校園網路管理基礎班
有線網路實作研習

網管輔導員:李 煒
alfred@ntpc.edu.tw
80723456-517

新北市教網

李煒 ALFRED LEE

- 新北市教育局網管輔導員
- 經歷
  - 石碇高中資訊學程教師
  - 中和國中數學老師
- 資格
  - ISO27001、BSI10012、ISO27701資安/個資--主導稽核員
  - TACCST資安技術檢核員
  - ISCB ISMS稽核員
  - ISCB PIMS觀察員
- 證照
  - CCNA、CCNP、NSE4、CHFI、NSPA
  - 資安網路架構、資安健檢職能證照

專案

- 校園網路設備採購案
  - Dlink3620、Dlink1510、DWC2000、AP6610、CISCO 2802i、WLC3504、LevelOne 5port、Cisco2960L
- 全市教育網路電路案
- 核心機房路由器、防火牆、LTM、WAF維運。
- 全市高國中小基礎網路維運、建置、更新
- 校園網路駐點人員管理
- 資訊安全相關設備維運

課程進行互動方式

- 若是操作Lab過程有疑問，請務必直接slido發問。
- 我們的Lab為漸進式，前後相關。因此要與同組一同討論。兩人做一個Lab也是ok。
- 課程中隨時slido問問題，有疑問就直接slido。

課程問題及時提問slido

slido

從以下位址加入：

slido.com

#205 985

網管組業務職掌

- 教育局所屬各級學校實體及無線網路規劃與建置。
- 新北市教育學術網路(TANet)骨幹及各級學校網路維運、監控、管理、分析與統計。
- 提供VPN、NLB等各項網路基礎服務。
- 集中式防火牆及不當入侵防禦系統規劃與管理。
- 各級學校集中式防毒軟體維運及管理。
- 教育網路中心內部網路環境管理。
- Siraya、PRTG建置設計

這門課程內容涵蓋那些網管知識？

- 電腦上網設定
  - tcp/ip網路概論
  - DNS基本原理
  - DHCP基本原理
- 交換器
  - 有線網路接線
  - 網路訊框frame基本概念
    - Broadcast
  - Vlan
    - Access、trunk、trunk native.
- 路由器
    - 閘道 Gateway (vlan interface)
    - 靜態路由原理
    - Dhcp forward
  - 無線網路
  - vpn基本原理
    - Tunnel mode
    - Splite Tunnel
  - 網路認證
    - radius基本原理
    - eduroam
  - 電腦及網路安全
    - KMS and 授權網站

課程安排

- 11/23 校園網路管理基礎
  - PC網路設定
  - PC基本網路設定及問題除錯
  - PRTG
  - 基礎服務介紹及實作：DNS、DHCP、VPN、Radius
  - L2 Switch基本介紹及運用實作
  - L2 switch Vlan原理及實作
- 11/29 校園網路管理進階班
  - L3 Switch Routing (ipv4 and ipv6)
  - 設備弱掃，找出自己架設校網伺服器的漏洞及弱點。
- 12/14校園無線網路管理實作
  - Wireless路由 (NTPC、NTPC-WPA2、NTPC-Mobile、class)
    - Acom認證實作
  - 繪製校園網路拓譜圖。
  - 架設及設定建置自己學校之校園網路實作。
  - 前瞻案CISCO WLC控制及設計一個符合校園的無線網路環境。
  - Case Study
- 歡迎資訊組長撥冗參加

