

A blue-tinted photograph of a business meeting in a modern office. Several people are gathered around a table, looking at a laptop. Large windows in the background show a cityscape. The overall mood is professional and collaborative.

# 新北市K12 智慧教室無線網路系統




報告人：翁浚豪 Arian Wong / 王宸緯 Chuck Wang  
2020/9/1

# 1. 整體服務規劃

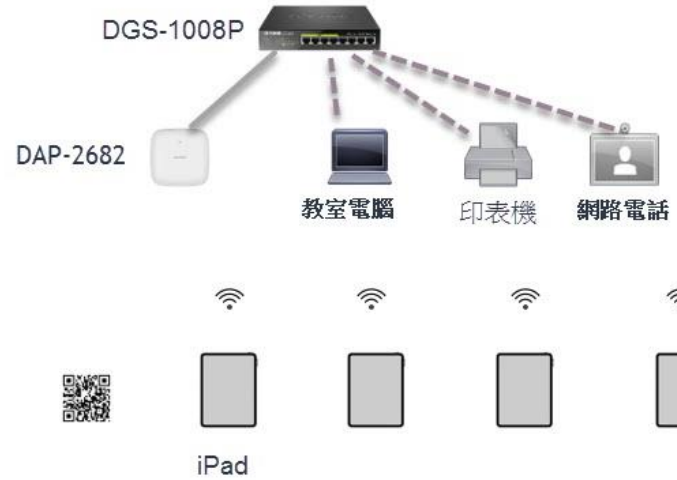
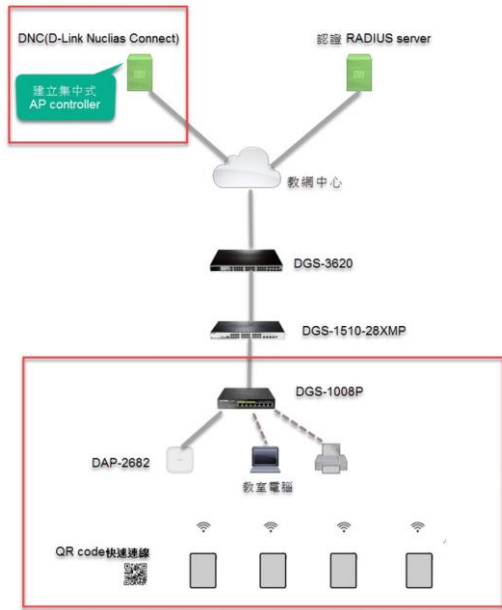
打造數位校園(Smart Campus)，達成前瞻計畫KPI

- ◆ 100%教室wifi 完整含蓋率
- ◆ 即時監測和管控，縮短障礙排除時間
- ◆ 達成各項關鍵量化指標(KPI)

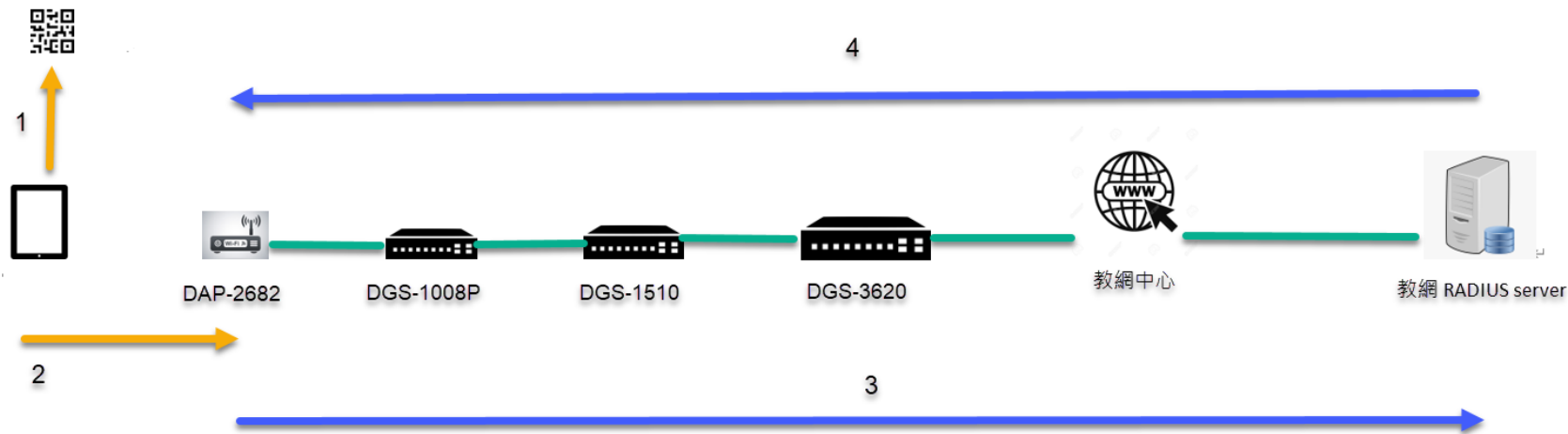
國民中小學校園數位建設實施計畫量化目標(KPI)

