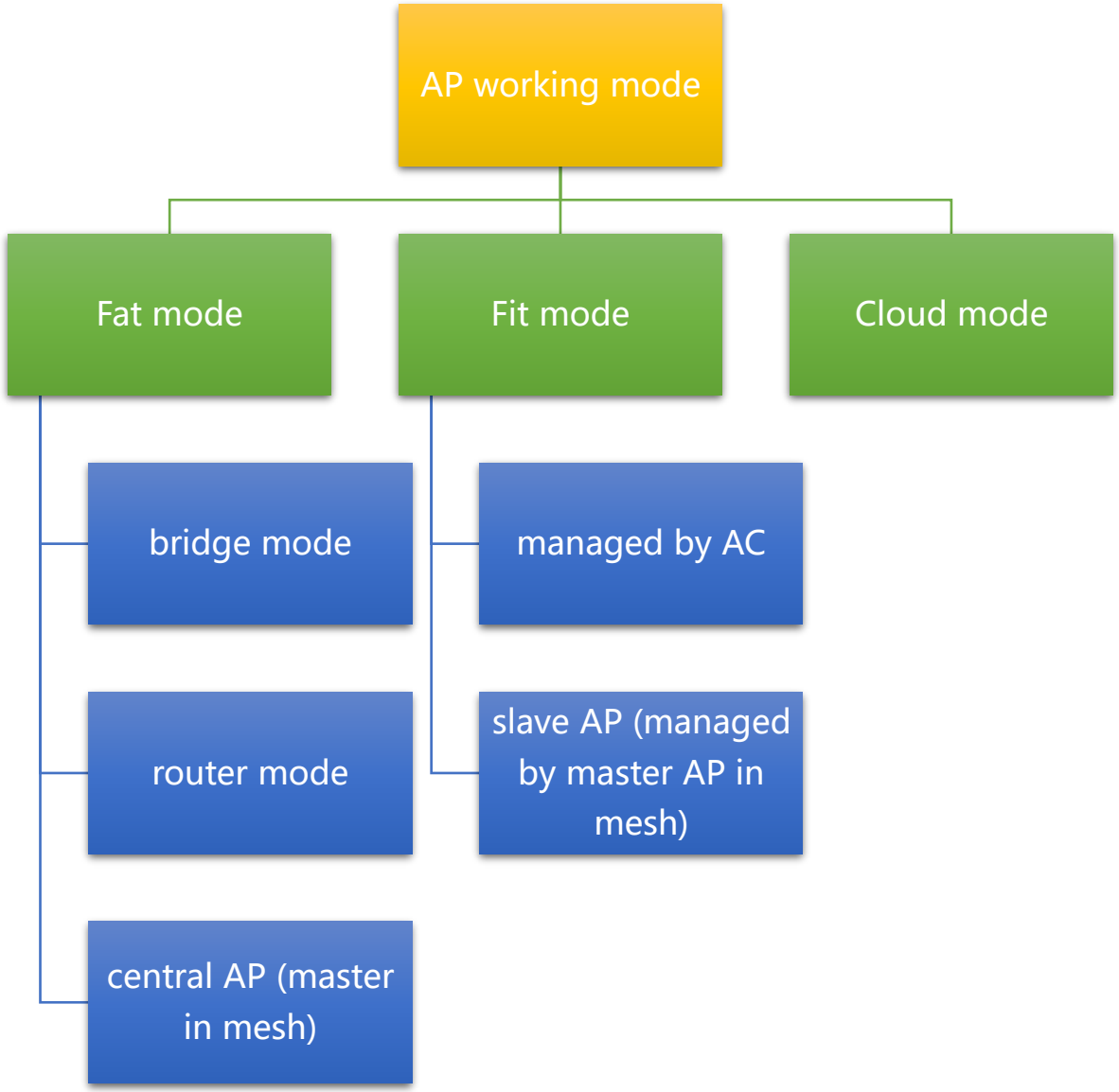
DCWS-6028-C#copy tftp://192.168.1.100/00-03-0f-e0-fe-f4_WL023410M115000024_configCtrl.licx configCtrl.licx

CLI license works immediately, AC rebooting is not required

02 Deployment Scenarios of WLAN product

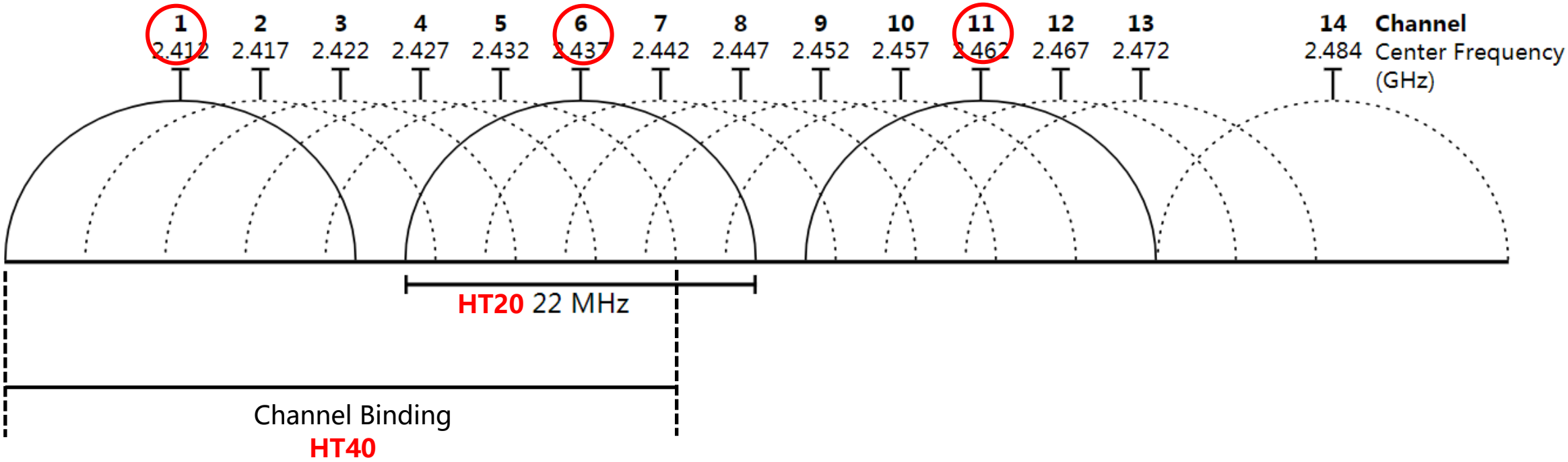
- FAT AP networking
- AP mesh networking
- FIT AP + AC simple layer-2 networking
- FIT AP + AC recommended layer-3 networking
- Cloud AP networking

WLAN basic concept and terms

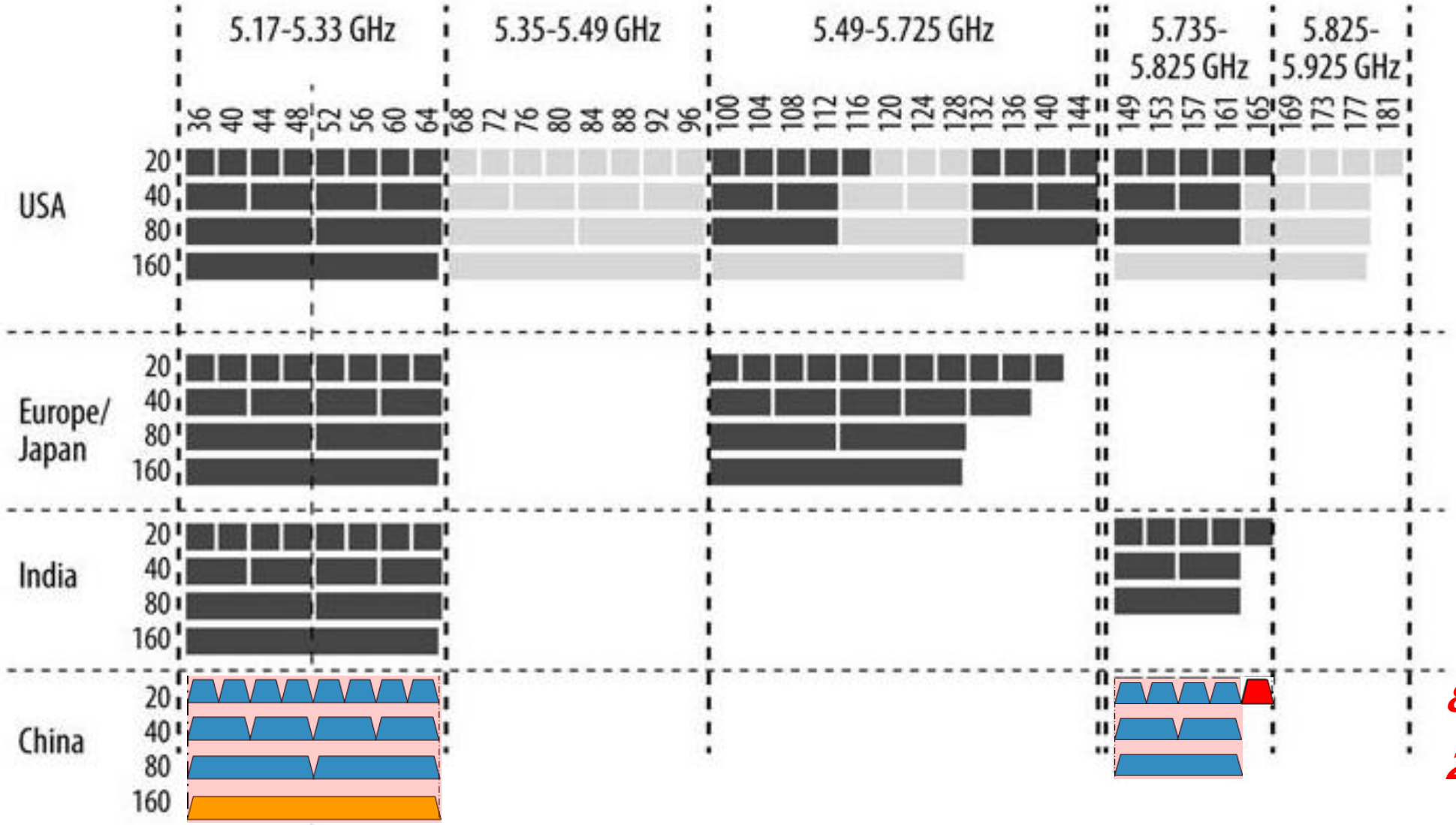


2.4GHz Radio

Independent Channels



5GHz Radio



802.11ac/ax:

20/40/80/160MHz

Channel binding

- After Channel Binding, the number of available channels is reduced

2.4GHz 20MHz bandwidth

```
Supported Channels (* = Auto Eligible)
----------------------------------------------

   1*    2     3     4     5     6*    7     8
   9    10    11*   12    13
```

2.4GHz 40MHz bandwidth

```
Supported Channels (* = Auto Eligible)
----------------------------------------------

   1*    2*    3*    4*    5*    6*    7*    8*
   9*
```

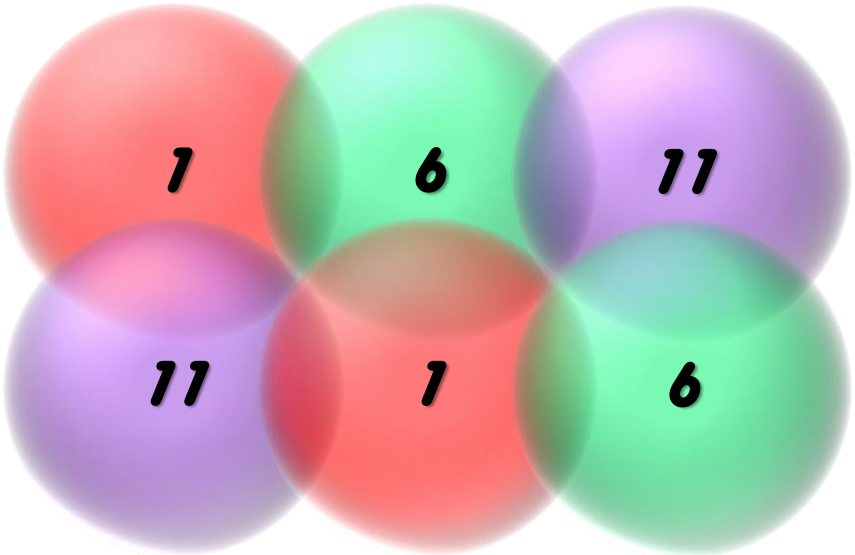
5GHz 20MHz bandwidth

```
Supported Channels (* = Auto Eligible)
----------------------------------------------

  36*   40*   44*   48*   52*   56*   60*   64*
 149*  153*  157*  161*  165*
```

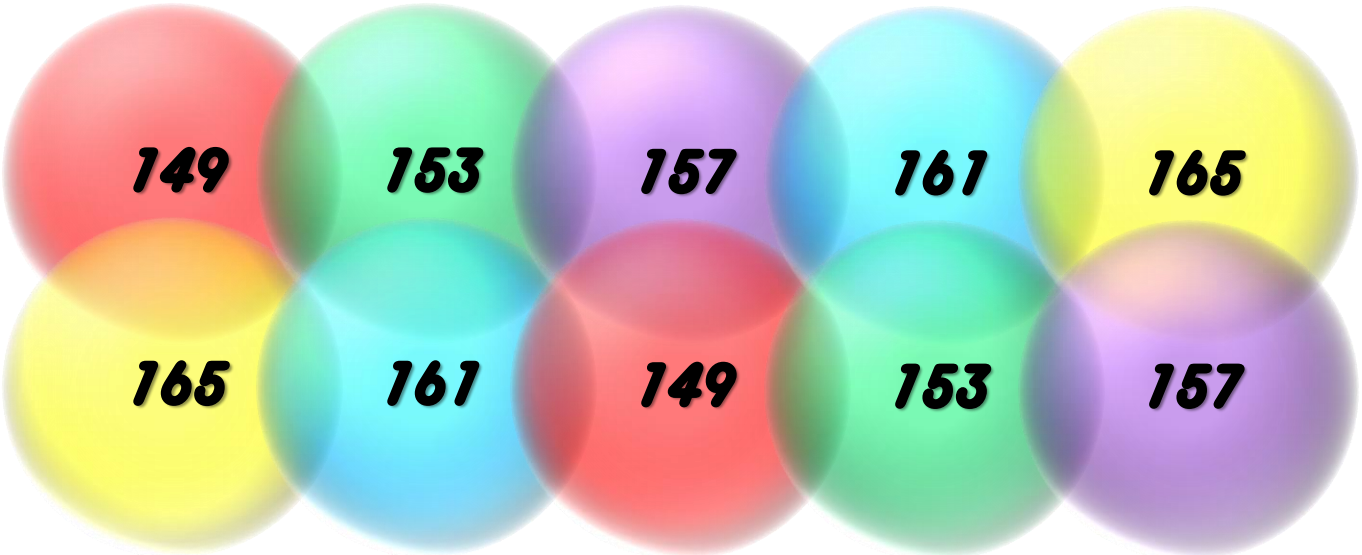
5GHz 40MHz bandwidth

```
Supported Channels (* = Auto Eligible)
----------------------------------------------

  36*   44*   52*   60*  149*  157*
```

Channel Adjustment

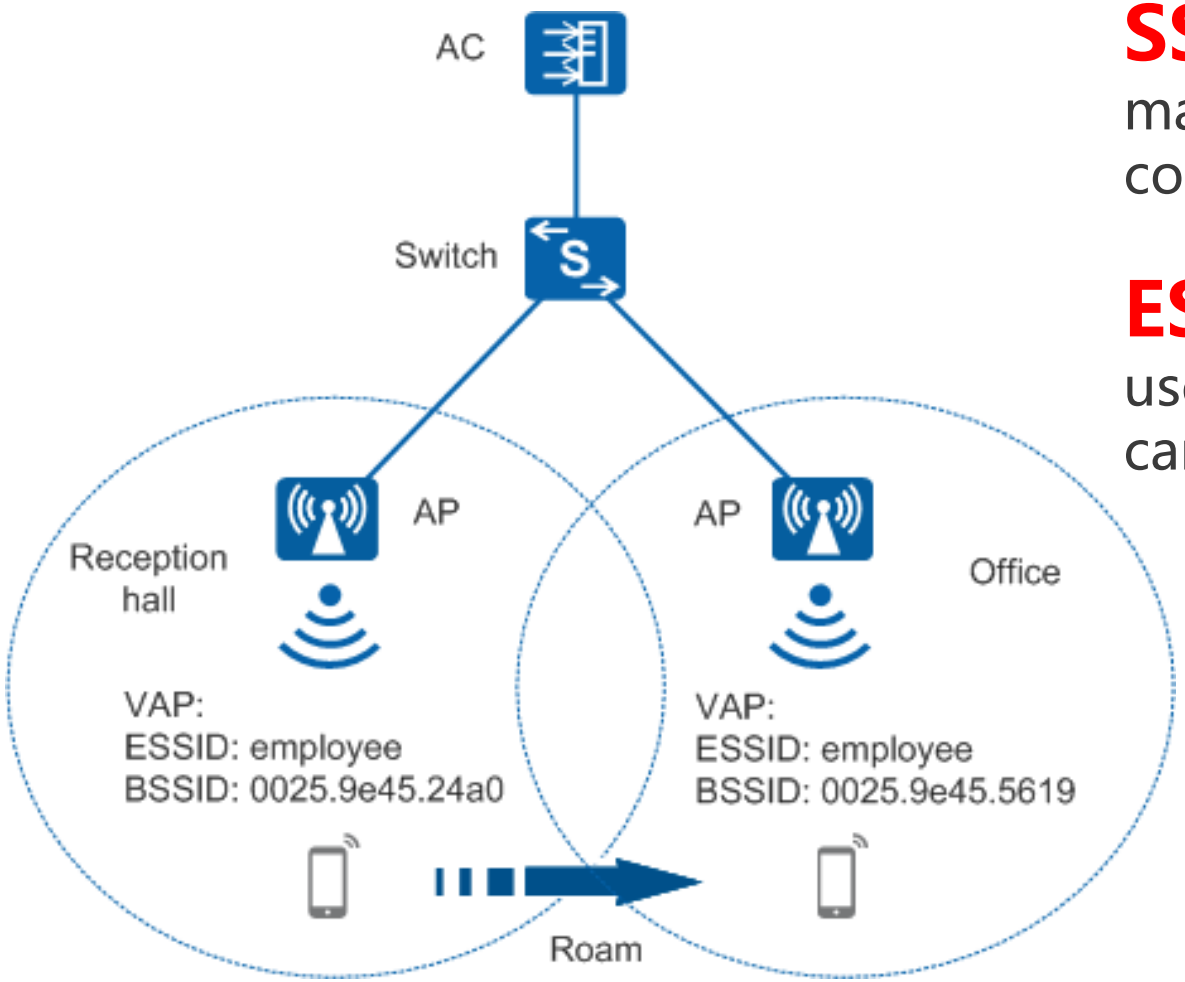


2.4GHz Allocation



5.8GHz Allocation

ESSID and BSSID



SSID is the abbreviation of Service Set Identifier, mainly used to identify the wireless networks. SSID contains ESSID and BSSID.

ESSID (extended service set identifier) is used to distinguish different networks and can have up to 32 characters.

BSSID is the MAC address of the wireless router (essentially a MAC address)

AP online process

- ✓ Private protocol type 0x88e8
- ✓ UDP protocol packet with destination port 57776 from AP or AC

- ✓ Need AC can support the type of AP
- ✓ AP actively establishes TCP connection to the port 57777 of AC and will be identified by AC
- ✓ Correct AP authentication

- ✓ TCP connection between AC and AP should be keep-alive
- ✓ TCP protocol packet with source port 57777 from AC

AC discover AP in Layer-2 networks

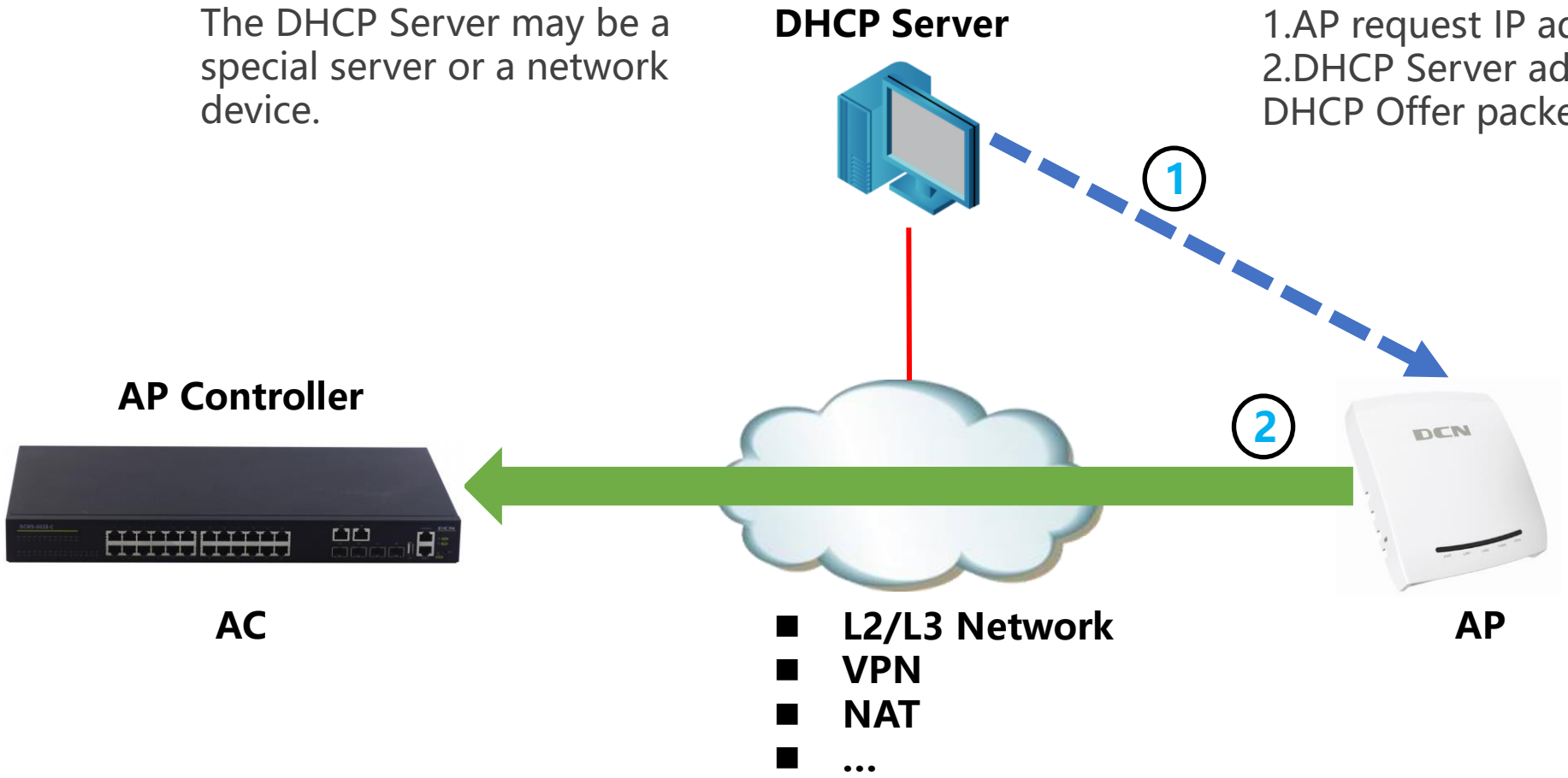
- AC sends a layer-2 broadcast packet with private protocol type 0x88e8 every 30 seconds, and its data field carries the IP address information of AC.
- By default, AC sends the packet in VALN 1 only.

- The characteristic of L2 network is that AC and AP can learn each other's MAC address directly.

- After AP receives the packet, it will parse the IP address of AC from the data field of the packet, so as to further establish a TCP connection with AC.

AP discover AC

The DHCP Server may be a special server or a network device.



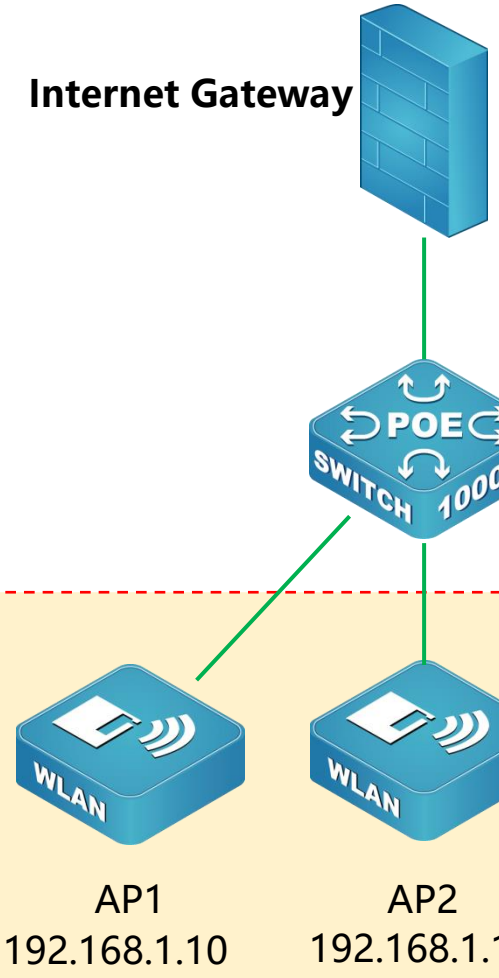
1.AP request IP address from DHCP Server;
2.DHCP Server add AC IP address to Option 43 in DHCP Offer packet to AP.

APs can get their own IP address and also the IP address of controller. Then AP will start to discover the controller and register.

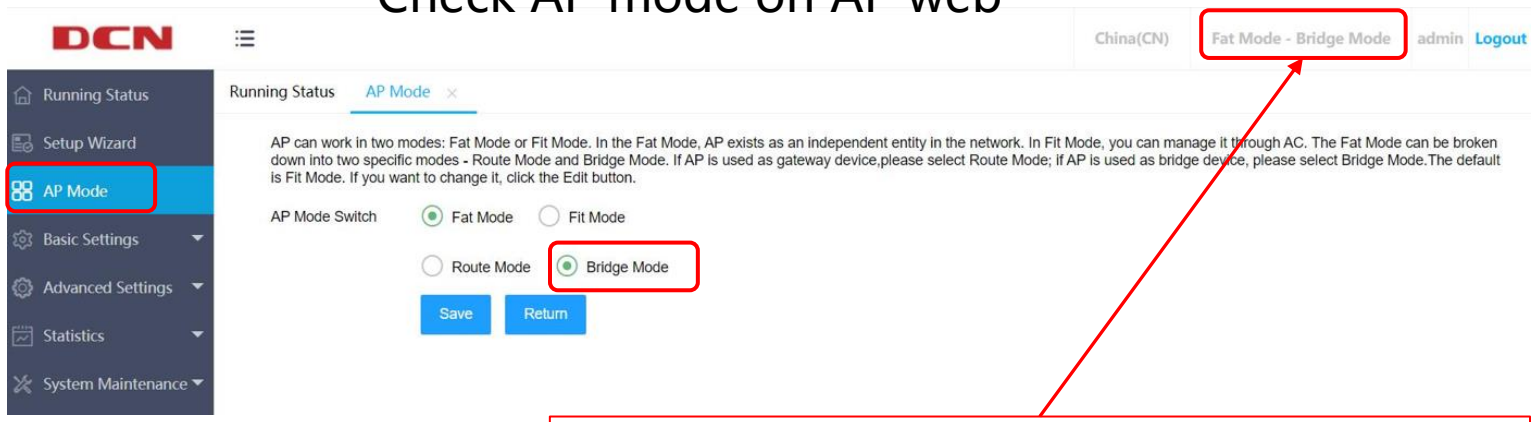
02 Deployment Scenarios of WLAN product

- **FAT AP networking**
- **AP wired mesh networking**
- **FIT AP + AC simple layer-2 networking**
- **FIT AP + AC recommended layer-3 networking**
- **Cloud AP networking**

FAT AP networking – FAT AP Bridge mode



Check AP mode on AP web



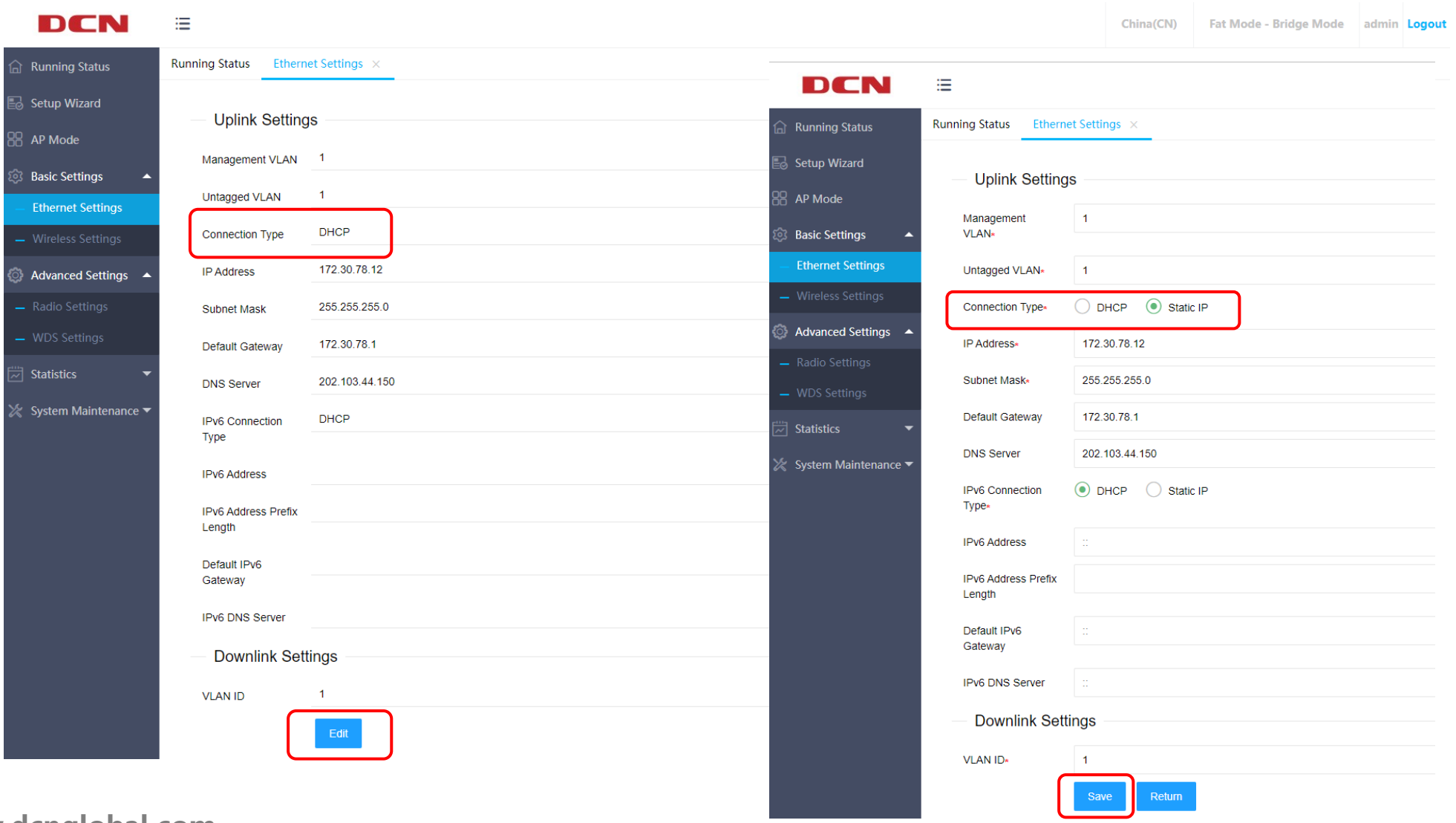
current working mode is displayed here

Required configuration on FAT AP:

- Each AP has a different management IP address.
- Set the correct country code.
- Set the SSID required by the customer.
- Set the wireless service VLAN.