個人PC網路設定

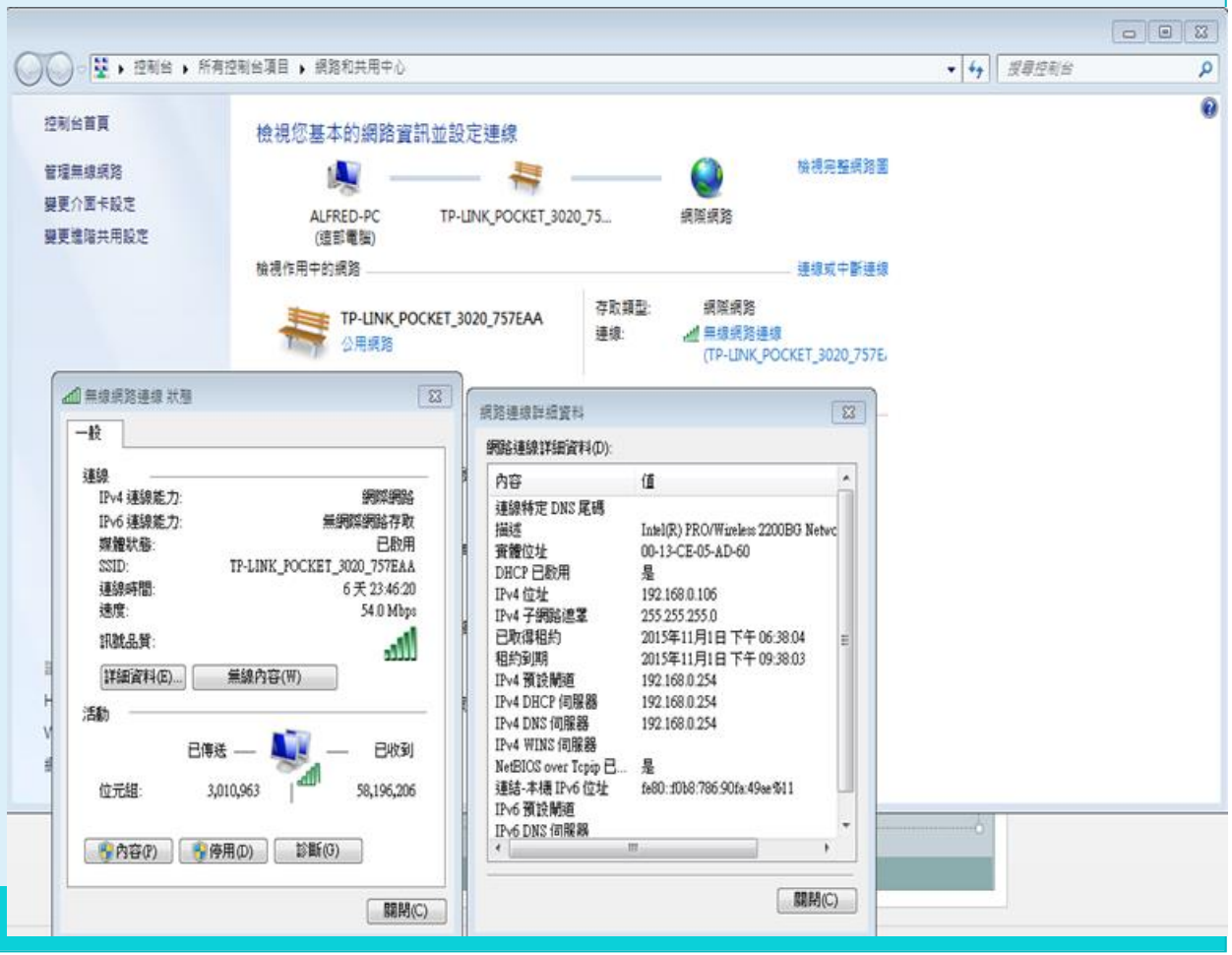
- 目的：了解PC網路設定
- IP 地址-IPv4 and IPv6
- 遮罩用途: 演算內外網判別。
- Gateway 用途， Gateway在哪裡??
- 常用指令
  - Ipconfig/all ipconfig/flushdns
  - Ping
  - nslookup
  - Tracert pathping
  - Route print

電腦開機程序及網頁開啟行為

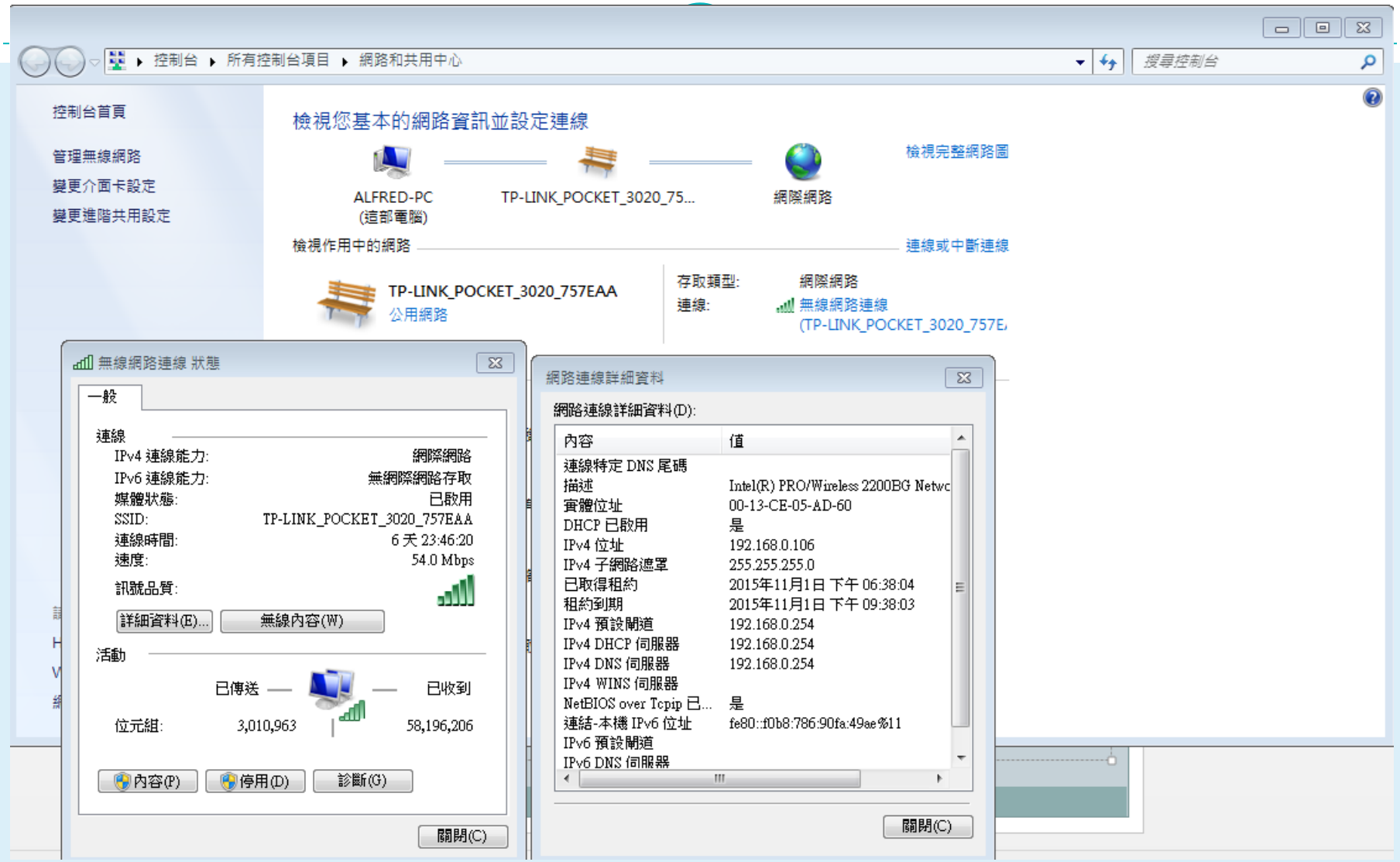
- 電腦開機程序
  - 找尋DHCP server
  - 從DHCP取得ip、netmask、gateway、dns
  - 自訂ip、netmask、gateway、dns
- 網頁開啟行為
  - 向DNS 詢問IP
  - 取得ip上網
  - PC->L 3 Switch GW->F/W->Core->DNS
  - PC->L 3 Switch GW->F/W->Core->NCCU