項目	達成率
教室具有Cat.5e以上線路及Gigabit Ethernet埠以上之比例	100% 
校園教室具備順暢接收寬頻無線網路環境之比例	100% 
支援基礎邊際運算資料存取(edge computing)環境	100% 





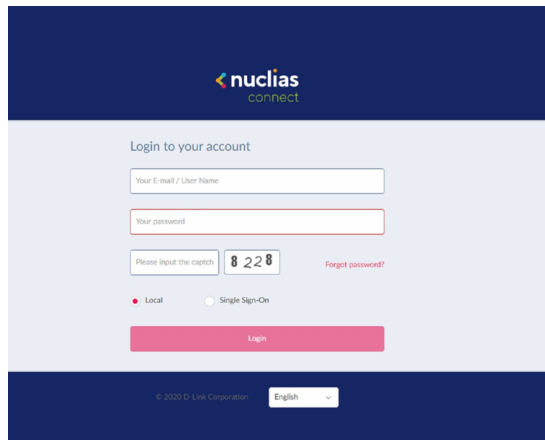
## 1.1 整體無線網路架構規劃



## 1.2 智慧教室無線網路認證流程

流程說明如下：

- Step1: 平板電腦掃描QR code後自動導引SSID資訊儲存並連線
- Step2: 平板電腦與智慧教室專屬無線基地台(DAP-2682)連線後進行MAC認證
- Step3: 無線基地台傳送 client MAC資訊給傳教網中心Radius Server進行MAC驗證
- Step4: Radius Server若已有平板電腦的MAC資訊記錄，Radius Server即會通知AP對此平板電腦放行通過驗證程序，反之就是阻檔
- Step5: 認證成功後, 平板電腦即可連網進行數位教學學習



## 2.無線網路系統三元件

## 2.1 無線網路基地台(AP) 相關規格

廠牌/型號:D-Link DAP-2682

- ❑ AC Wave 2技術提供無線傳輸速率高達**1732Mbps+600Mbps**
- ❑ 內建式全向型天線**(2.4GHz 4x4+5GHz 4x4)**
- ❑ 1個 802.3 af/at PoE Giga LAN Port + 1個 Giga LAN Port
- ❑ 可同步使用2.4和5GHz頻段、最大輸出功率可達**28dBm**
- ❑ 具備WEP 64/128-bit、WPA/WPA2 AES/TKIP等無線安全加密機制
- ❑ 向下相容於802.11a/b/g/n無線網路並支援**MU-MIMO**、**Airtime Fairness**、**Fast Roaming**、**Band Steering**多項無線網路優化功能
- ❑ 支援多達16個Multi-SSID





Login to your account

Your E-mail / User Name

Your password

Please input the captch

8 228

[Forgot password?](#)

Local

Single Sign-On

Login

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English

# 2.2DNC(D-Link Nuclias Connect) 無線網路管理 系統

具備階層式無線管理(Multi-Tenancy)  
功能



支援繁體  
中文介面



主面板

監看

無線AP

無線用戶

設定

報告

Log

系統

選擇...

昌福國民小學

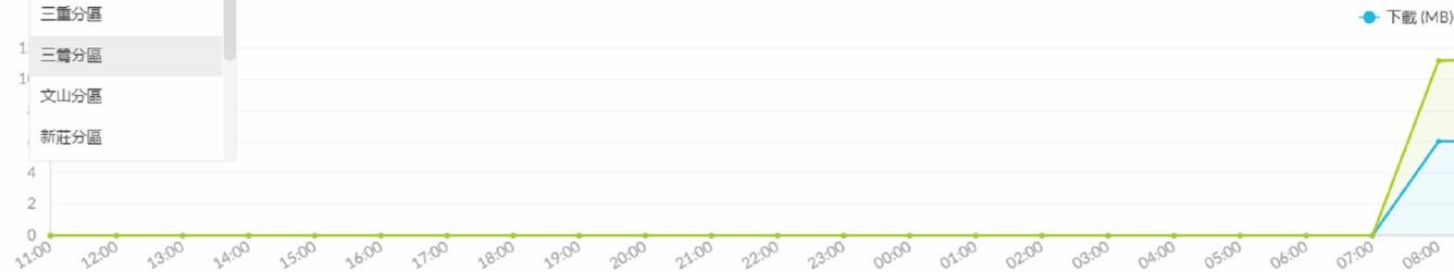
所有網路



總共: 2/2 無線AP

- All Areas
- 總 七星分區
- 三畫分區
- 1 三畫分區
- 1 文山分區
- 新莊分區

總 10.40 MB



無線AP

查看離線AP列表

查詢類型

近端IP位址

搜索「關鍵字」

No. ...	狀態	動作	近端IP位址	MAC位址	型號	地點	網路	無線用戶	2.4G頻道	第一個5G頻道
1	<span style="color: green;">●</span>		10.228.6.230	c4:e9:0a:27:bc:10	DAP-2682	三樓智慧教室	昌福智慧教室	2	n/a	149
2	<span style="color: green;">●</span>		10.228.6.231	c4:e9:0a:27:bb:90	DAP-2682	英語教室4	昌福智慧教室2	0	n/a	44