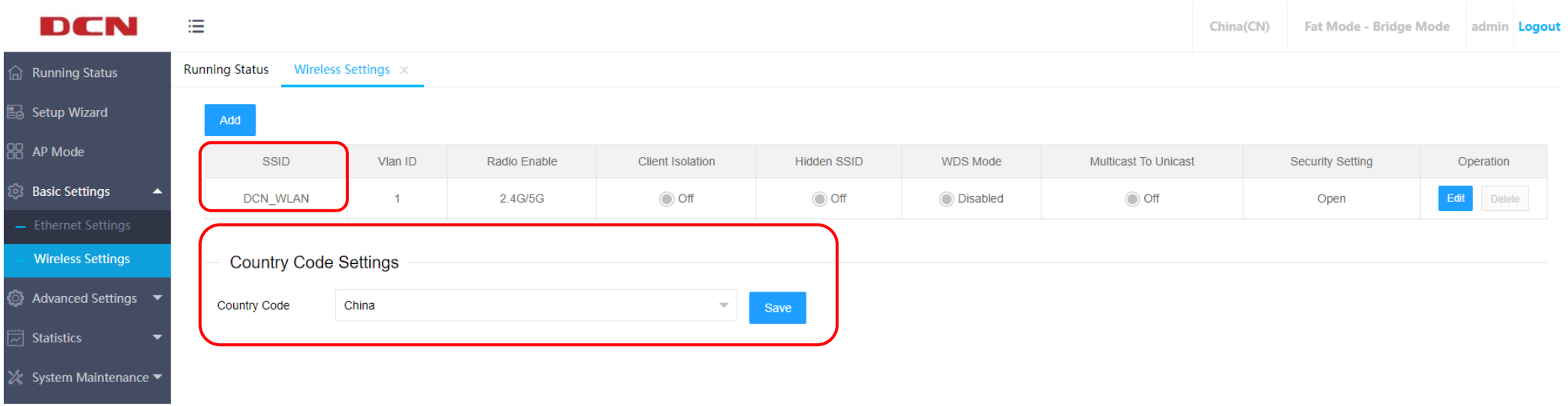
FAT AP networking – FAT AP Bridge mode

Configure IP address on AP



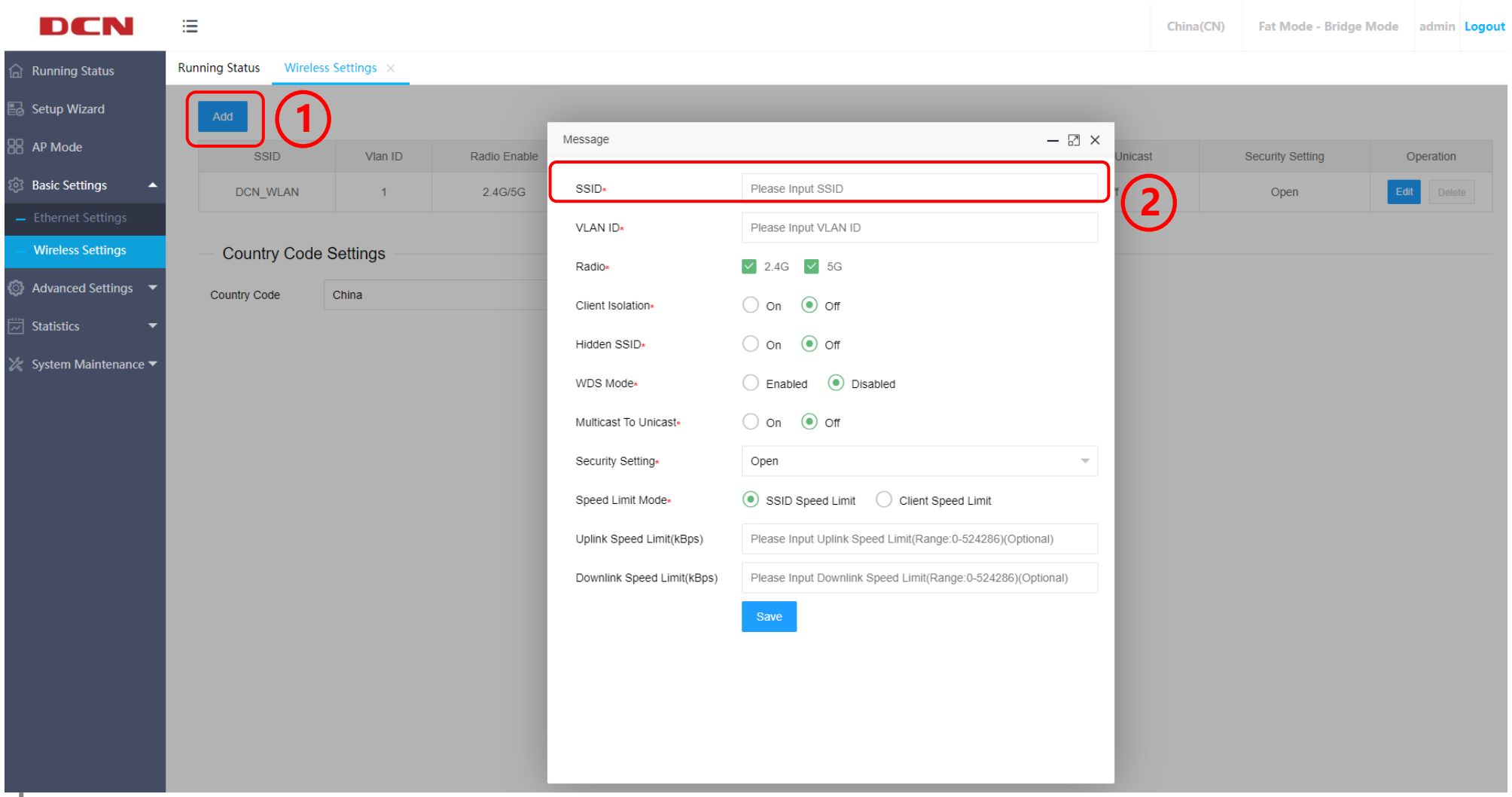
FAT AP networking – FAT AP Bridge mode

Set country code on AP



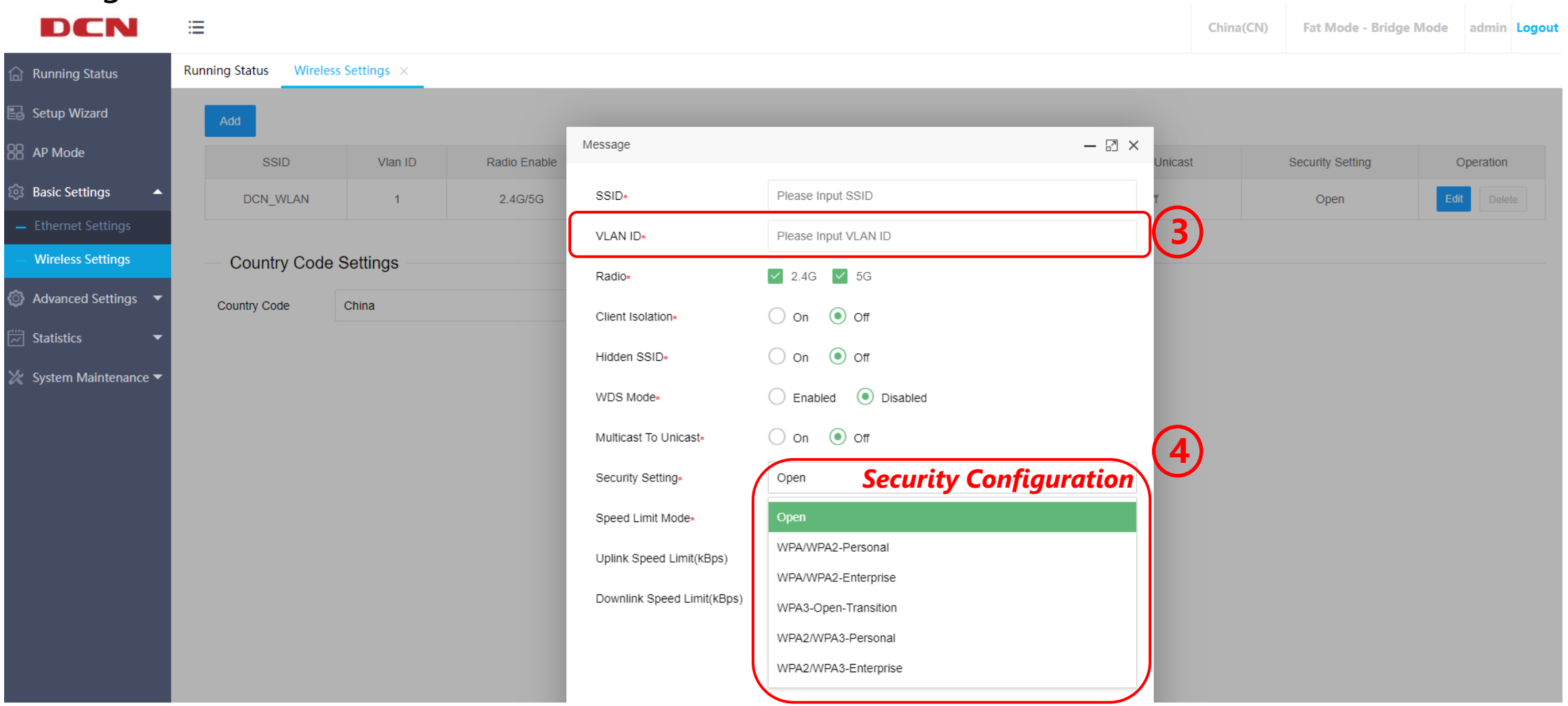
FAT AP networking – FAT AP Bridge mode

Add new SSID on AP



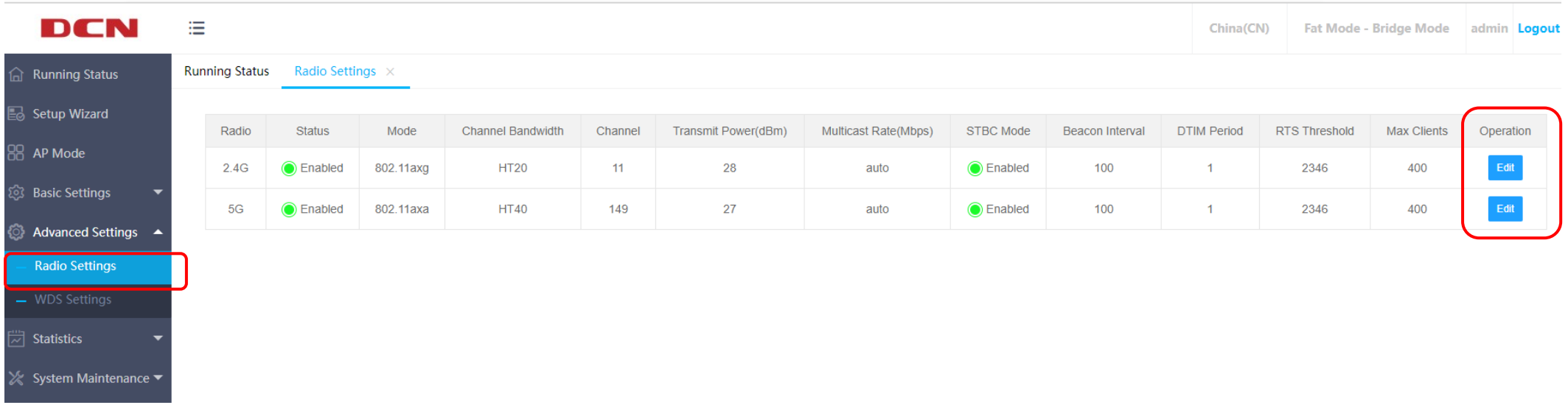
FAT AP networking – FAT AP Bridge mode

Configure service VLAN ID and user authentication method on AP



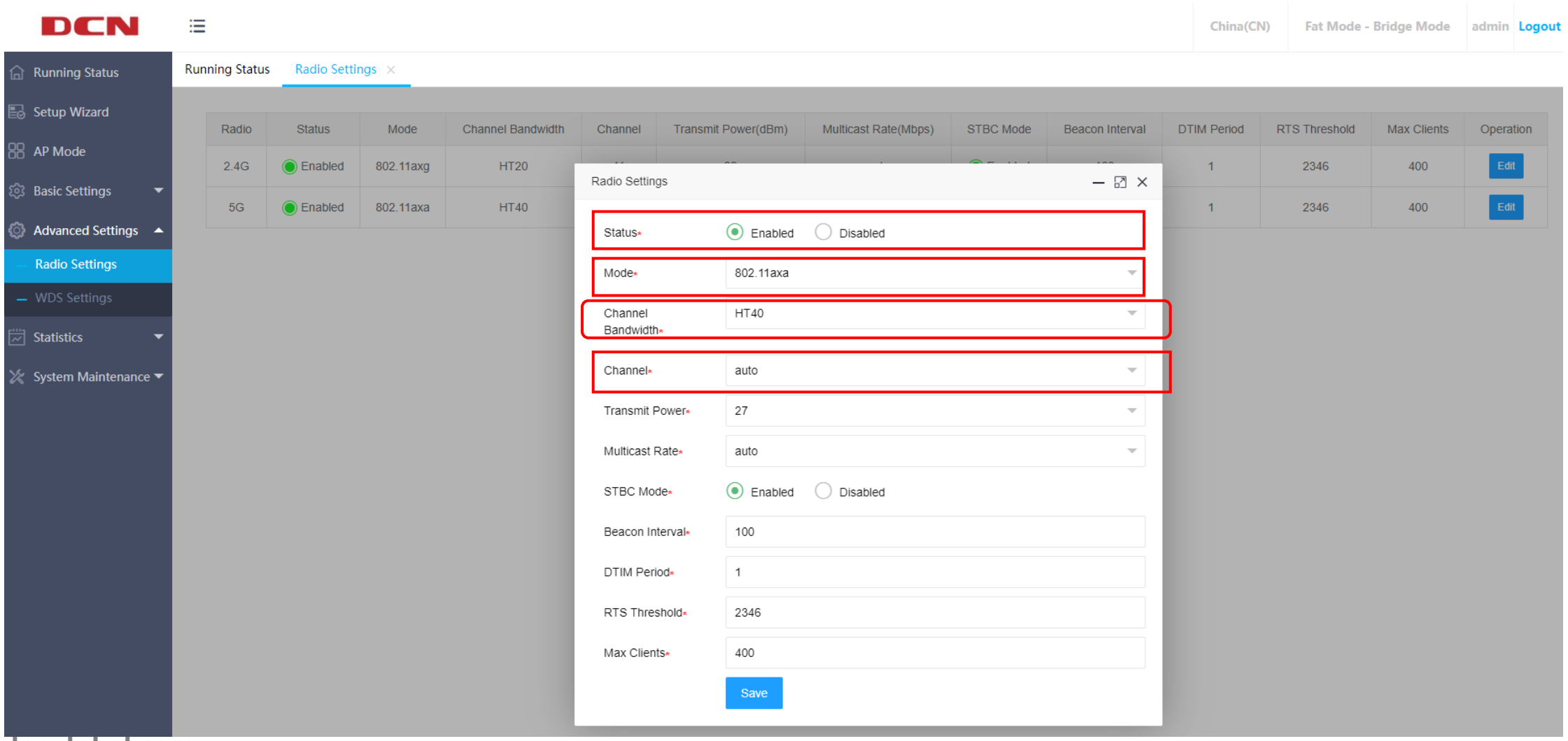
FAT AP networking – FAT AP Bridge mode

Check radio setting on AP

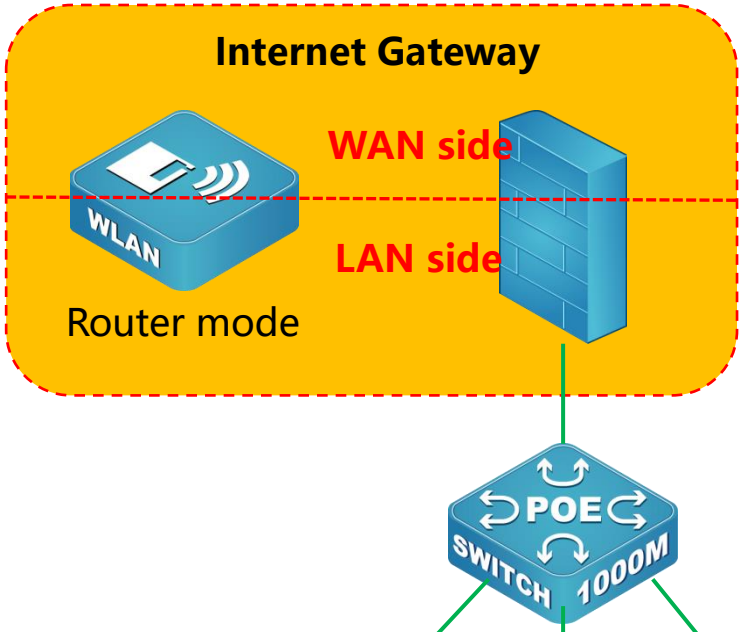


FAT AP networking – FAT AP Bridge mode

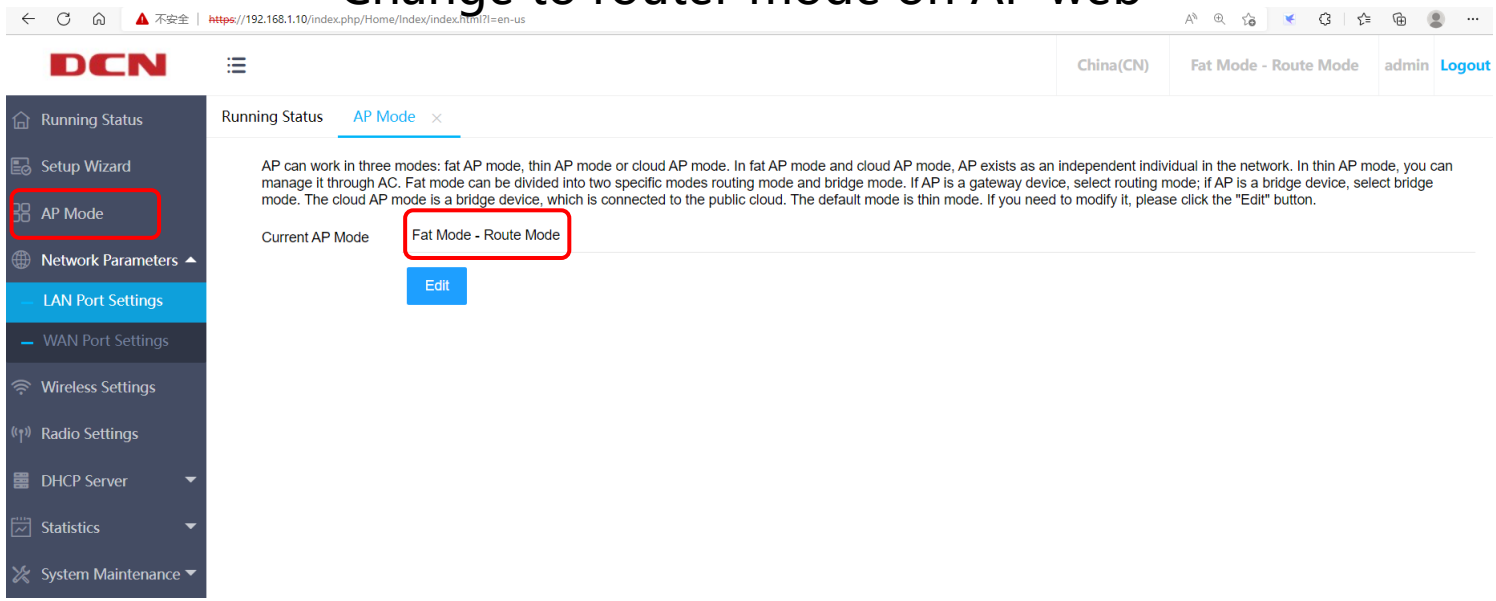
Configure radio parameters



FAT AP networking – FAT AP Router mode



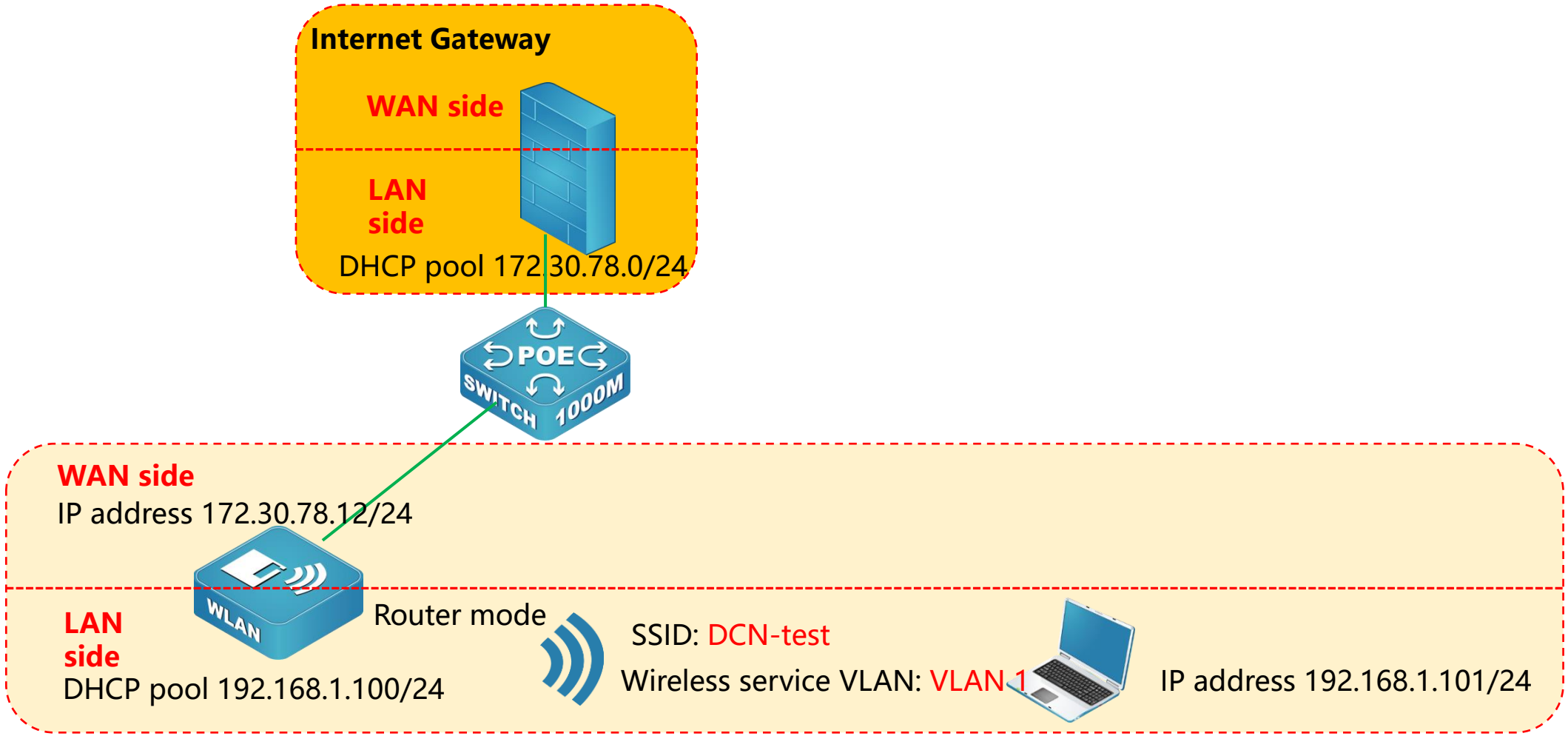
Change to router mode on AP web



Compared with the bridge mode, the router mode adds the following functions:

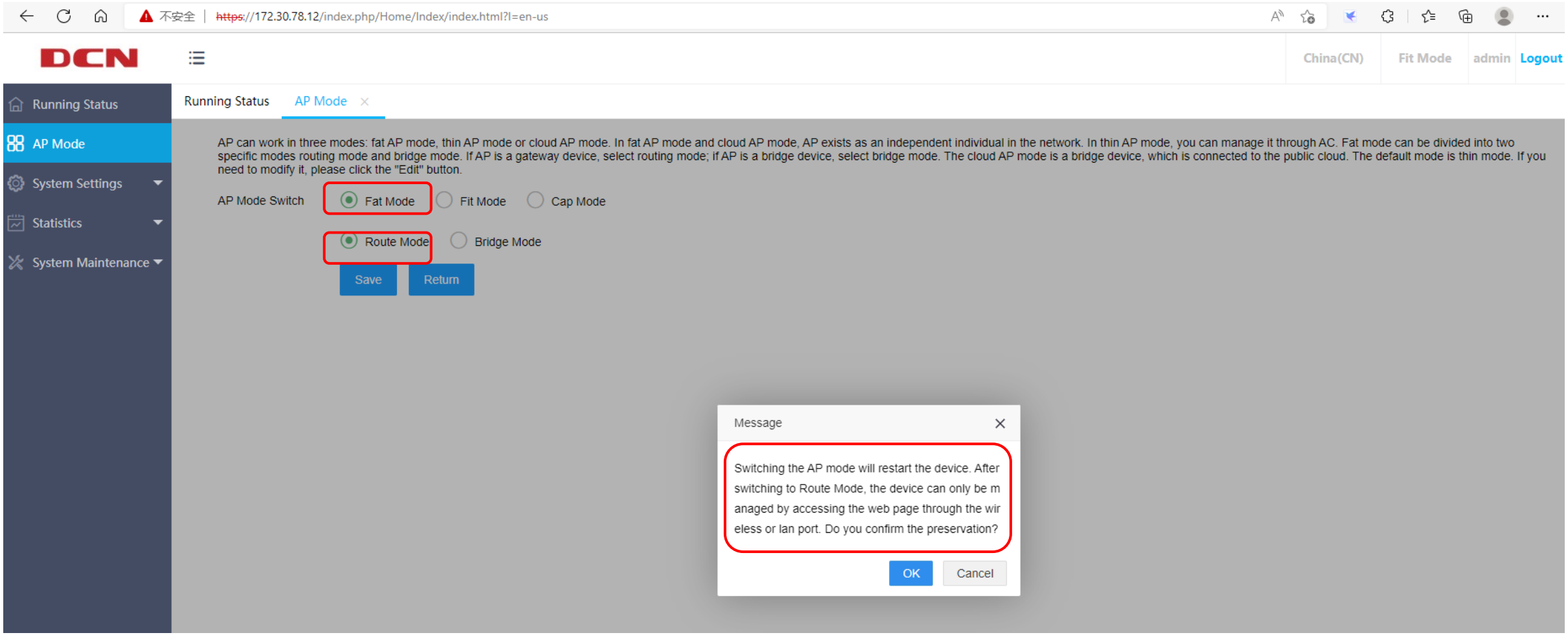
- NAT function from LAN side to WAN side.
- The PPPoE dialing function on the WAN side.
- DHCP server function on the LAN side.

FAT AP networking – FAT AP Router mode



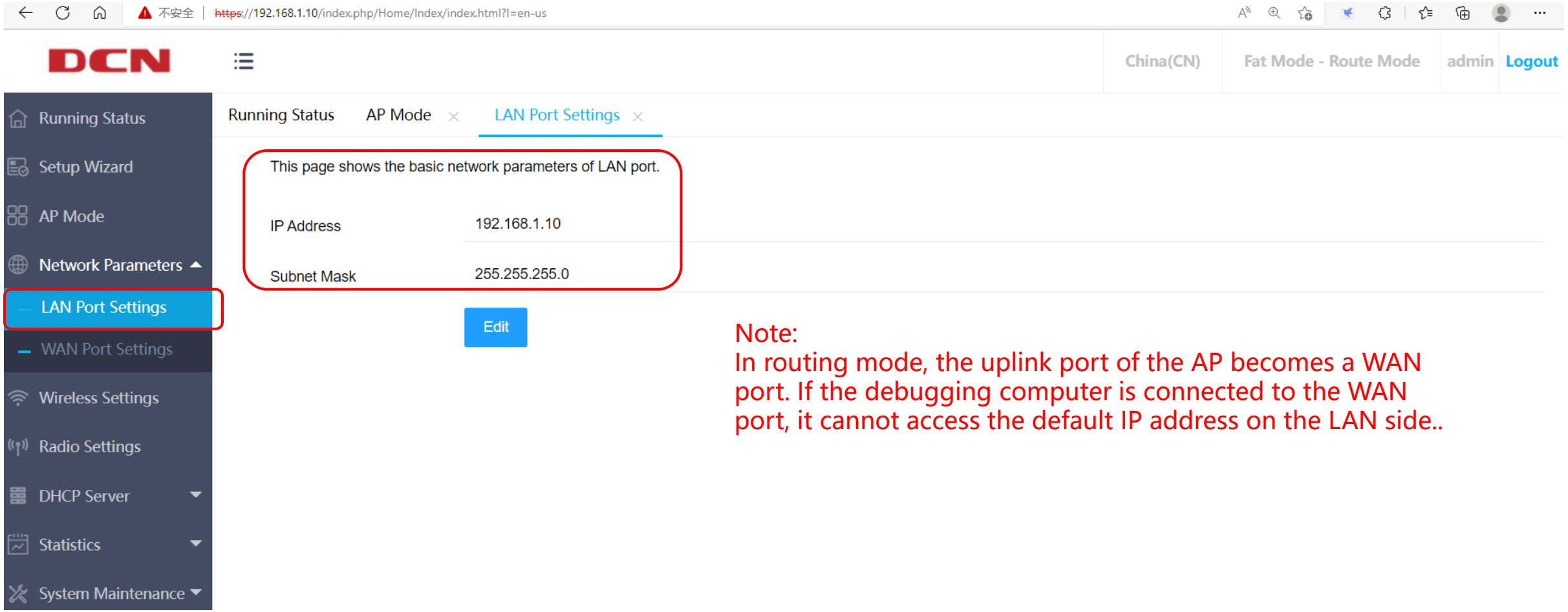
FAT AP networking – FAT AP Router mode

Change working mode on AP



FAT AP networking – FAT AP Router mode

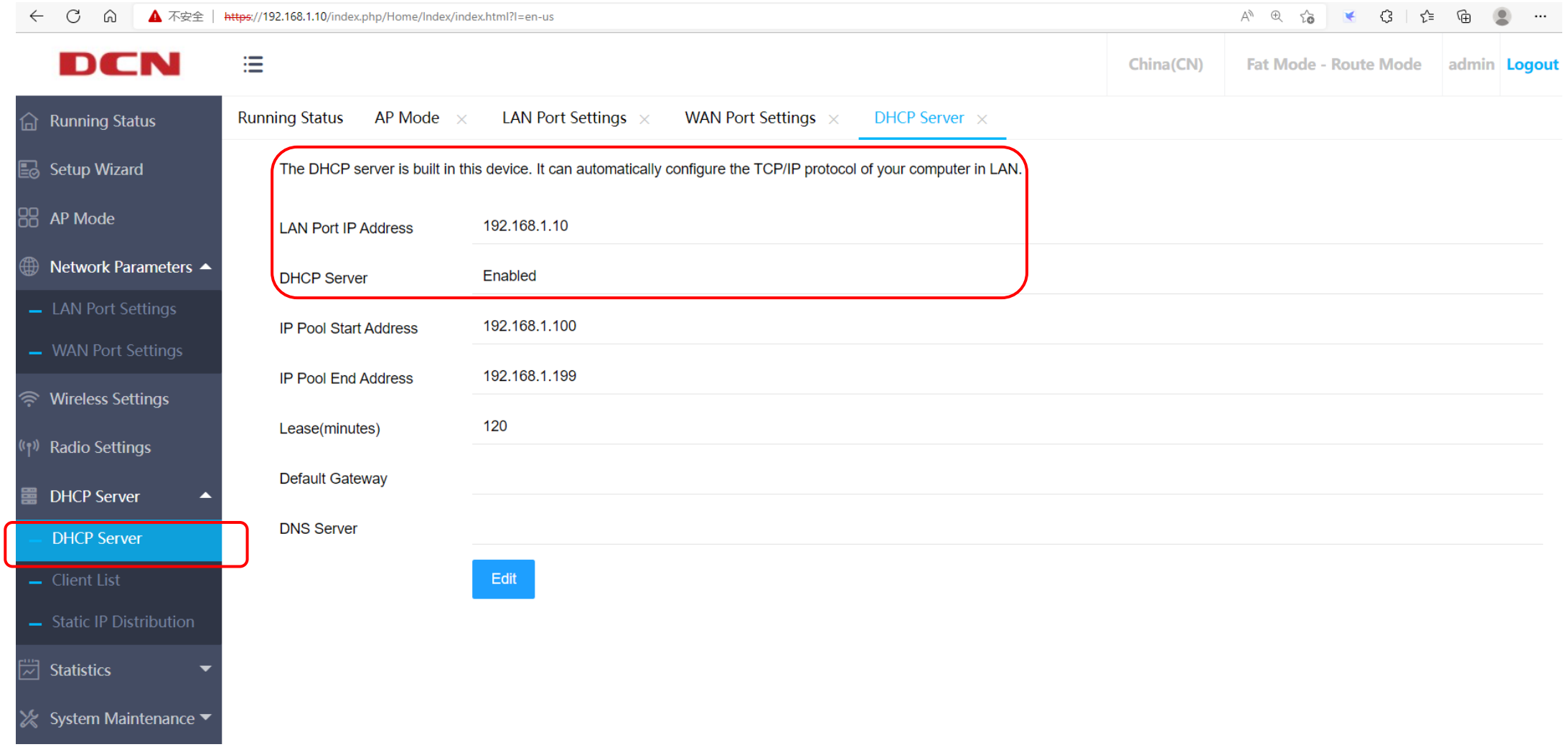
Configure IP address for AP downlink port



Note:
In routing mode, the uplink port of the AP becomes a WAN port. If the debugging computer is connected to the WAN port, it cannot access the default IP address on the LAN side..

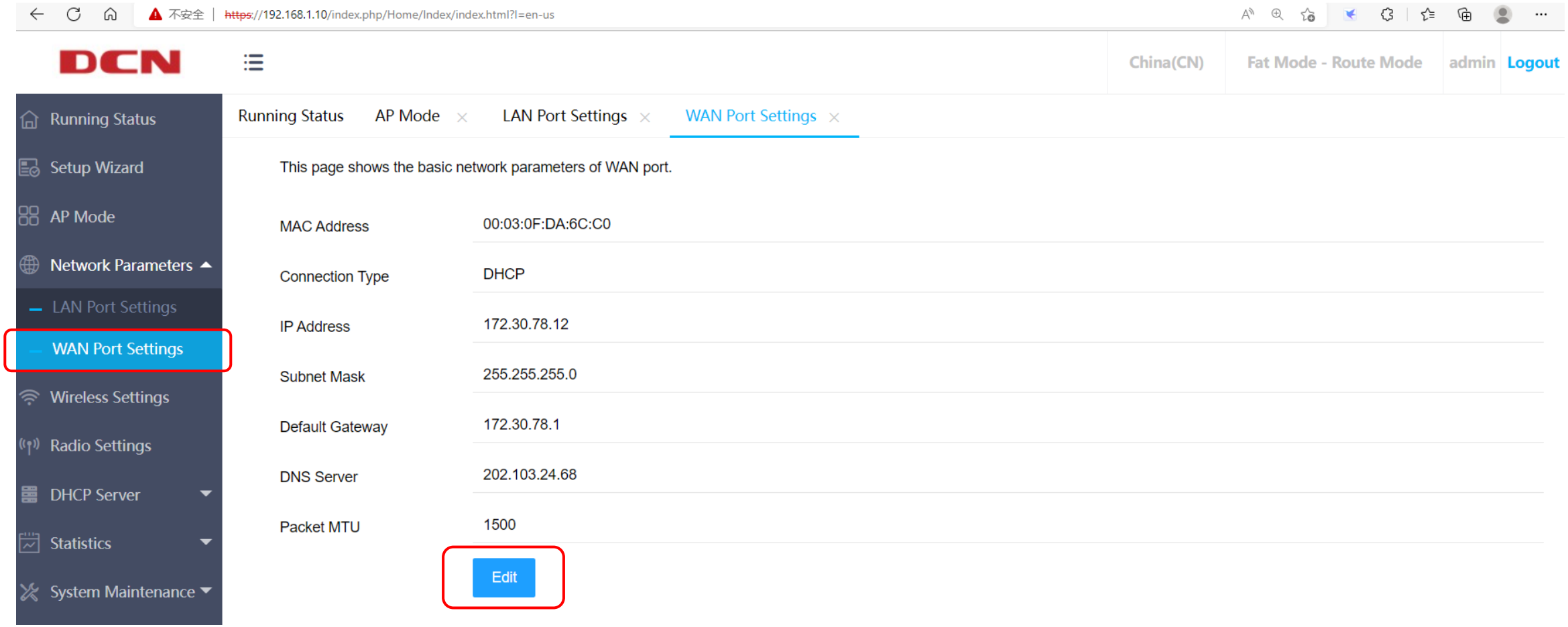
FAT AP networking – FAT AP Router mode

Configure DHCP service on AP



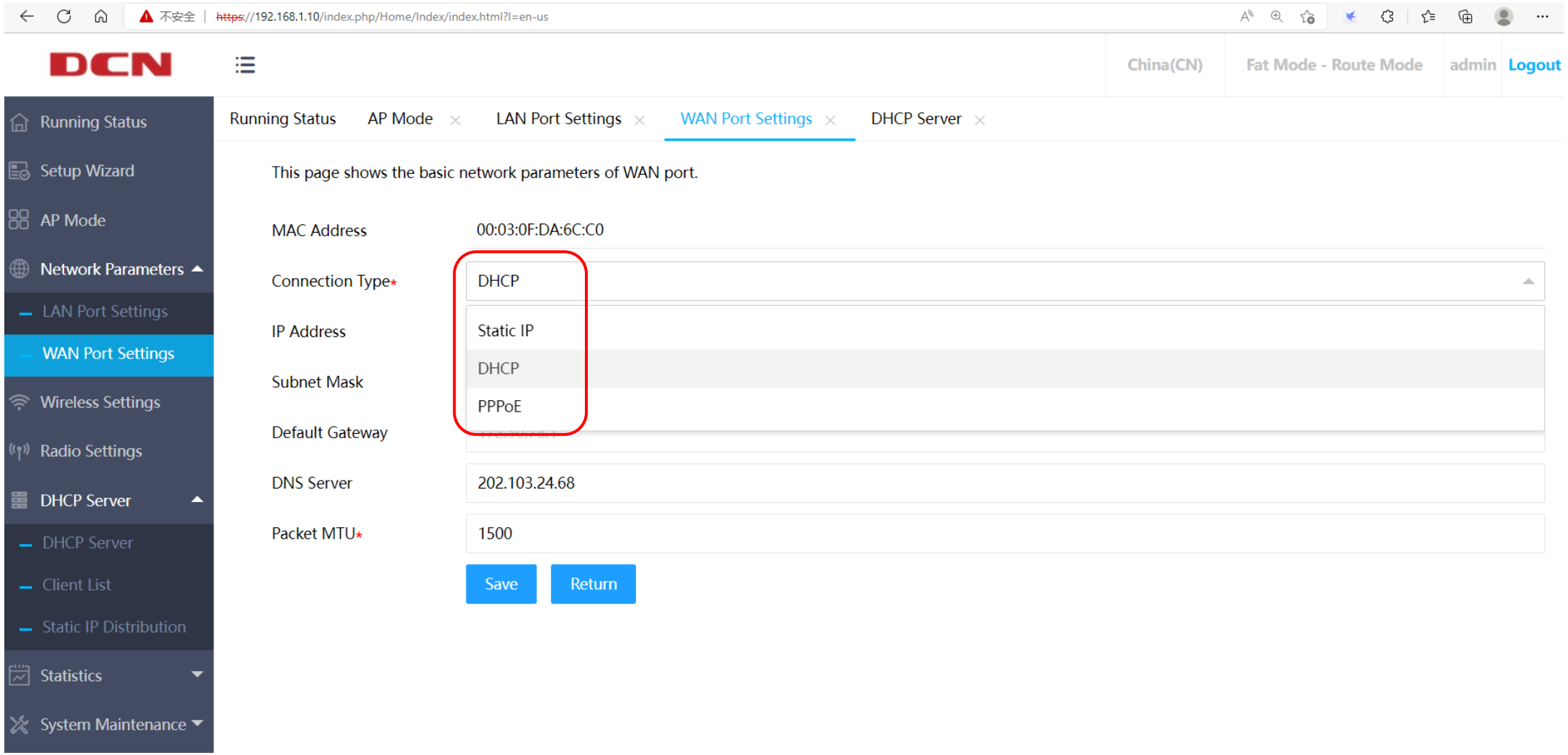
FAT AP networking – FAT AP Router mode

Configure uplink port on AP



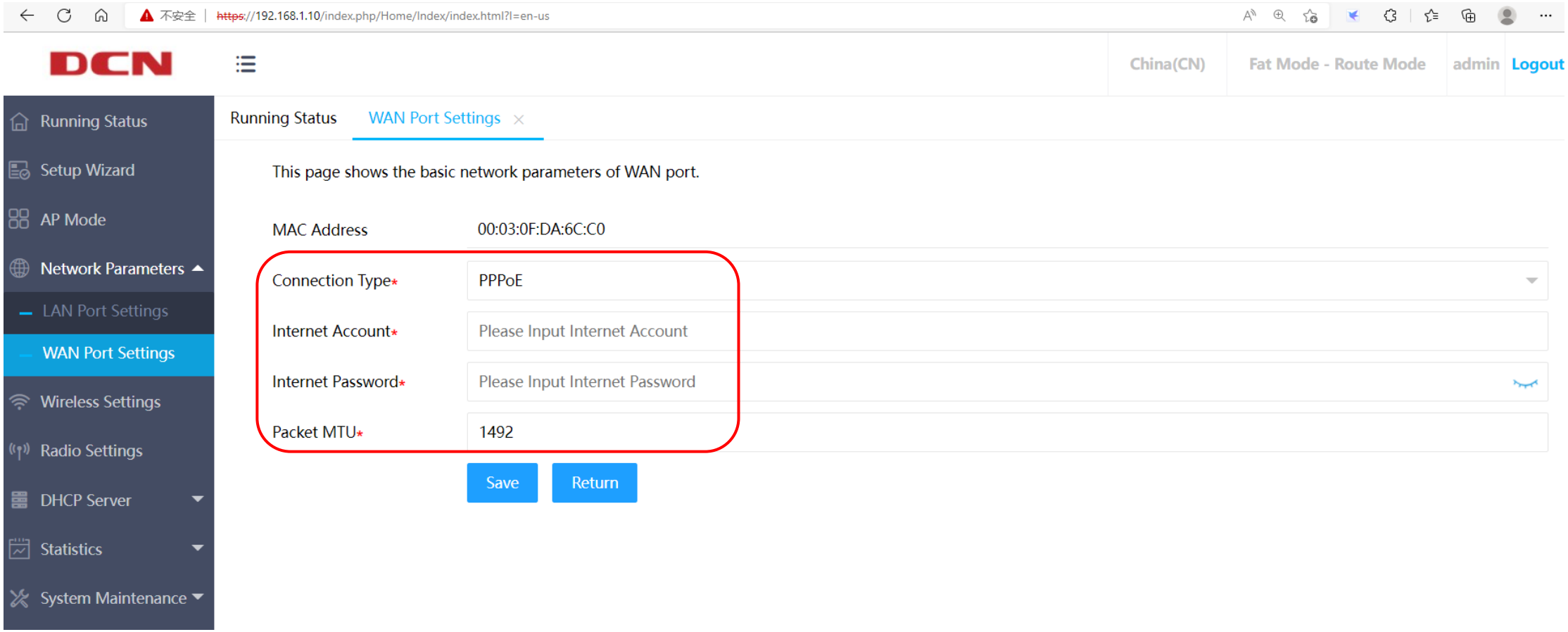
FAT AP networking – FAT AP Router mode

Configure uplink connection type



FAT AP networking – FAT AP Router mode

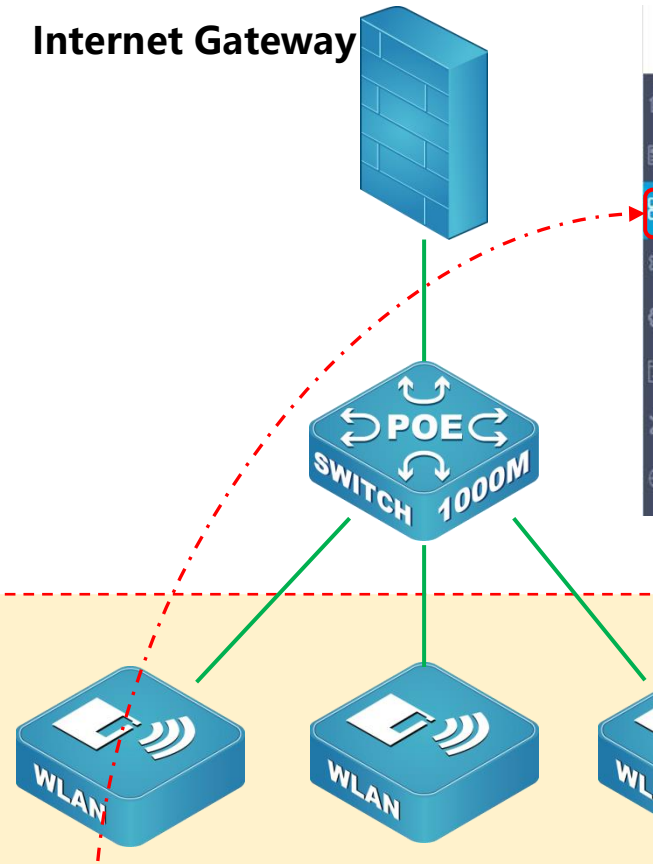
Configure PPPoE dial-up connection



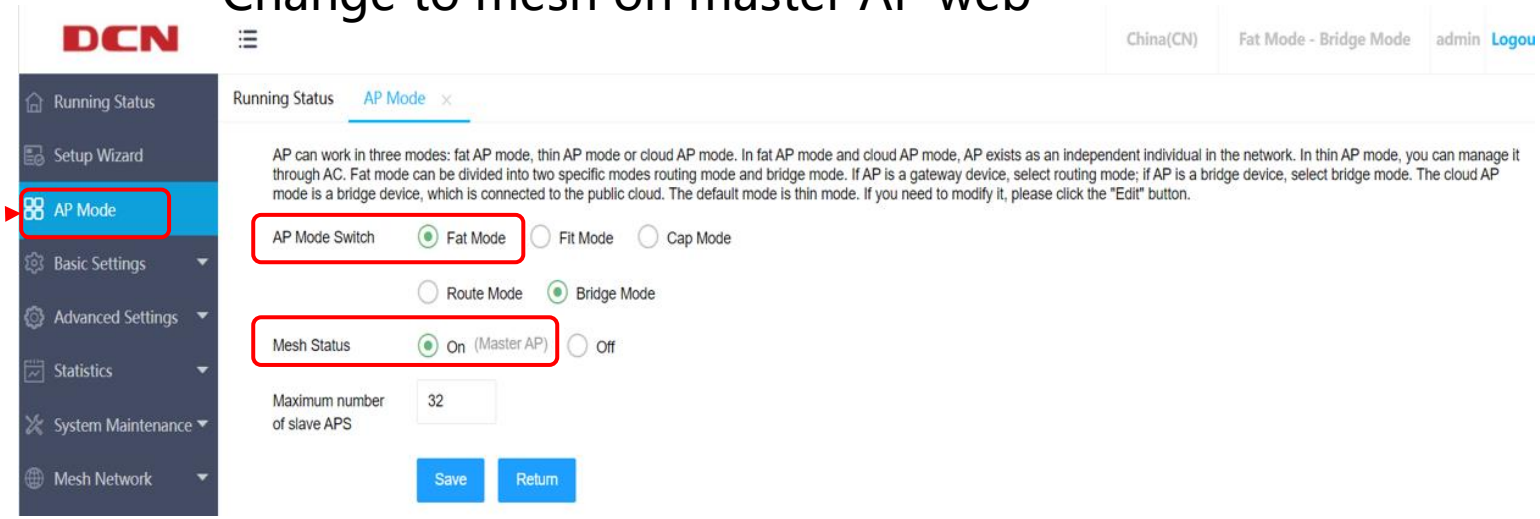
02 Deployment Scenarios of WLAN product

- FAT AP networking
- AP wired mesh networking
- FIT AP + AC simple layer-2 networking
- FIT AP + AC recommended layer-3 networking
- Cloud AP networking

AP wired mesh networking



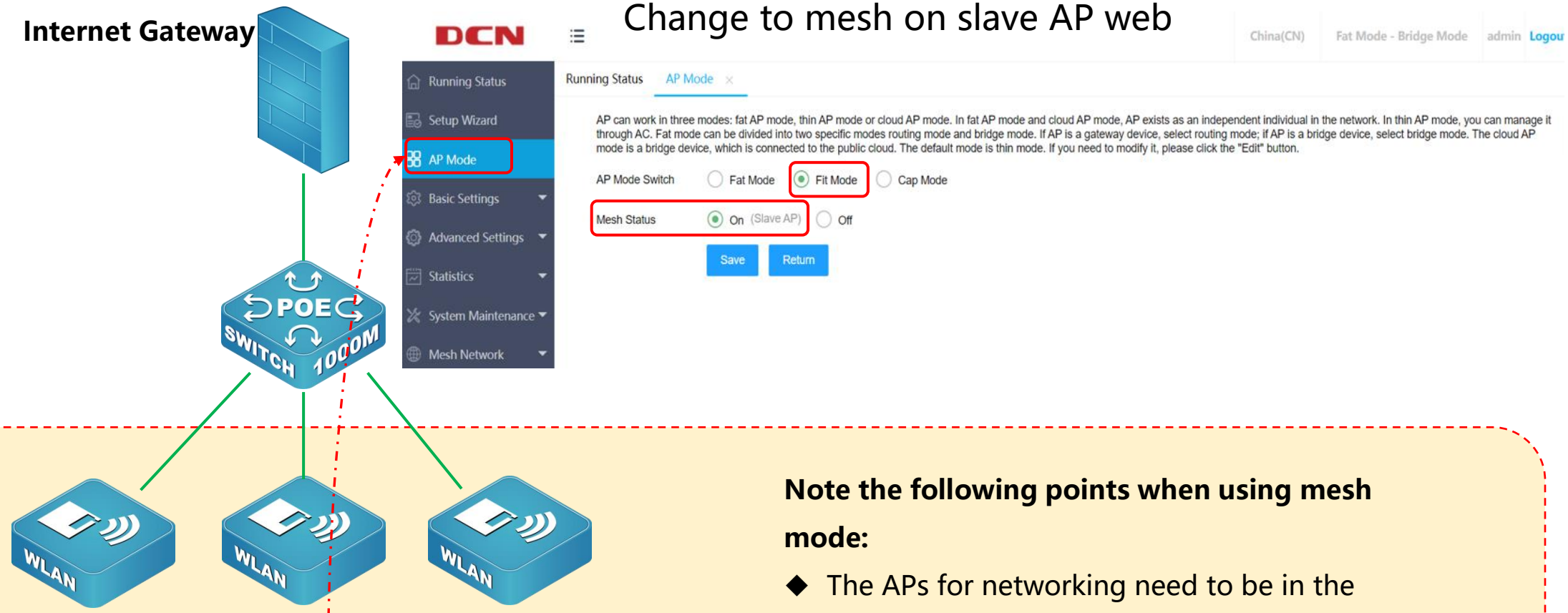
Change to mesh on master AP web



Note the following points when using Mesh mode:

- The AP software version starts with 4.14.x.x.
- It is recommended to set only one Central Access Controller AP in one layer 2 network.

AP wired mesh networking

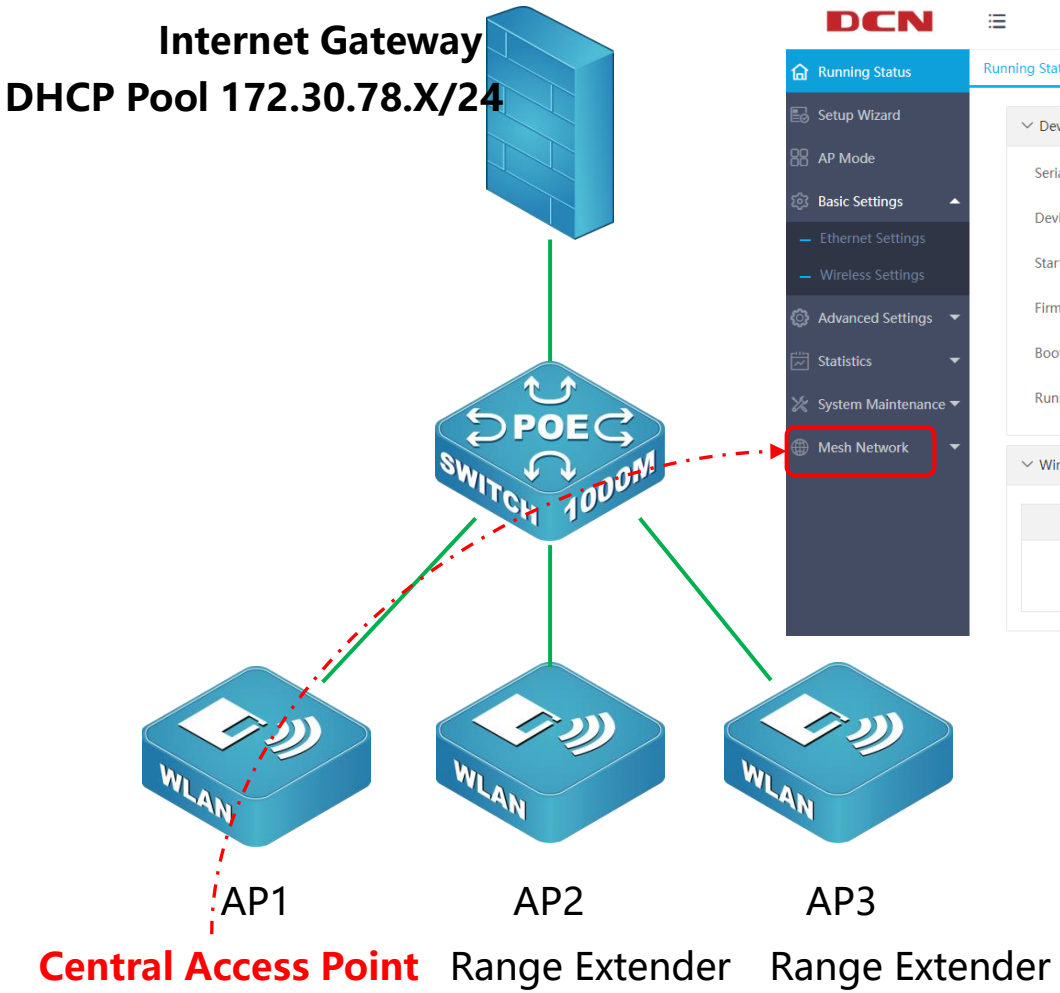


Change to mesh on slave AP web

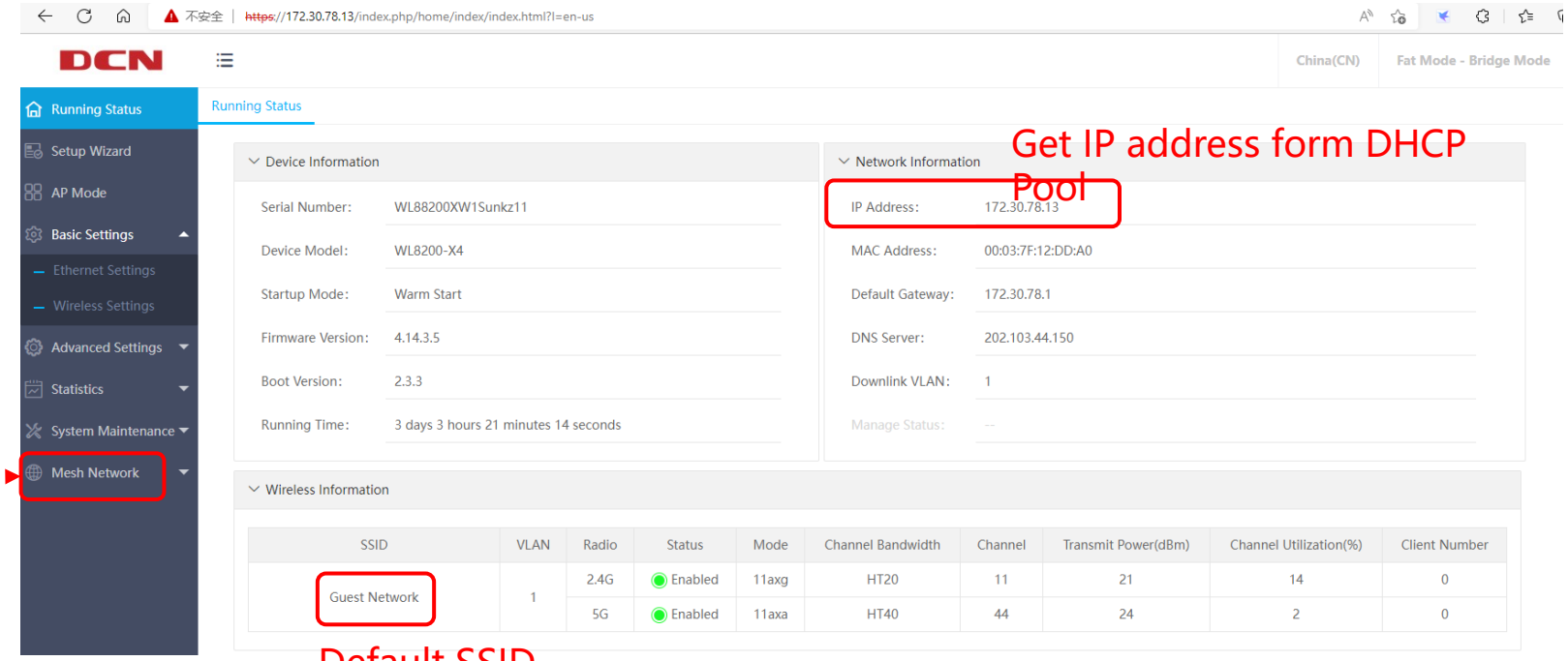
Note the following points when using mesh mode:

- The APs for networking need to be in the same layer 2 network.
- AP models can be mixed.