IP Address

- A.B.C.D 0-255
- NetMask 遮罩
- Gateway
- DNS
- DHCP
- Ipv6

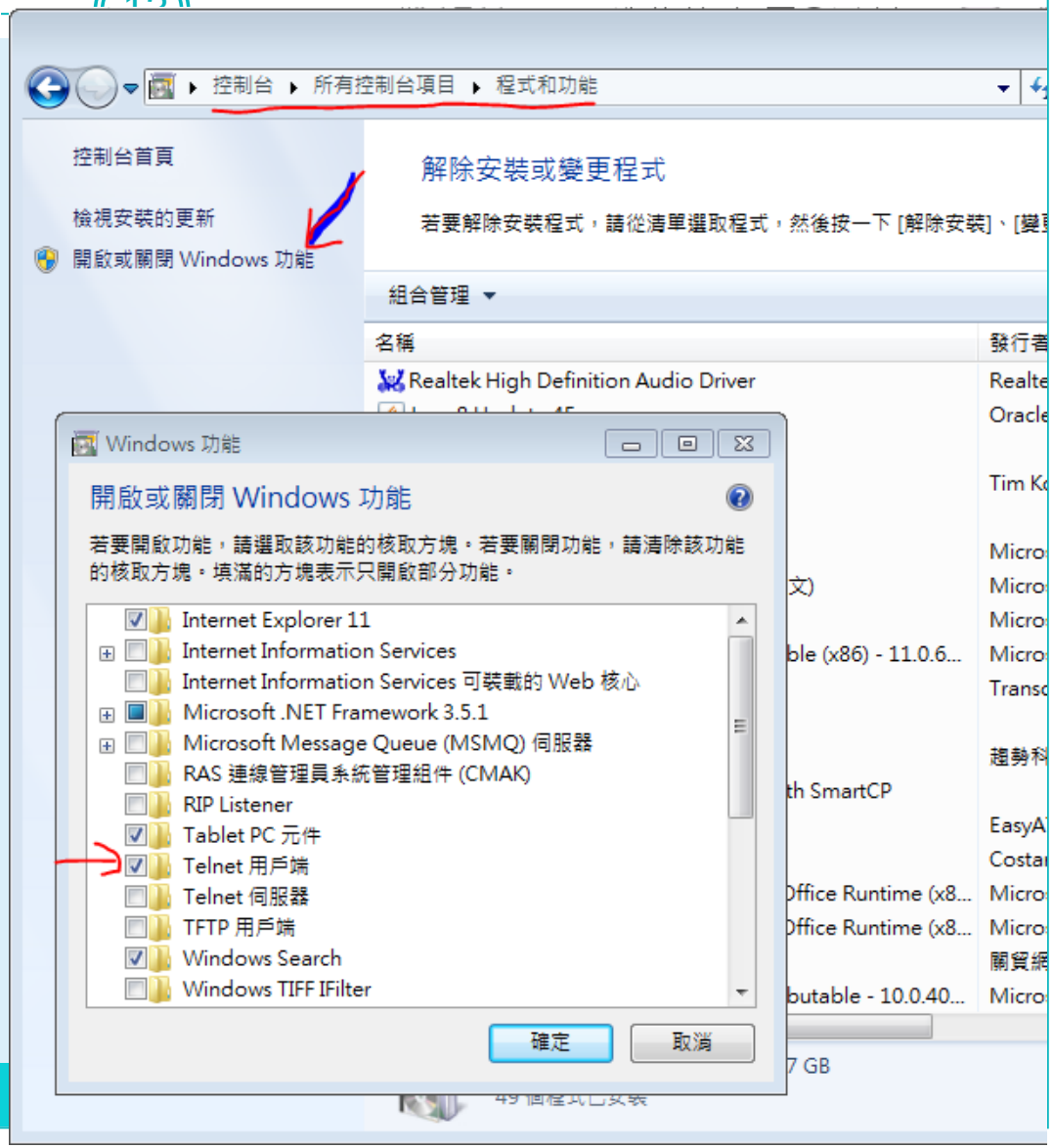


實體PC 網路設定


控制台 ▸ 所有控制台項目 ▸ 網路和共用中心
搜尋控制台
控制台首頁
管理無線網路
變更介面卡設定
變更進階共用設定
檢視您基本的網路資訊並設定連線
檢視完整網路圖
ALFRED-PC
(這部電腦)
TP-LINK_POCKET_3020_75...
網際網路
檢視作用中的網路
連線或中斷連線
TP-LINK_POCKET_3020_757EAA
公用網路
存取類型:
網際網路
連線:
無線網路連線
(TP-LINK_POCKET_3020_757E
無線網路連線 狀態
一般
連線
IPv4 連線能力:
網際網路
IPv6 連線能力:
無網際網路存取
媒體狀態:
已啟用
SSID:
TP-LINK_POCKET_3020_757EAA
連線時間:
6 天 23:46:20
速度:
54.0 Mbps
訊號品質:
詳細資料(E)...
無線內容(W)
活動
已傳送
已收到
位元組:
3,010,963
58,196,206
內容(P)
停用(D)
診斷(G)
關閉(C)
網路連線詳細資料
網路連線詳細資料(D):
內容
值
連線特定 DNS 尾碼
描述
Intel(R) PRO/Wireless 2200BG Netwc
實體位址
00-13-CE-05-AD-60
DHCP 已啟用
是
IPv4 位址
192.168.0.106
IPv4 子網路遮罩
255.255.255.0
已取得租約
2015年11月1日 下午 06:38:04
租約到期
2015年11月1日 下午 09:38:03
IPv4 預設閘道
192.168.0.254
IPv4 DHCP 伺服器
192.168.0.254
IPv4 DNS 伺服器
192.168.0.254
IPv4 WINS 伺服器
NetBIOS over Tcpip 已...
是
連結-本機 IPv6 位址
fe80::f0b8:786:90fa:49ae%11
IPv6 預設閘道
IPv6 DNS 伺服器
關閉(C)

個人電腦網路設定基本概念

- DOS指令
  (命令提示字元)
  或 執行 cmd
  - ipconfig /all
  - Nslookup
  - Ping
  - Tracert –d DST ip
  - Pathping
  - telnet ip port



模擬器操作教學Lab簡介

- Cisco Packet Tracer簡介
- 模擬機PC網路設定
- Wireless Device Linksys 無線分享器設定
  - LAN
  - WAN
  - Wireless
- L2 Switch 設定教學
- L3 Switch設定教學
- Packet Tracert Lab中可模擬DHCP、Radius Server