主面板

監看

- 無線AP
- 無線用戶

設定

報告

Log

系統

三層分區



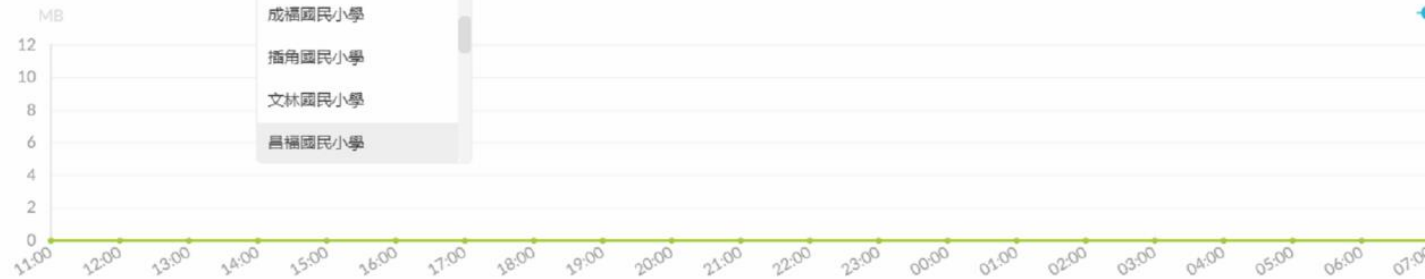
選擇...

所有網路



總共: 2/2 無線AP

總共下載: 12.07 MB 總共上傳: 1



無線AP

查看離線AP列表

查詢類型

近端IP位址

搜尋

No. ...	狀態	動作	近端IP位址	MAC位址	型號	地點	網路	無線用戶	2.4G頻道	第一個5G
1	<span style="color: green;">●</span>		10.228.6.230	c4:e9:0a:27:bc:10	DAP-2682	三樓智慧教室	昌福智慧教室	2	n/a	149
2	<span style="color: green;">●</span>		10.228.6.231	c4:e9:0a:27:bb:90	DAP-2682	英語教室4	昌福智慧教室2	0	n/a	44



2.3智慧教室8埠  
Gigabit，1~4埠  
PoE乙太網路供  
電交換器(創意  
回饋)

DGS-1008P

# 3. 智慧教室無線網路使用方式



1. 學校智慧教室都有一個SSID使用QR code做對應，老師預先將QR code列印出來，學生在教室要使用教學載具的時候再拿出來掃描上網



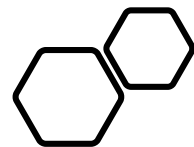
2. 學生使用平板掃描QR code作上網認證





## 4.無線網路系統施工原則

- AP佈建的特定教室,教室內一定需提供網點及電源插座
- 本施工團隊將會提供一條最長5米網路線介接DGS-1008P與DAP-2682
- 另提供一條最長1米網路線介接原教室網點與DGS-1008P
- 為使智慧教室AP連線穩定及獨立性,無線基地台僅提供WiFi 5G連線並隱藏SSID(smart\_room 、 smart\_room2...)



## 5.完工示意圖



## 6.各校須注意及配合事項

- ❑ 置放AP的教室必須提供一個網點，並確認此網點是正常可以連線上網。
- ❑ 教室的網點是接到學校的L2 交換器，此網點的設定需帶有 VLAN 3 & VLAN34 tag 的設定。
- ❑ 大屏電視跟 POE switch 都需要電源供應, 安裝位置附近必須有電源插座可以供應電源。
- ❑ MAC認證→登入ACOM 白名單。