AP wired mesh networking



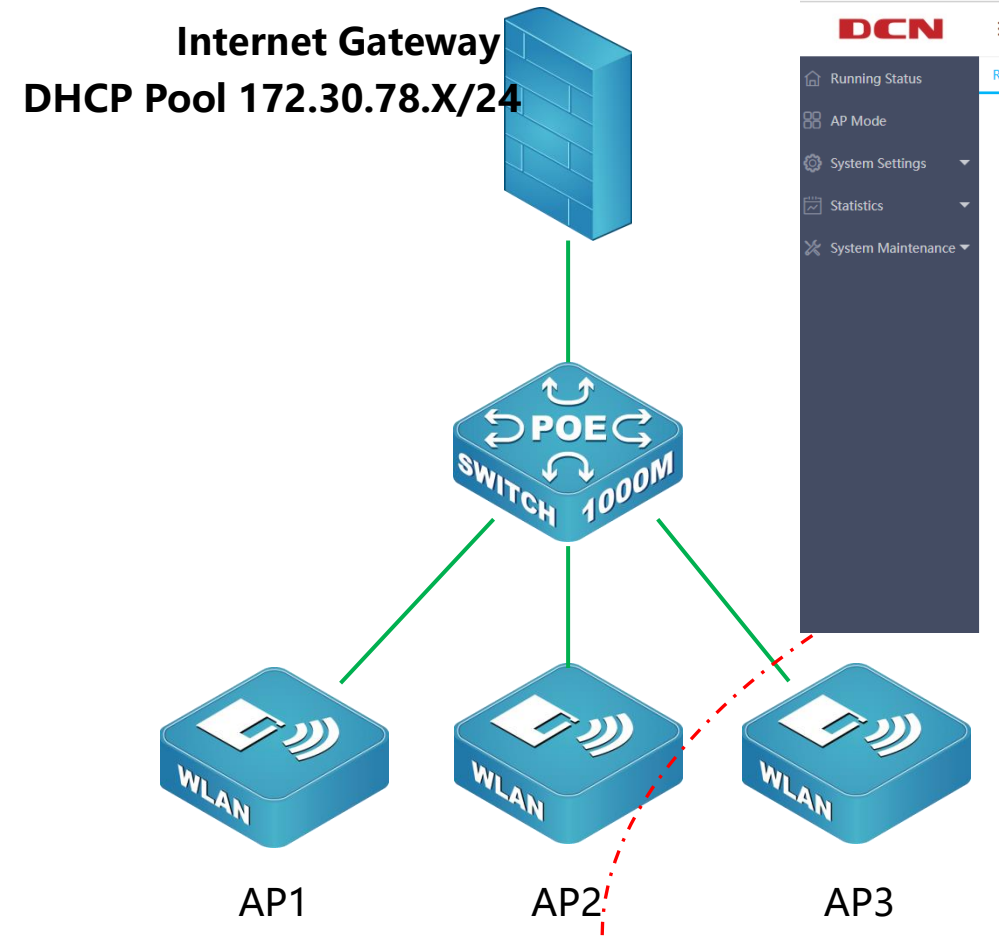
Check status on master AP web



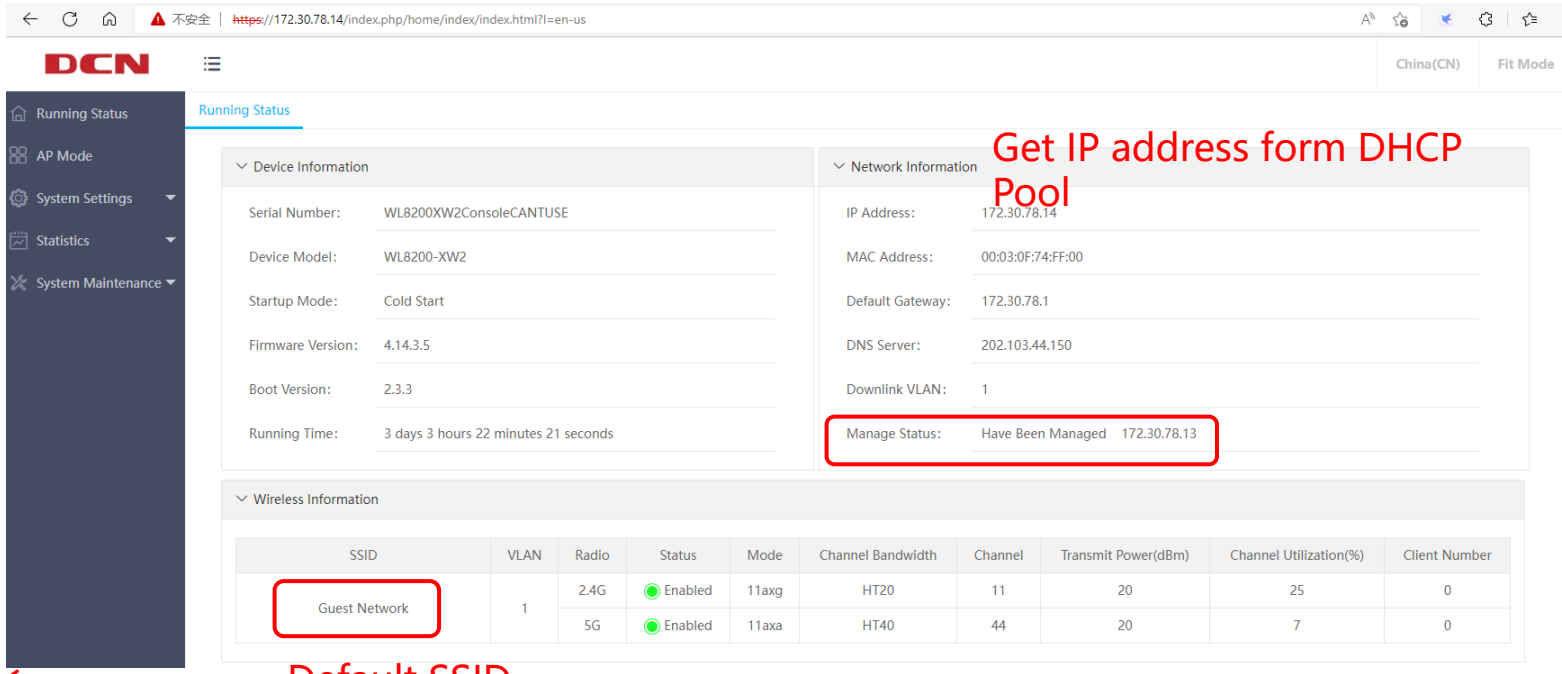
Get IP address form DHCP Pool

Default SSID
It can only be modified and cannot be deleted.

AP wired mesh networking



Check status on slave AP web

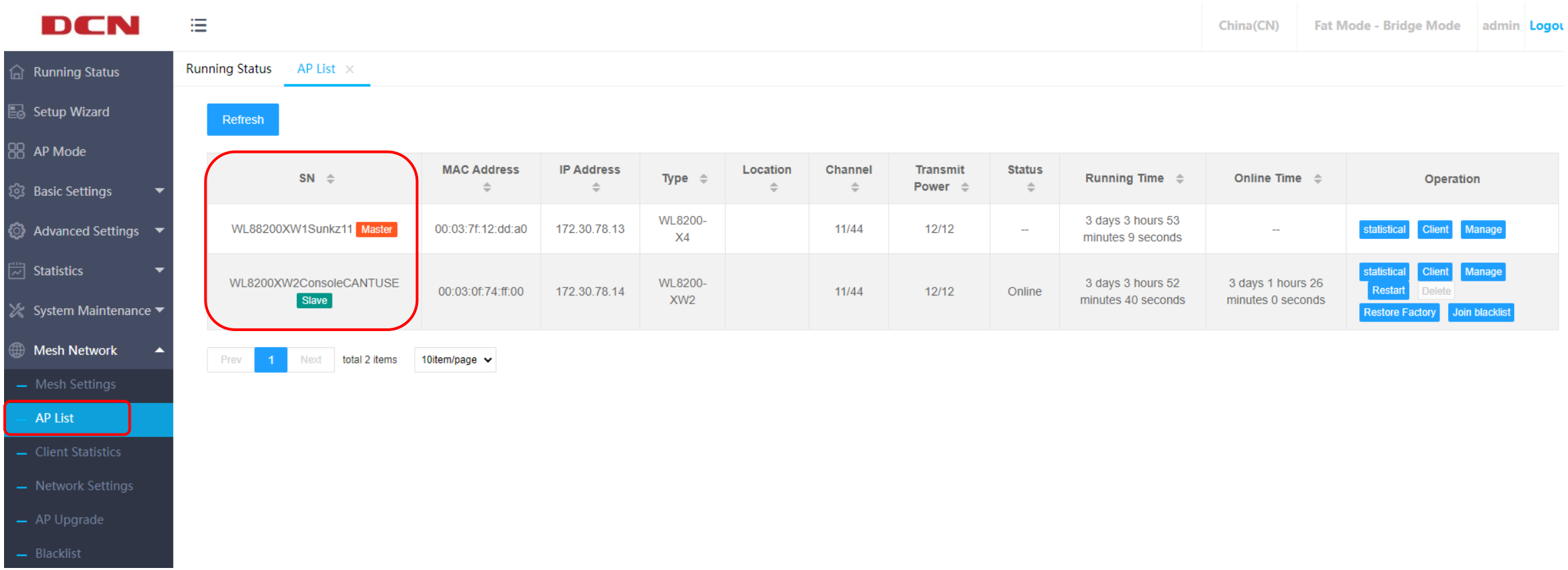


Get IP address form DHCP Pool

Default SSID
It can only be modified and cannot be deleted.

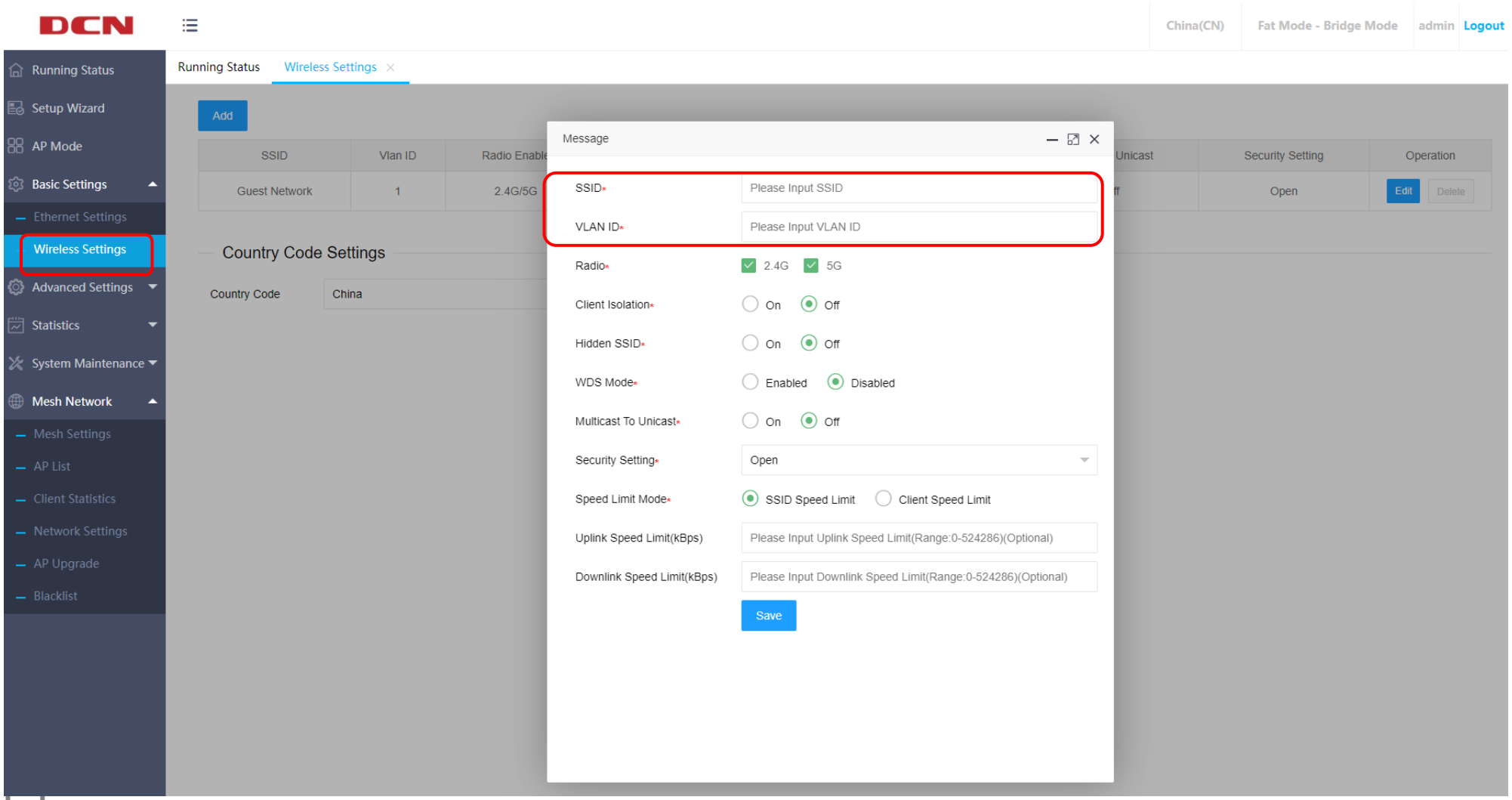
AP wired mesh networking

Check all AP info on master AP web



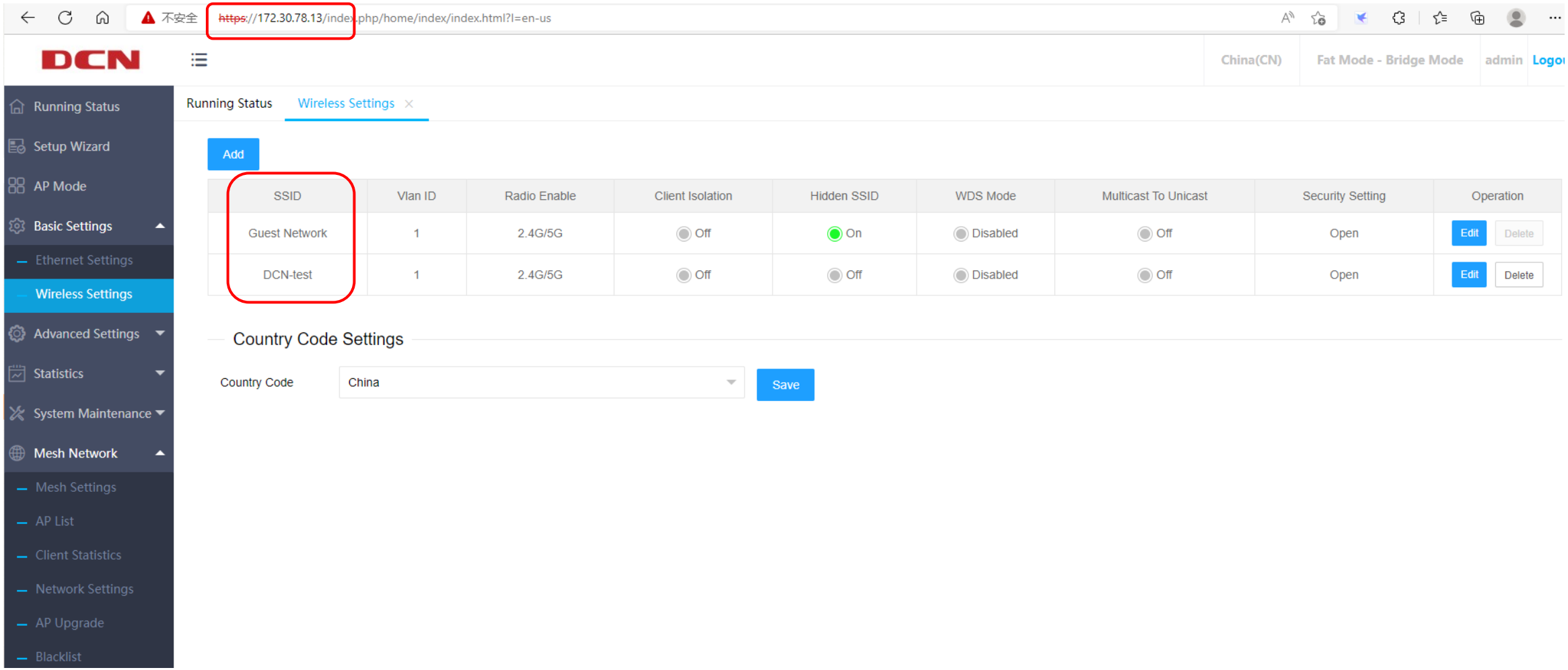
AP wired mesh networking

Add new SSID on Master AP



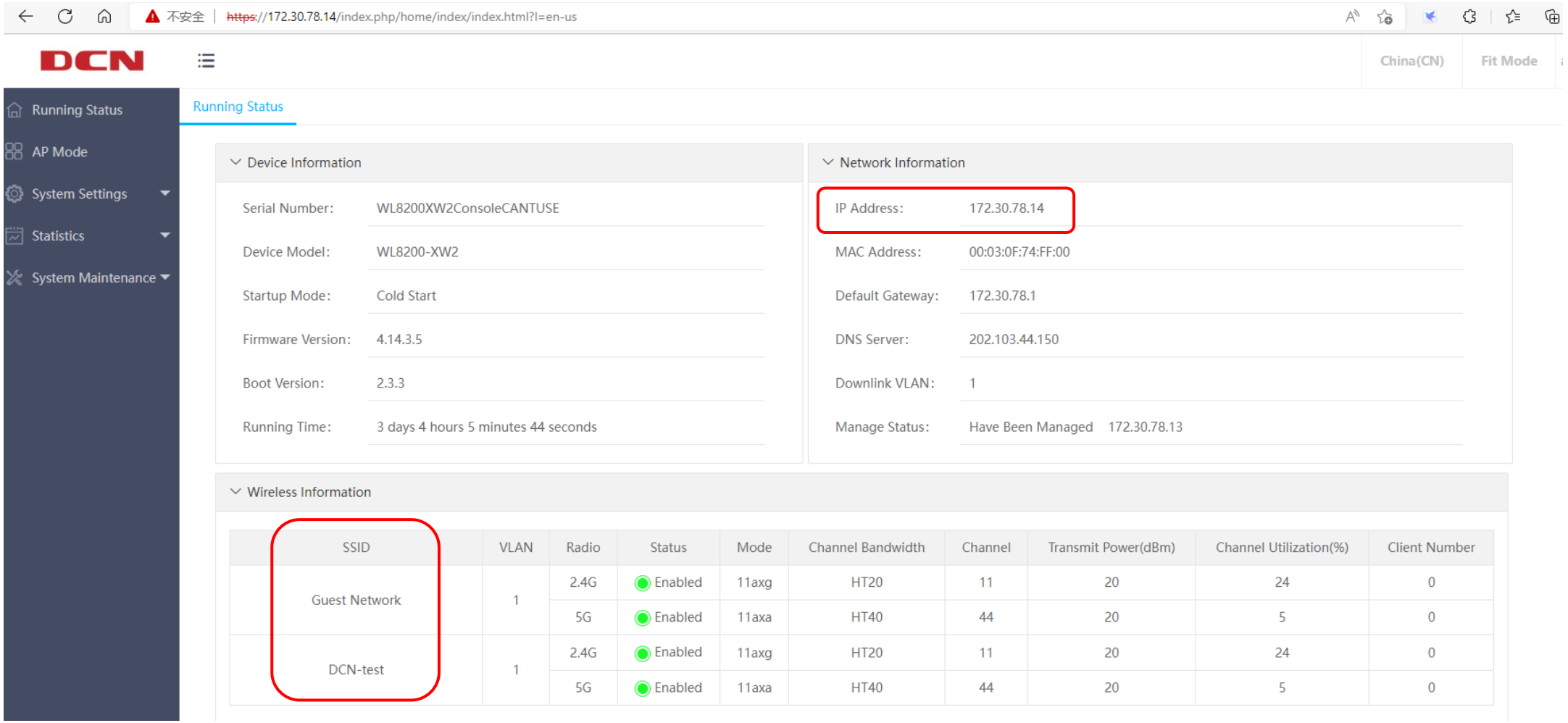
AP wired mesh networking

Check new SSID on Master AP



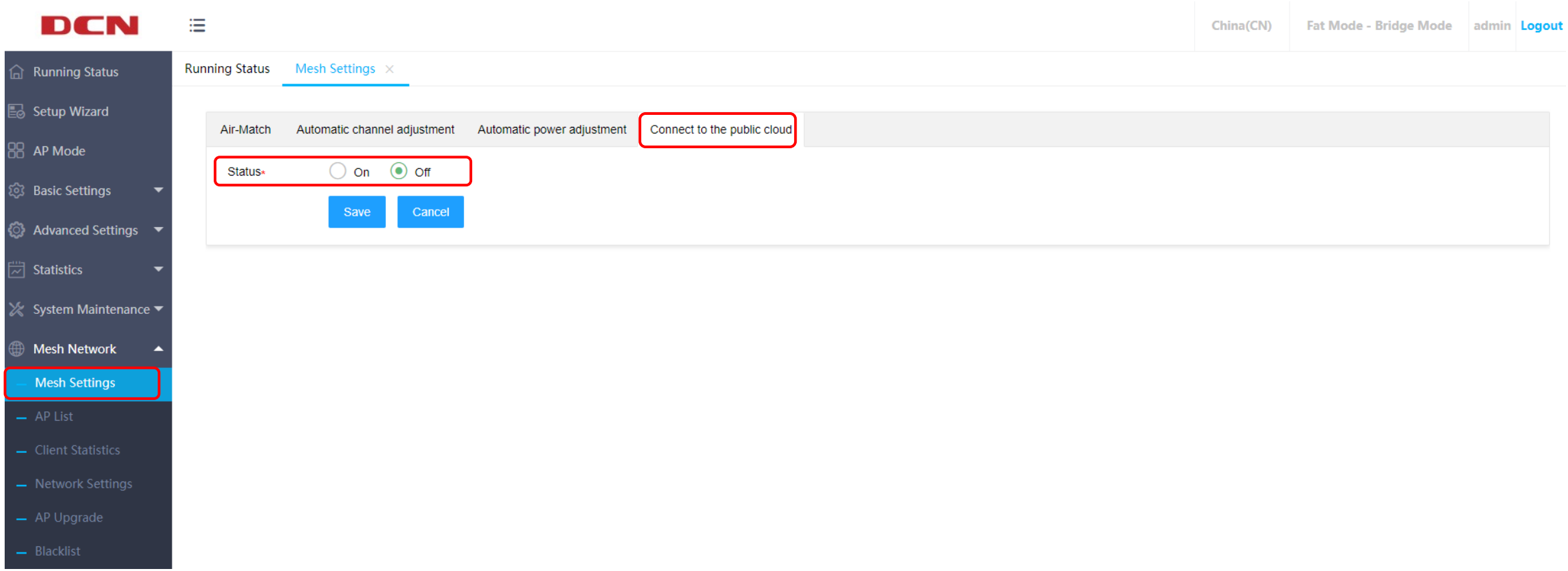
AP wired mesh networking

Check new SSID on slave AP



AP wired mesh networking

Set mesh networks managed by Imcloud platform on master AP web



AP wired mesh networking

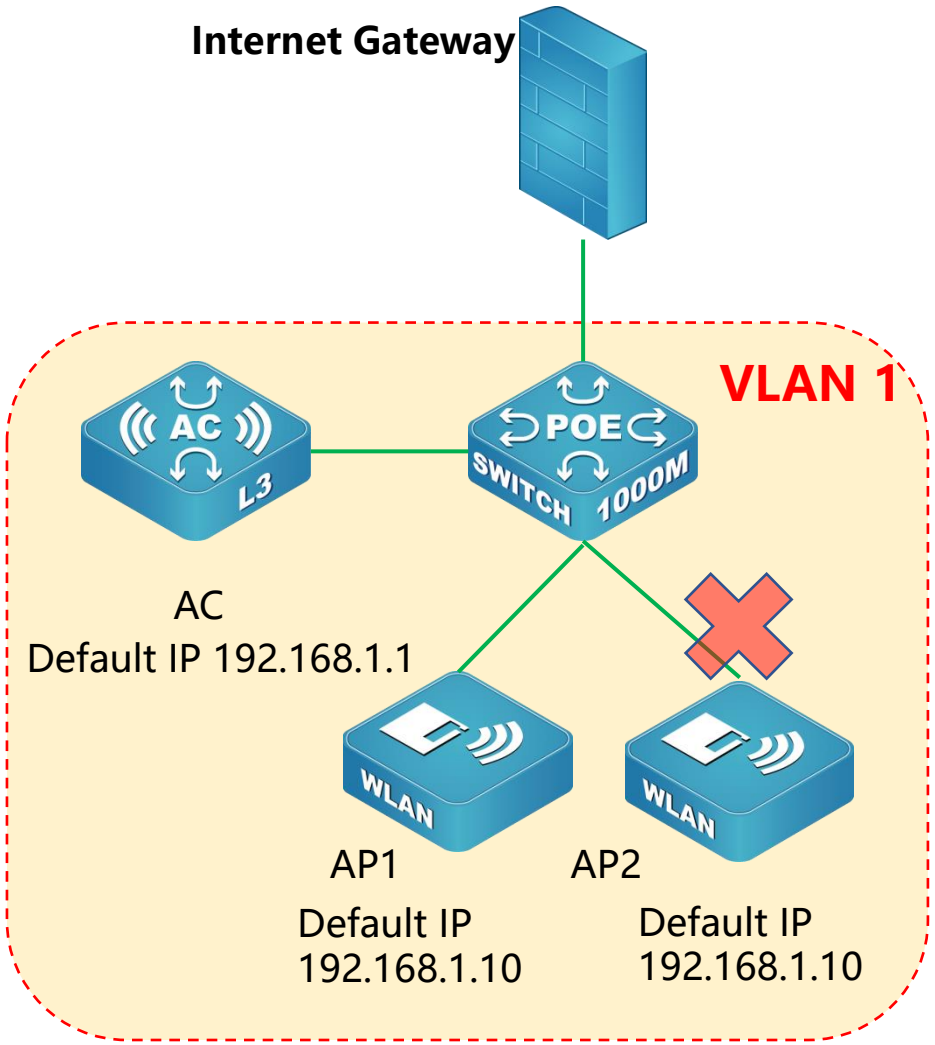
Mesh supported AP models

Model	FW version	CAP	RE	RE Qty
WL8200-X10	4.14.3.x	Yes	Yes	32
WL8200-X4		Yes	Yes	32
WL8200-X2		Yes	Yes	16
WL8200-XW2		Yes	Yes	16
WL8200-XT2/XIT2		Yes	Yes	16
WL8200-X1	5.15.3.x	Yes	Yes	8
WL8200-XW1		NA	Yes	NA

02 Deployment Scenarios of WLAN product

- FAT AP networking
- AP wired mesh networking
- FIT AP + AC simple layer-2 networking
- FIT AP + AC recommended layer-3 networking
- Cloud AP networking

FIT AP + AC simple layer-2 networking – Network topology

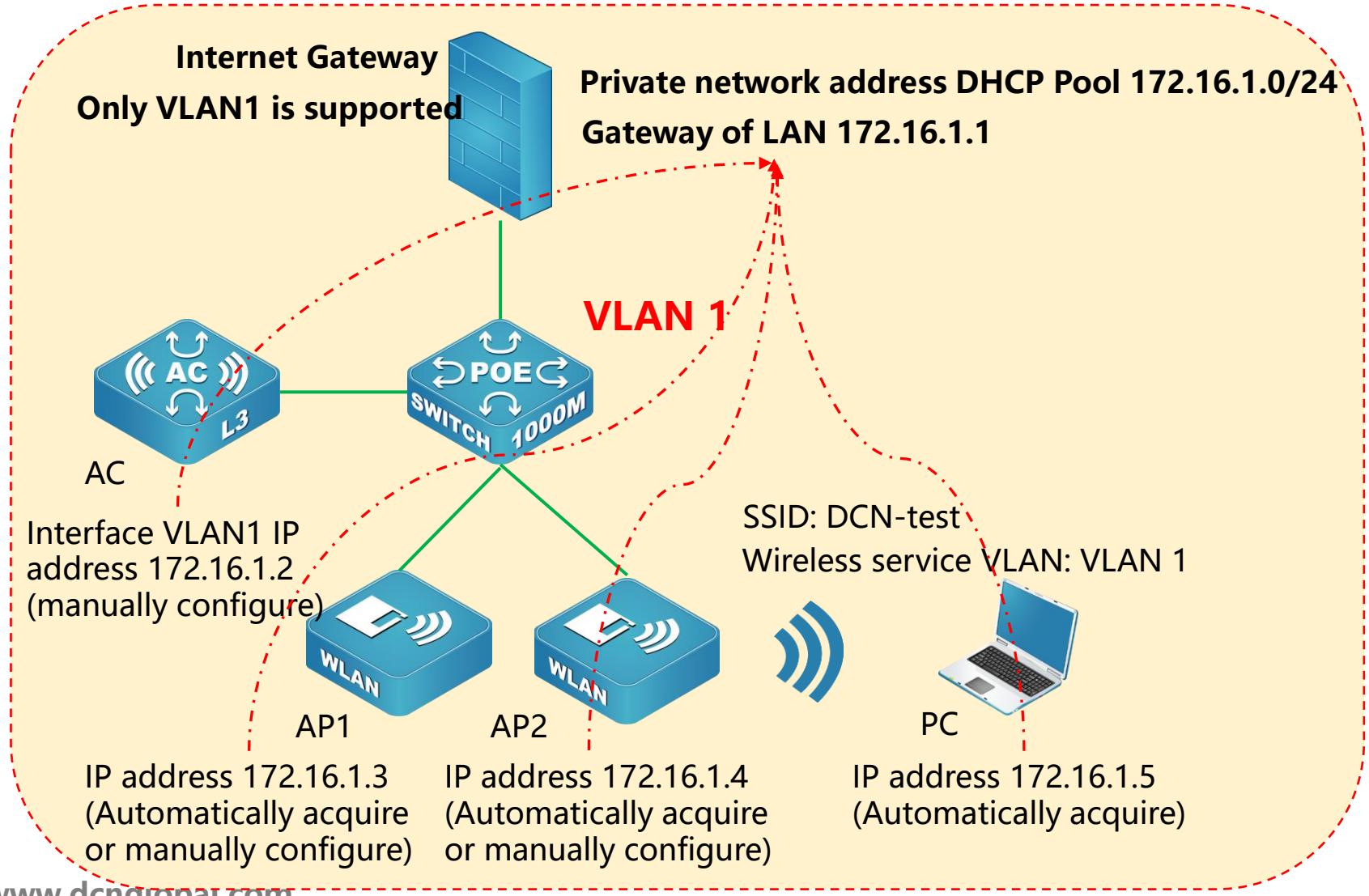


Such networking is not particularly applicable in real production networks.

Reason:

- The wireless management IP address of AC will be changed according to the network planning.
- There will be many APs, not only one. We need to manually set the IP address used by each AP (by default, all AP will use 192.168.1.10), so as to ensure that each AP can communicate with AC normally.
- In order to simplify the IP address allocation for APs, we can choose to use DHCP service.

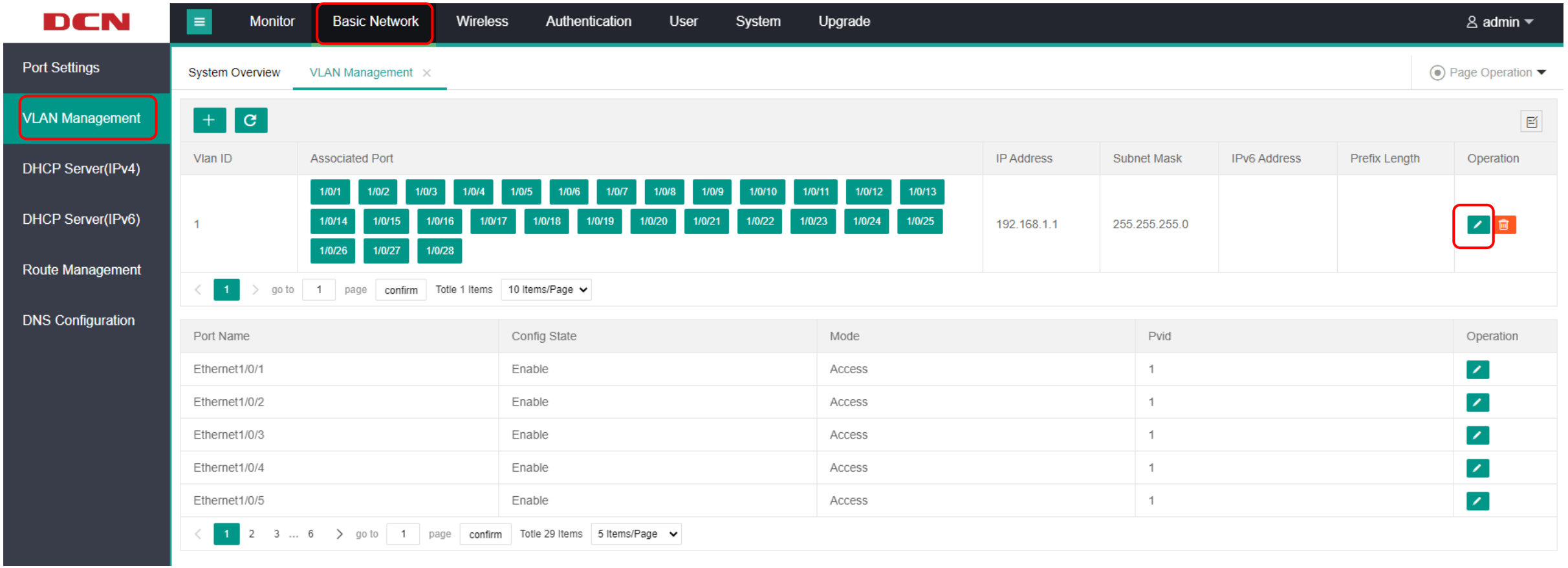
FIT AP + AC simple layer-2 networking – Network topology



- If the Internet gateway is just a simple device that can only support VLAN1, this is the most convenient way to network.
- The IP address of the AP can be automatically obtained or manually configured. Just avoid address conflicts.
- The advantage of this networking is that AC and AP can access the Internet and the networking is simple without any configuration of the switch.
- The disadvantage is that all devices are in VLAN1. If wireless customers manually configure IP addresses, IP address conflicts may occur and affect the stable operation of the network.

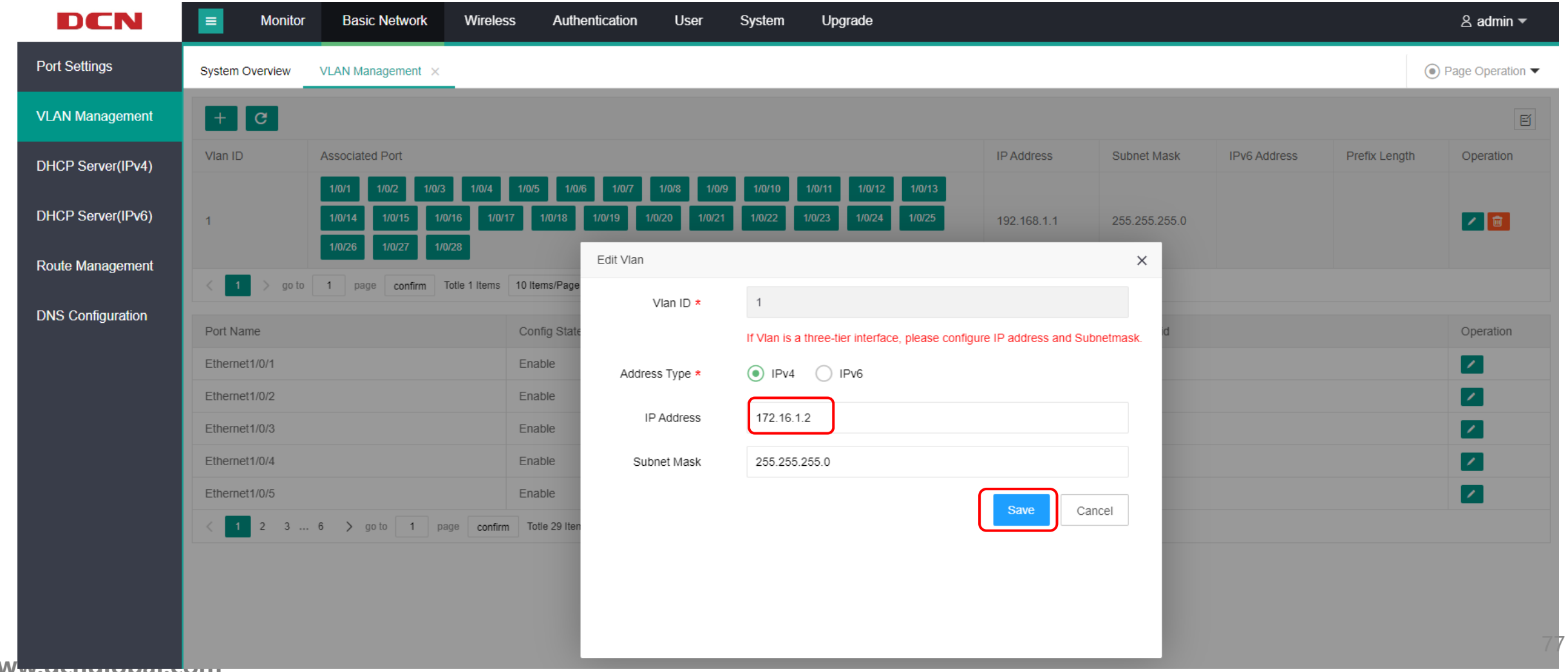
FIT AP + AC simple layer-2 networking – Network topology

Configure VLAN on AC



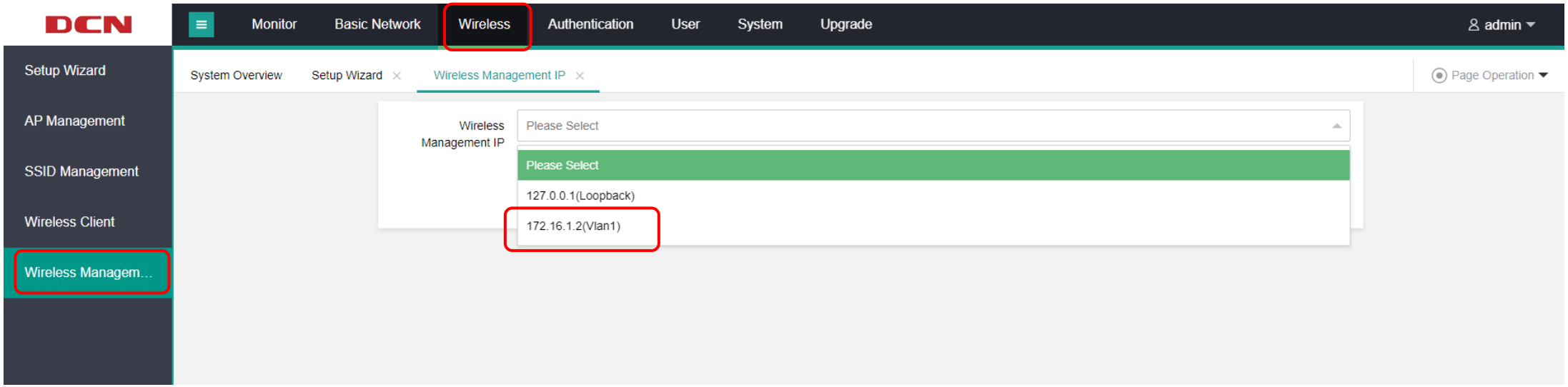
FIT AP + AC simple layer-2 networking – Network topology