Packet Tracer基本使用介紹

- CISCO原廠開發
- 提供cisco wlc controller、CCNA、CCNP考試用
- 可以模擬大部分狀況
- 使用簡單易懂

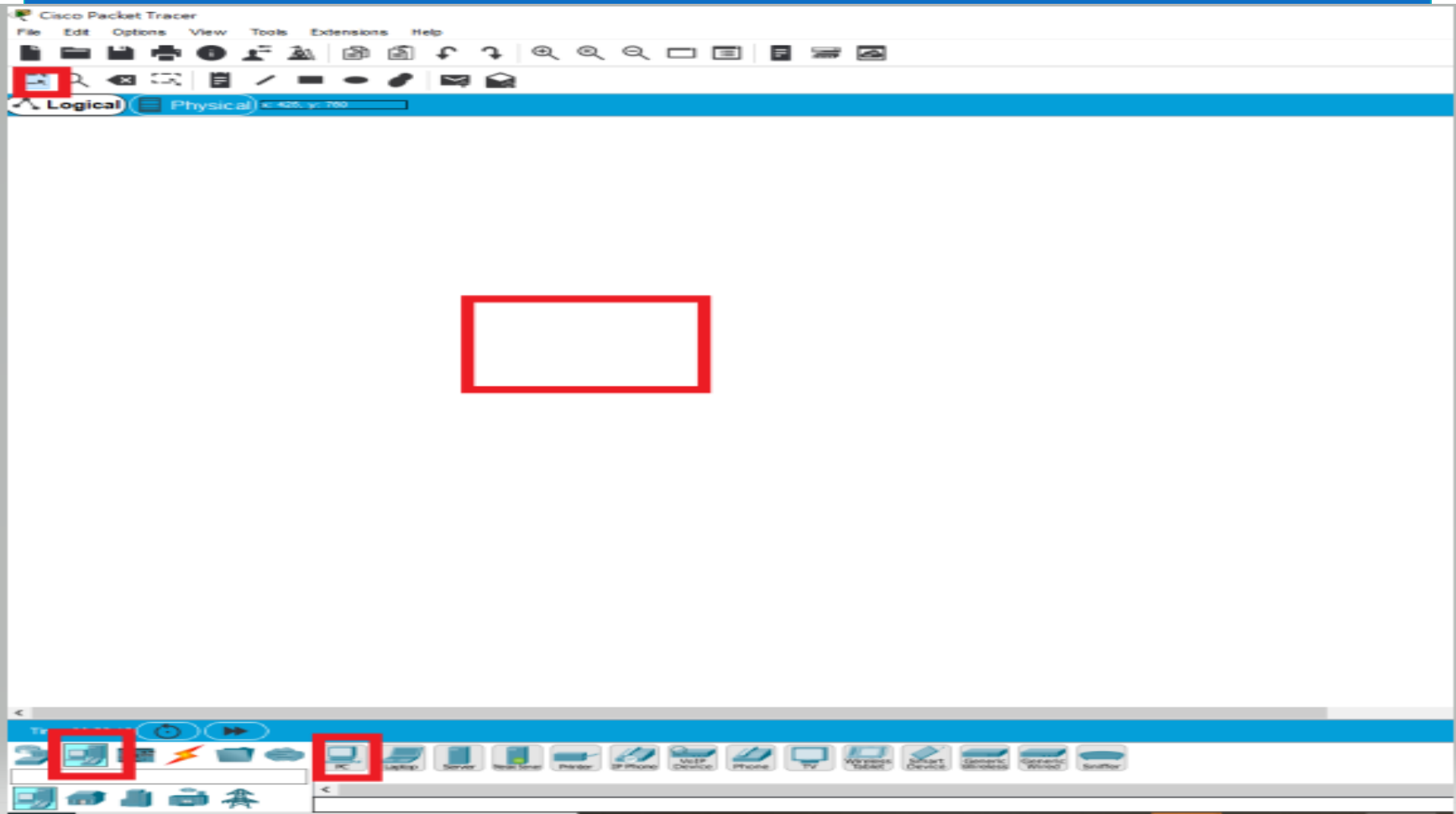
Cisco Packet Tracer

File Edit Options View Tools Extensions Help

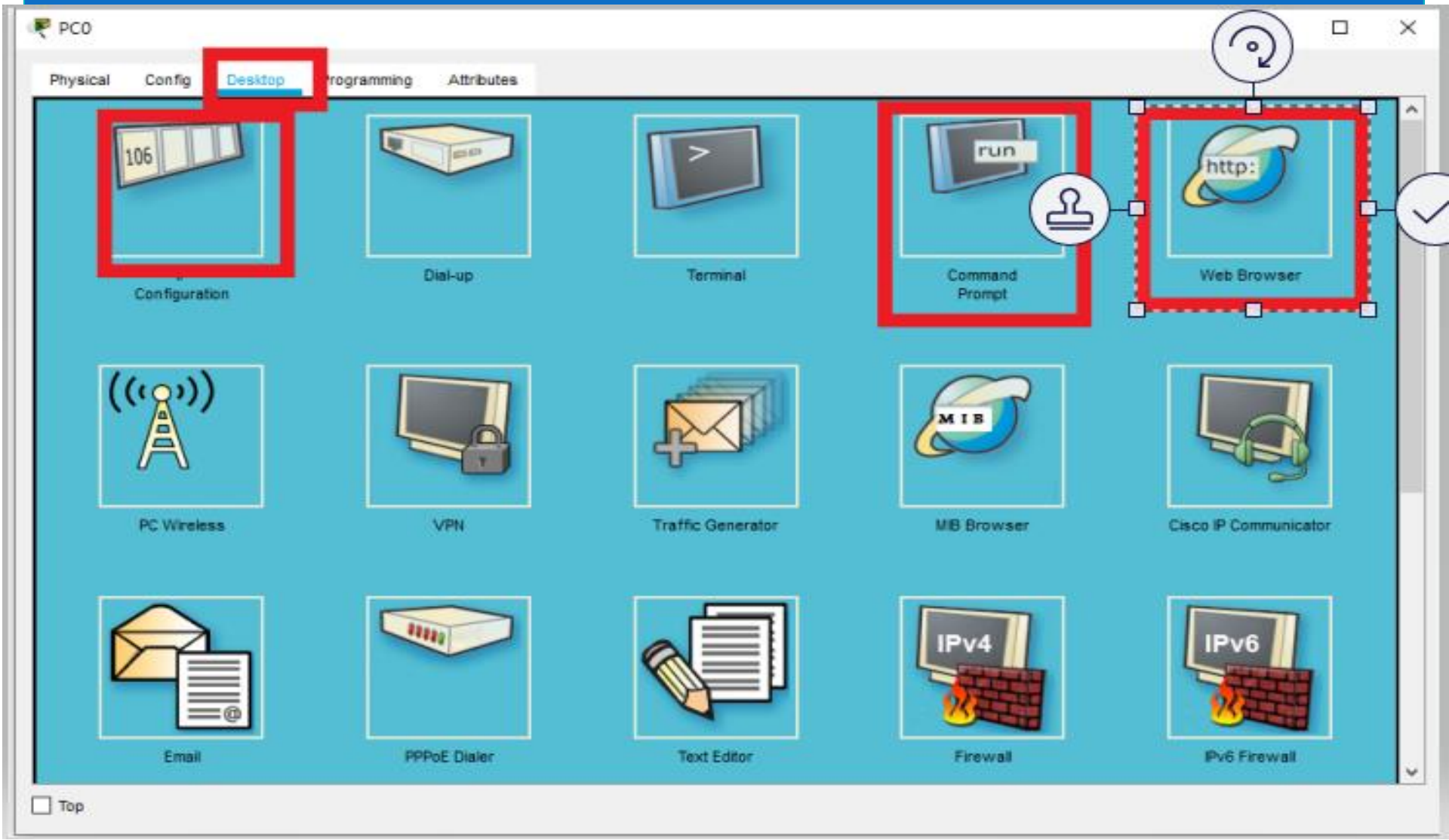
Logical Physical x: 471, y: 8

Time: 00:25:27

模擬PC網路設定


Cisco Packet Tracer
File
Edit
Options
View
Tools
Extensions
Help
Logical
Physical

設定PC網路


PC0
Physical
Config
Desktop
rogramming
Attributes
106
Configuration
Dial-up
Terminal
run
Command Prompt
http:
Web Browser
PC Wireless
VPN
Traffic Generator
MIB
MIB Browser
Cisco IP Communicator
Email
PPPoE Dialer
Text Editor
IPv4
Firewall
IPv6
IPv6 Firewall
Top