# Training material



December 15, 2020



# Overview

## Lesson 1

How to login controller by SSO

## Lesson 2

How to setup MAC authentication

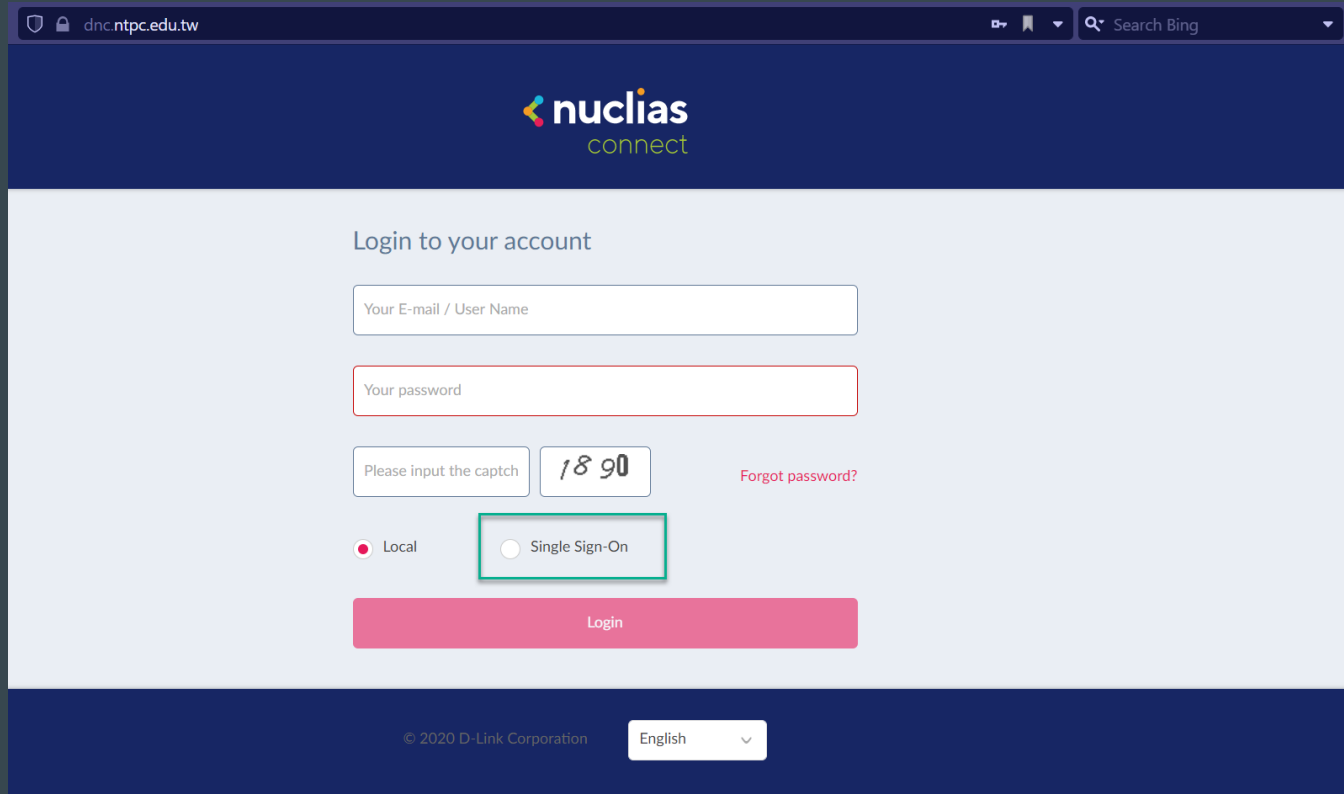
## Lesson 3

How to know client information

# How to login controller by SSO

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Login controller system by <https://dnc.ntpc.edu.tw>



The image shows a web browser window displaying the login page for 'nuclias connect'. The browser's address bar shows 'dnc.ntpc.edu.tw'. The page has a dark blue header with the 'nuclias connect' logo. Below the header, the main content area is light blue and contains the text 'Login to your account'. There are three input fields: 'Your E-mail / User Name', 'Your password', and a captcha field with the text 'Please input the captch' and a box containing '18 90'. To the right of the captcha is a link for 'Forgot password?'. Below the input fields are two radio buttons: 'Local' (selected) and 'Single Sign-On' (highlighted with a green box). At the bottom of the form is a pink 'Login' button. The footer of the page is dark blue and contains the copyright notice '© 2020 D-Link Corporation' and a language dropdown menu set to 'English'.