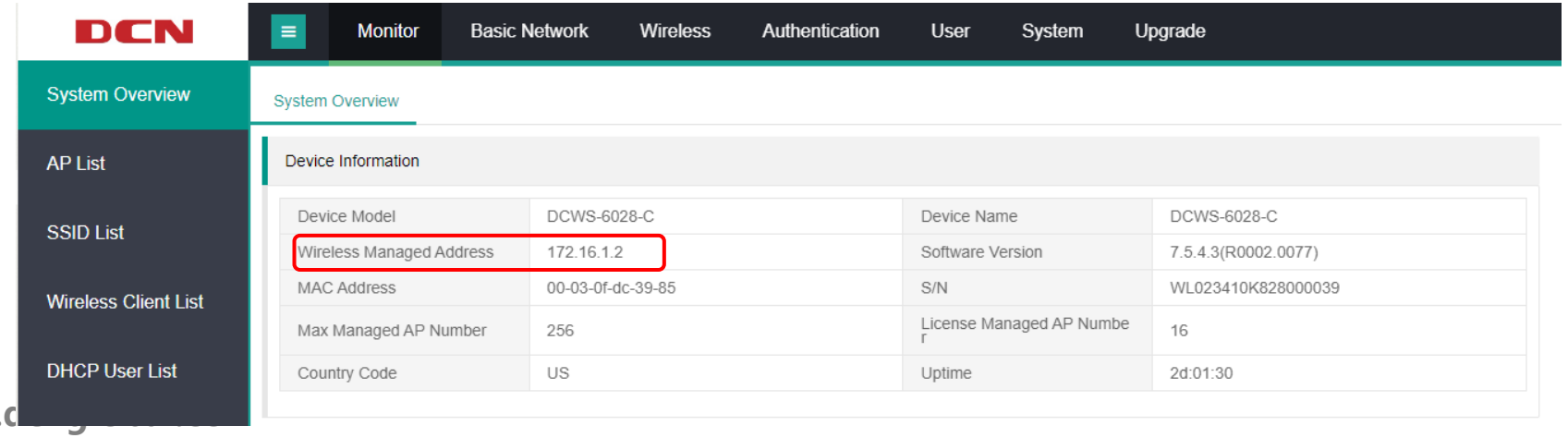
Configure VLAN interface on AC



FIT AP + AC simple layer-2 networking – Network topology

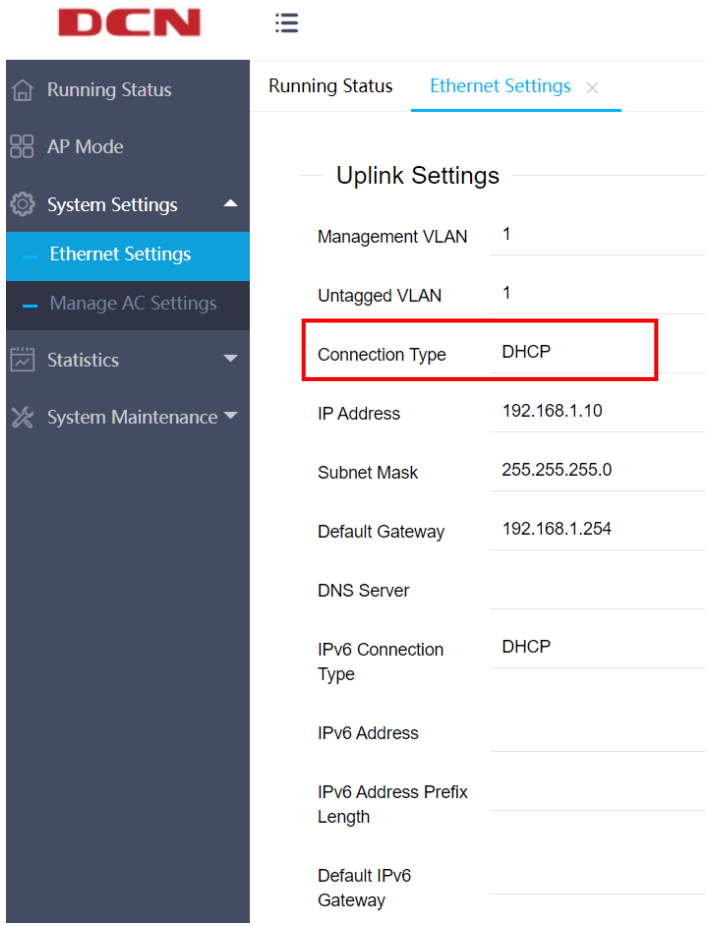
Configure and check wireless management IP address on AC

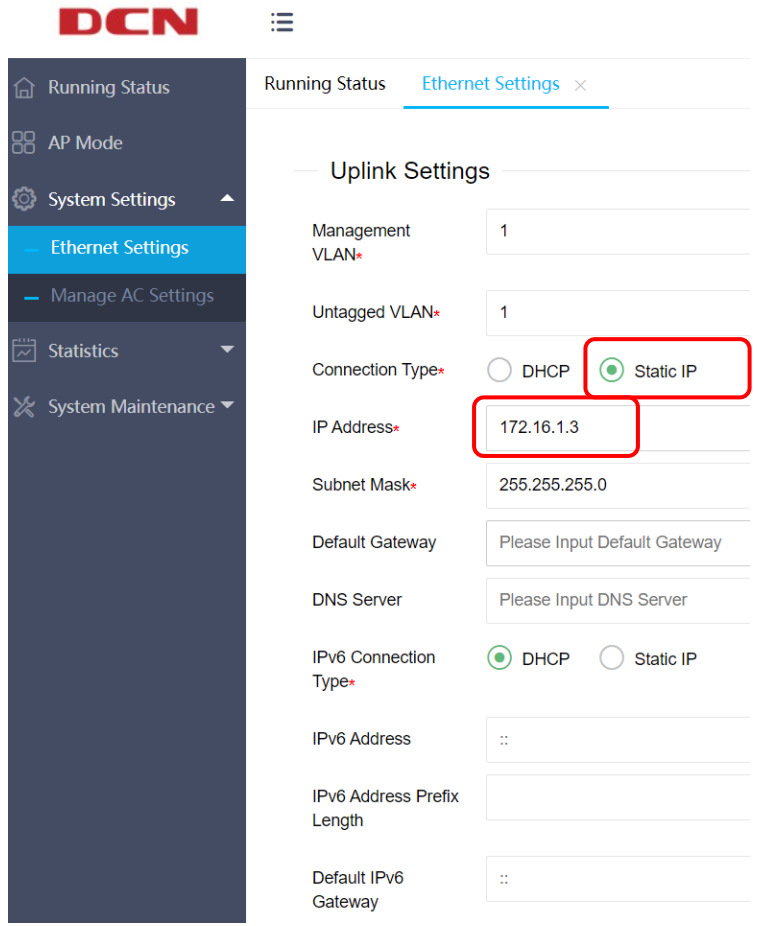




FIT AP + AC simple layer-2 networking – Network topology

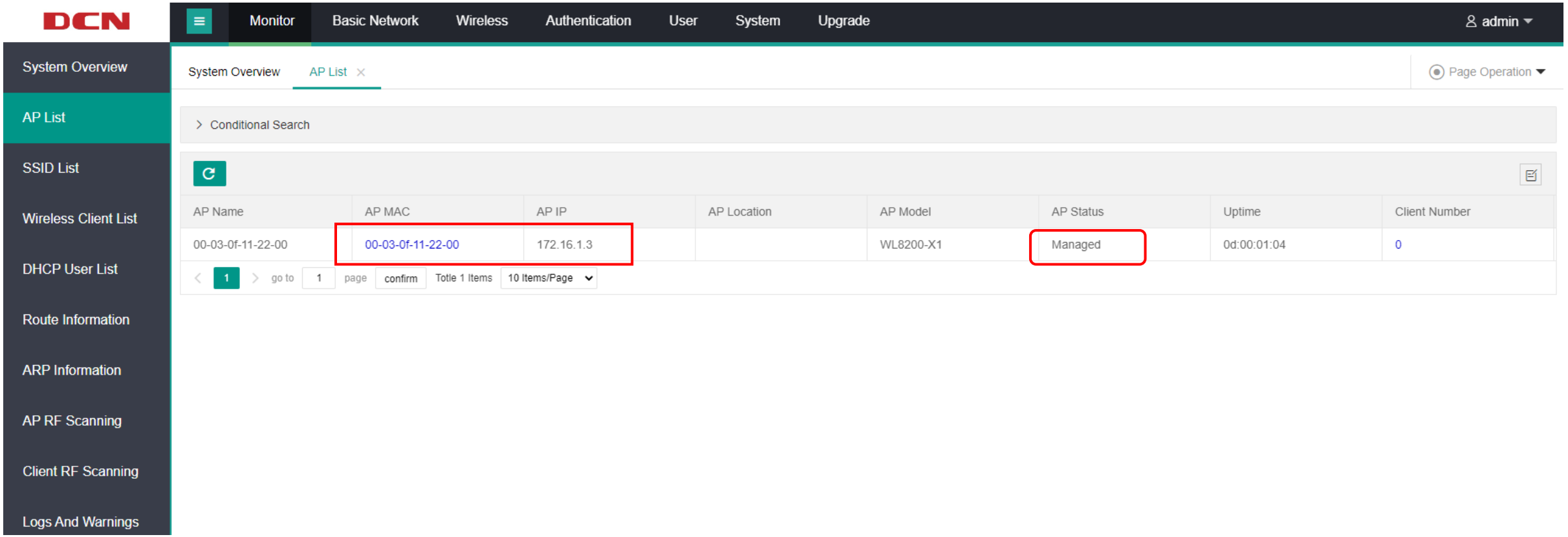
Configure IP address on AP Web





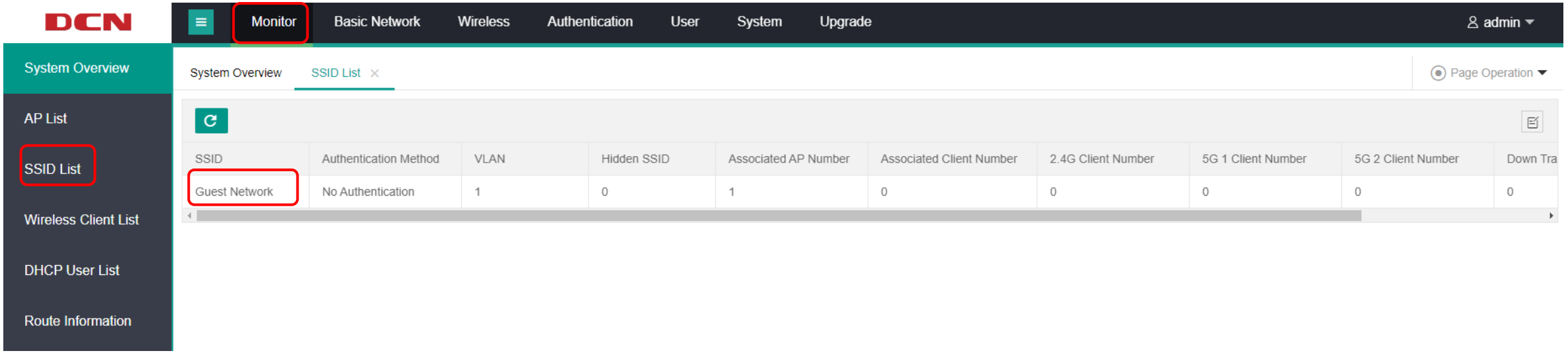
FIT AP + AC simple layer-2 networking – Network topology

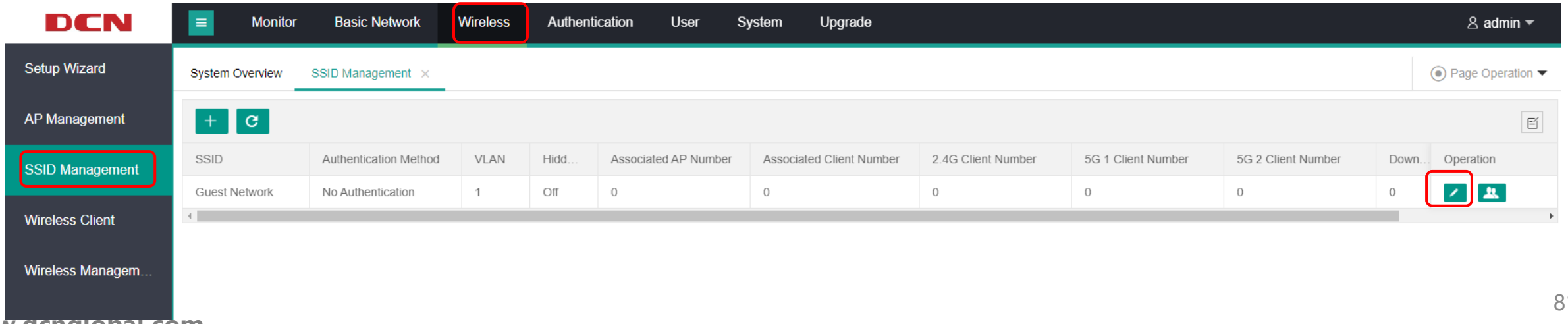
Check managed AP on AC



FIT AP + AC simple layer-2 networking – Network topology

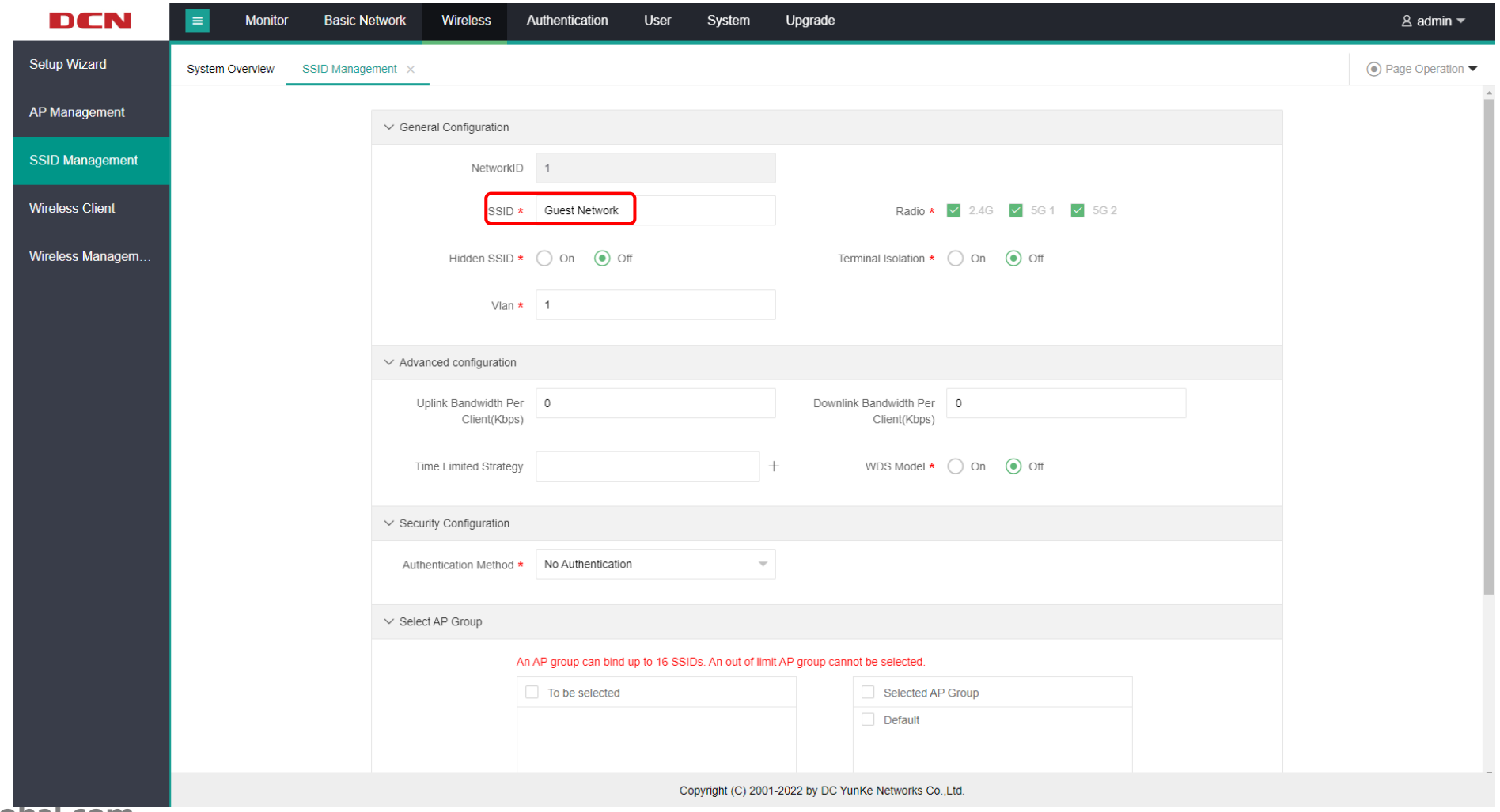
Check SSID on AC





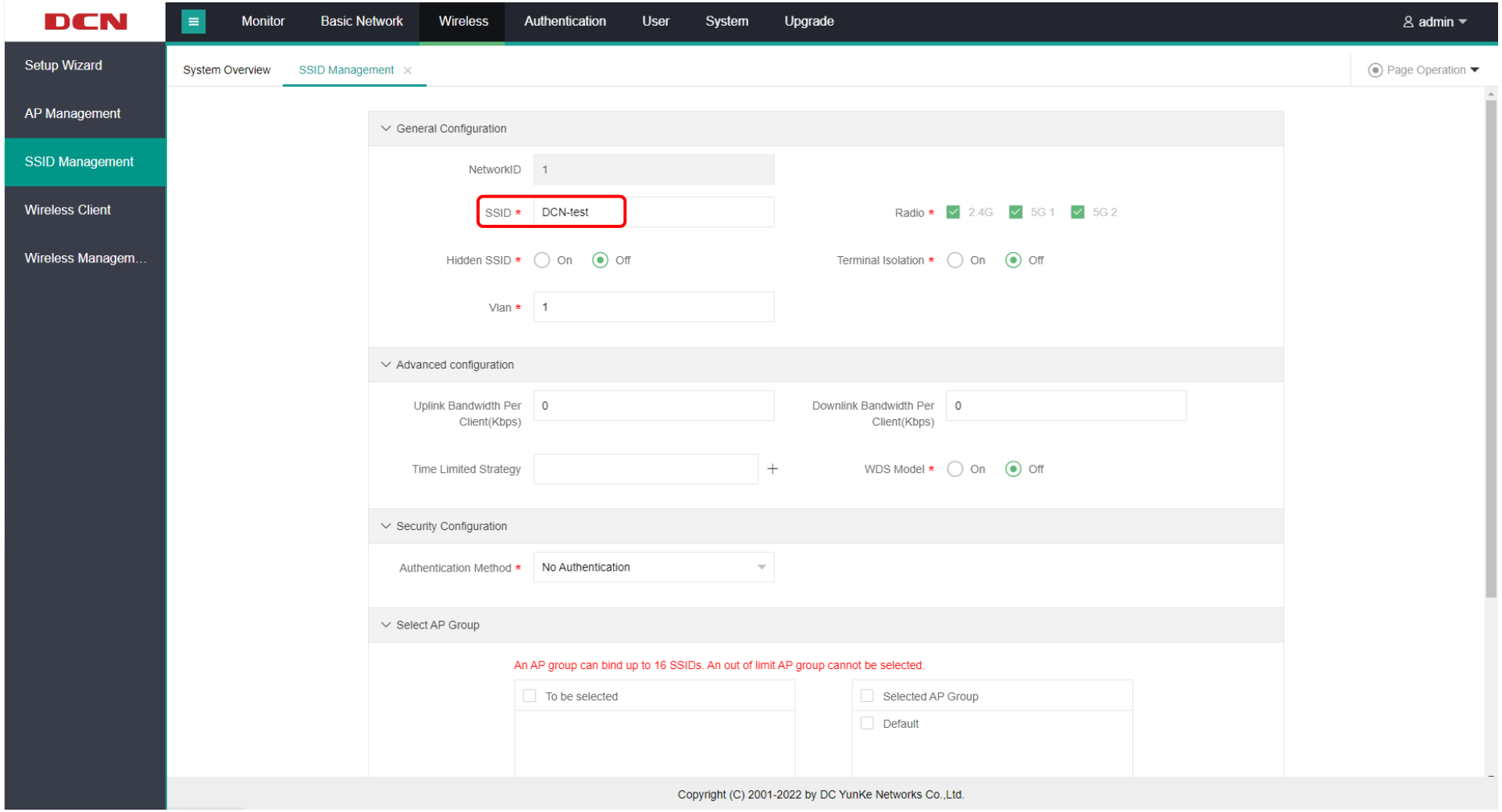
FIT AP + AC simple layer-2 networking – Network topology

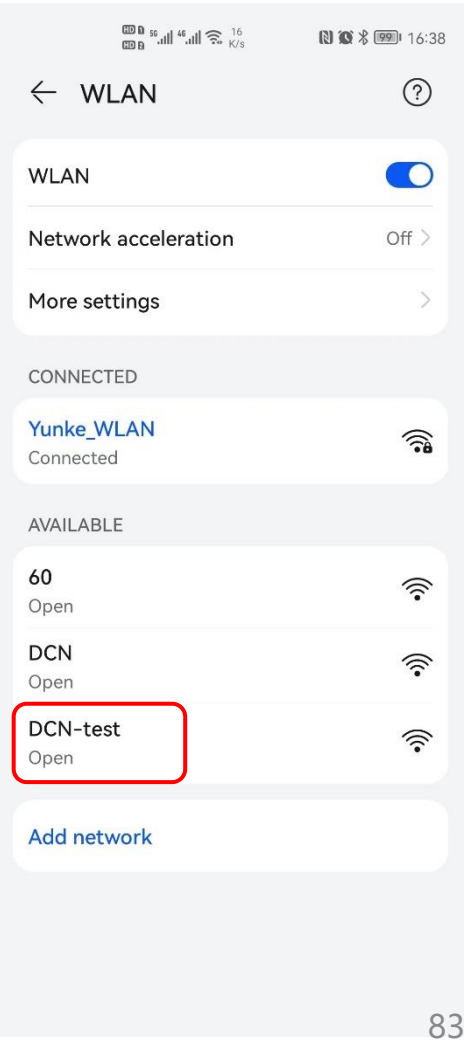
Configure SSID on AC



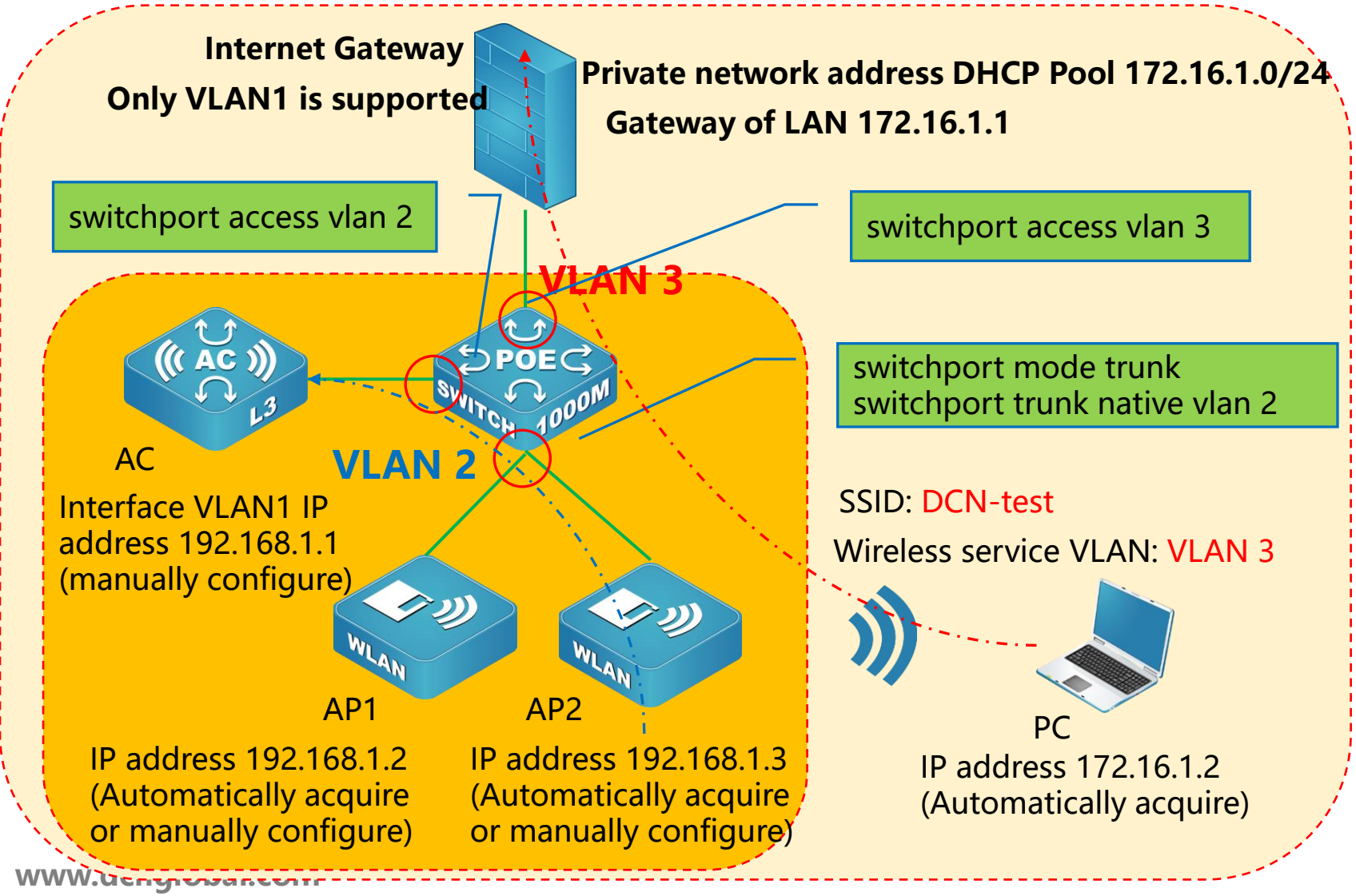
FIT AP + AC simple layer-2 networking – Network topology

Configure SSID on AC





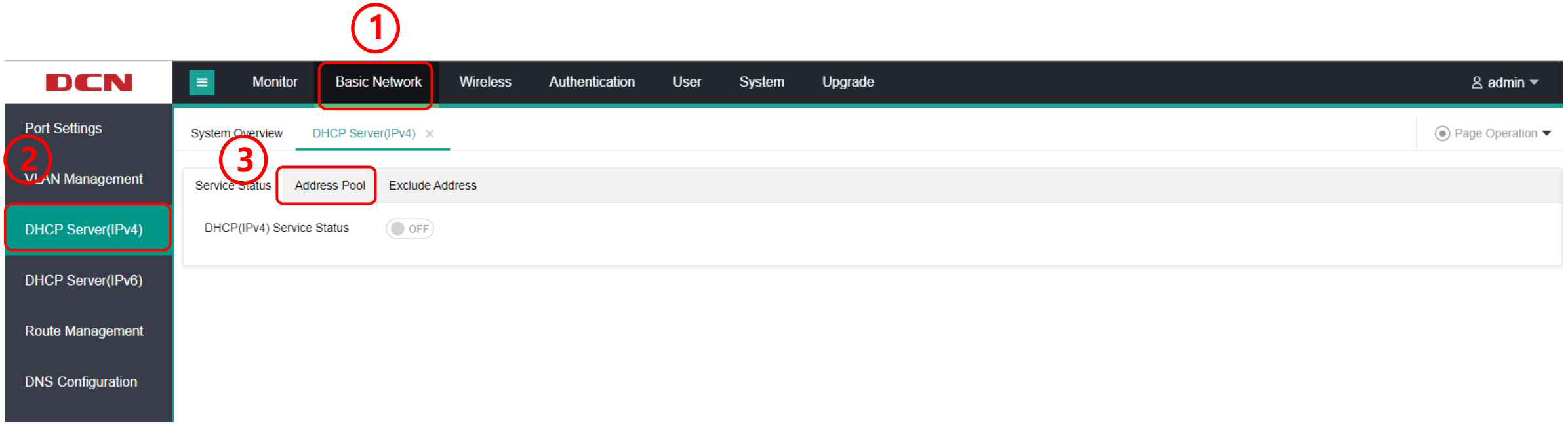
FIT AP + AC simple layer-2 networking – Network topology



- If the AC and AP do not need to be accessed from Internet, they can be planned with special management VLAN2.
- Wireless service VLAN and device management VLAN are independent.
- DHCP service can be deployed on AC in VLAN2 to automatically assign IP addresses to APs.
- Need to config proper VLAN on switches.
- At this time, VLAN 1 will not be used as wireless service VLAN.

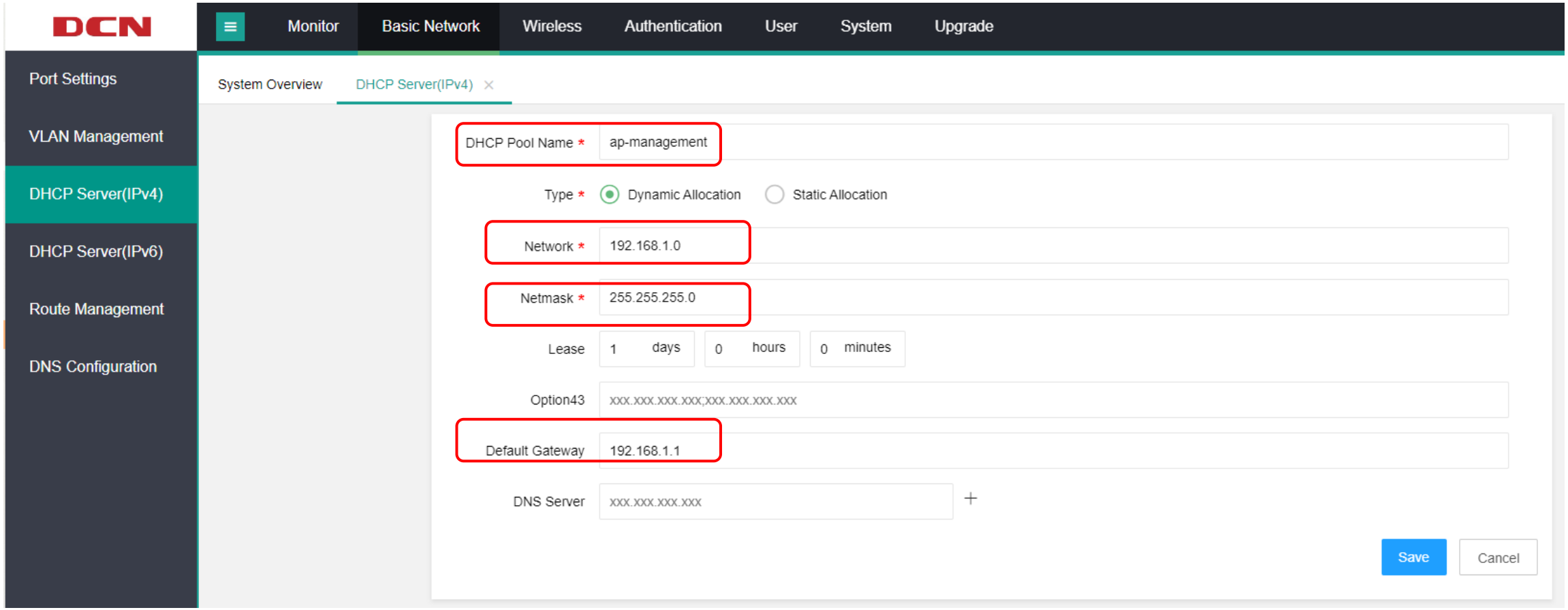
FIT AP + AC simple layer-2 networking – Config DHCP service

Create DHCP service pool on AC



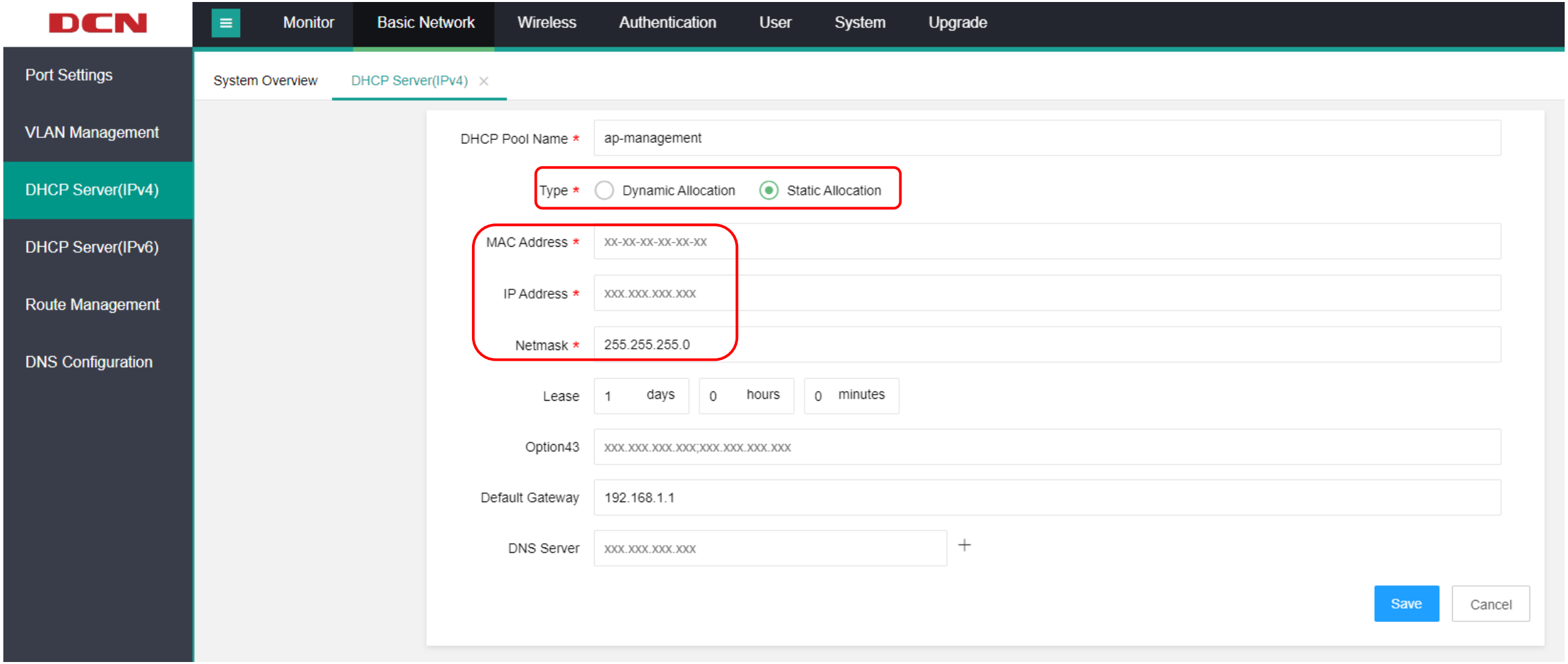
FIT AP + AC simple layer-2 networking – Config DHCP service

Configure DHCP pool on AC



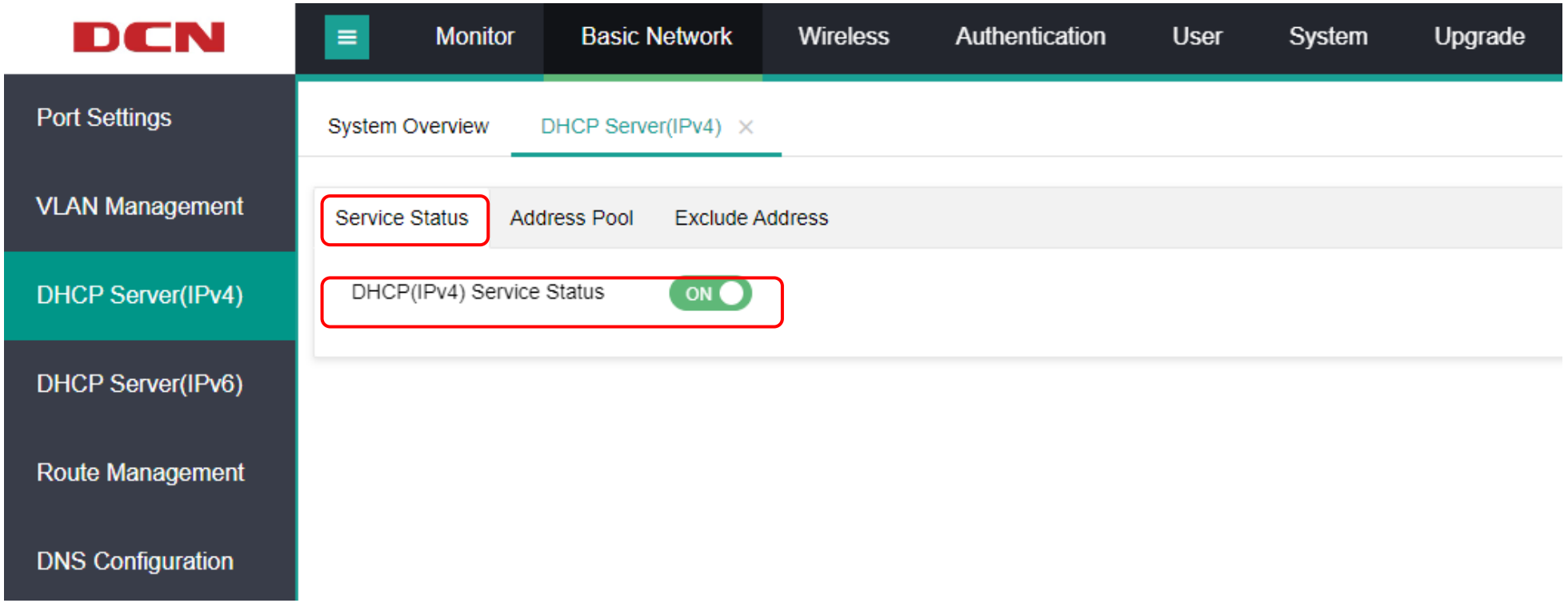
FIT AP + AC simple layer-2 networking – Config DHCP service

Configure DHCP pool on AC web



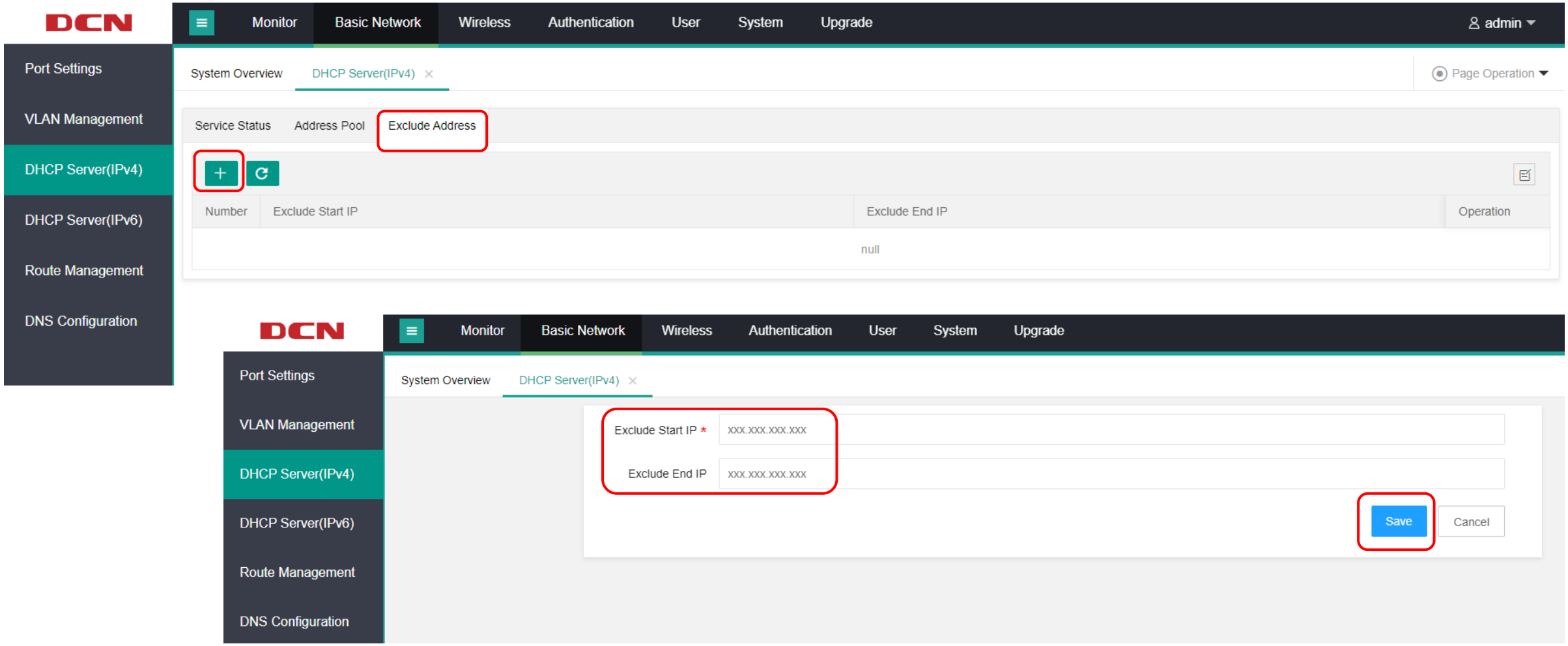
FIT AP + AC simple layer-2 networking – Config DHCP service

Enable DHCP service on AC



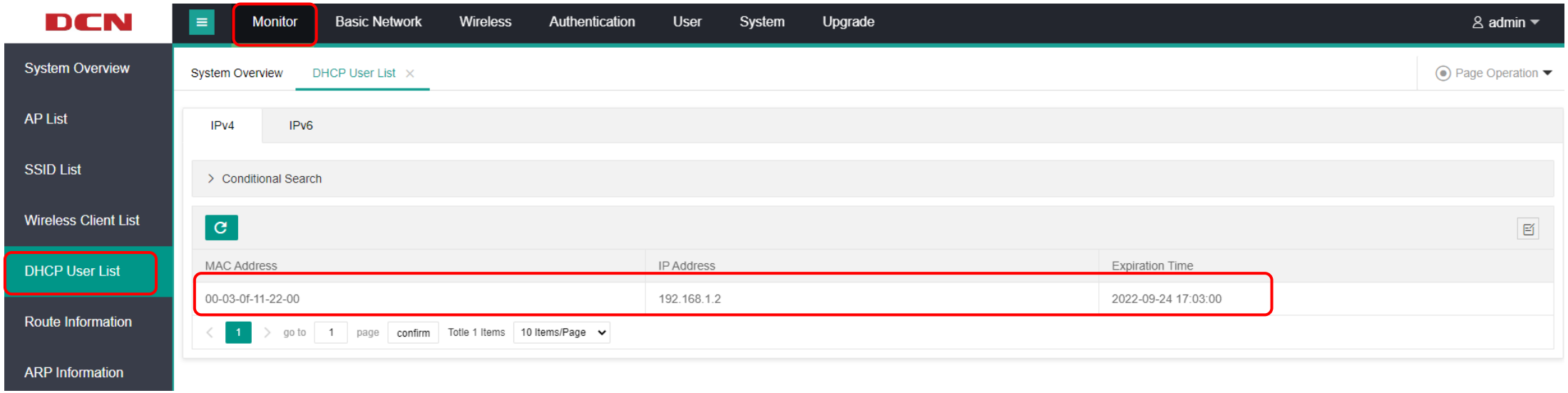
FIT AP + AC simple layer-2 networking – Config DHCP service

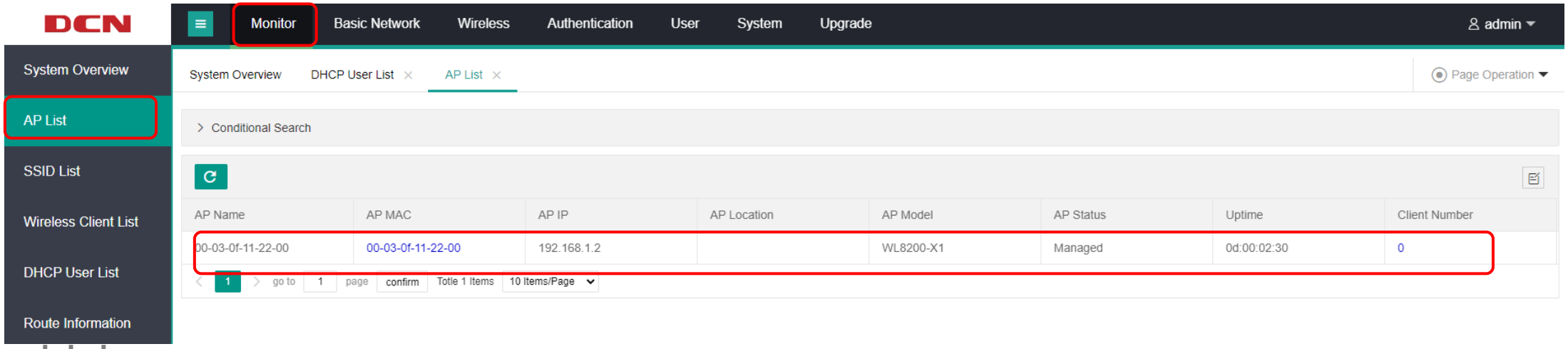
Configure excluded address of DHCP service on AC