PC0

Physical | Config | Desktop | Programming | Attributes

GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth

FastEthernet0

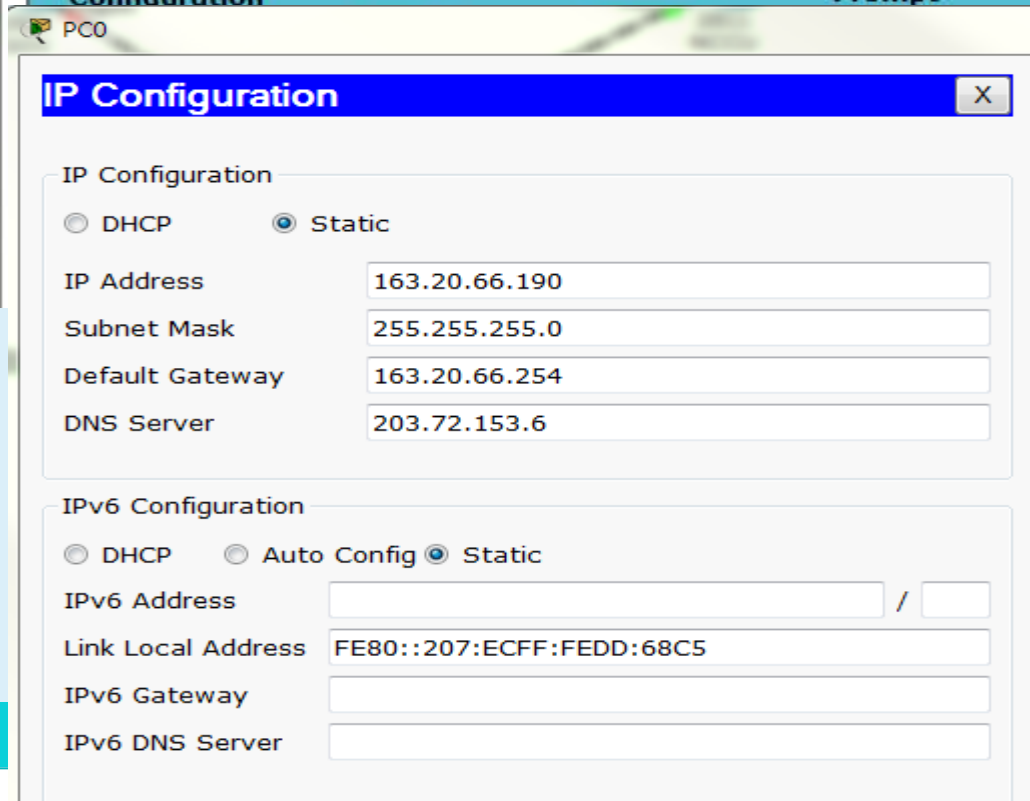
Port Status: [x] On
Bandwidth: (•) 100 Mbps ( ) 10 Mbps [x] Auto
Duplex: (•) Half Duplex ( ) Full Duplex [x] Auto
MAC Address: 0060.5C10.1A62

IP Configuration
( ) DHCP
(•) Static
IP Address:
Subnet Mask:

IPv6 Configuration
( ) DHCP
( ) Auto Config
(•) Static
IPv6 Address: /
Link Local Address: FE80::260:5CFF:FE10:1A62