nuclias  
connect

Login to your account

Your E-mail / User Name

Your password

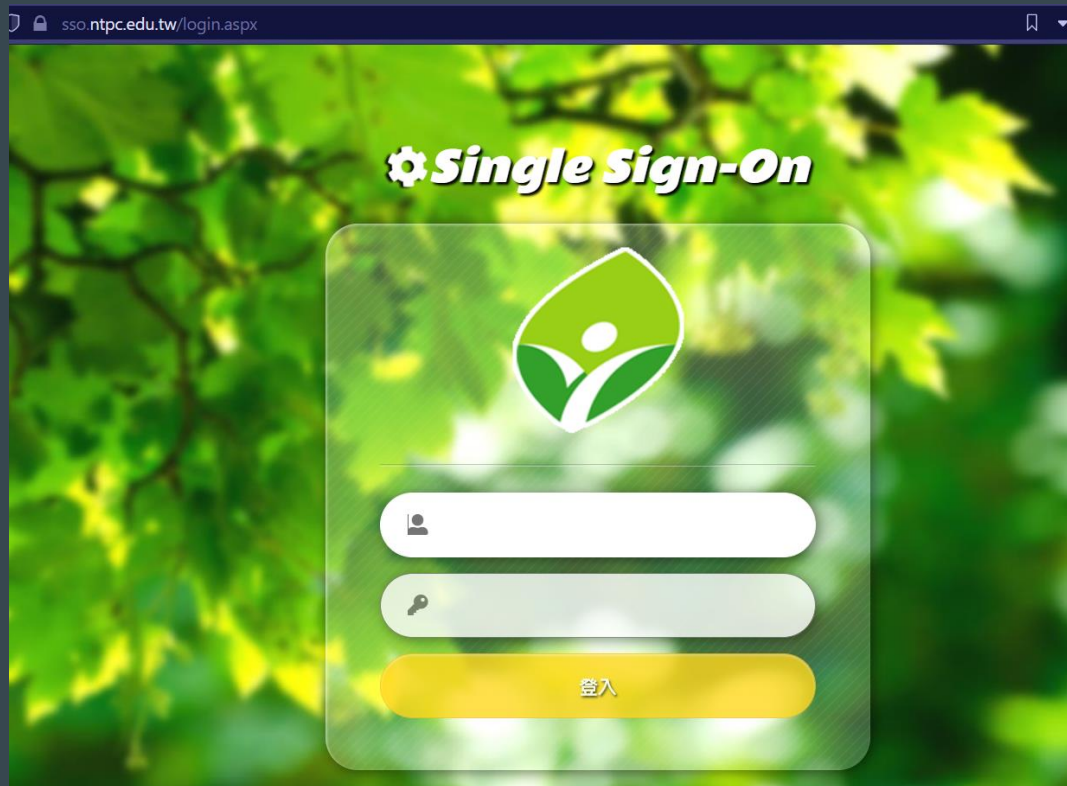
Please input the captch 18 90 [Forgot password?](#)

Local  Single Sign-On

Login

© 2020 D-Link Corporation English

You can use your SSO account to login controller system



# How to know client information

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# Dashboard information



# Monitor > AP

You can monitor your AP status at this page. Example, MAC, Firmware, Location, IP and client.

The screenshot shows the Nuclias Connect web interface for NTPC (新北市資訊業務入口網). The interface is divided into a sidebar and a main content area.

**Sidebar:**

- Dashboard
- Monitor** (selected)
- Access Point
- Wireless Client
- Configuration
- Report
- Log
- System

**Main Content Area:**

- Navigation: 板橋分區, 中山國民中學, All Networks
- Total: 1/2 Access Points
- Total Download: 260.32 MB, Total Upload: 103.42 MB
- Line Graph: Shows Download (MB) and Upload (MB) over time. The x-axis ranges from 16:00 to 15:00. The y-axis ranges from 0 to 60 MB. Both Download and Upload traffic start at 07:00, peak around 09:00-12:00, and drop to 0 by 15:00.
- Access Points: View Offline APs
- Search: Search By Local IP Address, Search 'Keyword'
- Table:

No. ...	Status	Action	Local IP Address	MAC Address	Model Type	FW Version	Location	Network	Client
1	<span style="color: green;">●</span>		10.228.95.230	c4:e9:0a:27:c1:a0	DAP-2682	v1.00B06r028	六樓	中山智慧教室	36

# Monitor > Wireless client

You can monitor client status at this page. Example, MAC, IP and channel.

The screenshot shows the 'nuclias connect' web interface. The left sidebar contains navigation options: Dashboard, Monitor (selected), Access Point, Wireless Client, Configuration, Report, Log, and System. The main content area is titled 'Connected Clients' and shows a total of 36 connected clients. The interface includes filters for 'Board Area' (板橋分區), 'School' (中山國民中學), 'All Networks', and 'All Clients'. A search bar is set to 'Search By MAC Address' with a search input field. Below the filters is a table of client data:

No.	Action	Network	IP Address	MAC Address	Auth Type	Channel	RSSI (dBm)	SNR (dB)	Bandwidth
1		中山智慧教室	10.217.95.16	18:7e:b9:70:59:96	Disabled	36	-70	25	5GHz 1
2		中山智慧教室	10.217.95.20	18:7e:b9:70:4f:c5	Disabled	36	-68	27	5GHz 1
3		中山智慧教室	10.217.95.21	18:7e:b9:6b:79:29	Disabled	36	-72	23	5GHz 1
4		中山智慧教室	10.217.95.22	18:7e:b9:6f:72:2c	Disabled	36	-72	23	5GHz 1
5		中山智慧教室	10.217.95.25	18:7e:b9:6b:45:cc	Disabled	36	-72	23	5GHz 1

At the bottom of the table, there is a pagination control showing '1 - 20 of 36 total Items: 36' and a dropdown menu for 'items per page' set to '20'. A red box highlights the three-dot menu icon in the rightmost column of the table.