FIT AP + AC simple layer-2 networking – Config DHCP service

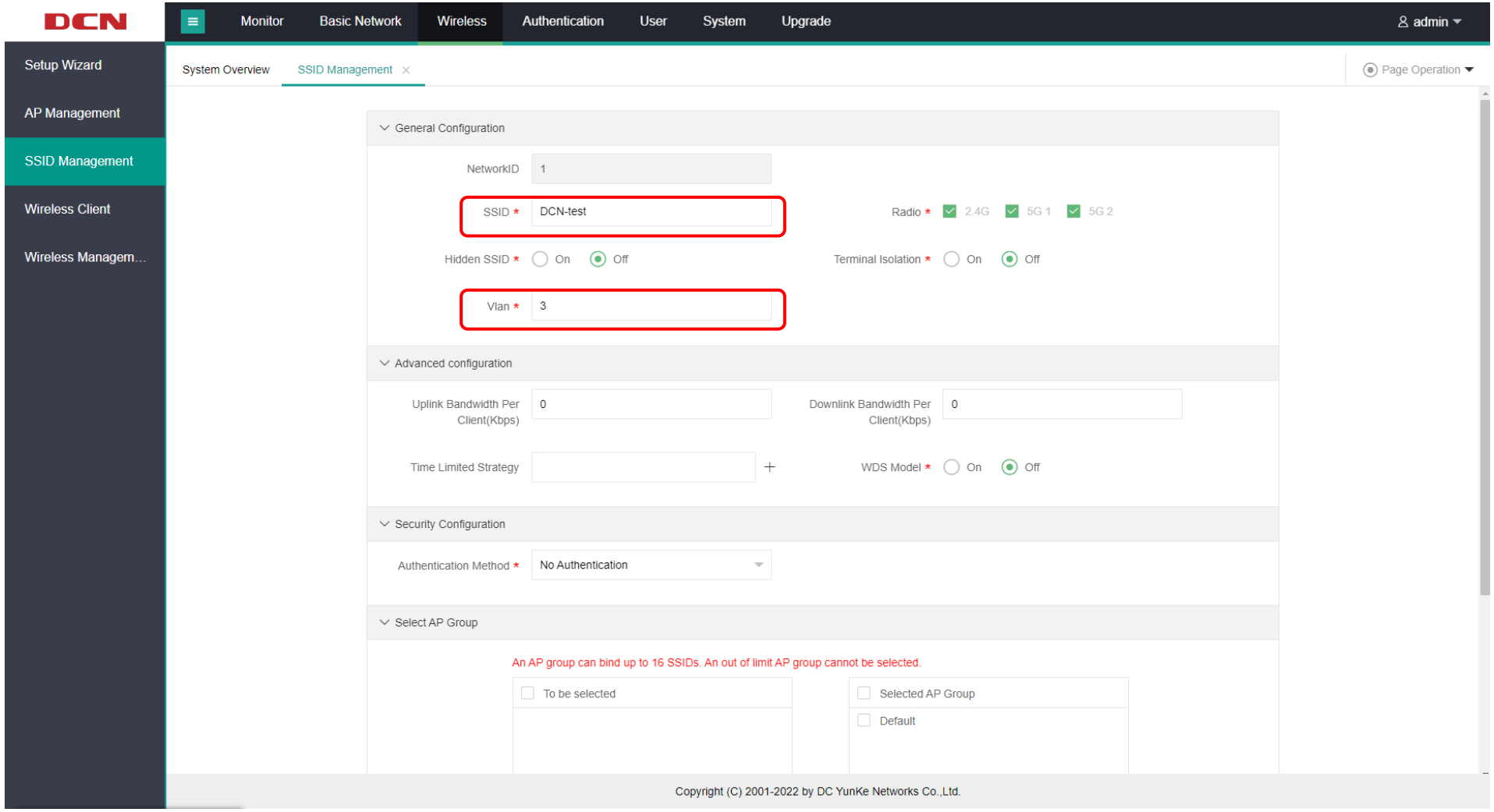
Check AP and assigned IP address on AC web





FIT AP + AC simple layer-2 networking – Config wireless service

Configure service VLAN ID in SSID on AC web

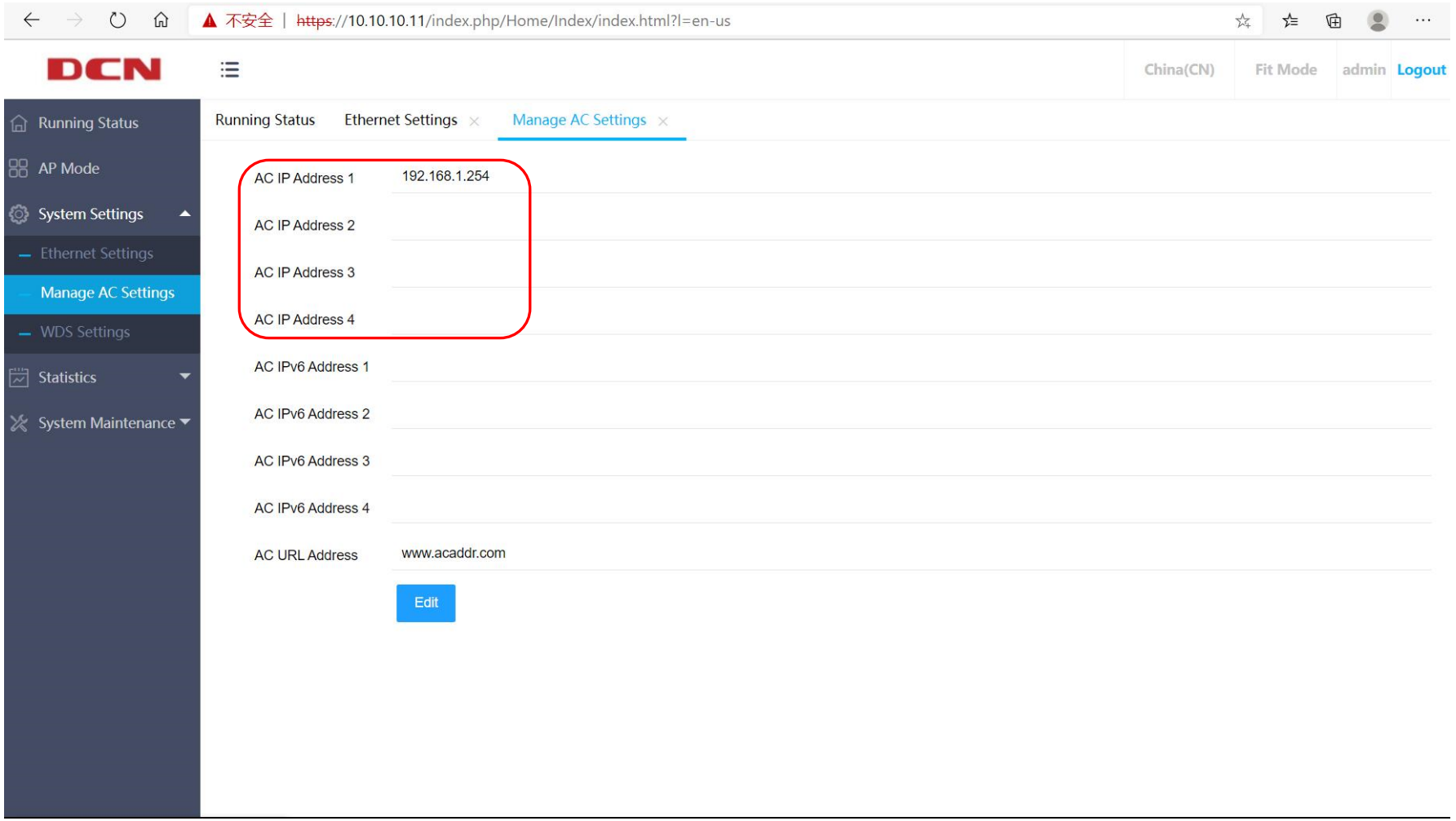


FIT AP + AC simple layer-2 networking – AP discovers AC

- AC is listening port 57776 always and will respond if it receives the AP discovery message.
- ensure that the discovery message sent by AP to AC can reach AC normally.
- Manually configure the wireless management IP address of AC into FIT AP.
- AP will send discovery message using UDP type and destination port 57776 to wireless management IP address of AC.
- After receiving the discovery response message of AC, AP will initiate a TCP connection to AC using destination port 57777.

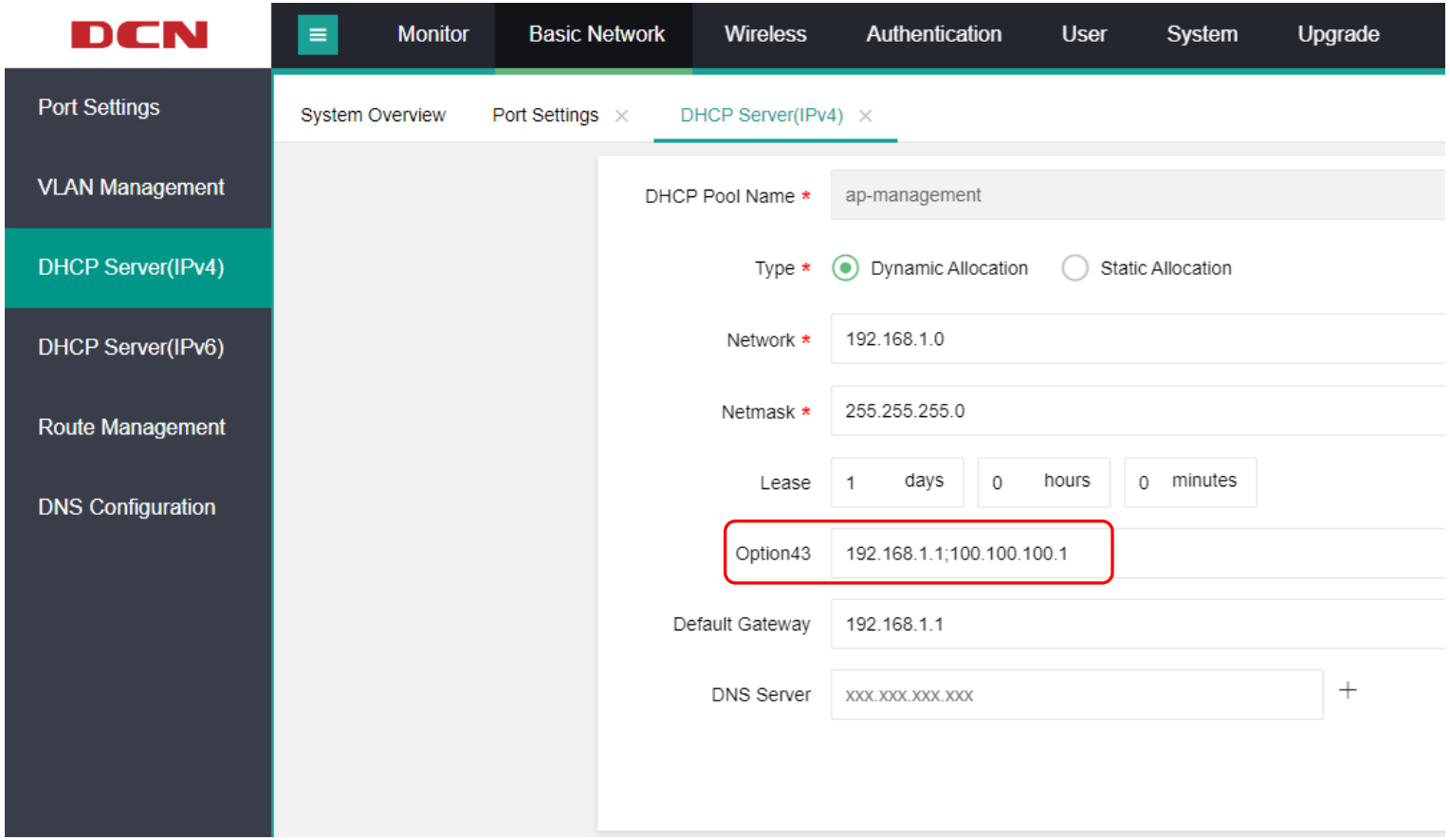
FIT AP + AC simple layer-2 networking – AP discovers AC

Config AC management IP on AP web



FIT AP + AC simple layer-2 networking – DHCP option 43

Configure option43 in DHCP pool on AC web

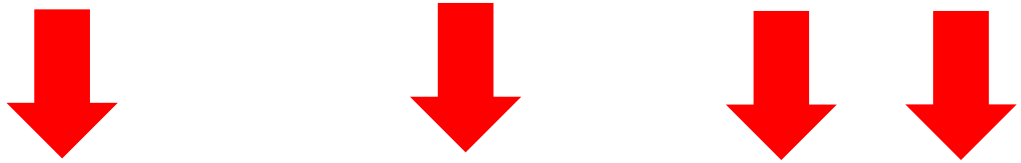



```
service dhcp
!
ip dhcp conflict ping-detection enable
!
ip dhcp pool ap-management
 network-address 192.168.1.0 255.255.255.0
 default-router 192.168.1.1
 option 43 hex 0104C0A80101010464646401
!
```

Note:
The DHCP option 43 is configured in decimal form on the Web page and in hexadecimal form on the CLI.

FIT AP + AC simple layer-2 networking – DHCP option 43

AC IP: 192.168.1.1



0104 C0 A8 0101

Command:

option 43 hex 0104c0a80101

option 43 hex 0104c0a801010104xxxxxxxxx

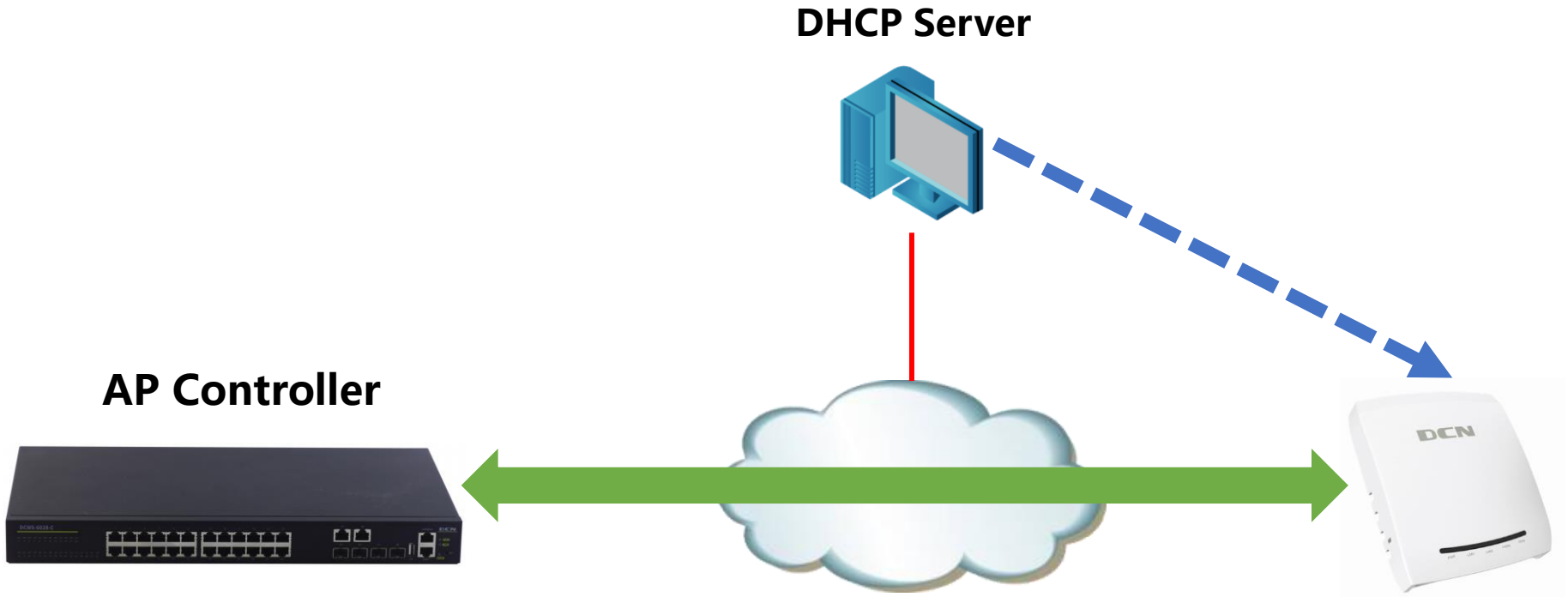
FIT AP + AC simple layer-2 networking – DHCP option 43

- Enable DHCP Server;
- Add DHCP pool;
- Add DHCP Option 43 into the DHCP pool.

```
Switch(config)#ip dhcp pool AP
Switch(dhcp-AP-config)#network-address 192.168.100.1 24
Switch(dhcp-AP-config)#default-router 192.168.100.254
Switch(dhcp-AP-config)#option 43 hex 0104c0a80101
```

FIT AP + AC simple layer-2 networking

– Priority of discovery mechanism



Priority rules:

- *AP discover AC > AC discover AP*
- *Static configuration > DHCP option 43*

Tips:

- Because the priority of static configuration is the highest, this method can be used for troubleshooting to detect the network and port accessibility between AC and AP.

In a real environment, there may be multiple ways of discovery coexisting. In the network environment as shown in the figure above, there will be both the layer-2 broadcast message from AC and the UDP message from AP.

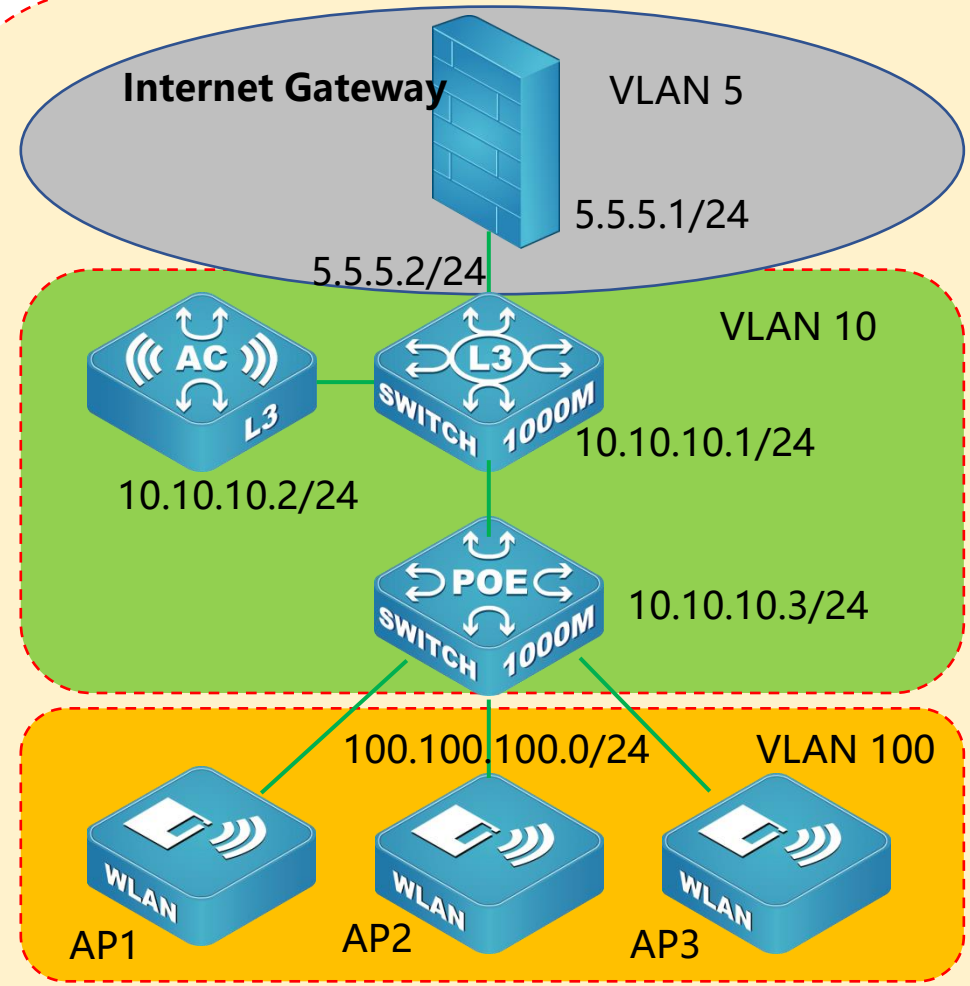
02 Deployment Scenarios of WLAN product

- FAT AP networking
- AP wired mesh networking
- FIT AP + AC simple layer-2 networking
- FIT AP + AC recommended layer-3 networking
- Cloud AP networking

FIT AP + AC recommended layer-3 networking

– Network topology

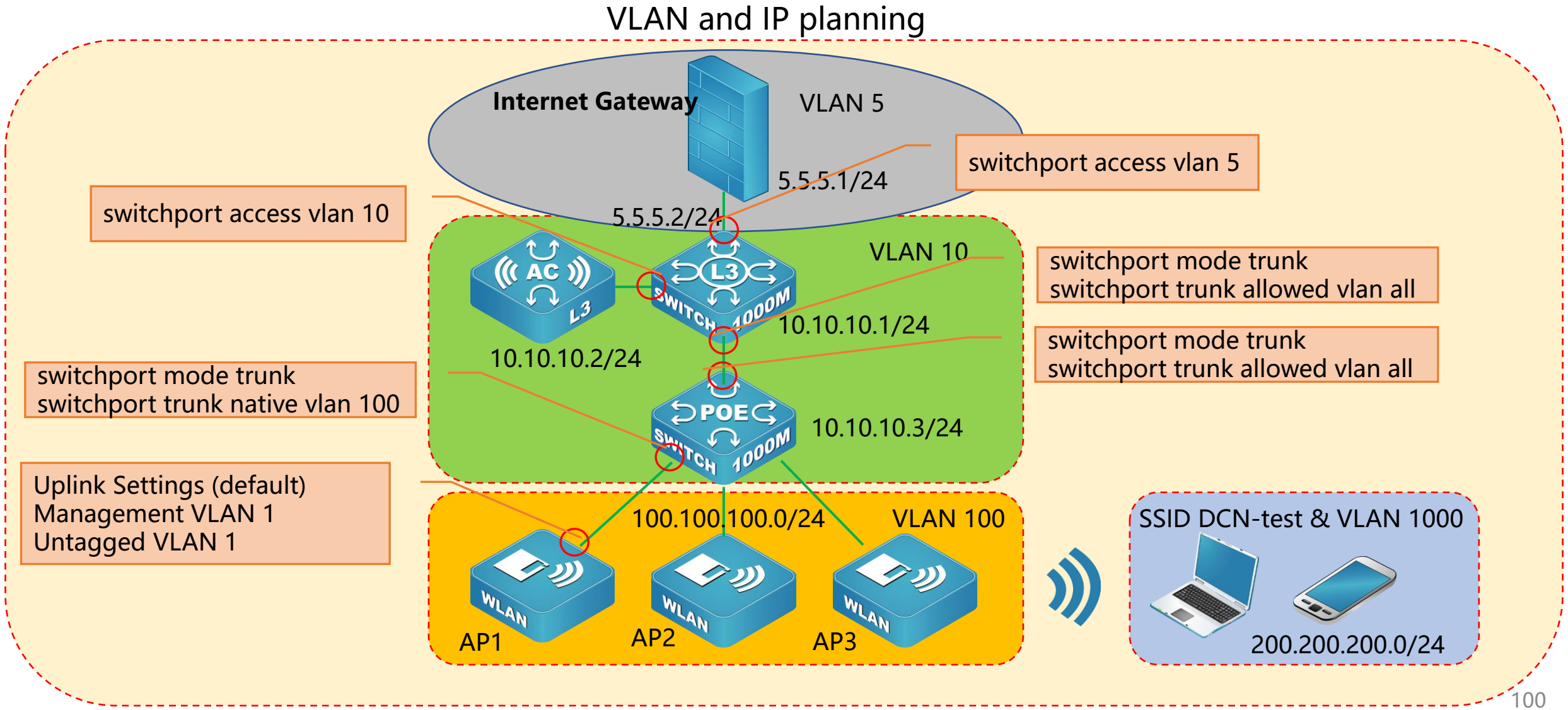
VLAN and IP planning



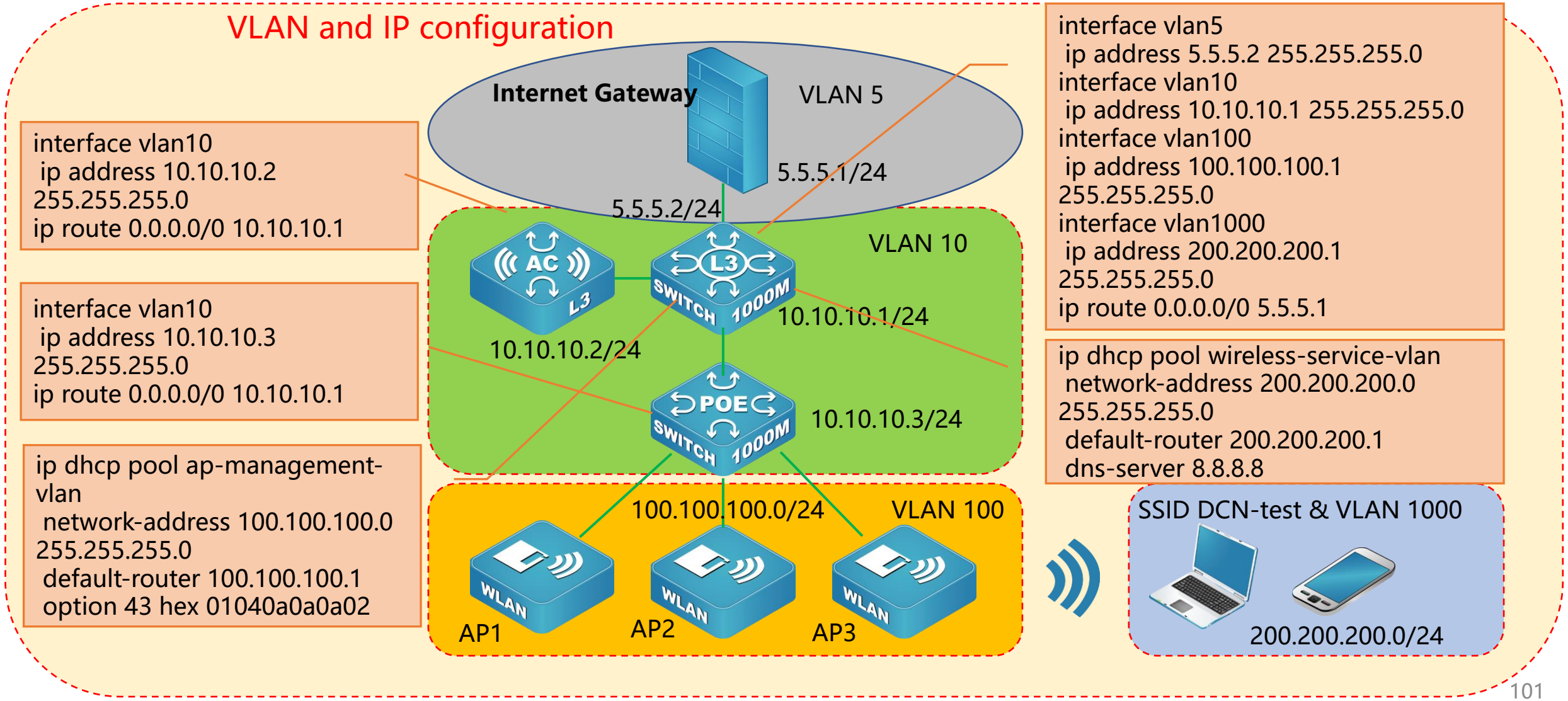
- L3 switch is the gateway of AC, POE switch, AP and wireless client.
- The management network segment of AC and POE switches is 10.10.10.X/24. Both are in VLAN10.
- The management network segment of the AP is 100.100.100.X/24. They are all in VLAN100.
- The network segment of the wireless client is 200.200.200.X/24. They are all in VLAN1000.
- Enable DHCP service on L3 switch to distribute IP addresses to APs and wireless clients.
- L3 switch uses 5.5.5.2 to interconnect with Internet gateway 5.5.5.1

FIT AP + AC recommended layer-3 networking

– Network topology

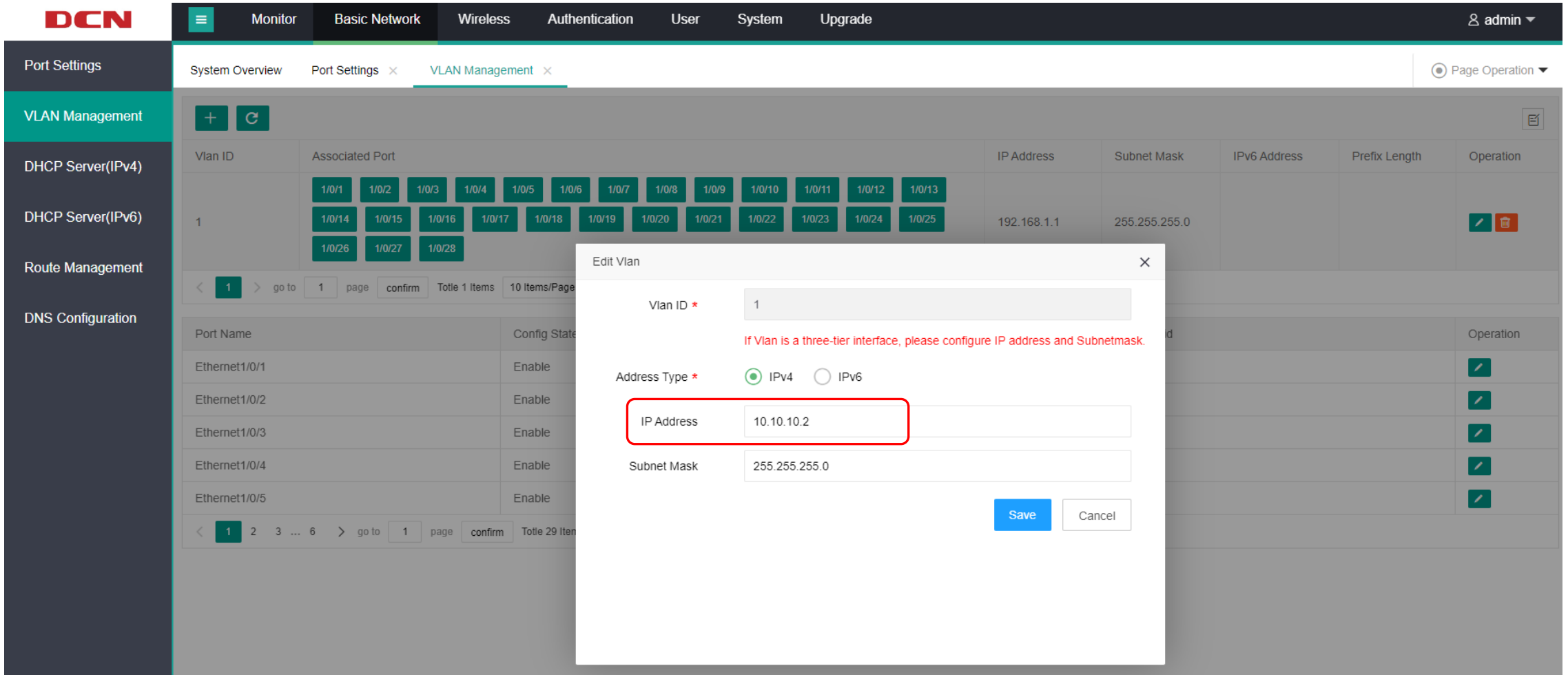


FIT AP + AC recommended layer-3 networking – Network topology



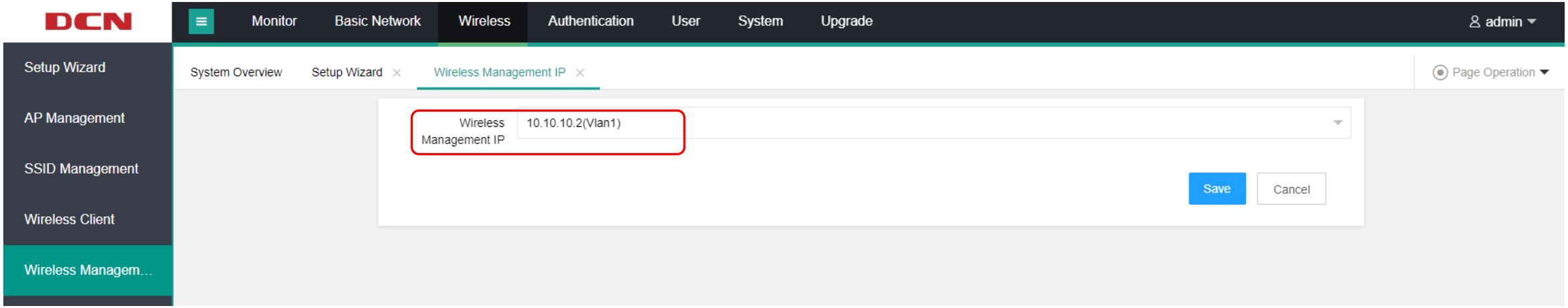
FIT AP + AC recommended layer-3 networking

Configure VLAN interface on AC



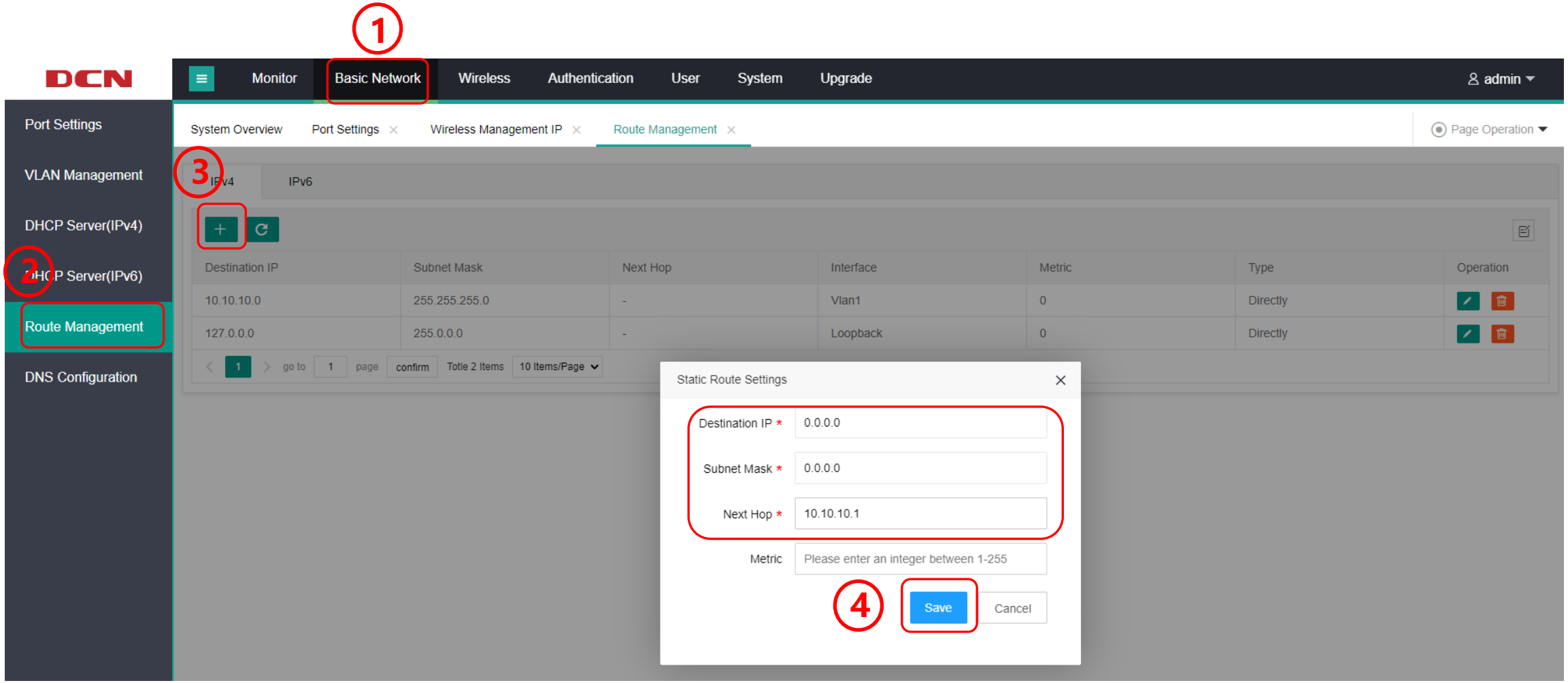
FIT AP + AC recommended layer-3 networking

Configure wireless management IP address on AC



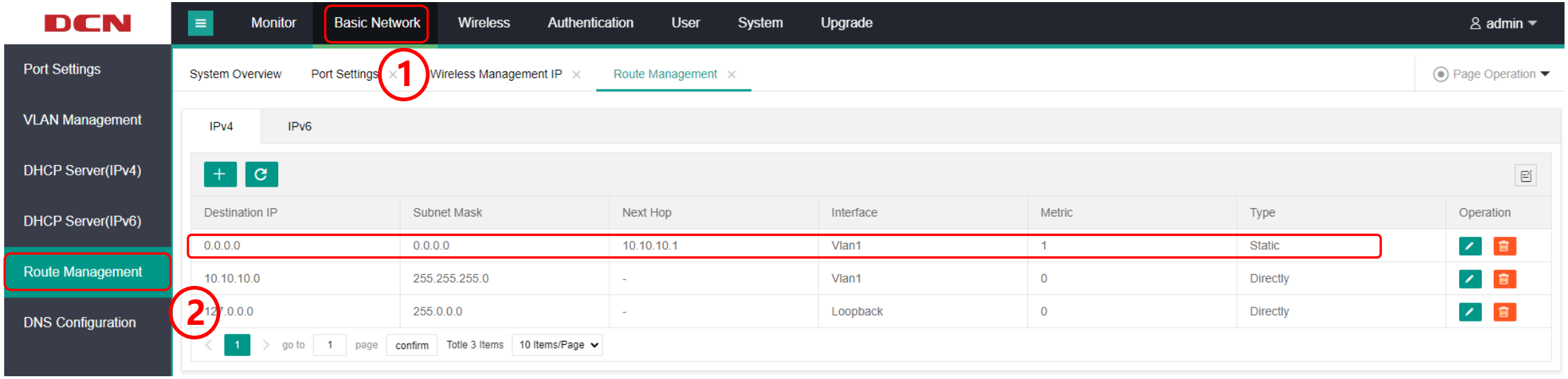
FIT AP + AC recommended layer-3 networking

Configure default route on AC



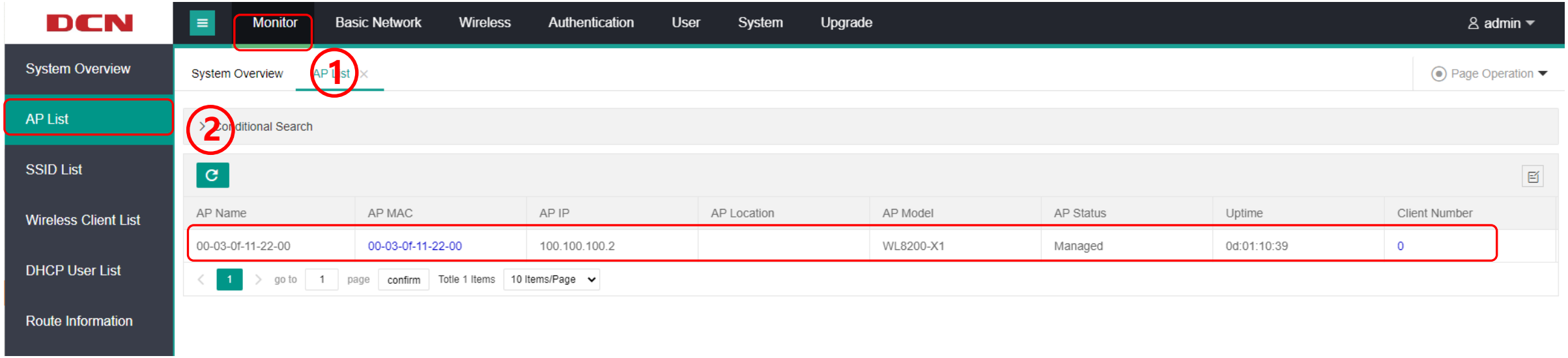
FIT AP + AC recommended layer-3 networking

Check routes on AC



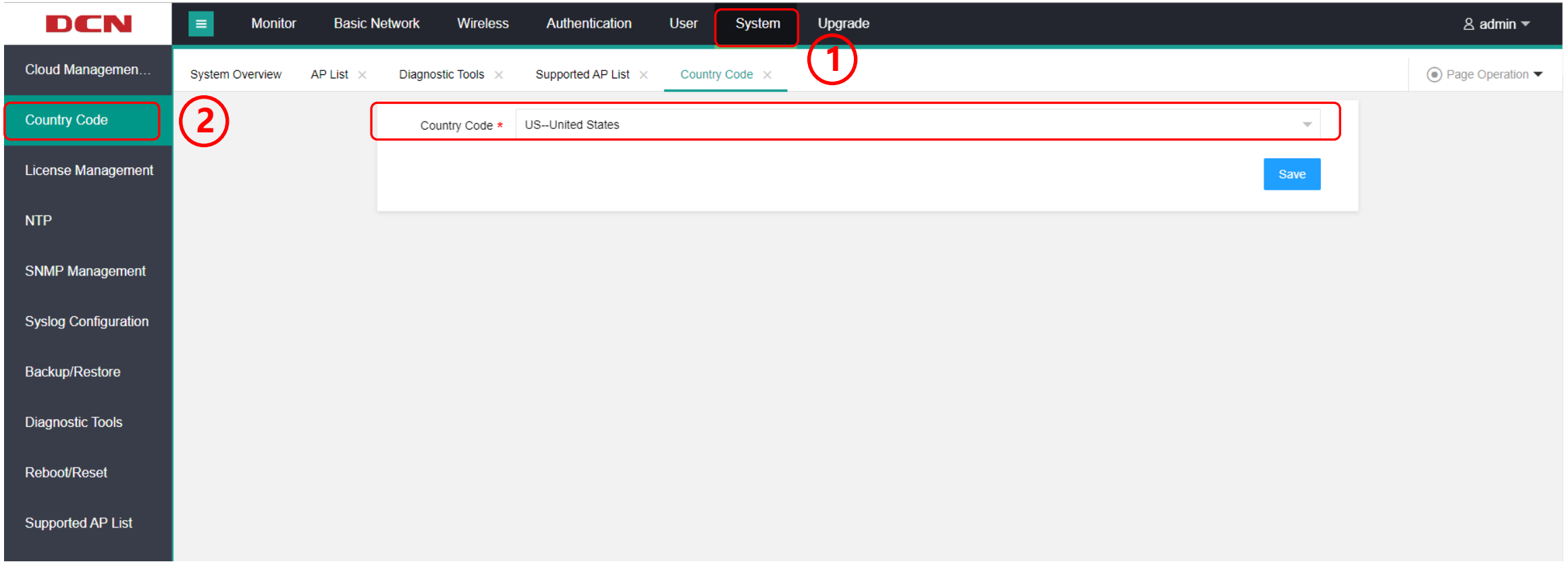
FIT AP + AC recommended layer-3 networking