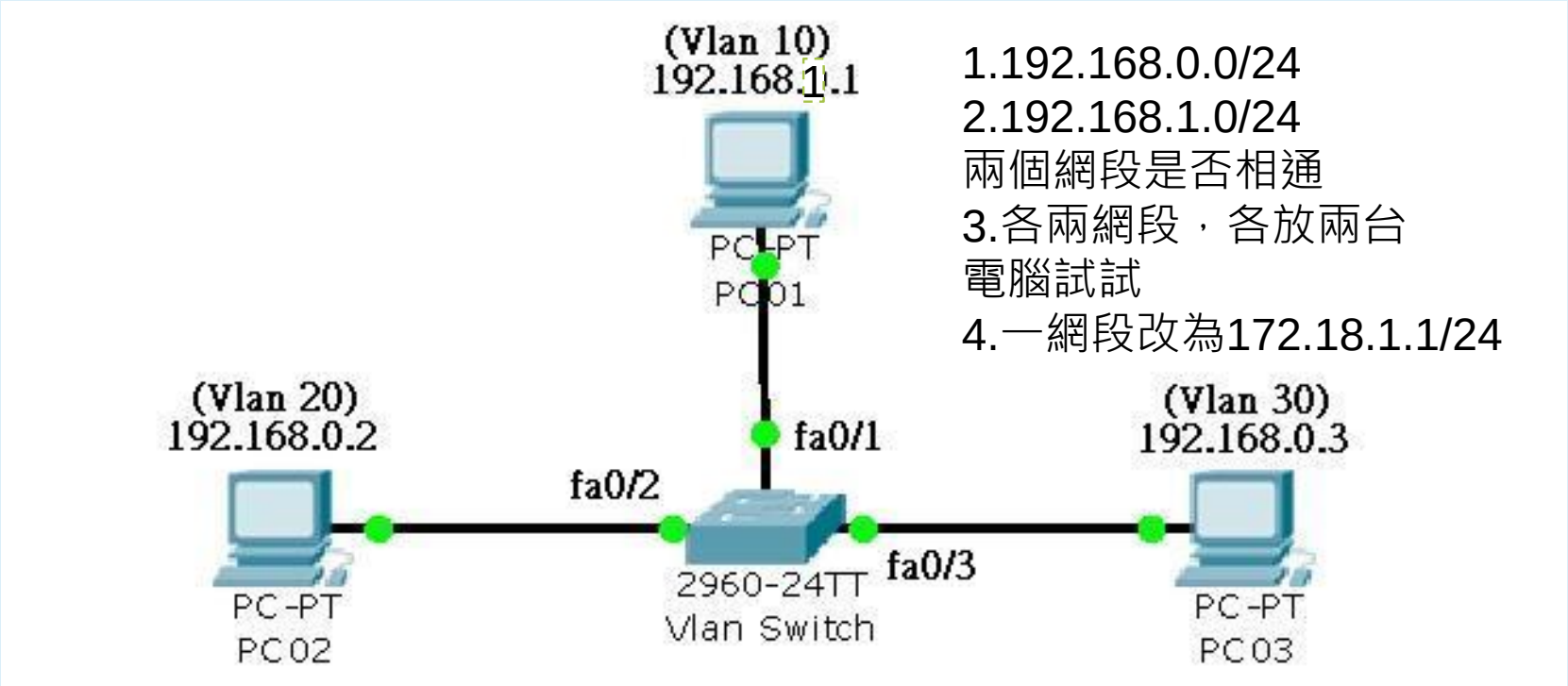
Lab 1 PC 設定

- Packet Tracert
- PC 設定、使用



Lab 3-1 基本練習Hub、L2、家用AP (NetMask)