# How to setup MAC authentication

---

# Native to profile setting > school name > SSID

## Click action button

The screenshot shows the nuclias connect web interface. The left sidebar contains a navigation menu with the following items: Dashboard, Monitor, Configuration (expanded), Report, Log, and System. Under Configuration, the following items are listed: Create Profile, Profile Settings (highlighted with a red box), Firmware Upgrade, SSL Certificate, and Payment Gateway. The main content area shows the breadcrumb path: Profile > 三重分區 > 三光國民小學 > 三光小智慧教室2 > SSID. The left sidebar of the main content area lists various settings: Profile, 七星分區, 三重分區, 三光國民小學, 三光小智慧教... (highlighted with a red box), SSID (highlighted with a red box), VLAN, Bandwidth Op..., RF Optimization, Schedule, Device Settings, Performance, WLAN Partition, Wireless Resou..., and 三光智慧教室. The main content area displays a table of SSID configurations with the following columns: Index, Band, SSID, Security, Access Control, User Authentica., and Action. The table contains three rows of data, each with an edit icon in the Action column (the middle icon is highlighted with a red box). Below the table, there are sections for Security and Wireless Settings.

nuclias connect

新北市資訊業務入口網 NTPC

Dashboard

Monitor

Configuration

- Create Profile
- Profile Settings
- Firmware Upgrade
- SSL Certificate
- Payment Gateway

Report

Log

System

Profile

Profile > 三重分區 > 三光國民小學 > 三光小智慧教室2 > SSID

七星分區

三重分區

三光國民小學

三光小智慧教...

SSID

VLAN

Bandwidth Op...

RF Optimization

Schedule

Device Settings

Performance

WLAN Partition

Wireless Resou...

三光智慧教室

Index	Band	SSID	Security	Access Control	User Authentica.	Action
Primary	2.4GHz	smart_room2	Open System	Disabled	Disabled	
Primary	5GHz 1	smart_room2	Open System	Disabled	Disabled	
Primary	5GHz 2 (Tri-Band)	smart_room2	Open System	Disabled	Disabled	

Security

Wireless Settings

# Security type choose "MAC RADIUS" RADIUS server IP and secret key as below.

The screenshot displays the NTPC (New Taipei City Network Management Platform) web interface. The breadcrumb navigation shows the path: Profile > 三重分區 > 三光國民小學 > 三光小智慧教室2 > SSID. The left sidebar contains a menu with items like 七星分區, 三重分區, 三光國民小學, 三光小智慧教室..., SSID (highlighted), VLAN, Bandwidth Op..., RF Optimization, Schedule, Device Settings, Performance, WLAN Partition, and Wireless Resou... The main configuration area for the SSID 'smart\_room2' includes the following settings:

- Band: 5GHz 1
- Index: Primary
- SSID: smart\_room2
- Character Set: UTF-8
- SSID Broadcast: Enabled
- WMM (Wi-Fi Multimedia): Enabled
- Security: MAC RADIUS (highlighted with a red box)
- Fast Roaming (802.11 k/v/r): Disabled (with a note: "This feature is only available on the compatible models and specific firmware version.")

Under the "Security Settings" section, the "Primary RADIUS Server Settings" are configured as follows:

- RADIUS Server\*: 203.72.154.101
- Port\*: 1812
- RADIUS Secret\*: acomntpcwifi (with a toggle to show/hide the secret)

Below this, there is a section for "Backup RADIUS Server Settings(optional)".

Click “save” button.

Profile

Profile > 三重分區 > 三光國民小學 > 三光小智慧教室2 > SSID

七星分區

三重分區

三光國民小學

三光小智慧教...

SSID

VLAN

Bandwidth Op...

RF Optimization

Schedule

Device Settings

Performance

WLAN Partition

Wireless Resou...