Check managed AP on AC web



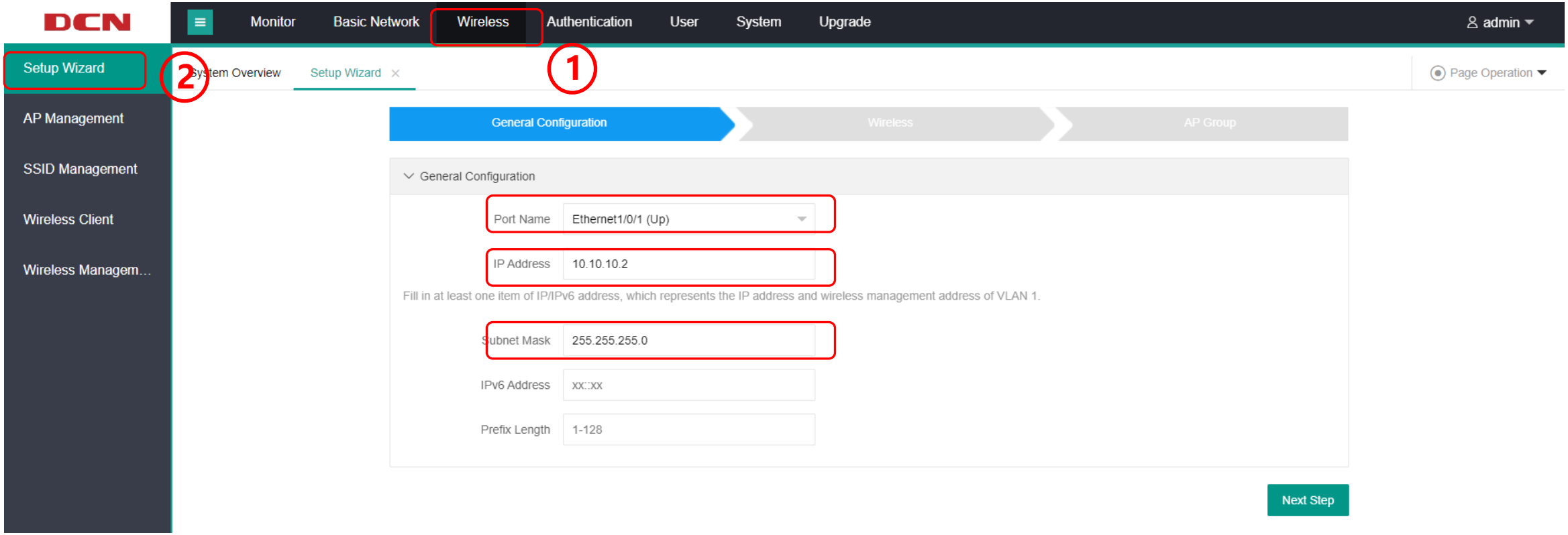
FIT AP + AC recommended layer-3 networking

Set country code on AC web



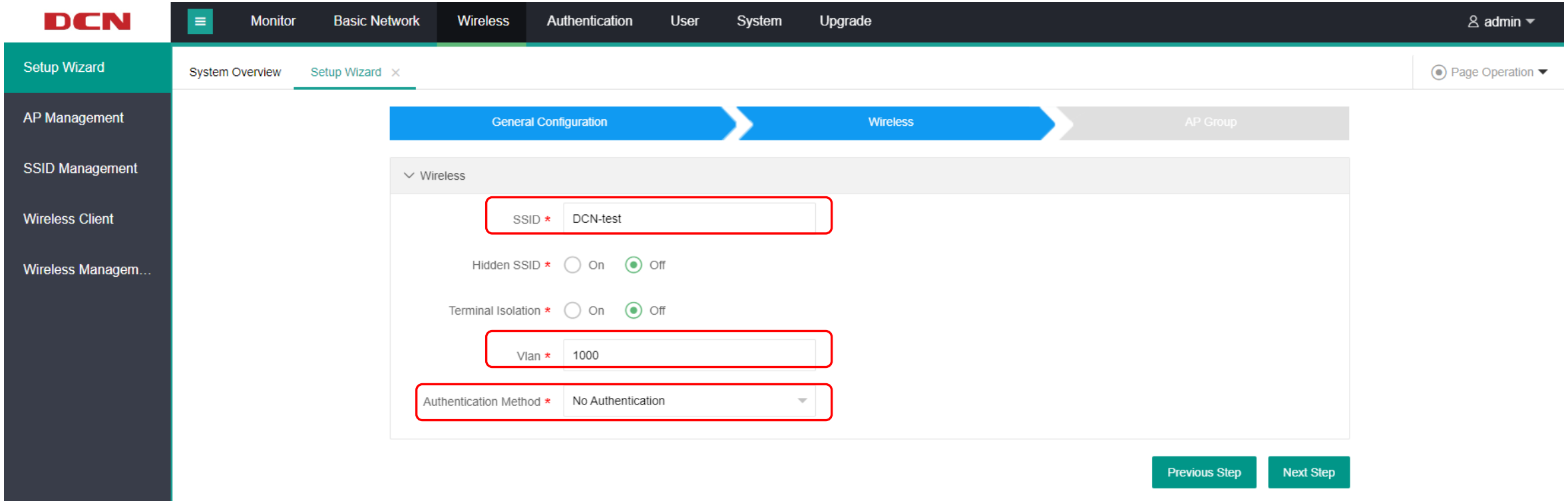
FIT AP + AC recommended layer-3 networking

Fast configuration guide on AC web



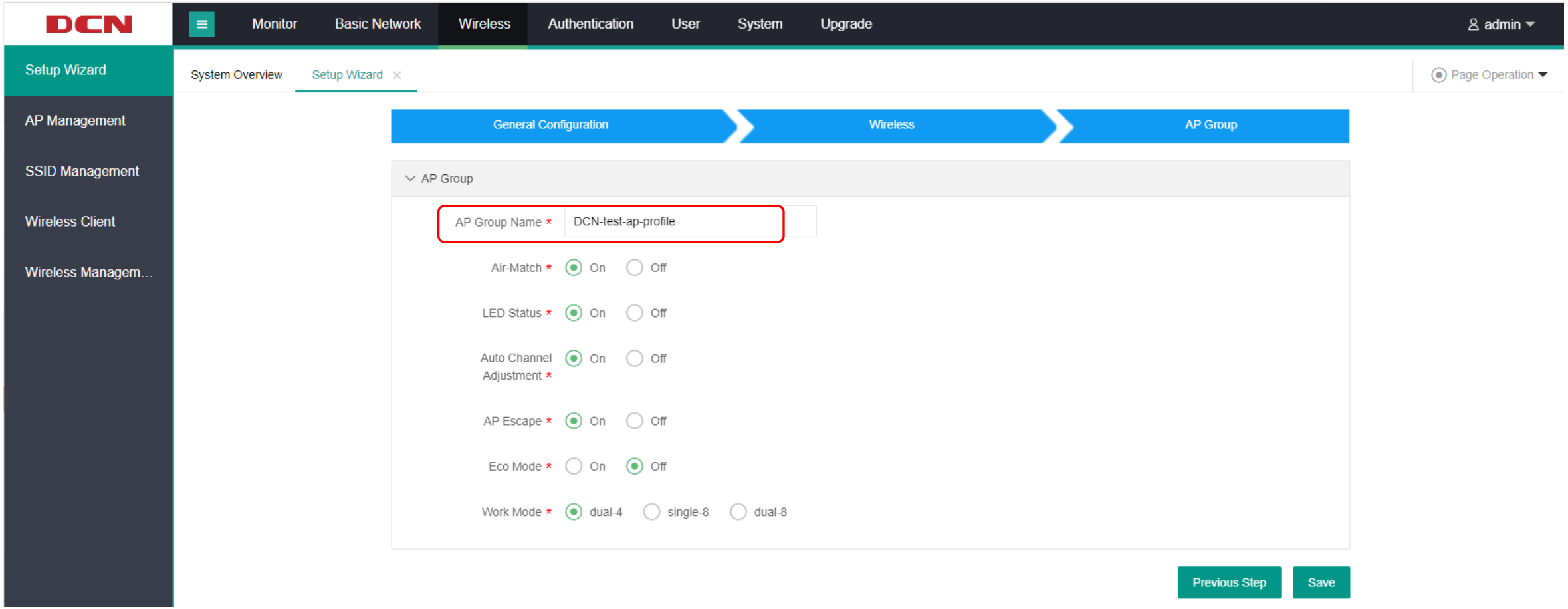
FIT AP + AC recommended layer-3 networking

Fast configuration guide on AC web



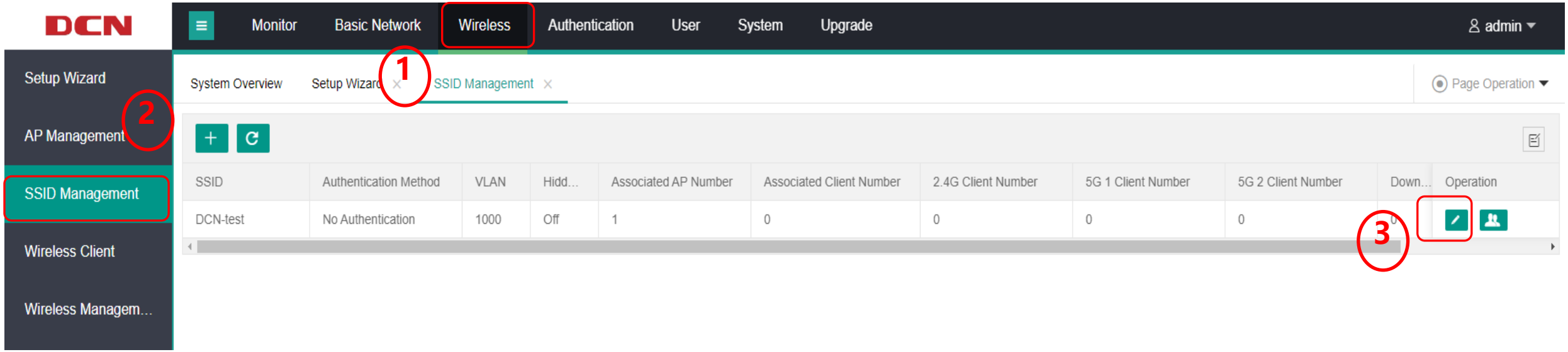
FIT AP + AC recommended layer-3 networking

Fast configuration guide on AC web



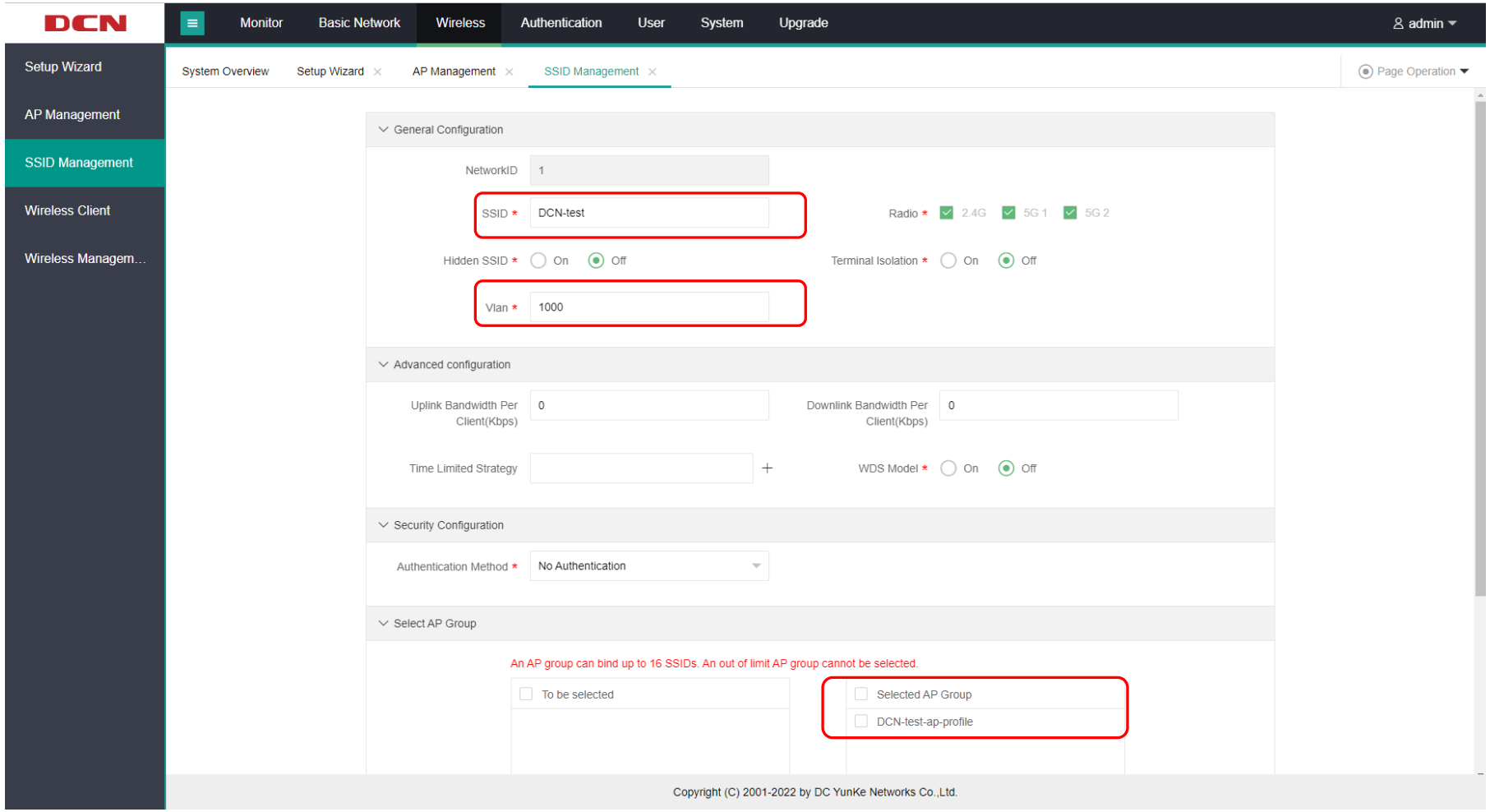
FIT AP + AC recommended layer-3 networking

Check SSID on AC web



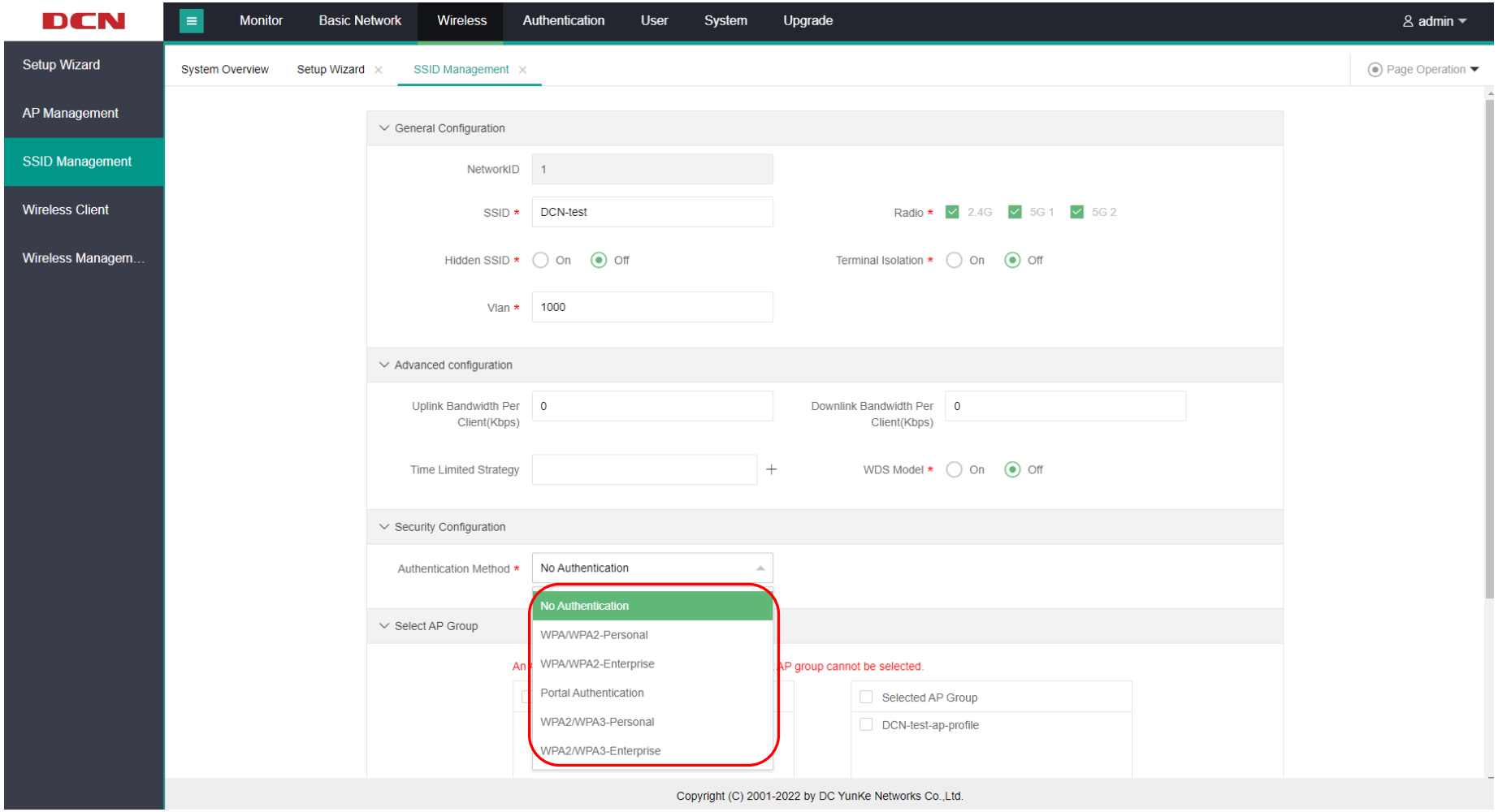
FIT AP + AC recommended layer-3 networking

Configure SSID on AC web, set service VLAN ID and AP group



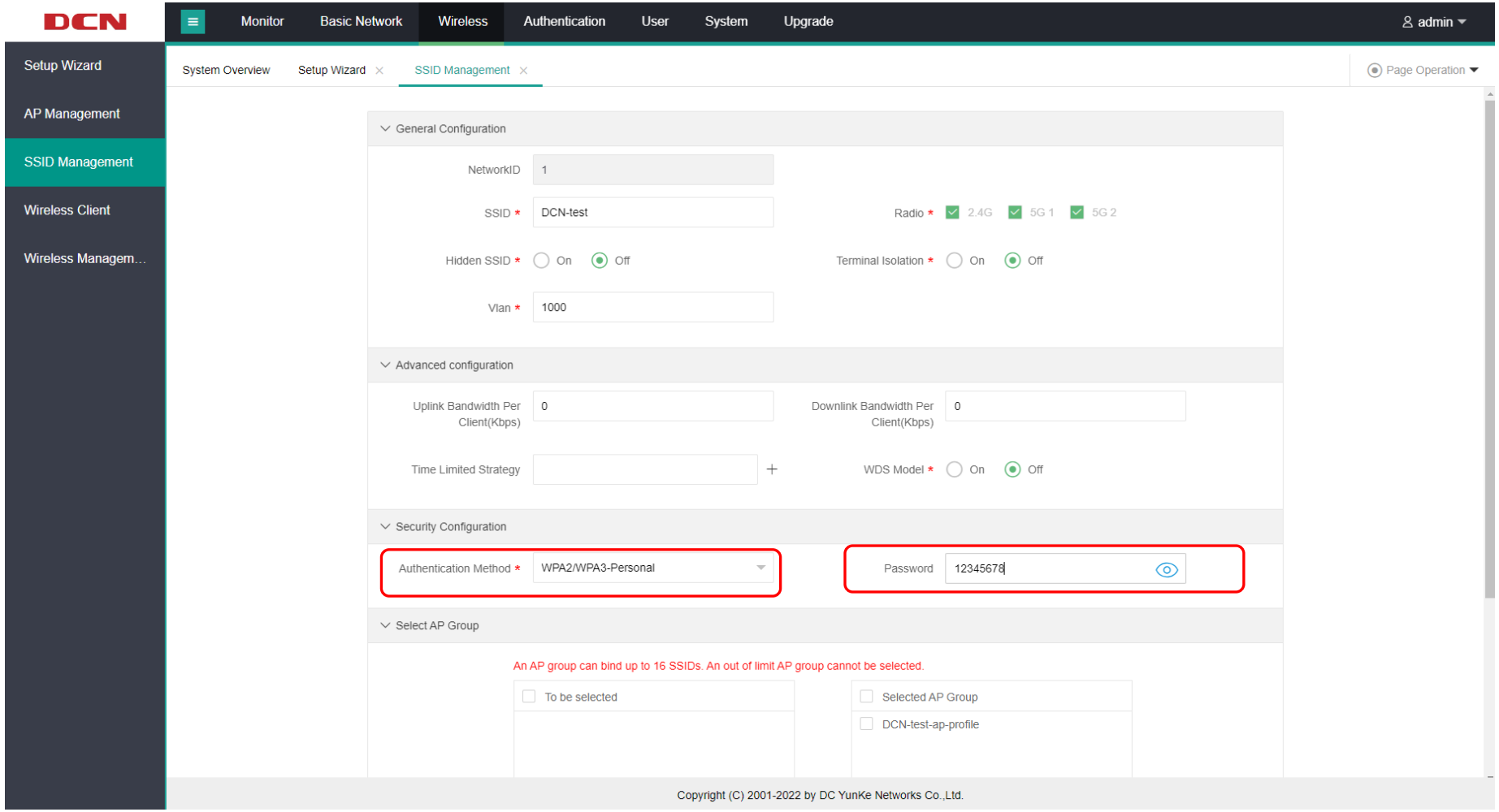
FIT AP + AC recommended layer-3 networking

Configure SSID on AC web, change authentication method



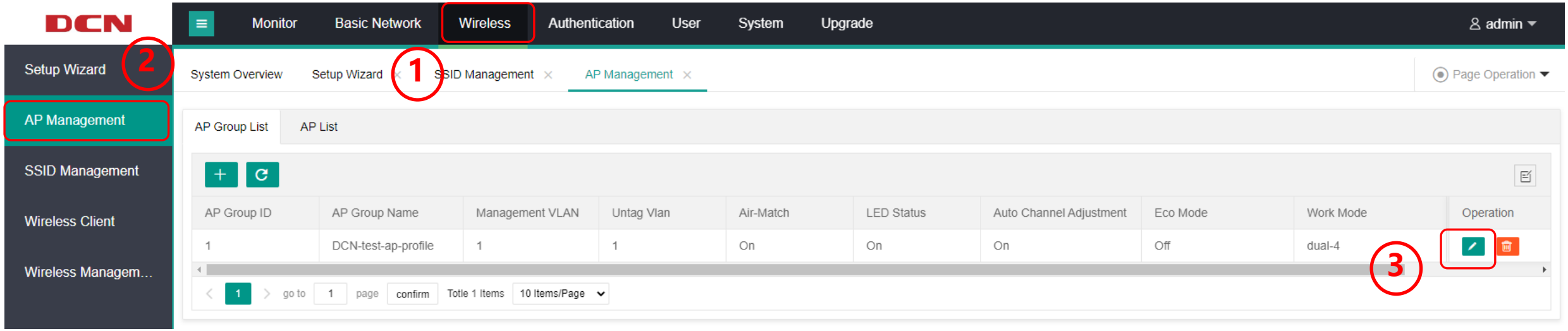
FIT AP + AC recommended layer-3 networking

Configure SSID on AC web, change authentication method



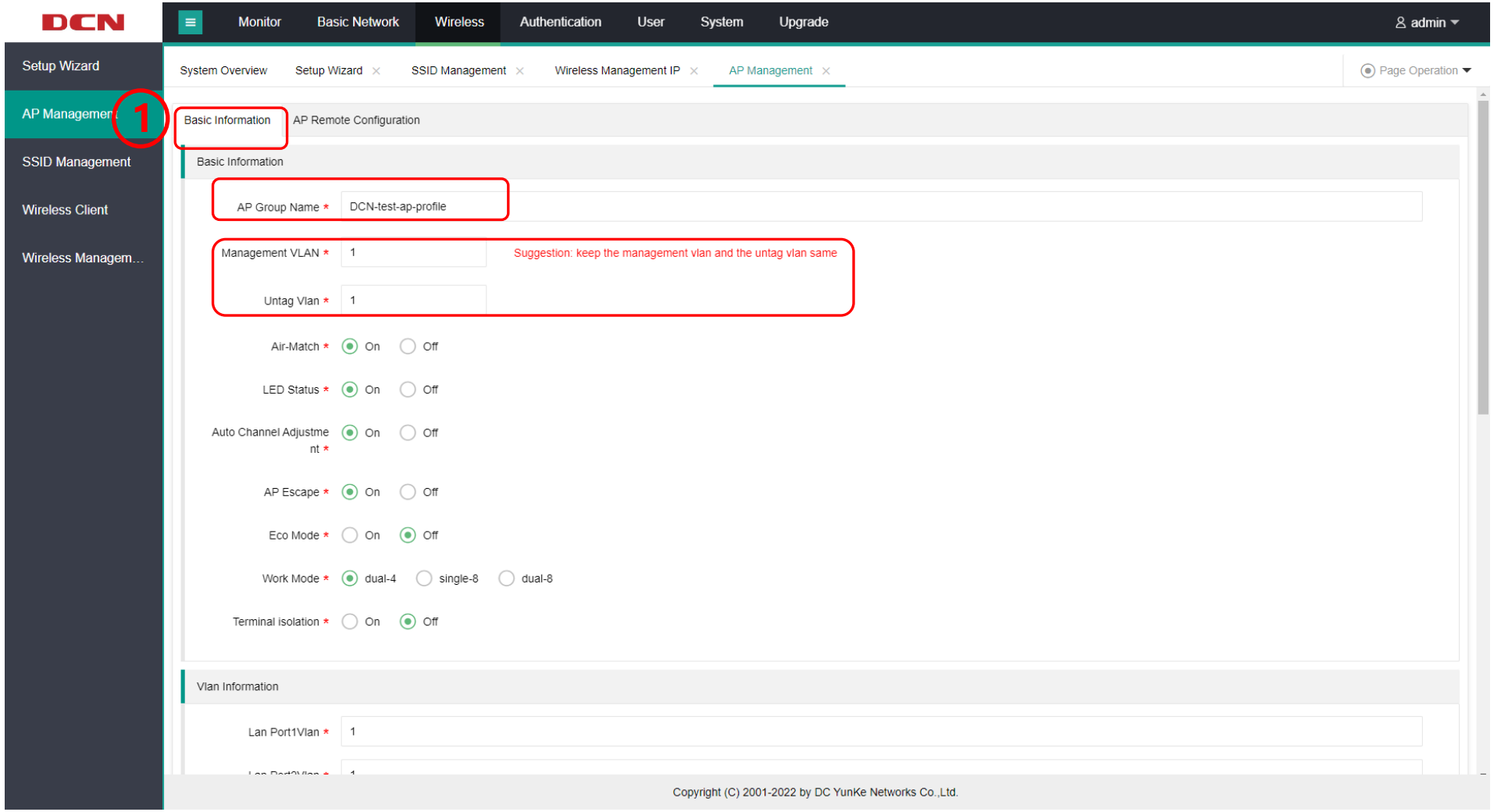
FIT AP + AC recommended layer-3 networking

Check AP group configuration on AC web



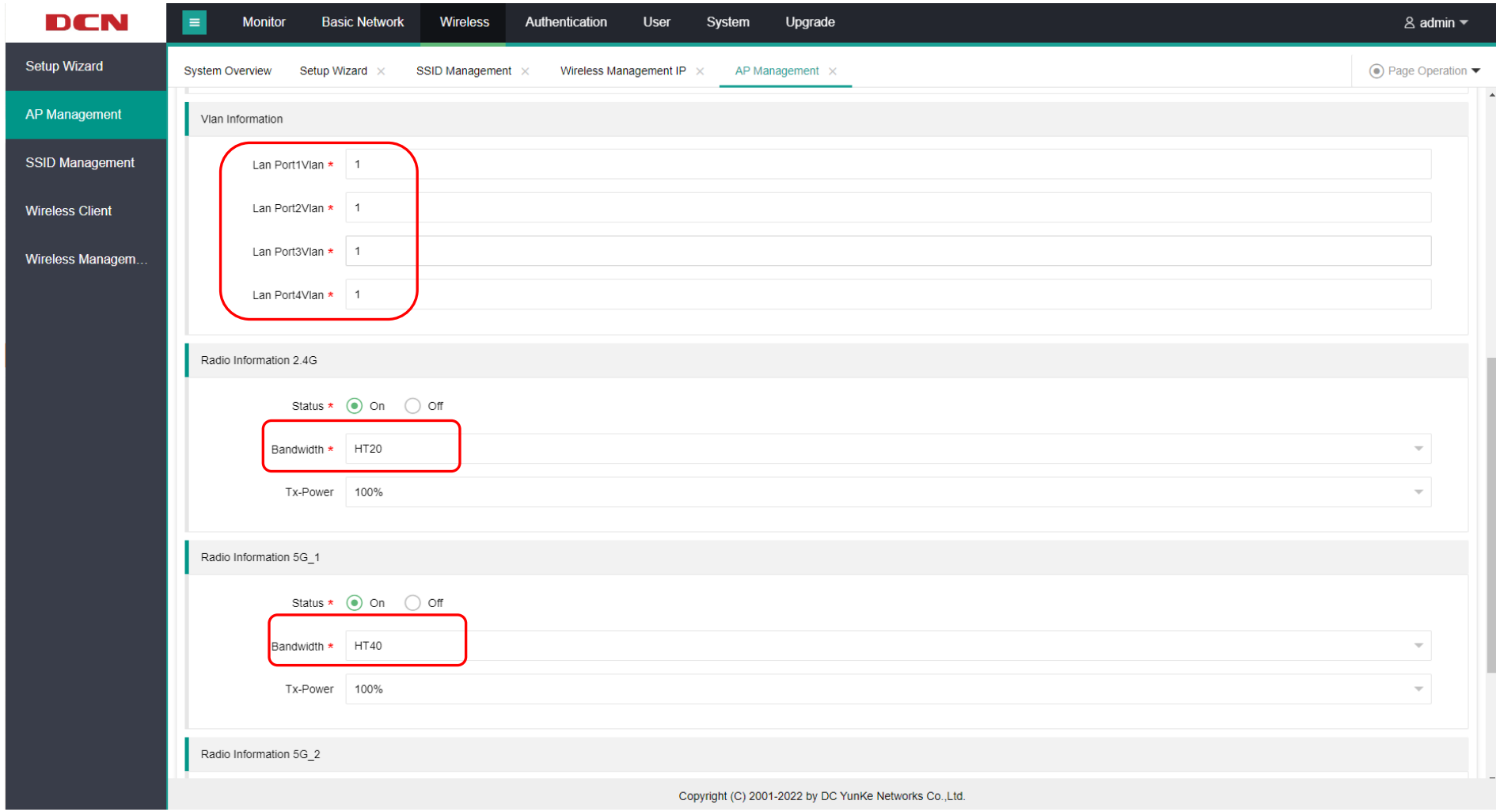
FIT AP + AC recommended layer-3 networking

AP group basic configuration on AC web



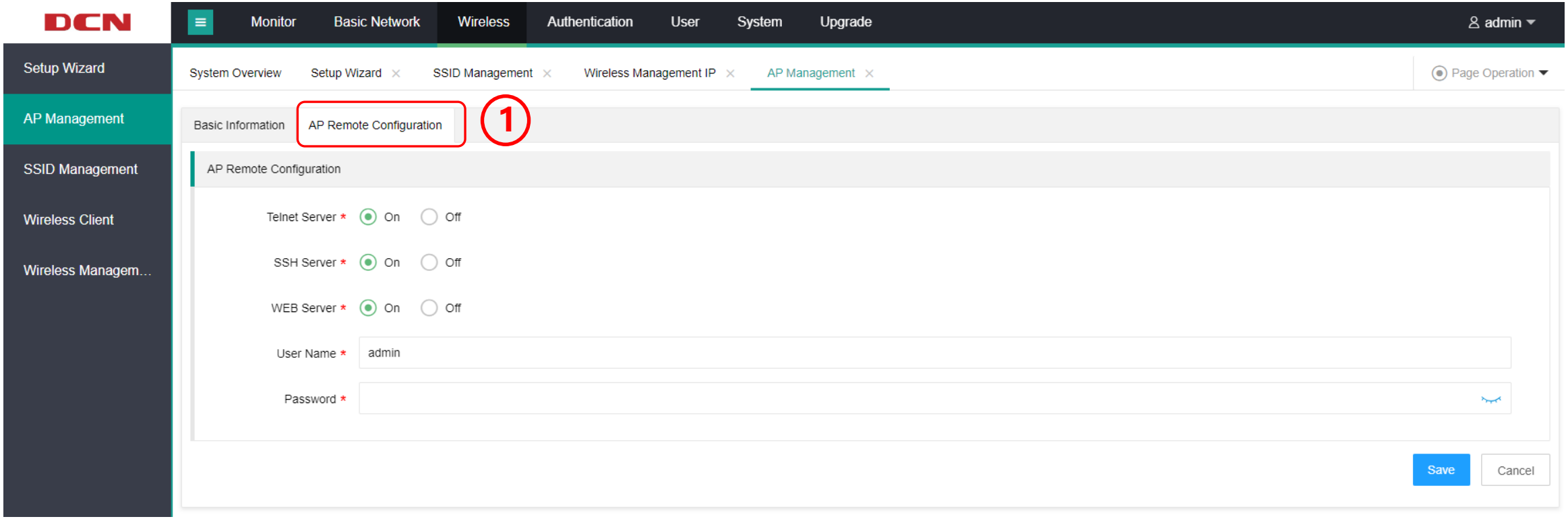
FIT AP + AC recommended layer-3 networking

AP group basic configuration on AC web



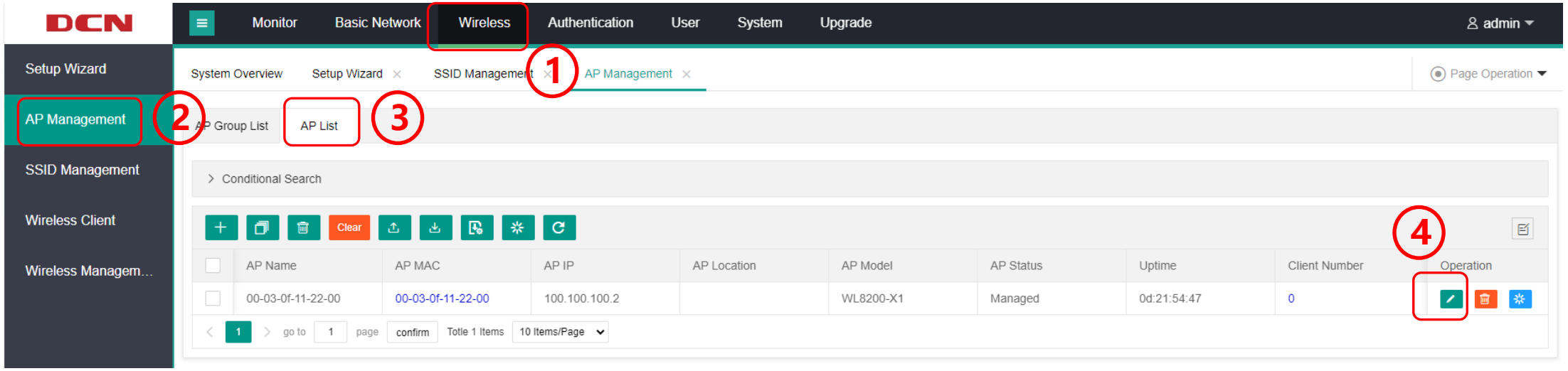
FIT AP + AC recommended layer-3 networking

Set AP remote access method on AC web



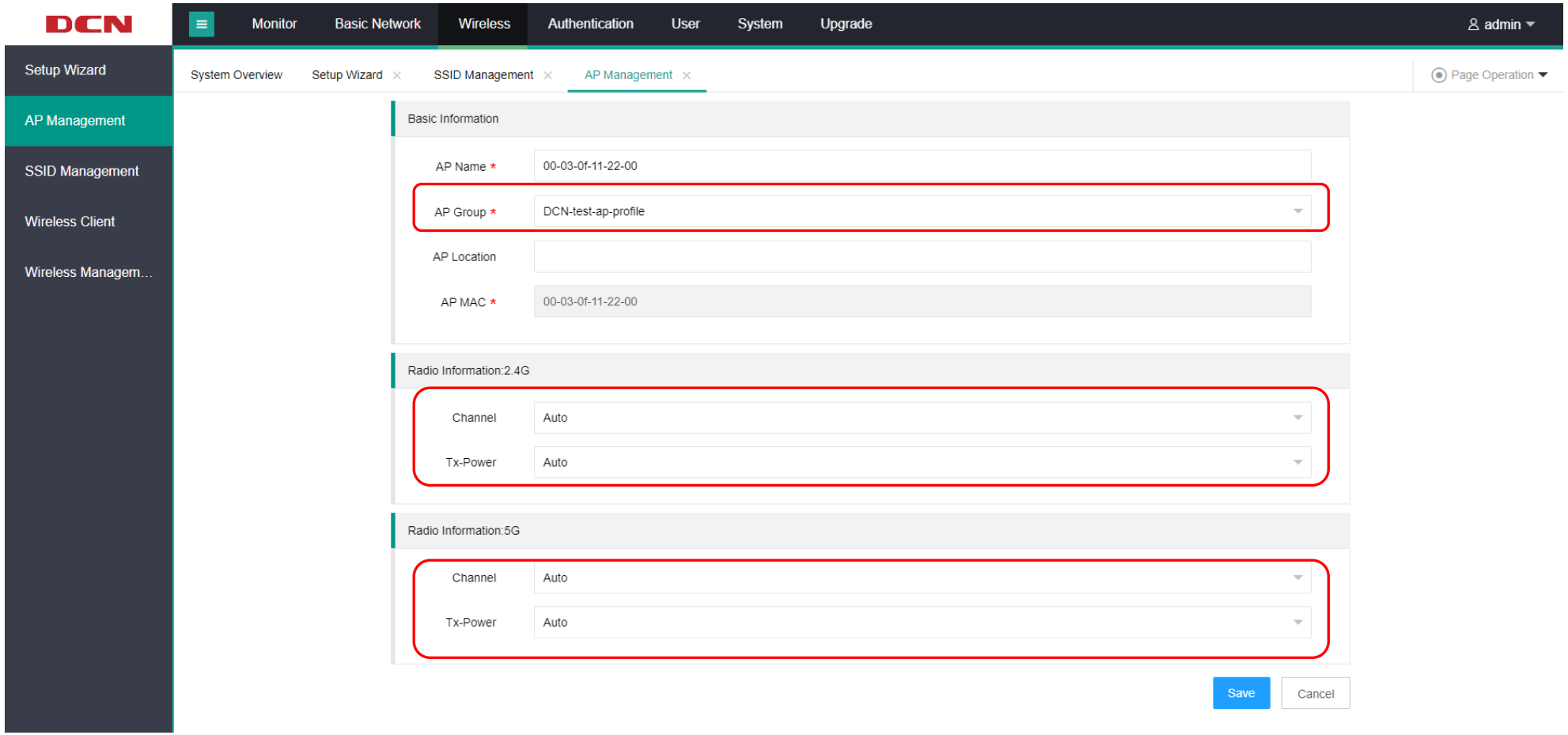
FIT AP + AC recommended layer-3 networking

Check specific AP in AP list on AC web



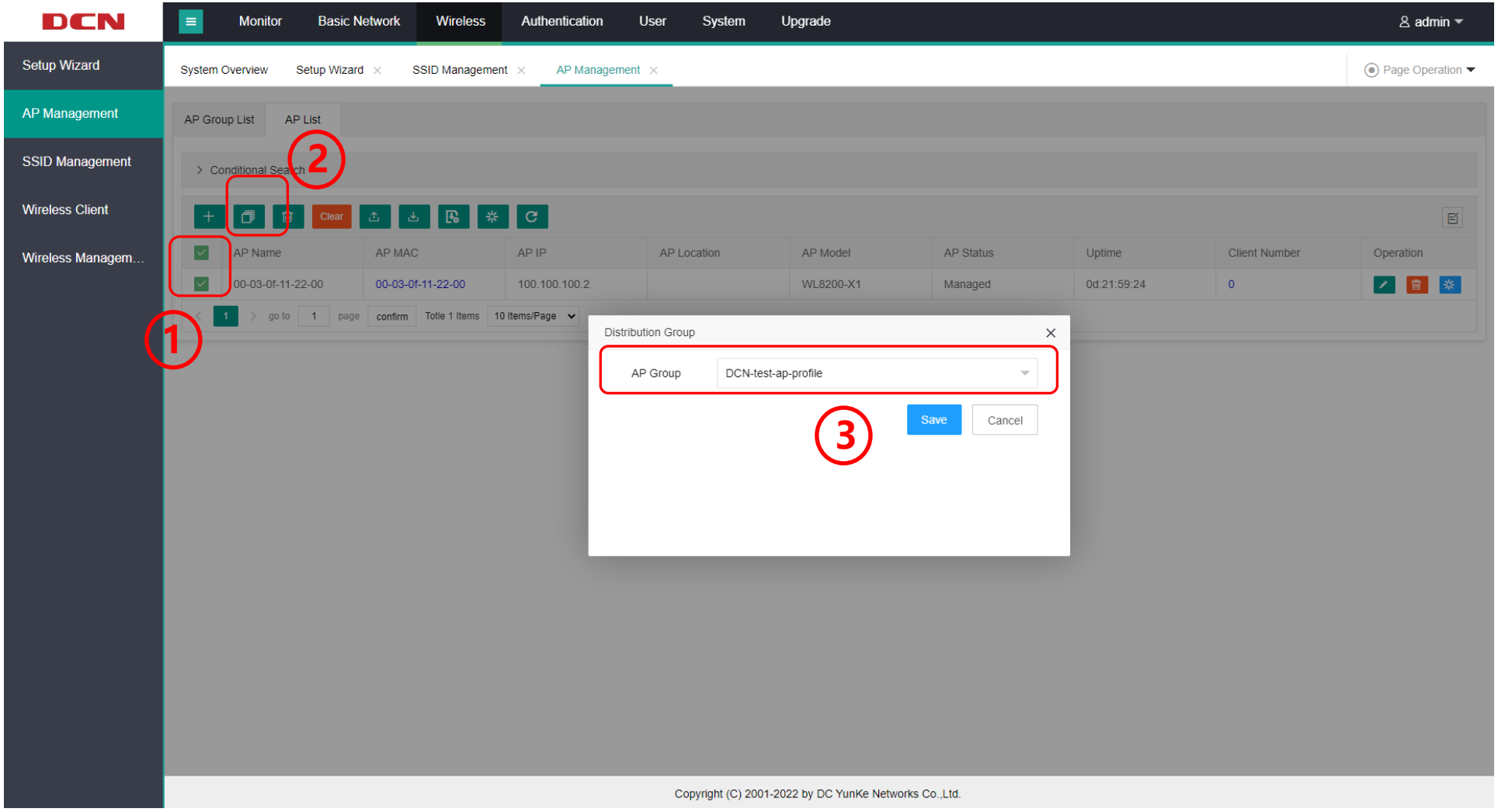
FIT AP + AC recommended layer-3 networking

Configure specific AP on AC web



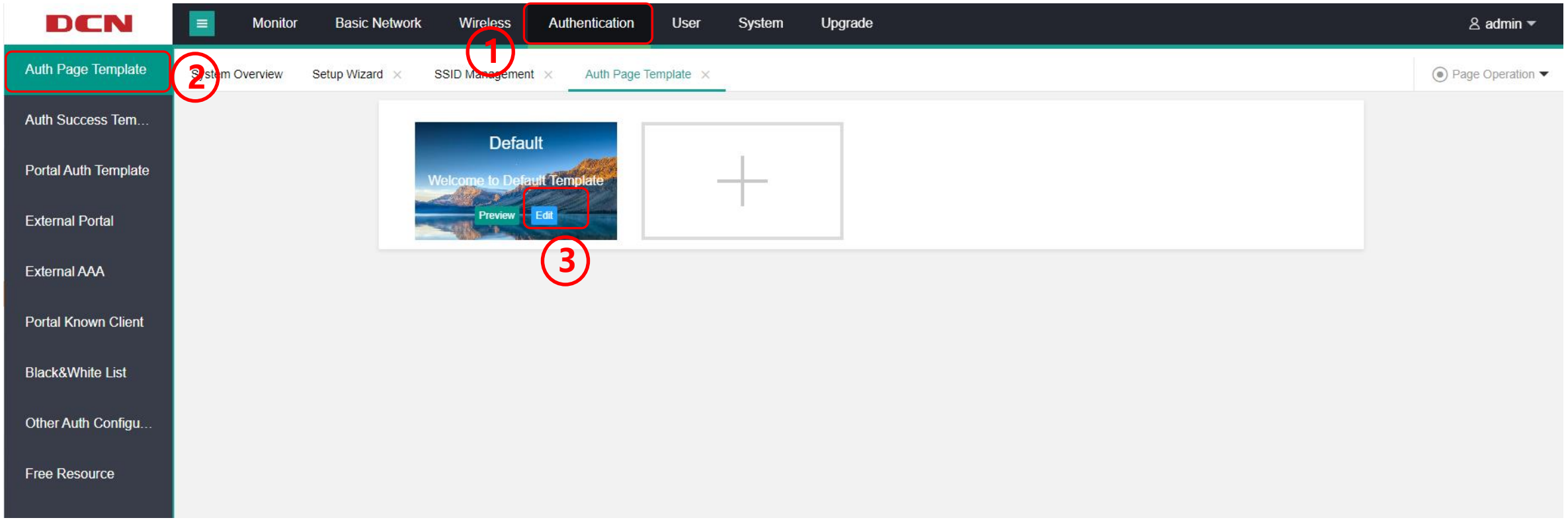
FIT AP + AC recommended layer-3 networking