三光智慧教室

OSU Service Description

OSU Icon Language Code

OSU Icon File Path

OSU Icon File Name

OSU Icon Width \*

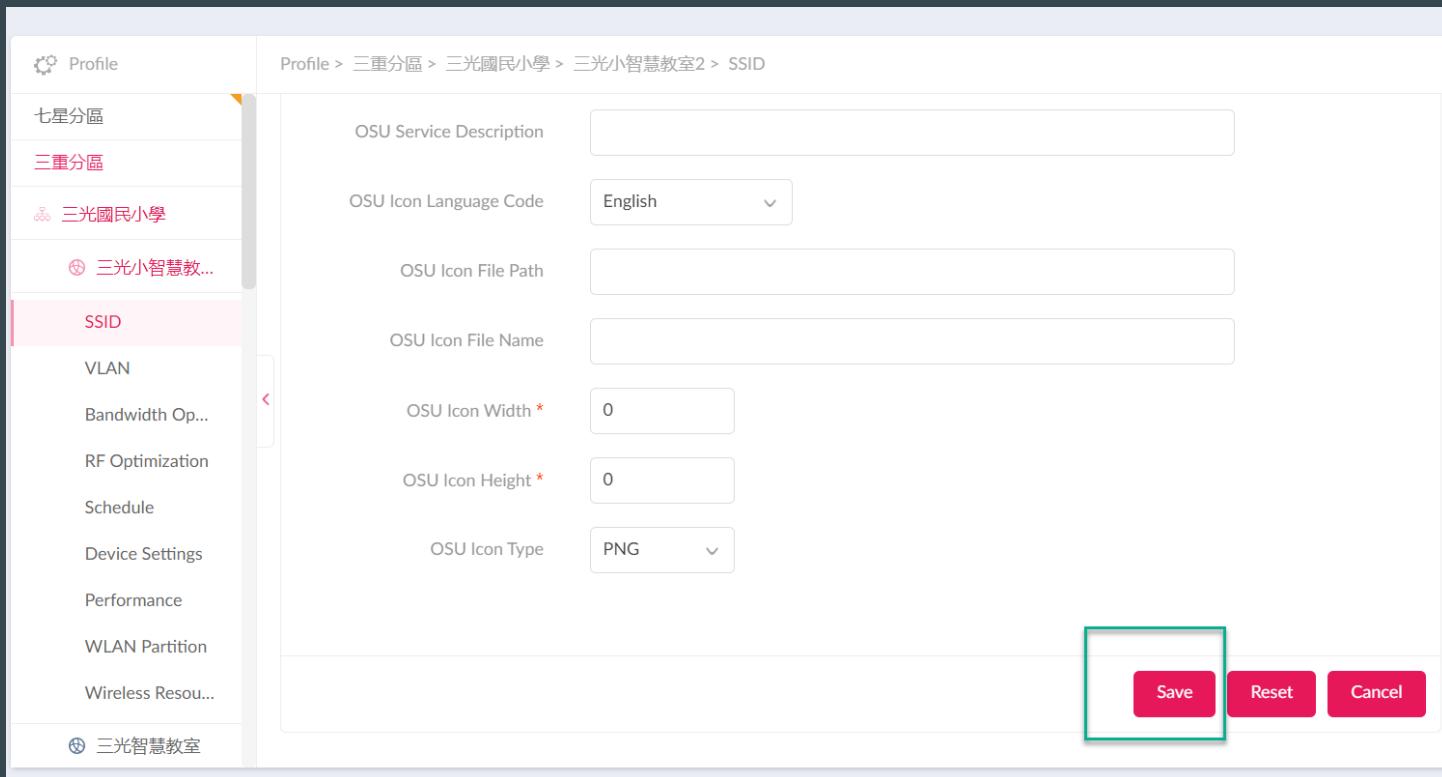
OSU Icon Height \*

OSU Icon Type

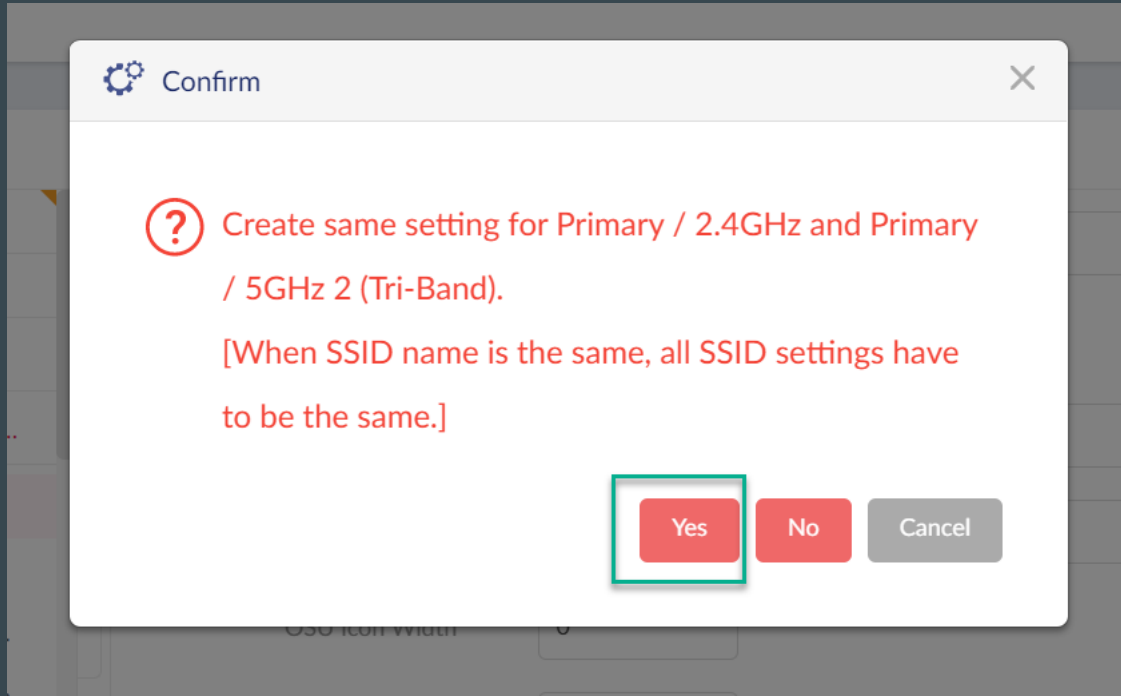
Save

Reset

Cancel

The image shows a web-based configuration interface for an SSID. On the left is a vertical navigation menu with various settings categories. The main area contains several form fields for configuring the SSID, including text boxes for service description and file paths, dropdown menus for language and icon type, and numeric input fields for icon width and height. At the bottom right, there are three buttons: 'Save', 'Reset', and 'Cancel'. The 'Save' button is highlighted with a red rectangular box.

Click “yes” button.  
It means apply same config to all SSID.



Final step, click “apply” button. We need to apply config to AP.

The screenshot displays a web-based network management interface. On the left is a navigation sidebar with a tree structure. The breadcrumb at the top reads: Profile > 三重分區 > 三光國民小學 > 三光小智慧教室2. The main content area is titled 'Upload Configuration' and contains a 'Time Start' dropdown menu set to 'Immediate'. Below this, there are two buttons: a red 'Apply' button and a grey 'Clear' button. The 'Apply' button is highlighted with a red rectangular box. Underneath the 'Upload Configuration' section is a 'Run Status' section, which shows 'Apply Status' as '0/0' and a table with columns for 'Run Time', 'Name', 'IP Address', 'MAC Address', and 'Model Type ...'. The 'Apply' button is also highlighted with a red rectangular box.

Profile > 三重分區 > 三光國民小學 > 三光小智慧教室2

Profile

- 七星分區
- 三重分區
- 三光國民小學
  - 三光小智慧教...
  - SSID
  - VLAN
  - Bandwidth Op...
  - RF Optimization
  - Schedule
  - Device Settings
  - Performance
  - WLAN Partition
  - Wireless Resou...

Upload Configuration

Time Start: Immediate

Apply Clear

Run Status

Apply Status: 0/0

Results

Run Time	Name	IP Address	MAC Address	Model Type ...
----------	------	------------	-------------	----------------

Check security type, you can see security type change to “MAC RADIUS”.

The screenshot shows a network management interface. On the left is a sidebar menu with the following items: Profile, 七星分區, 三重分區, 三光國民小學, 三光小智慧教..., SSID (highlighted), VLAN, Bandwidth Op..., RF Optimization, Schedule, Device Settings, and Performance. The main content area has a breadcrumb trail: Profile > 三重分區 > 三光國民小學 > 三光小智慧教室2 > SSID. Below the breadcrumb is a table with the following columns: Index, Band, SSID, Security, Access Control, User Authentica., and Action. The table contains three rows of data:

Index	Band	SSID	Security	Access Control	User Authentica.	Action
Primary	2.4GHz	smart_room2	MAC RADIUS	Disabled	Disabled	
Primary	5GHz 1	smart_room2	MAC RADIUS	Disabled	Disabled	
Primary	5GHz 2 (Tri-Band)	smart_room2	MAC RADIUS	Disabled	Disabled	

If you don't want to use MAC RADIUS, you can use WPA-Personal.

Profile > 三重分區 > 三光國民小學 > 三光小智慧教室2 > SSID

Band	2.4GHz	Index	Primary
SSID *	smart_room2	Character Set	UTF-8
SSID Broadcast	Enabled	WMM (Wi-Fi Multimedia)	Enabled
Security	Pick one...		
Fast Roaming (802.11 k/v/r)	Enhanced Open	is only available on the compatible models and specific firmware	
	Enhanced Open or Open		
Security Settings	WPA-Personal		
Primary RADIUS Server Setting	WPA-Enterprise		
RADIUS Server*	802.1X	Port*	1812
	MAC RADIUS		
RADIUS Secret*	.....		

Backup RADIUS Server Settings(optional)



SSID \*

smart\_room2

Character Set

UTF-8

SSID Broadcast

Enabled

WMM (Wi-Fi Multimedia)

Enabled

Security

WPA-Personal

Fast Roaming (802.11  
k/v/r)

Disabled

This feature is only available on the compatible models and specific firmware version.

### Security Settings

WPA Mode

Auto(WPA or WPA2)

Encryption Type

Auto

Passphrase



Group Key Update  
Interval

86400

# Q&A