A group of APs batch operation on AC web



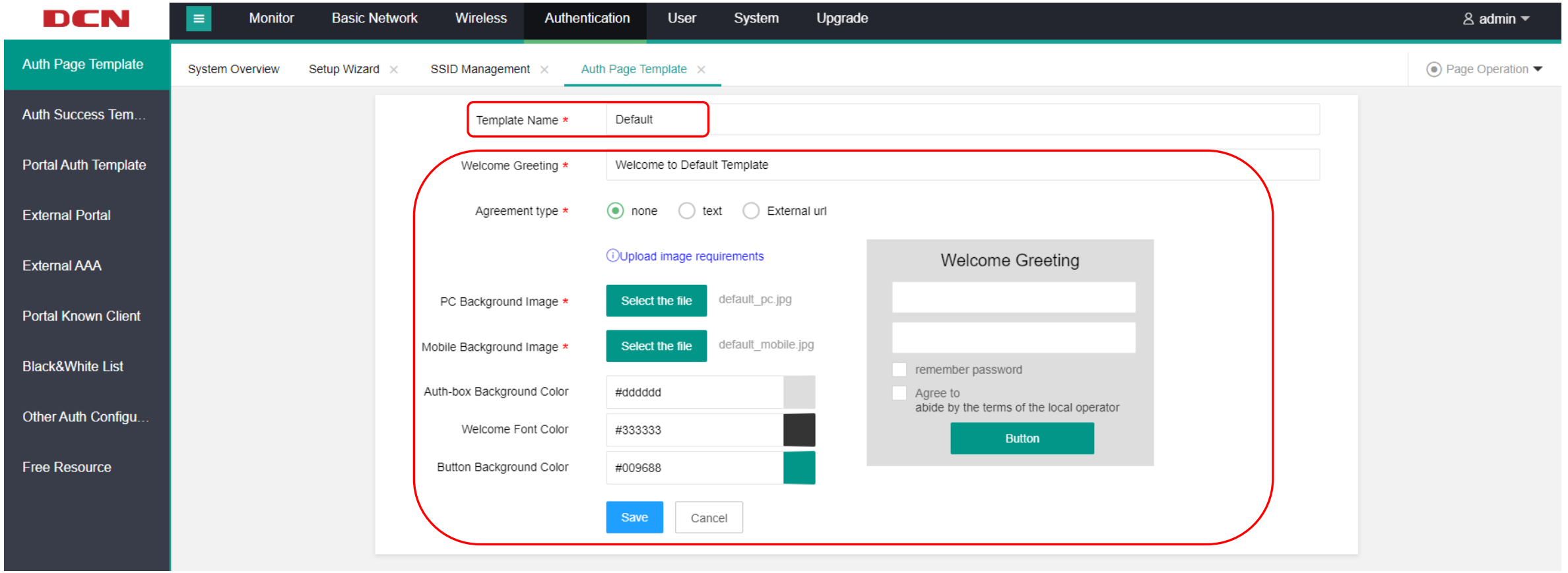
FIT AP + AC recommended layer-3 networking

Configure built-in portal server on AC



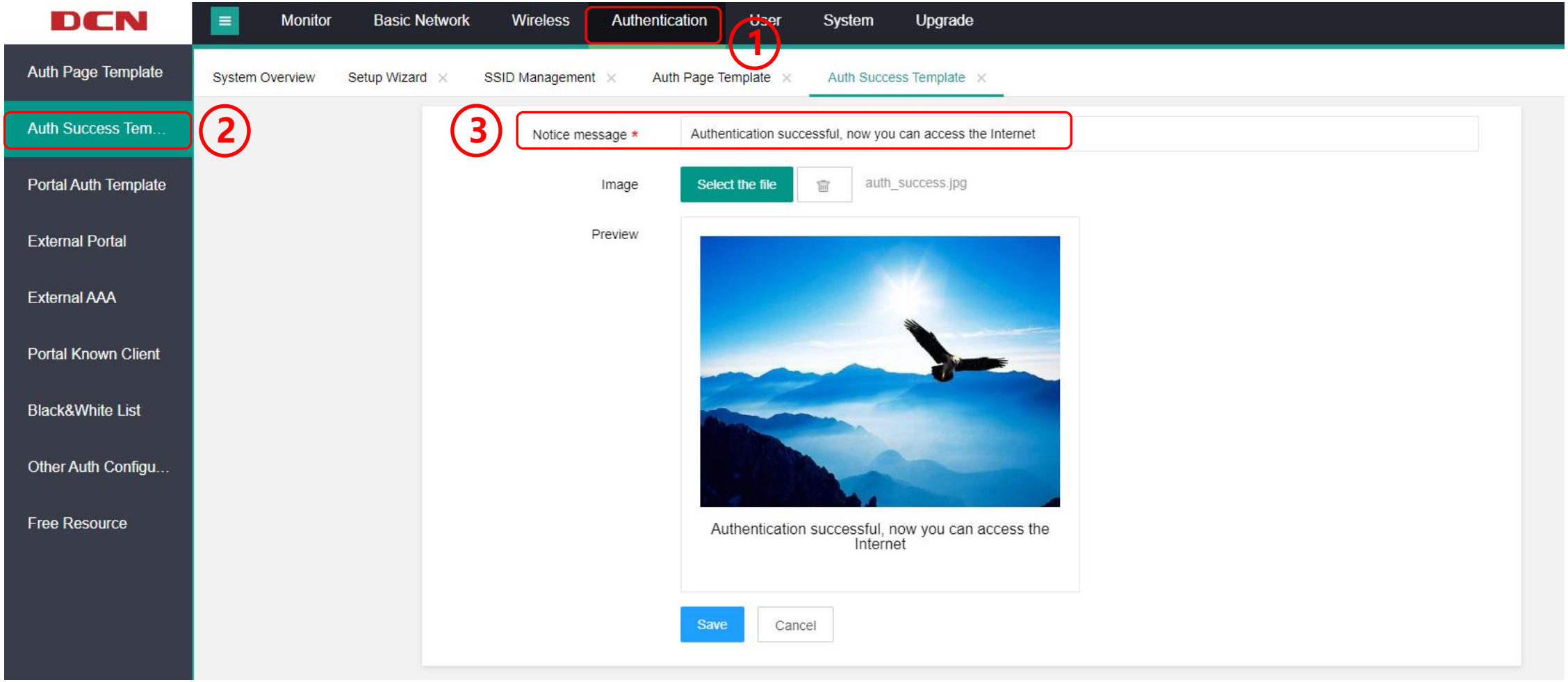
FIT AP + AC recommended layer-3 networking

Edit portal authentication template of built-in server on AC web



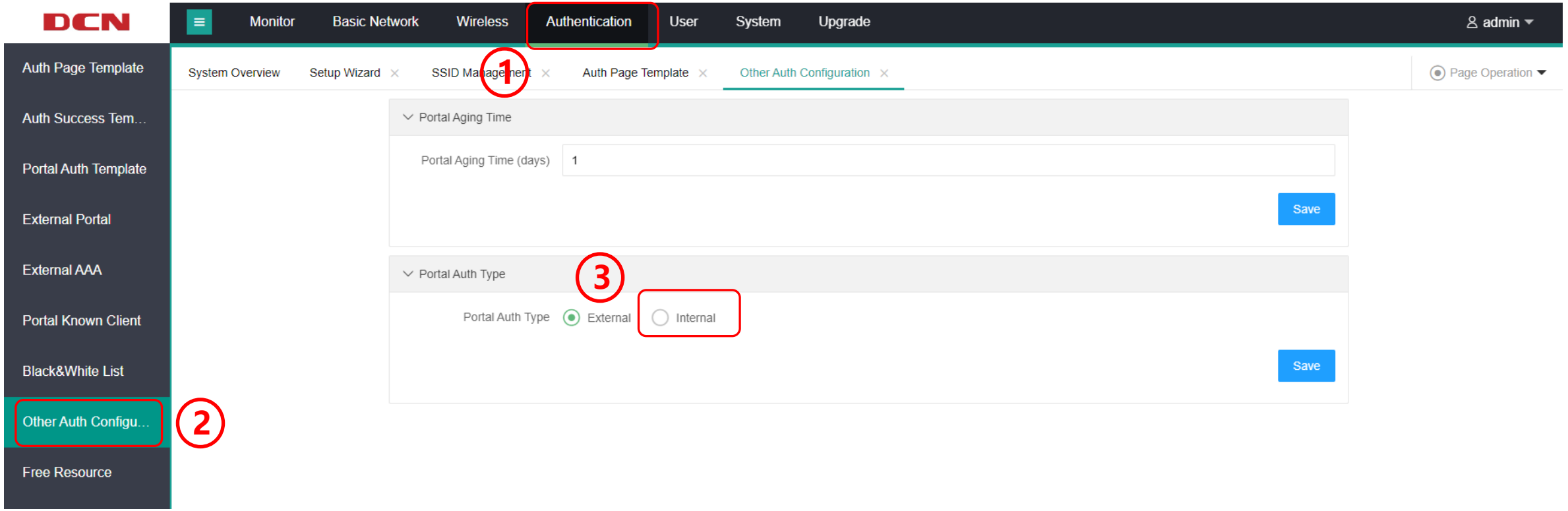
FIT AP + AC recommended layer-3 networking

Edit portal auth success template of built-in server on AC web



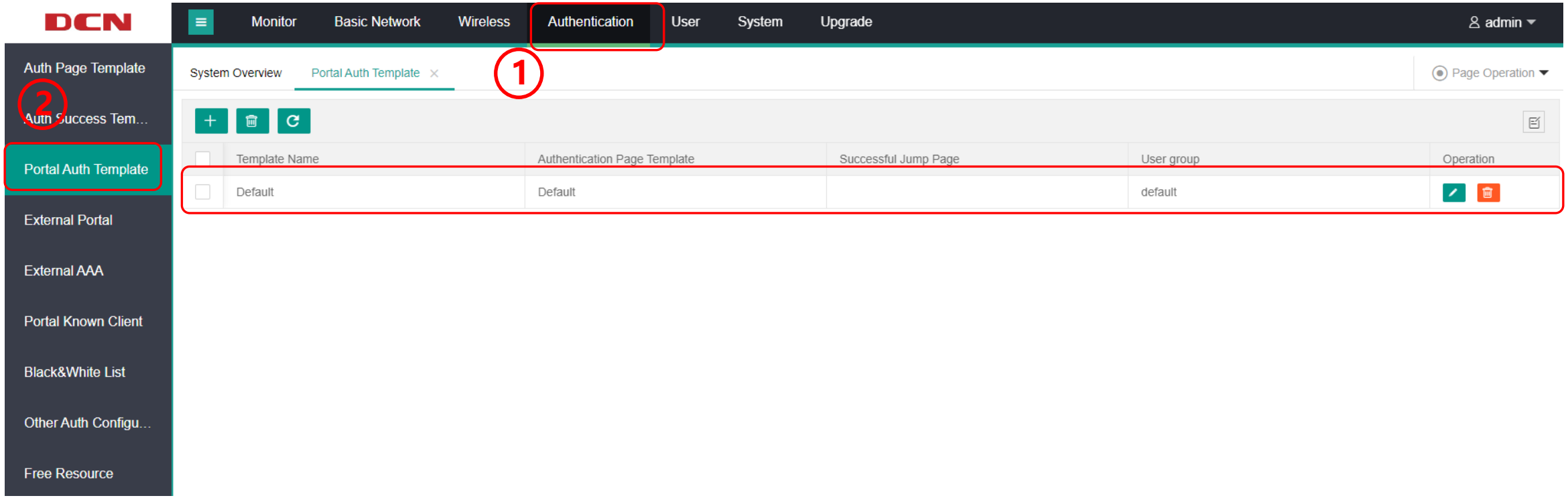
FIT AP + AC recommended layer-3 networking

Configure portal auth aging time and portal server type on AC web



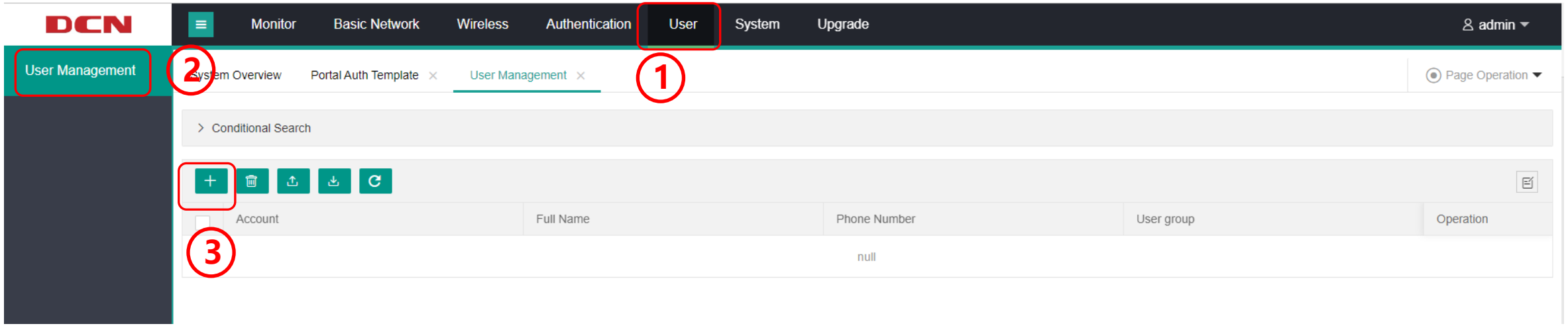
FIT AP + AC recommended layer-3 networking

Check built-in portal auth template on AC web



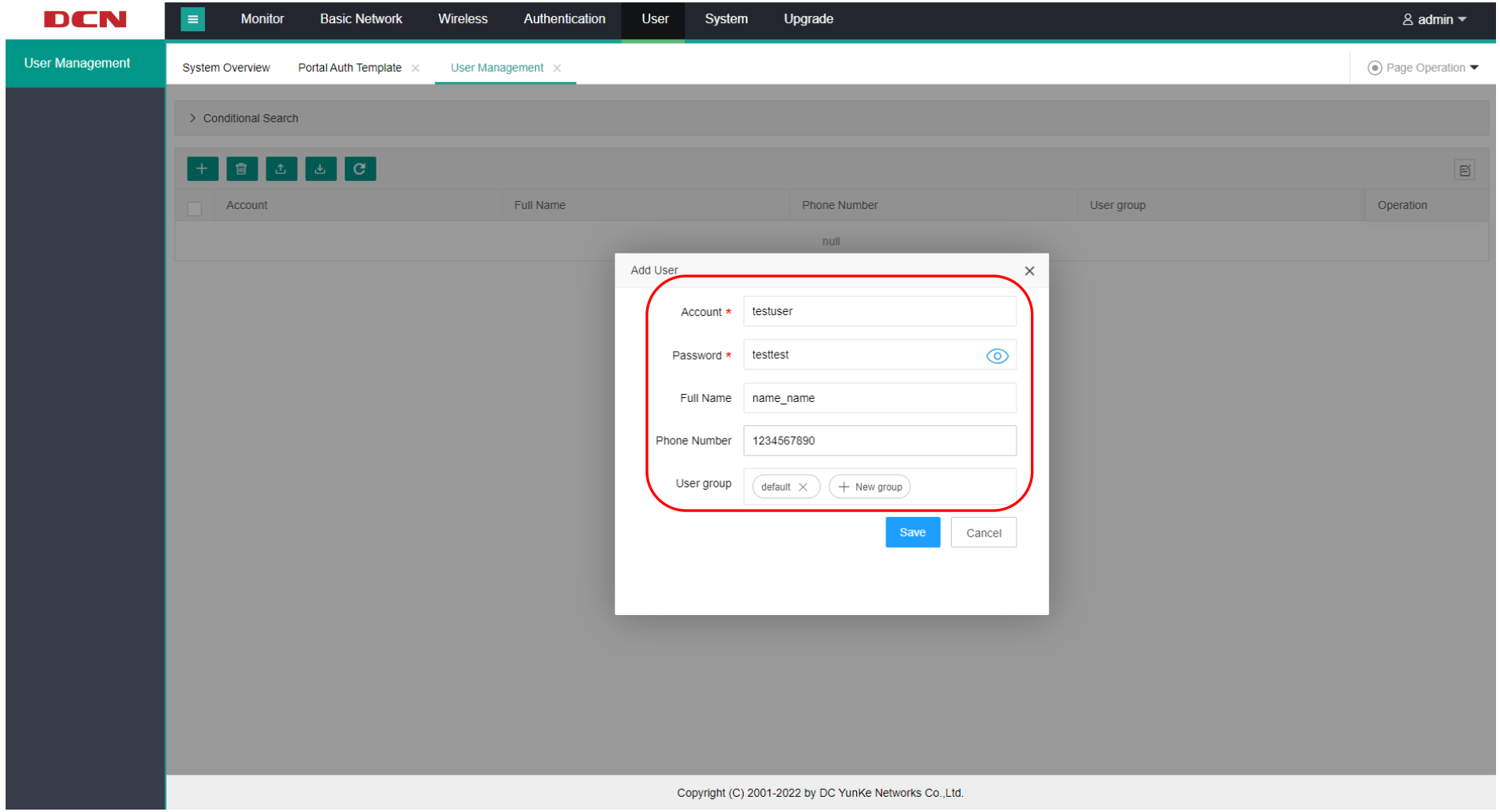
FIT AP + AC recommended layer-3 networking

Built-in portal auth user management on AC web



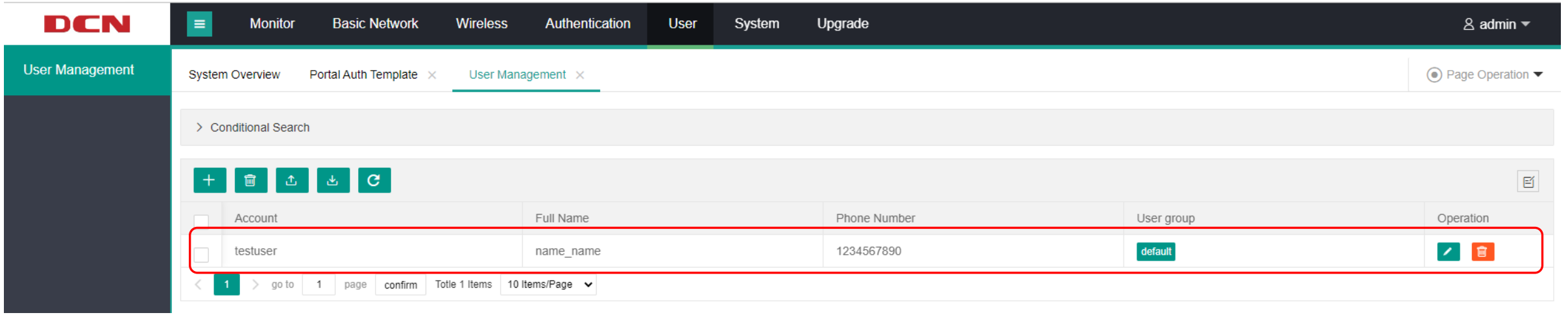
FIT AP + AC recommended layer-3 networking

Edit built-in portal auth user account on AC web



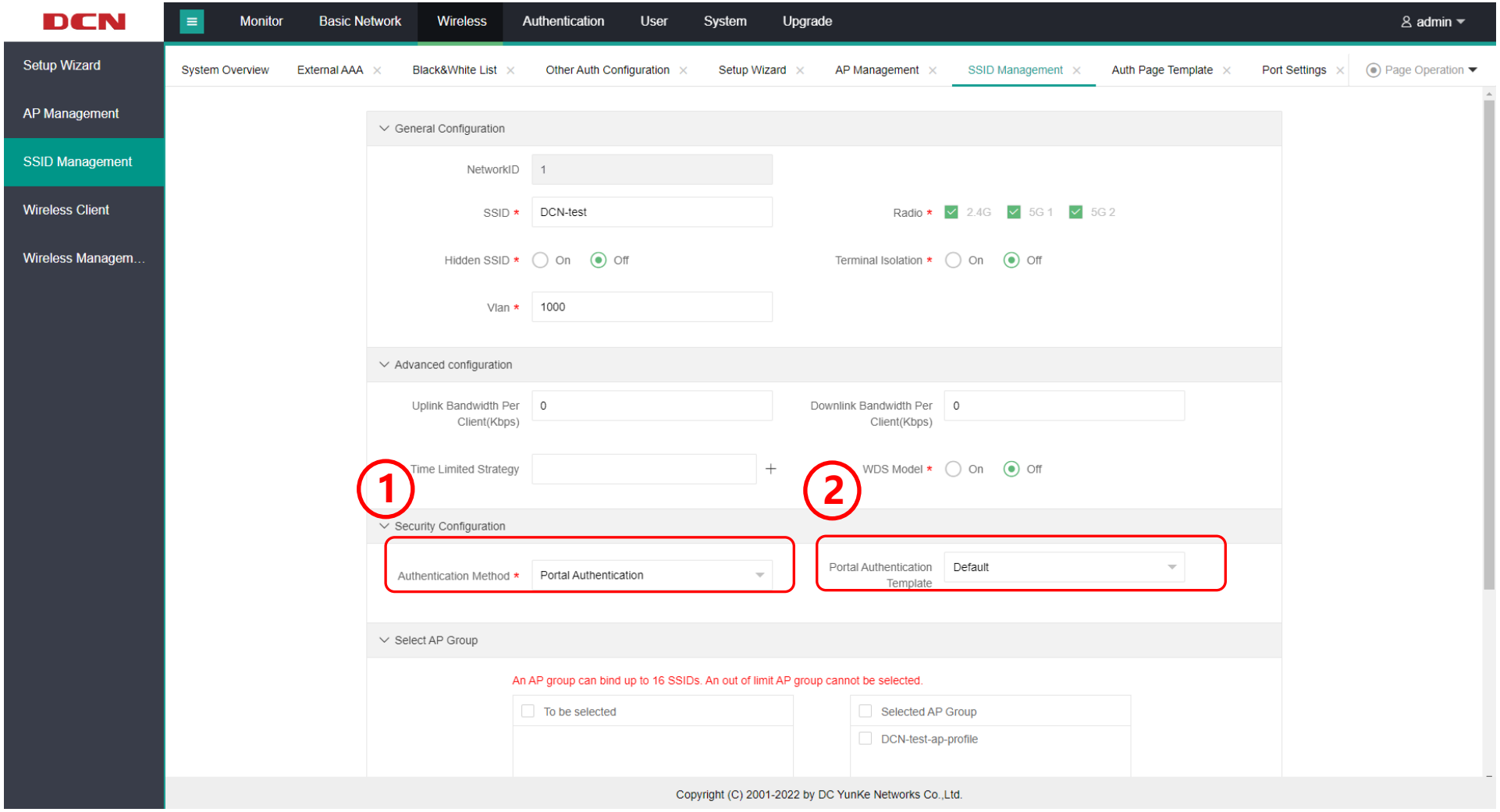
FIT AP + AC recommended layer-3 networking

Check built-in portal auth user account on AC web

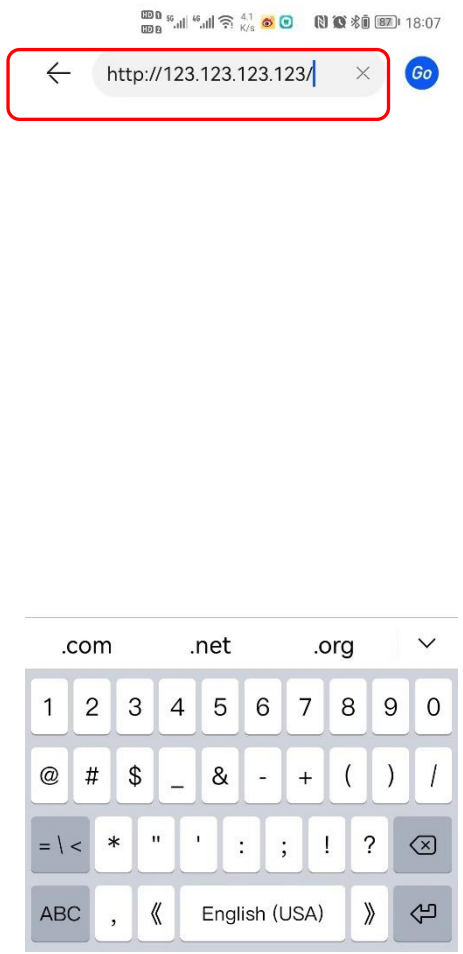


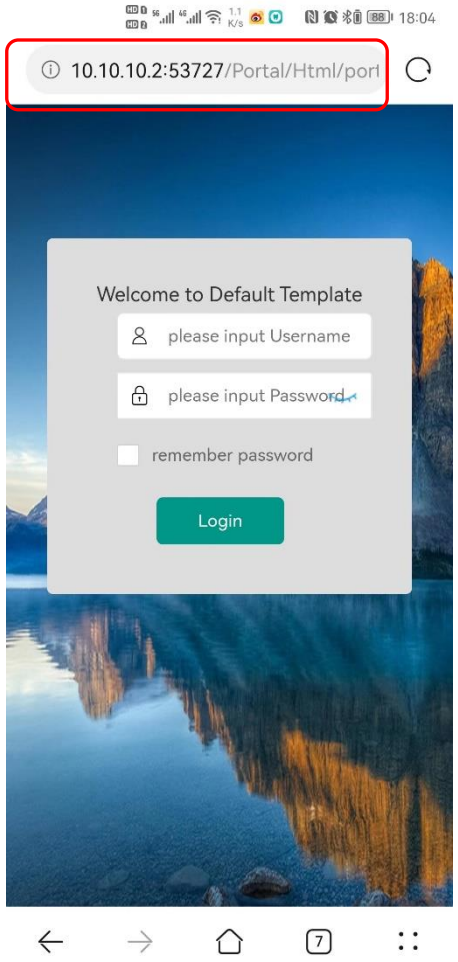
FIT AP + AC recommended layer-3 networking

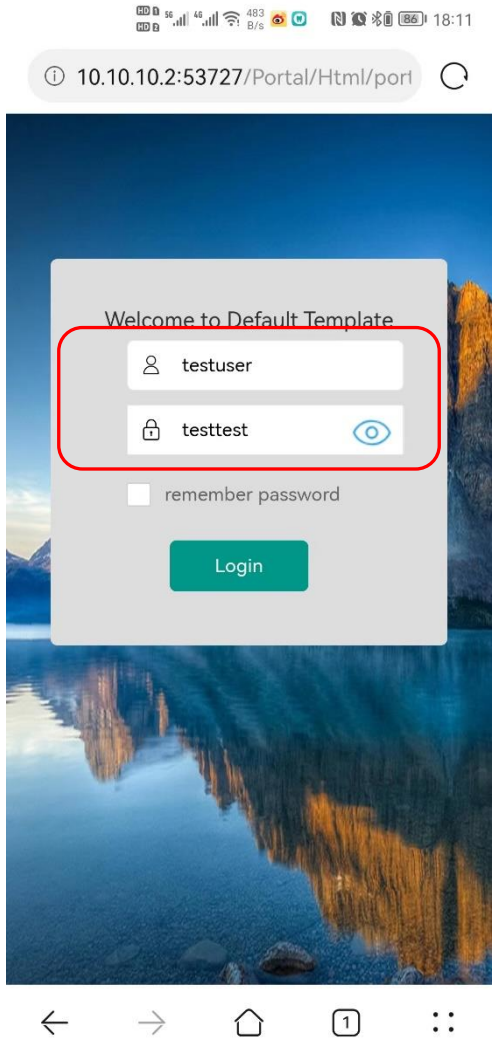
Apply portal auth template to specific SSID on AC web

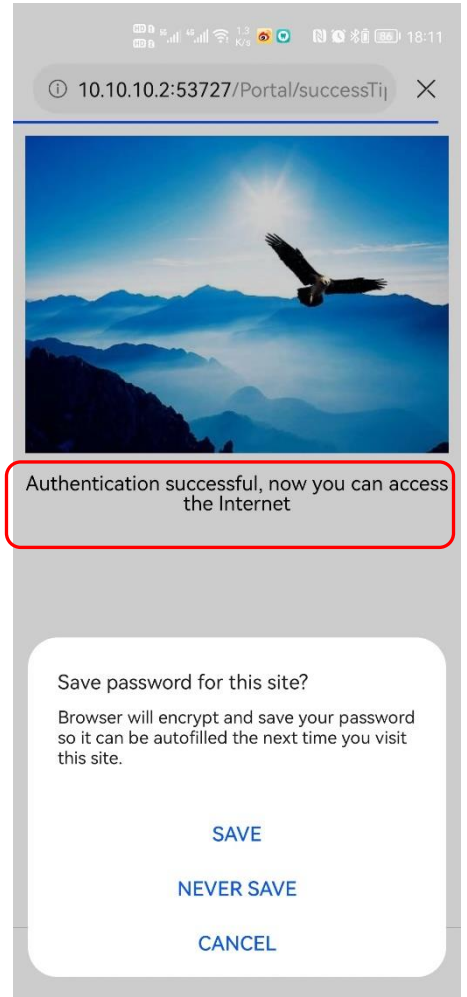


FIT AP + AC recommended layer-3 networking



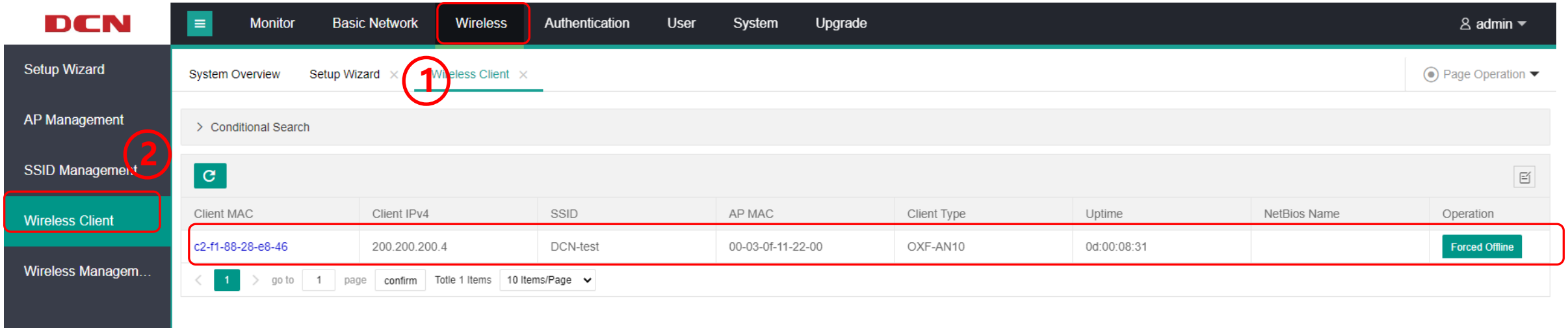






FIT AP + AC recommended layer-3 networking

Check wireless client information on AC web



02 Deployment Scenarios of WLAN product

- FAT AP networking
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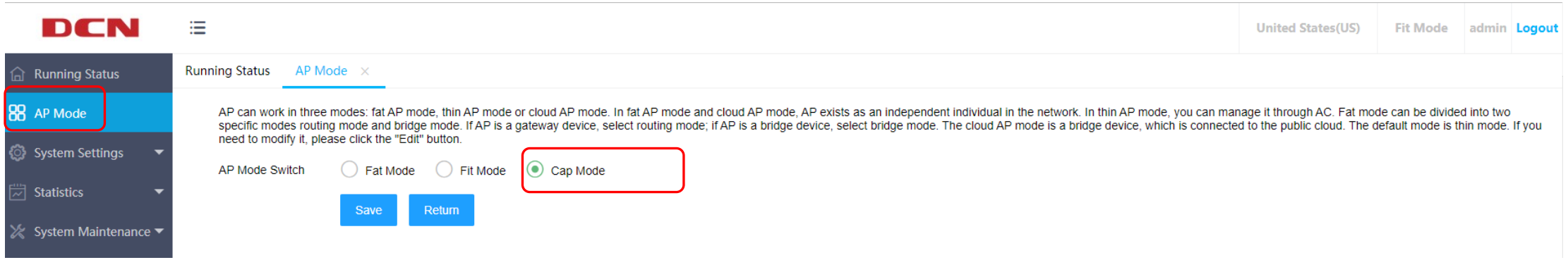
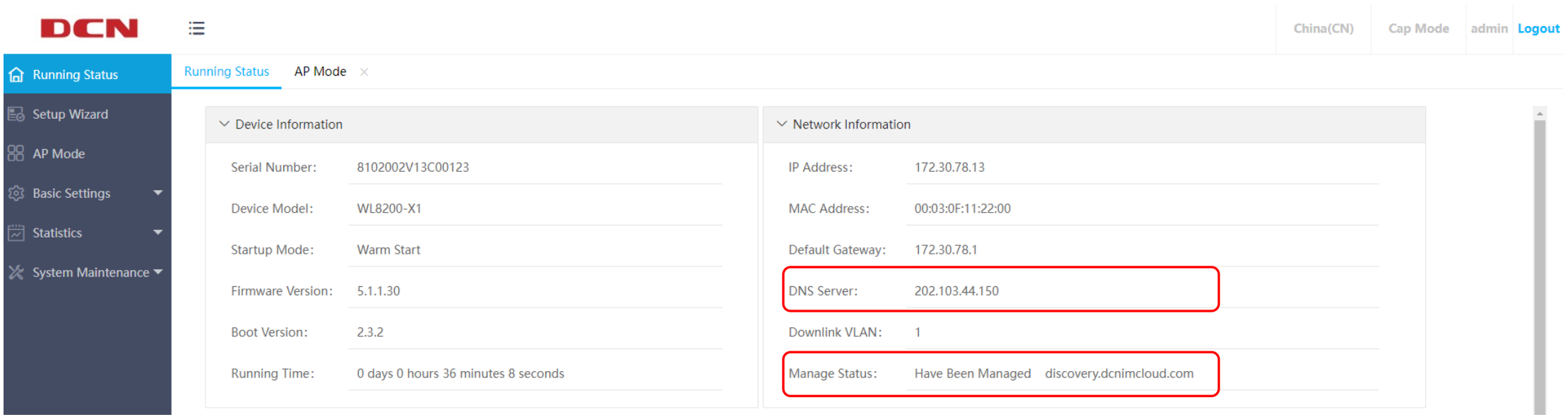
- Cloud AP networking

Cloud mode of AP networking

Enable cloud mode on AP web





03 Abnormal Situation Handling Guide

- Basic information for troubleshooting
- How to restore AP & AC under boot mode
- How to retrieve AC password
- What to check if all APs are not online
- NAT traversal between AC and AP
- How to check BSSID from the same AP

03 Abnormal Situation Handling Guide

- **Basic information for troubleshooting**
- **How to restore AP & AC under boot mode**
- **How to retrieve AC password**
- **What to check if all APs are not online**
- **NAT traversal between AC and AP**
- **How to check BSSID from the same AP**

Basic information for troubleshooting- AP information

```
admin@Dcn:~# get system detail
Property                    Value
-----------------------------------------
username                    admin
model                       WL8200-WH2
version                     3.8.2.38
country                     CN
nmode-supported             Y
forty-mhz-supported-g       Y
forty-mhz-supported-a       Y
base-mac                    00:03:0F:B0:55:90
base-mac-status             on
serial-number               WL021810IC07000200
country-code-is_configurable  1
device-type                 61
reboot-mode                 cold
usb-support                 Y
```

Basic information for troubleshooting - AC information

```
DCWS-6028#show version
  DCWS-6028 Device, Compiled on Jun 06 17:58:03 2020
  sysLocation China
  CPU MAC          00-03-0f-14-8f-a3
  VLAN MAC         00-03-0f-14-8f-a2
  Software Version 7.0.6.1(R0001.0057)
  Bootrom Version  7.0.24
  Hardware Version R01
  CPLD Version     0.08
  Serial No        AA33004902
  Copyright (C) 2001-2020 by Yunke China Information
Technology Limited.
  All rights reserved
  Last reboot was cold reset.
  Uptime is 0 weeks, 0 days, 0 hours, 5 minutes
```

Basic information for troubleshooting – AC information

```
DCWS-6028#show vendor
NAME          LEN        VALUE
------------  -----      ------------------------------
SwitchName     9          DCWS-6028
VersionPre     0
VendNameEn     26         DC YunKe Networks Co.,Ltd.
VendNameBr     3          DCN
VendWWW        28         http://www.dcnetworks.com.cn
VendLocate     5          China
CopyRight      53         Copyright (C) 2001-2020 by DC YunKe Networks Co.,Ltd.
VendContact    12         400-810-9119
WebLogo        2729
WebLogin       8683
WebFacebd      21104
WebBG          14685
WebLang        2          cn
VendorOid      16         1.3.6.1.4.1.6339
DeviceOid      24         1.3.6.1.4.1.6339.1.5.1.9
KeyNeed        4          0
BaseMac        6          00 03 0f 03 00 00
CliStyle       3          0
HsrpNeed       4          0
DevType(ID)    4          508
ChassisCard    0
FileVersion    9          10.19.253
IMGPrefix      0
```

Basic information for troubleshooting – AC information

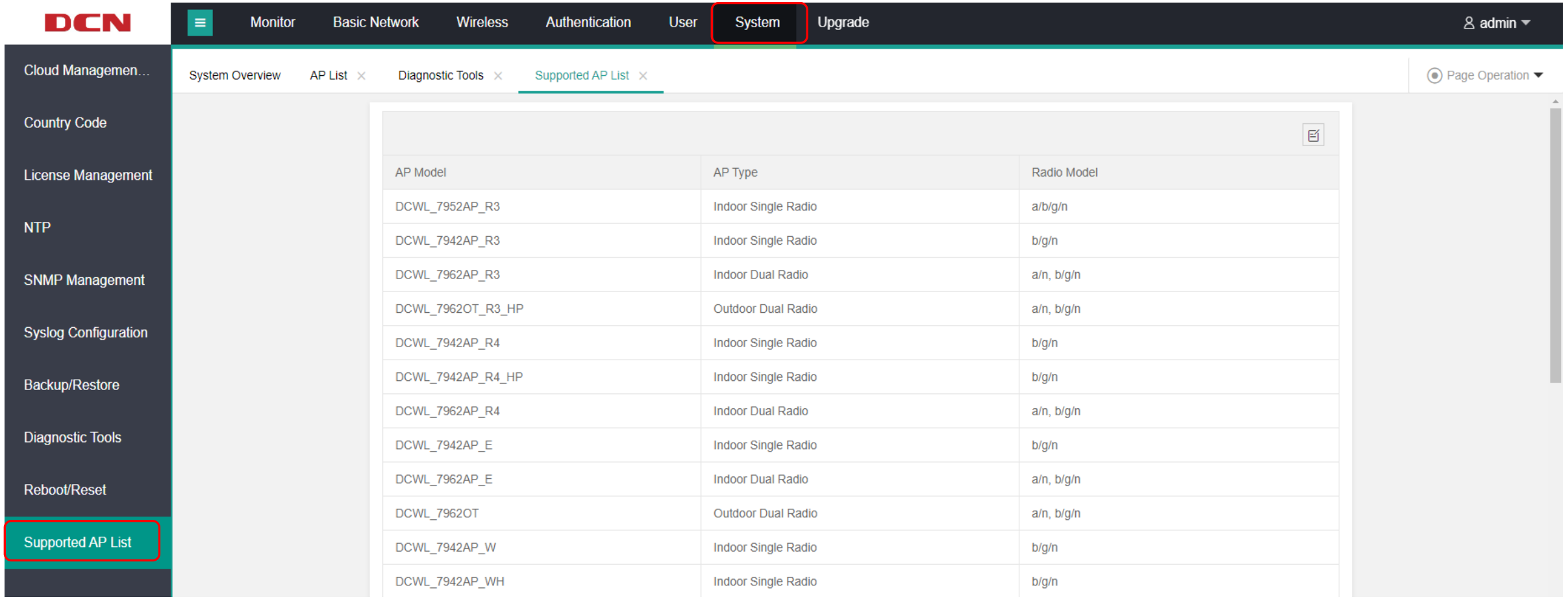
```
RomPrefix       0
HardWarePre     0
Prompt          0
UserName        5           admin
PassWord        5           admin
ManageIP        4           192.168.1.1
SupportAPs      3861
                  1 DCWL_7952AP_R3   R3    DCWL_7952AP_R3, Indoor Single Radio a/b/g/n
                  2 DCWL_7942AP_R3   R3    DCWL_7942AP_R3, Indoor Single Radio b/g/n
                  3 DCWL_7962AP_R3   R3    DCWL_7962AP_R3, Indoor Dual Radio a/n, b/g/n
                  4 DCWL_7962OT_R3_HP R3    DCWL_7962OT_R3_HP, Outdoor Dual Radio a/n, b/g/n
                  5 DCWL_7942AP_R4   R4    DCWL_7942AP_R4, Indoor Single Radio b/g/n
                  6 DCWL_7942AP_R4_HP R4    DCWL_7942AP_R4_HP, Indoor Single Radio b/g/n
                  7 DCWL_7962AP_R4   R4    DCWL_7962AP_R4, Indoor Dual Radio a/n, b/g/n
                  8 DCWL_7942AP_E    R1    DCWL_7942AP_E, Indoor Single Radio b/g/n
                  9 DCWL_7962AP_E    R1    DCWL_7962AP_E, Indoor Dual Radio a/n, b/g/n
                 10 DCWL_7962OT      R1    DCWL_7962OT, Outdoor Dual Radio a/n, b/g/n
                 11 DCWL_7942AP_W    R1    DCWL_7942AP_W, Indoor Single Radio b/g/n
                 12 DCWL_7942AP_WH   R1    DCWL_7942AP_WH, Indoor Single Radio b/g/n
                 13 DCWL_7942OT_R3_HP R3    DCWL_7942OT_R3_HP, Outdoor Single Radio b/g/n
                 14 DCWL_7962OT_R4_HP R4    DCWL_7962OT_R4_HP, Outdoor Dual Radio a/n, b/g/n
                 15 DCWL_7942OT_R4_HP R4    DCWL_7942OT_R4_HP, Outdoor Single Radio b/g/n
                 16 DCWL_7942AP_R4_5 R4_5  DCWL_7942AP_R4_5, Indoor Single Radio b/g/n
                 17 DCWL_7962AP_R4_5 R4_5  DCWL_7962AP_R4_5, Indoor Dual Radio a/n, b/g/n
                 21 DCWL_7942AP_R5   R5    DCWL_7942AP_R5, Indoor Single Radio b/g/n
                 22 DCWL_7962AP_R5   R5    DCWL_7962AP_R5, Indoor Dual Radio a/n, b/g/n
```

Basic information for troubleshooting – AC information

23 DCWL_7962OT_R5 R5 DCWL_7962OT_R5, Outdoor Dual Radio a/n, b/g/n
24 DCWL_7942AP_R5_1 R5_1 DCWL_7942AP_R5_1, Indoor Single Radio b/g/n
25 DCWL_7962AP_R5_1 R5_1 DCWL_7962AP_R5_1, Indoor Dual Radio a/n, b/g/n
26 DCWL_1000WAP_R1 R1 DCWL_1000WAP_R1, Indoor Single Radio b/g/n
27 DCWL_2000WAP_R1 R1 DCWL_2000WAP_R1, Indoor Single Radio b/g/n
28 DCWL-1000WAP R1.1 DCWL_1000WAP(R1.1), Indoor Single Radio b/g/n
29 WL8200-I2(R1) R1 WL8200-I2(R1), Indoor Dual Radio a/n/ac, b/g/n
30 WL8200-I3(R1) R1 WL8200-I3(R1), Indoor Dual Radio a/n/ac, b/g/n
31 DCWL_2000WAP(L) R1 DCWL_2000WAP(L), Indoor Single Radio b/g/n
32 EAP280(L) R1 EAP280(L), Indoor Single Radio b/g/n
33 DCWL_8200_W2 R1 DCWL_8200_W2, Indoor Dual Radio a/n/ac, b/g/n
36 DCWL-7962AP-D R1 DCWL-7962AP-D, Indoor Dual Radio a/n, b/g/n
37 DCWL_7942OT_R5 R5 DCWL_7942OT_R5, Outdoor Single Radio b/g/n
38 DCWL_7962OT_R6 R1 DCWL_7962OT_R6, Outdoor Single Radio b/g/n
39 WL8200-T2 R1 WL8200-T2, Outdoor Dual Radio a/n/ac, b/g/n
40 WL8200_T3 R1 WL8200_T3, Outdoor Dual Radio a/n/ac, b/g/n
41 WL8200-WL2 R1 WL8200-WL2, Indoor Dual Radio a/n/ac, b/g/n
42 WL8200-IT2 R1 WL8200-IT2, Outdoor Dual Radio a/n/ac, b/g/n
58 DCWL-2000WAP(R2) R2 DCWL-2000WAP(R2), Indoor Single Radio b/g/n
59 WL8200-I2(R2) R2 WL8200-I2(R2), Indoor Dual Radio a/n/ac, b/g/n
60 WL8200-I3(R2) R2 WL8200-I3(R2), Indoor Three Radio a/n/ac, b/g/n
61 WL8200-WH2 R1 WL8200-WH2, Indoor Dual Radio a/n/ac, b/g/n
62 WL8200-IT3 R1 WL8200-IT3(R1), Outoor Dual Radio a/n/ac, b/g/n
63 WL8200-T3 R1 WL8200-T3(R1), Outdoor Dual Radio a/n/ac, b/g/n
64 WL8200-I1 R1 WL8200-I1, Indoor Dual Radio a/n/ac, b/g/n
65 WL8200-TL2 R1 WL8200-TL2, Outoor Dual Radio a/n/ac, b/g/n
66 WL8200-TL1 R1 WL8200-TL1, Outoor Single Radio b/g/n

Basic information for troubleshooting – AC information

Check supported AP list on AC web



AP Model	AP Type	Radio Model
DCWL_7952AP_R3	Indoor Single Radio	a/b/g/n
DCWL_7942AP_R3	Indoor Single Radio	b/g/n
DCWL_7962AP_R3	Indoor Dual Radio	a/n, b/g/n
DCWL_7962OT_R3_HP	Outdoor Dual Radio	a/n, b/g/n
DCWL_7942AP_R4	Indoor Single Radio	b/g/n
DCWL_7942AP_R4_HP	Indoor Single Radio	b/g/n
DCWL_7962AP_R4	Indoor Dual Radio	a/n, b/g/n
DCWL_7942AP_E	Indoor Single Radio	b/g/n
DCWL_7962AP_E	Indoor Dual Radio	a/n, b/g/n
DCWL_7962OT	Outdoor Dual Radio	a/n, b/g/n
DCWL_7942AP_W	Indoor Single Radio	b/g/n
DCWL_7942AP_WH	Indoor Single Radio	b/g/n

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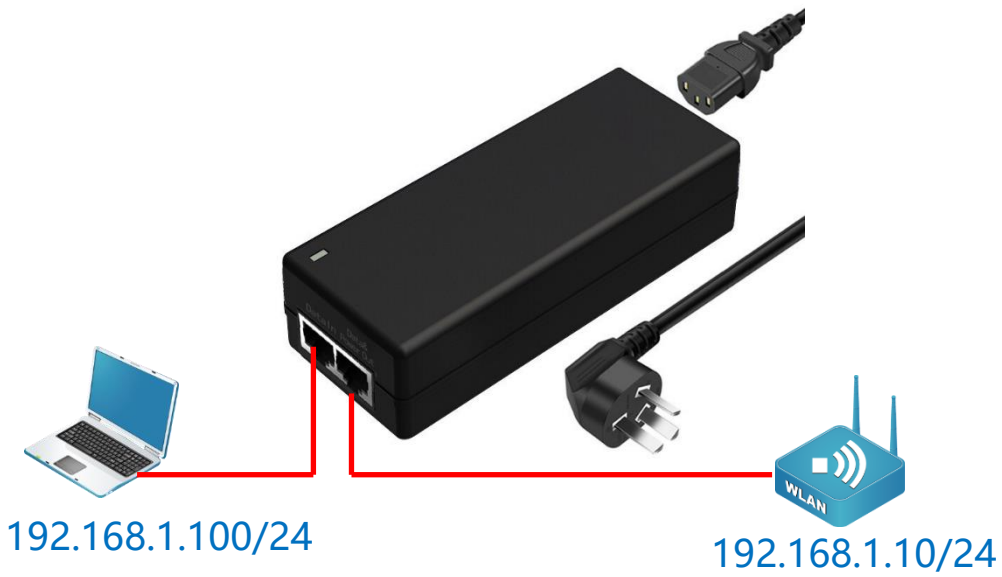
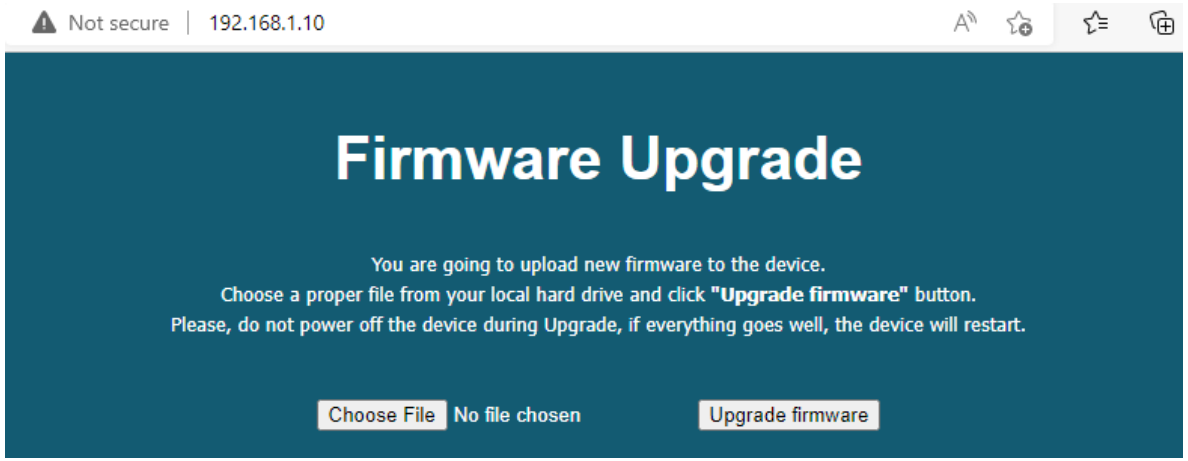
How to restore AP under boot mode



Press and hold the reset button of the AP and power up the AP. When the power indicator of AP is on, release the reset button after about 8 seconds. Then you can enter the Web interface of the AP boot mode.



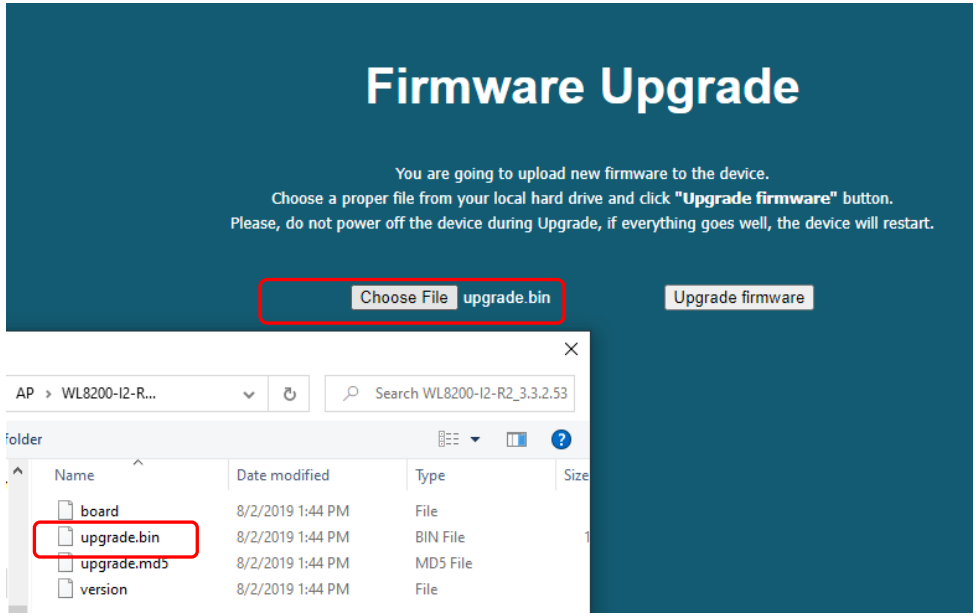

```
C:\Users\Caroline>ping 192.168.1.10

Pinging 192.168.1.10 with 32 bytes of data:
Reply from 192.168.1.10: bytes=32 time=100ms TTL=128
Reply from 192.168.1.10: bytes=32 time=50ms TTL=128
Reply from 192.168.1.10: bytes=32 time=51ms TTL=128
Reply from 192.168.1.10: bytes=32 time=51ms TTL=128
```

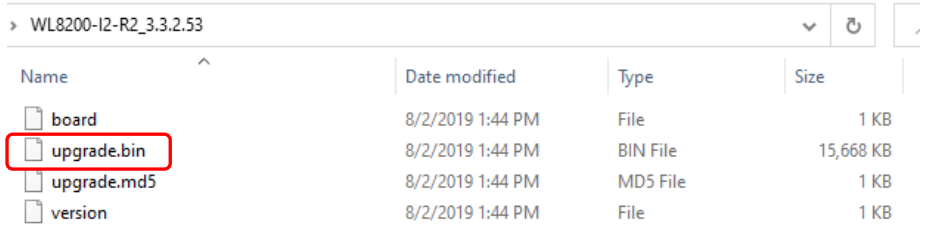
Note:

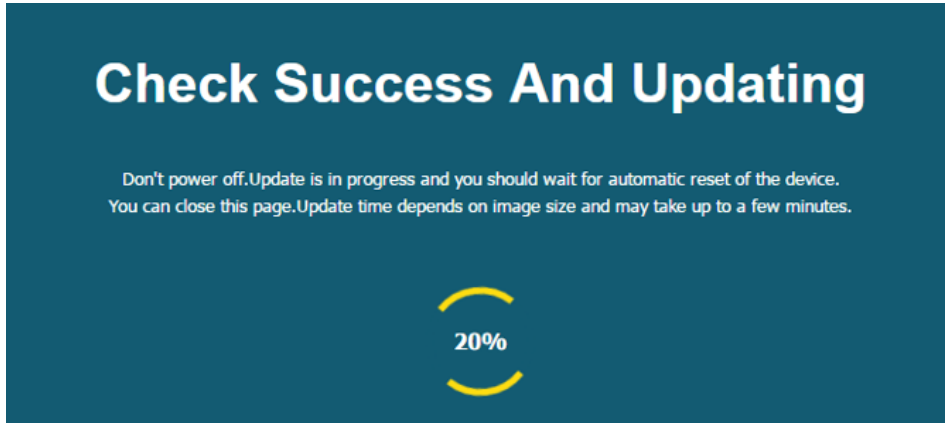
1. Under normal circumstances, you can ping the default IP address of the AP. If not, please try to reset the AP first.
2. You must use the http protocol, not the https protocol.

How to restore AP under boot mode

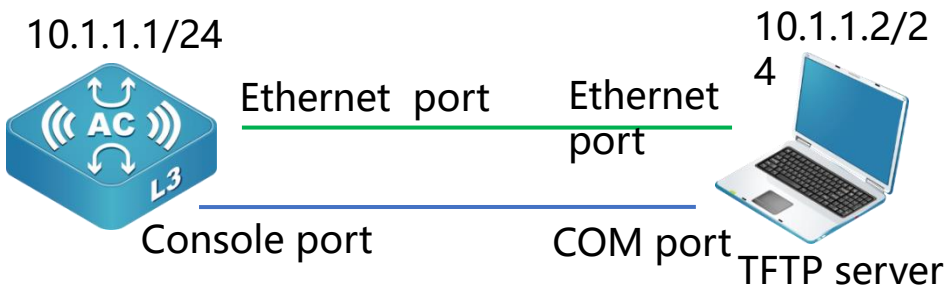
Unzip the AP firmware file "WL8200-xxxxx.tar" , you can see the "upgrade.bin" file. Select that "upgrade.bin " file in the Web page, then click "upgrade firmware" and wait patiently for the AP to complete the repairment and the "upgrade success" page will appear.

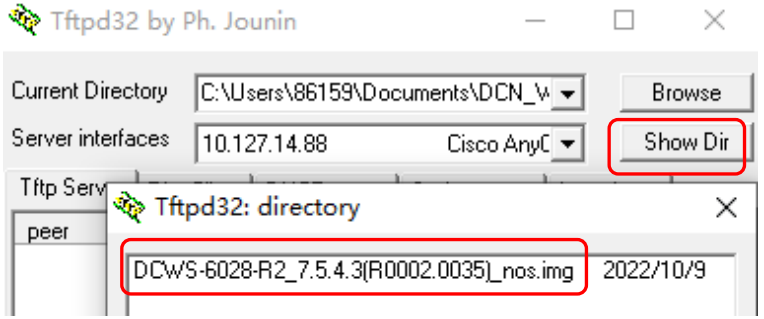






How to restore AC under boot mode






```
Bootrom version: 8.0.11

Creation date: Mar  9 2022 - 21:18:51

Testing RAM...
0x10000000 RAM OK.

(Re)start USB...
USB0:   Port (usbActive) : 0    Interface (usbType = 2) : USB
EHCI 1.00
scanning bus 0 for devices... 1 USB Device(s) found
       scanning usb for storage devices... 0 Storage Device(s)
found
       scanning usb for ethernet devices... 0 Ethernet Device(s)
found
[Boot]:
[Boot]: showconfig
Host IP Address:    10.1.1.1
Server IP Address:  10.1.1.2
[Boot]:
```

If you can enter the boot command line of AC, you can perform the following steps to try to repair.

(1) Get the effective IP address in AC and the IP address of TFTP server.

[Boot]: showconfig

(2) Configure the IP address of the debugging computer as the IP address of the TFTP server and start the TFTP service.

(3) [Boot]: run tftp:DCWS-6028-R2_7.5.4.3(R0002.0035)_nos.img

(4) After the above operations are completed normally, you can enter the CLI of AC, and then perform upgrade operation in the CLI.

copy tftp://10.1.1.2/DCWS-6028-R2_7.5.4.3(R0002.0035)_nos.img nos.img

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How to retrieve AC password

```
[Boot]: dir
Scanning JFFS2 FS: . done.
 -rw-r--r--    10201 Thu Jan 01 04:02:15 1970
startup20220810.cfg
 -rw-r--r--     4571 Fri Jan 02 19:44:37 1970 startup_20220630.cfg
 -rw-r--r--       32 Thu Jan 01 02:27:26 1970 configCtrl.licx
 -rw-r--r--     2673 Fri Jan 02 00:40:07 1970 startup.cfg
 -rw-r--r--       70 Fri Jan 02 00:40:07 1970 portal-locale.cfg
 -rw-r--r--     6707 Thu Jan 01 00:55:04 1970
startup_20220801.cfg
 -rw-r--r--     3754 Thu Jan 01 03:06:44 1970 startup-1x.cfg
 -rw-r--r--      245 Thu Jan 01 00:00:25 1970 dh1024.pem
 -rw-r--r--      156 Thu Jan 01 00:00:25 1970 dh512.pem
 -rw-r--r--      245 Thu Jan 01 00:00:25 1970 wsdh1024.pem
 -rw-r--r--      156 Thu Jan 01 00:00:25 1970 wsdh512.pem
 -rw-r--r--      928 Thu Jan 01 00:00:25 1970 wssl2_cert.pem
 -rw-r--r--      916 Thu Jan 01 00:00:25 1970 wssl2_key.pem
 -rw-r--r--       48 Thu Jan 01 00:00:38 1970 default_license.lic
 -rw-r--r-- 23238357 Thu Jan 01 23:20:18 1970 nos.img
[Boot]:
[Boot]: boot startup-config null
...default factory-config will be used.
[Boot]:
[Boot]: reboot
```

Note:
After the left side operations, the switch will start with the factory configuration and be able to enter the CLI normally. The username and password are the default. Never execute the 'write' command after entering CLI.

```
DCWS-6028-C#type startup.cfg
!$$1,511
!
no service password-encryption
!
hostname DCWS-6028-C
sysLocation China
sysContact 400-810-9119
!
authentication logging enable
!
username admin privilege 15 password 0 admin
!
authentication line console login local
!
```

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What to check if all APs are not online

If all APs are not online, please check these aspects in turn.

Check IP and Port

- Generally, check whether the IP addresses of AC and AP can reach each other through ping command. Except for Traversing NAT scenario.
- Configure the wireless management IP address of AC statically in FIT AP to check whether the network and port are normal.

Check Device-type and AP mode

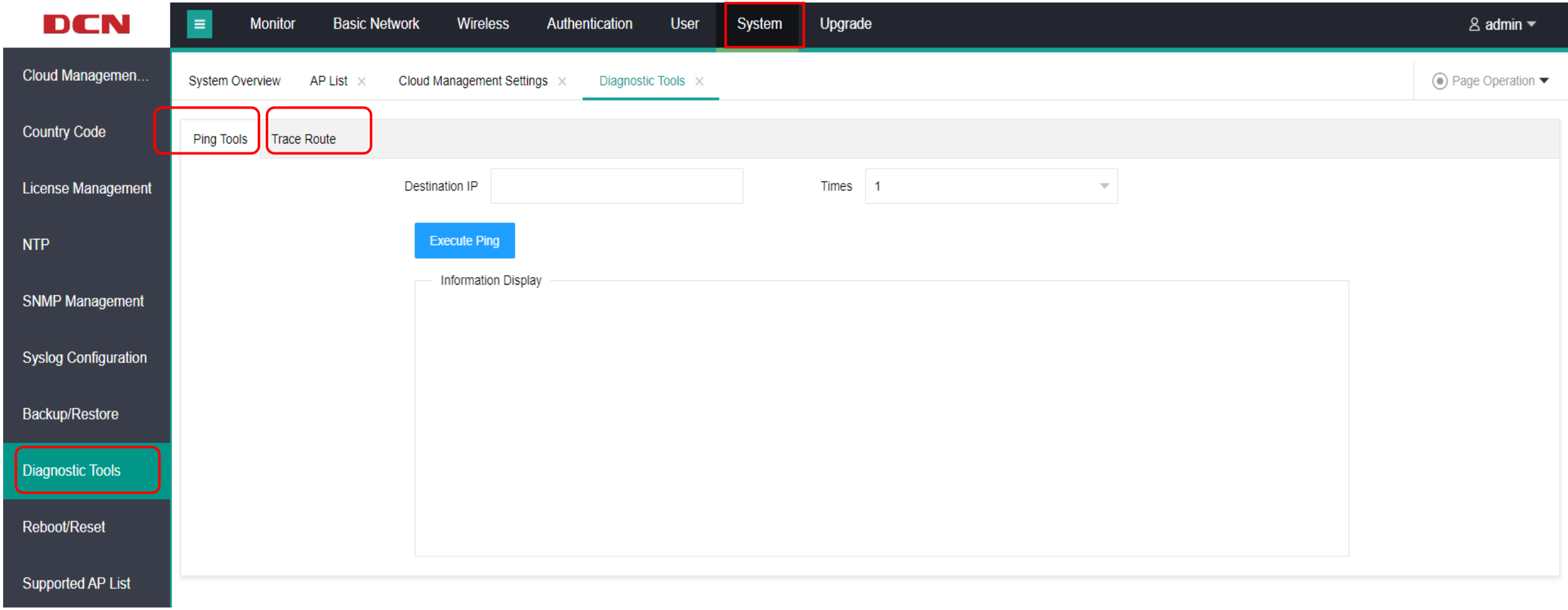
- Check whether the vendor file of AC contains the device-type of AP.
- Check whether the mode of AP is FIT.

Check configuration and debug info

- Check whether the relevant commands and services are normal in the CLI of AC.
- Configure the relevant debug command in the CLI of AC for analysis and judgment.

What to check if all APs are not online

Check IP connection on AC web



What to check if all APs are not online

```
DCWS-6028#ping ?
  A.B.C.D   Destination ipv4 address
  ethernet  Ethernet
  host      Ping destination hostname <1-64>
character
  src       Use ipv4 source address option
  vrf       VPN Routing/Forwarding instance
  <cr>
```

```
DCWS-6028#traceroute ?
  A.B.C.D   Trace route to destination address
  ethernet  Ethernet
  host      Trace route to destination hostname
  source    Use ipv4 source address option
  vrf       VPN Routing/Forwarding instance
```

What to check if all APs are not online - AC CLI

DCWS-6028#show wireless

Administrative Mode..... Enable
Operational Status..... Enabled
WS IP Address..... 10.10.10.2
WS IPv6 Address..... -----
WS Auto IP Assign Mode ..... Disable
WS Switch Static IP 10.10.10.2
WS Switch Static IPv6 ..... -----
AP Authentication Mode..... None
AP Auto Upgrade Mode..... Disable
AP Independent Auto Upgrade Mode..... Disable
AP Validation Method..... Local

What to check if all APs are not online - AP CLI

```
admin@Dcn:~# sh


BusyBox v1.30.1 () built-in shell (ash)

admin@Dcn:~# cd /tmp/
admin@Dcn:/tmp# touch consoleredirect
admin@Dcn:/tmp# ubus call mapd
show_disc_info
mapd show disc info.
static sw ip num = 1.
static sw ip[0] = 192.168.1.254
provision ip primary ipv4 = 192.168.1.254
dhcp sw ip num = 1.
dhcp sw ip[0] = 10.10.10.2
dhcpv6 sw ip num = 0.
ac_domain: www.acaddr.com
dns sw ip[0] = 0.0.0.0
dns sw ip[1] = 0.0.0.0
dns sw ip[2] = 0.0.0.0
dns sw ip[3] = 0.0.0.0
```

If you login CLI of AP with telnet, you need to redirect the debugging information to the telnet terminal.

What to check if all APs are not online – AC CLI

- Default Configuration: The debug command is off by default.
- Use relevant debug command:
  - Can only operate in the CLI of AC;
  - If you log in to AC through Telnet, you need to add command "AC#terminal monitor".

```
DCWS-6028#debug wireless discovery detail
                detail WD_LEVEL_DISC_INFO debug is on
DCWS-6028#
DCWS-6028#debug wireless discovery packet all
                packet WD_LEVEL_DISCOVERY_IP_TX debug is on
                packet WD_LEVEL_DISCOVERY_L2_TX debug is on
                packet WD_LEVEL_INITIAL_ID_TX debug is on
                packet WD_LEVEL_DISCOVERY_IP_RX debug is on
                packet WD_LEVEL_DISCOVERY_L2_RX debug is on
                packet WD_LEVEL_INITIAL_ID_RX debug is on
```

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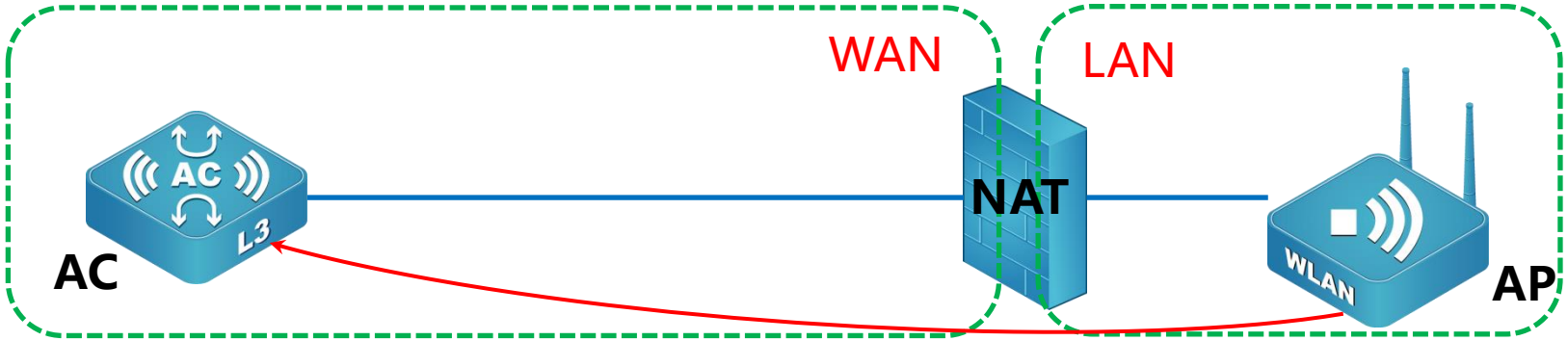
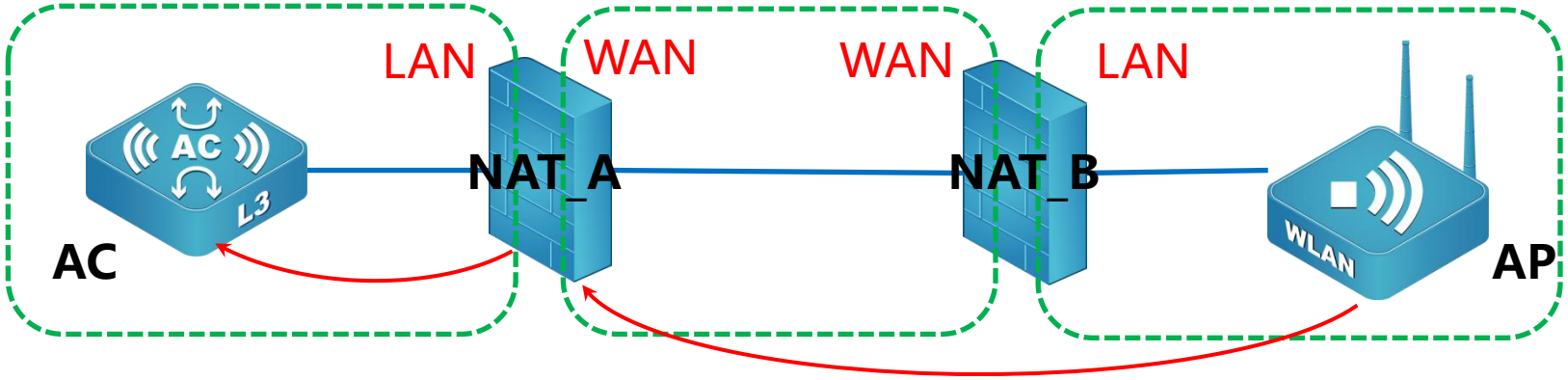
Traversing NAT scenario analysis – AP online process



Destination address: AC
Destination port: UDP 57776、TCP 57777

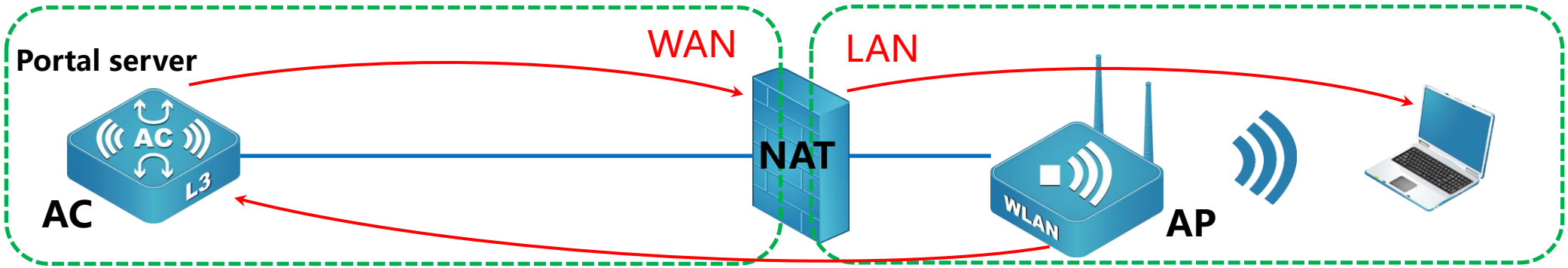
AC is located on WAN side of NAT device. Although AP is on LAN side , AP can directly access AC, so no special configuration is required on NAT device for AP going online.



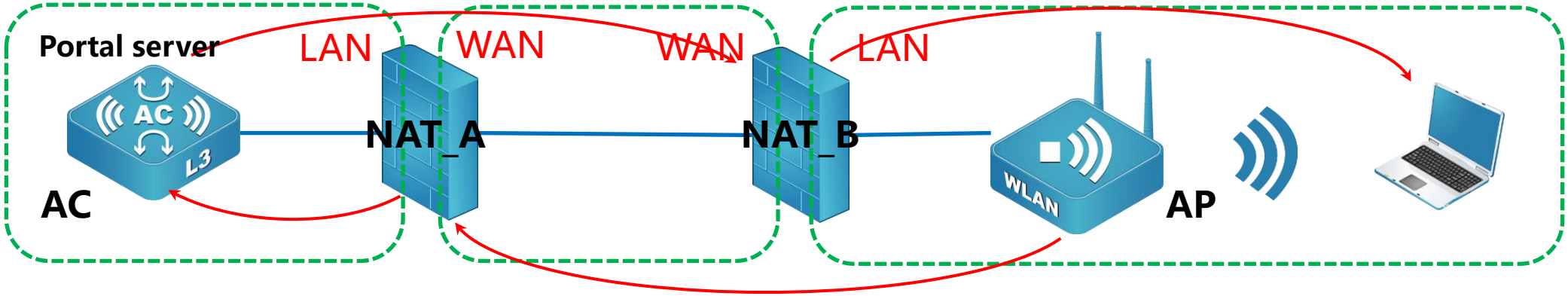
Destination address: NAT_A
Destination port: UDP 57776、TCP 57777

When the AC is on the LAN side of the NAT device, the discovery message sent by the AP needs to be forwarded to reach the AC. Therefore, port mapping rules need to be configured on NAT_A to forward UDP message arriving at NAT_A with destination port number 57776 and TCP message with destination port number 57777 to AC.

Traversing NAT scenario analysis – AC Redirect portal page

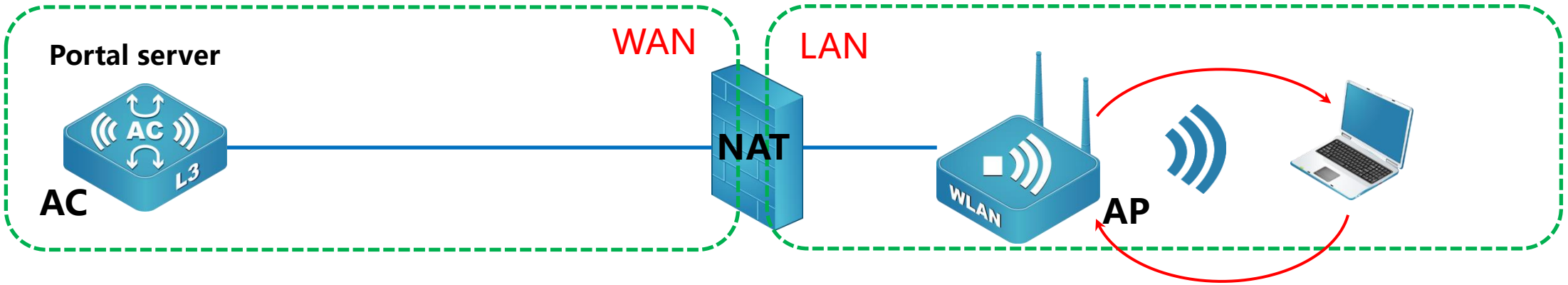


Destination address: AC
Destination port: TCP 53725、TCP 53726、TCP 8800、TCP 8443

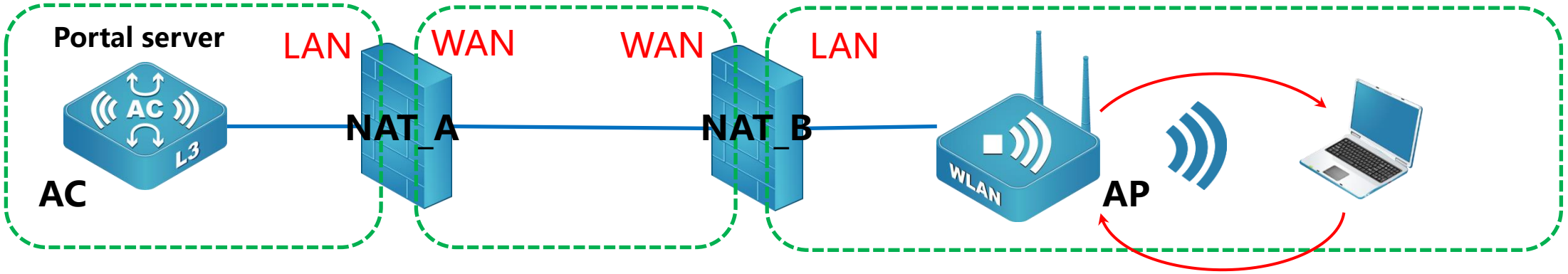


Destination address: NAT_A
Destination port: TCP 53725、TCP 53726 、TCP 8800、TCP 8443

Traversing NAT scenario analysis – AP Redirect portal page



Destination address: AC
Destination port: TCP 8800、TCP 8443



Destination address: NAT_A
Destination port: TCP 8800、TCP 8443

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How to check BSSID from the same AP

Report from Wi-Fi scanning software:

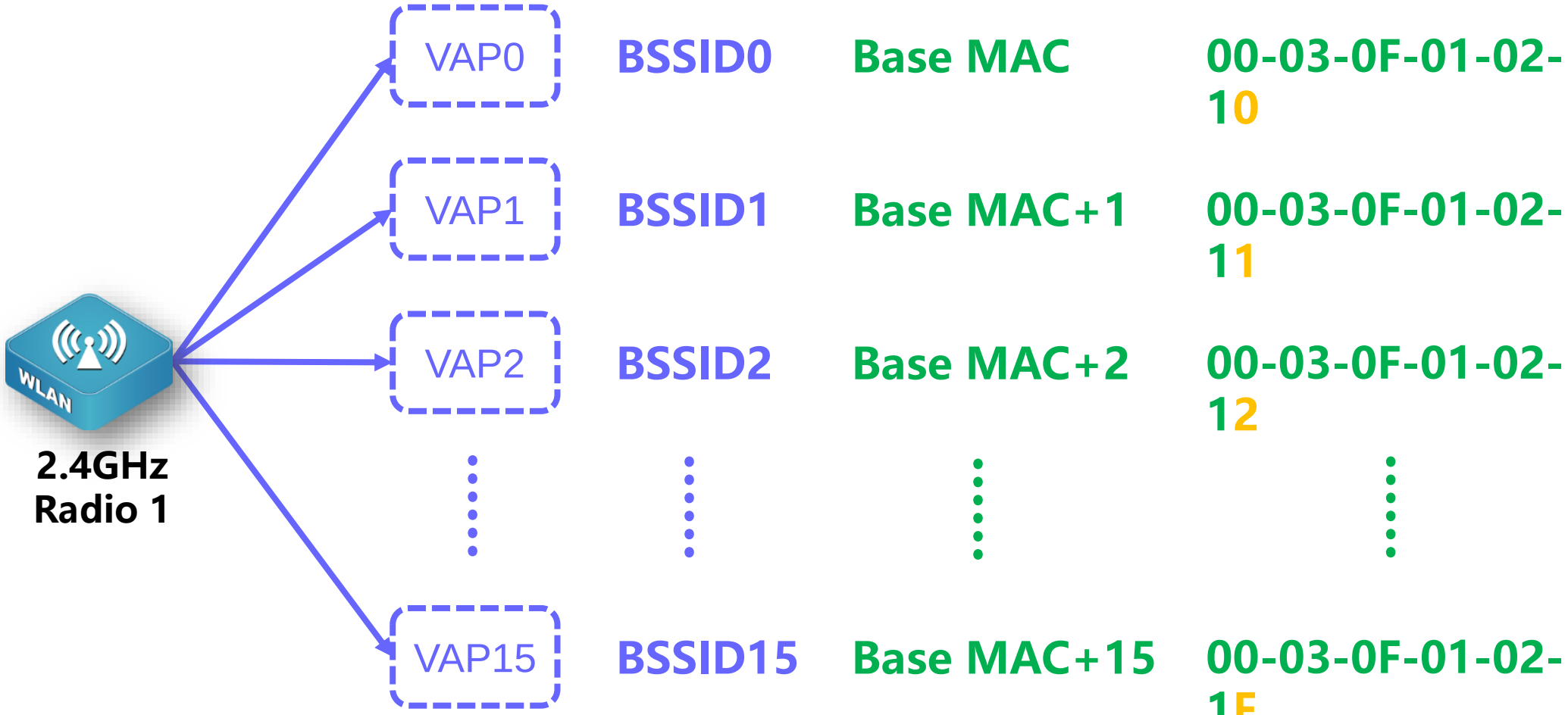
SSID	MAC Address	RSSI	Chan	Max Speed	WEP	WPA	WPA2	WPA3	WPS	Vendor
Yunke_WLAN	00:03:0F:83:DA:81	-50	36+44	866.7 Mbps		PSK-(TKIP|CCMP)	PSK-(TKIP|CCMP)			Digital China (Shanghai) Networl
DCN	00:03:0F:83:DA:80	-50	36+44	866.7 Mbps	Open					Digital China (Shanghai) Networl
DCN_WLAN	00:03:0F:DA:6C:C0	-19	11	286.8 Mbps	Open					Digital China (Shanghai) Networl
60	00:03:0F:83:D3:12	-74	6	144.4 Mbps	Open					Digital China (Shanghai) Networl
Yunke_WLAN	00:03:0F:83:D3:11	-71	6	144.4 Mbps		PSK-(TKIP|CCMP)	PSK-(TKIP|CCMP)			Digital China (Shanghai) Networl
DCN	00:03:0F:83:D3:10	-65	6	144.4 Mbps	Open					Digital China (Shanghai) Networl
DCN_WLAN	00:03:0F:DA:6C:D0	-37	149+153	1201 Mbps	Open					Digital China (Shanghai) Networl
Yunke_WLAN	00:03:0F:83:D3:21	-73	36+44	866.7 Mbps		PSK-(TKIP|CCMP)	PSK-(TKIP|CCMP)			Digital China (Shanghai) Networl
DCN	00:03:0F:83:D3:20	-74	36+44	866.7 Mbps	Open					Digital China (Shanghai) Networl
60	00:03:0F:78:B4:82	-50	6	144.4 Mbps	Open					Digital China (Shanghai) Networl
Yunke_WLAN	00:03:0F:78:B4:81	-48	6	144.4 Mbps		PSK-(TKIP|CCMP)	PSK-(TKIP|CCMP)			Digital China (Shanghai) Networl
DCN	00:03:0F:78:B4:80	-50	6	144.4 Mbps	Open					Digital China (Shanghai) Networl
60	00:03:0F:83:E4:B2	-22	1	144.4 Mbps	Open					Digital China (Shanghai) Networl
Yunke_WLAN	00:03:0F:83:E4:B1	-21	1	144.4 Mbps		PSK-(TKIP|CCMP)	PSK-(TKIP|CCMP)			Digital China (Shanghai) Networl
DCN	00:03:0F:83:E4:B0	-26	1	144.4 Mbps	Open					Digital China (Shanghai) Networl

ESSID

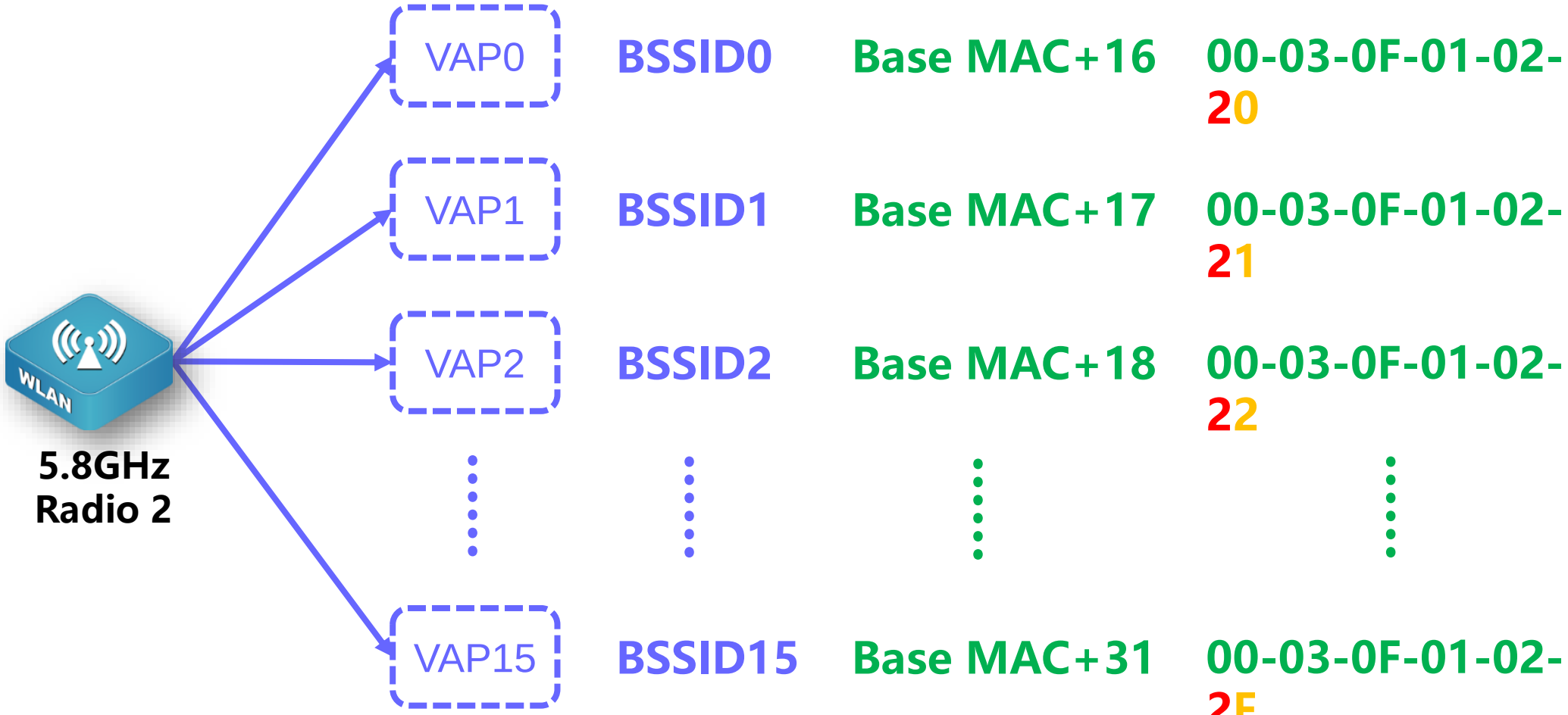
BSSID

They are BSSIDs generated by the same AP.
The MAC address of this AP is 00-03-0F-DA-6C-C0.

How to check BSSID from the same AP



How to check BSSID from the same AP



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