三台 PC 三個網段 、同網段可通、不同網段不通



家用無線AP設定

設定分為三部分

WAN IP (internet)
對外連線

LAN IP
內部有線

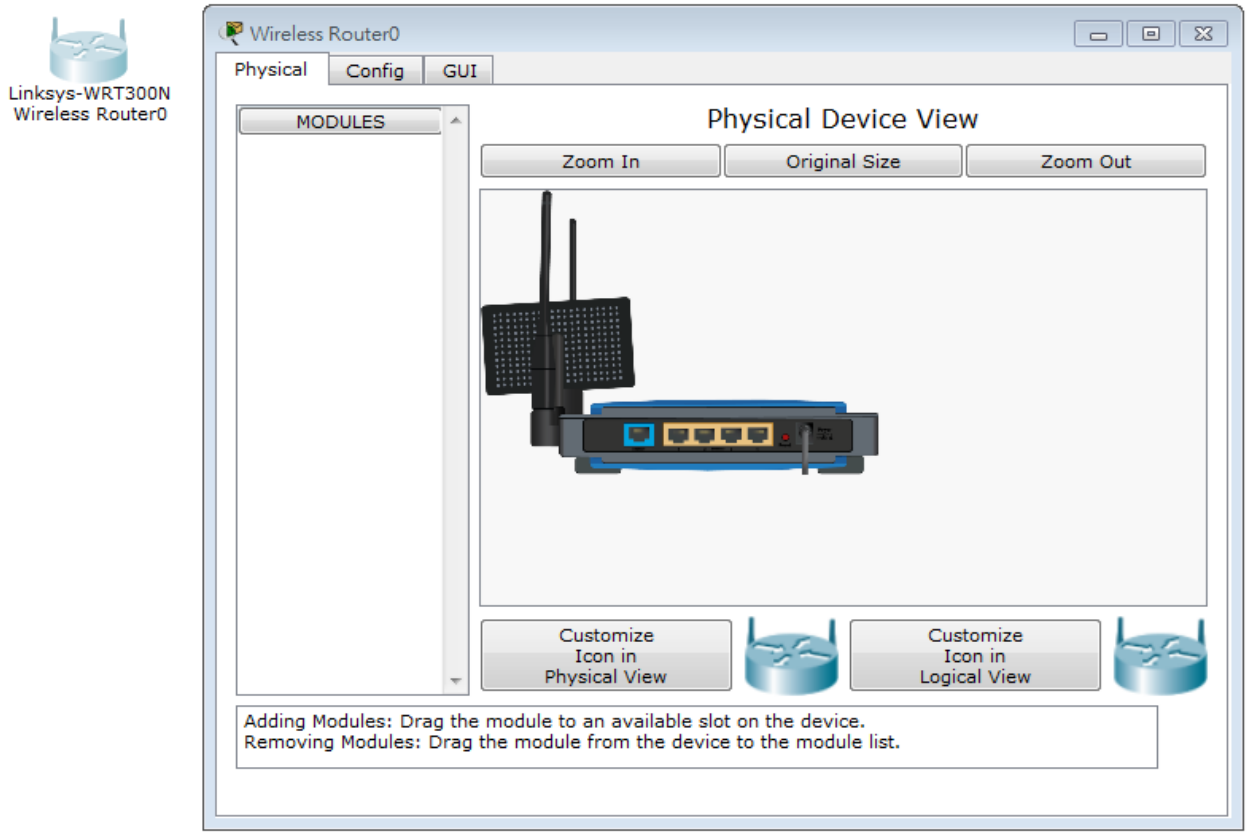
Wireless
內部無線

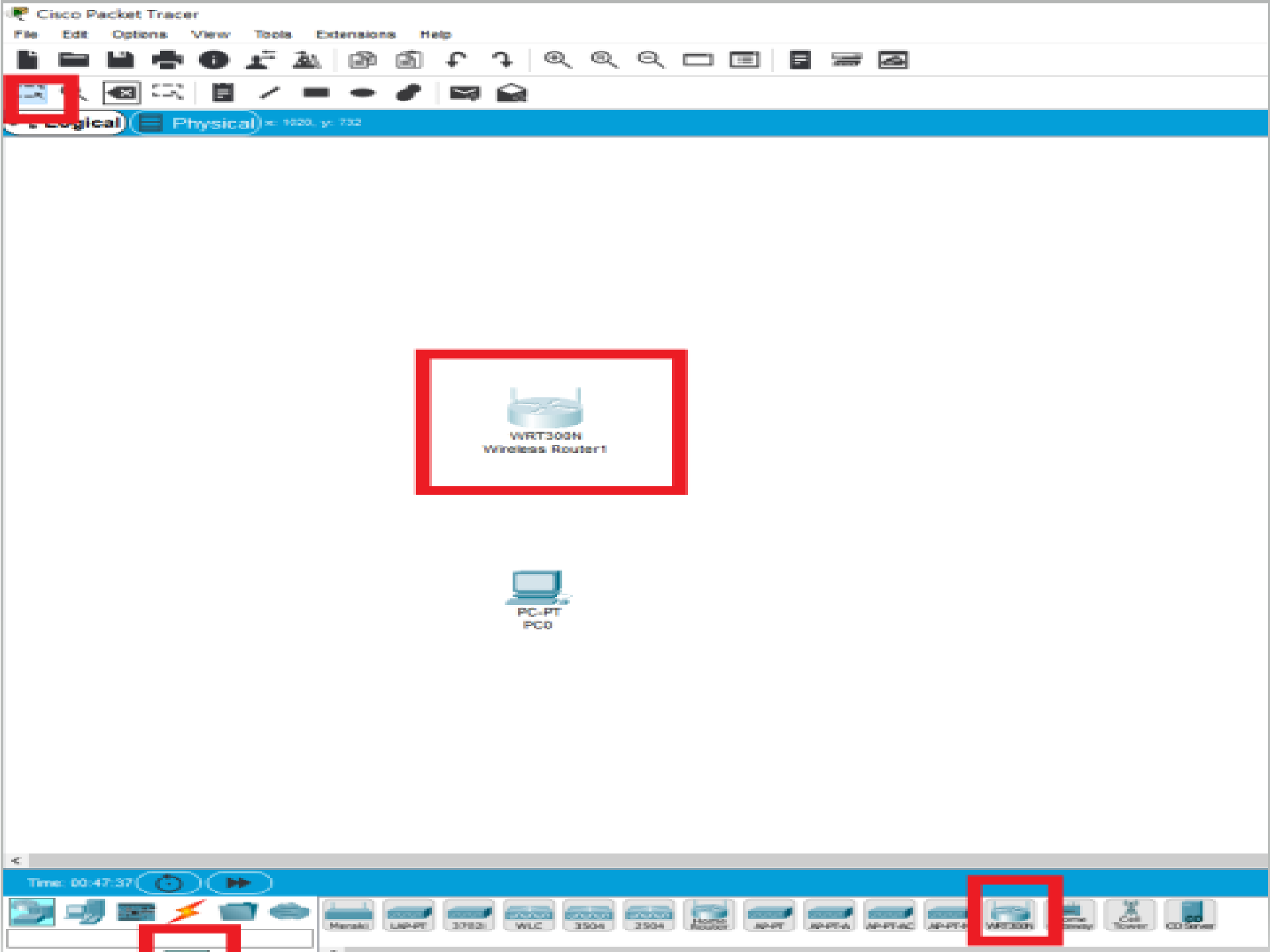
SSID

WPA2

Preshare key

Redius server




Cisco Packet Tracer
File
Edit
Options
View
Tools
Extensions
Help
Logical
Physical
WRT300N
Wireless Router1
PC-PT
PC0
Time: 00:47:37
Meraki
LAP-PT
3702i
WLC
3504
3504
AP-PT
AP-PT-A
AP-PT-AC
WRT300N
Cell Tower
CO Server

Wireless Router1

Physical | Config | GUI | Attributes

Wireless-N Broadband Router

Firmware Version: v0.93.3

Setup | Setup | Wireless | Security | Access Restrictions | Applications & Gaming | Administration | Status

Wireless-N Broadband Router WRT300N

Basic Setup | DDNS | MAC Address Clone | Advanced Routing

Internet Setup

Internet Connection type: Automatic Configuration - DHCP

Optional Settings (required by some internet service providers)

Host Name:

Domain Name:

MTU: Size: 1500

Network Setup

Router IP

IP Address: 192 . 168 . 0 . 1

Subnet Mask: 255.255.255.0

DHCP Server Settings

DHCP Server: Enabled Disabled

DHCP Reservation

Start IP Address: 192.168.0. 100

Maximum number of Users: 50

IP Address Range: 192.168.0. 100 - 149

Client Lease Time: 0 minutes (0 means one day

Static DNS 1: 0 . 0 . 0 . 0

Static DNS 2: 0 . 0 . 0 . 0

Static DNS 3: 0 . 0 . 0 . 0

WINS: 0 . 0 . 0 . 0

Help...

Wireless Router1

Physical | Config | GUI | Attributes

GLOBAL
- Settings
- Algorithm Settings

INTERFACE
- Internet
- LAN
- Wireless

Internet Settings

IP Configuration
- (●) DHCP
- ( ) Static
- ( ) PPPoE

UserName

Password

IP Address

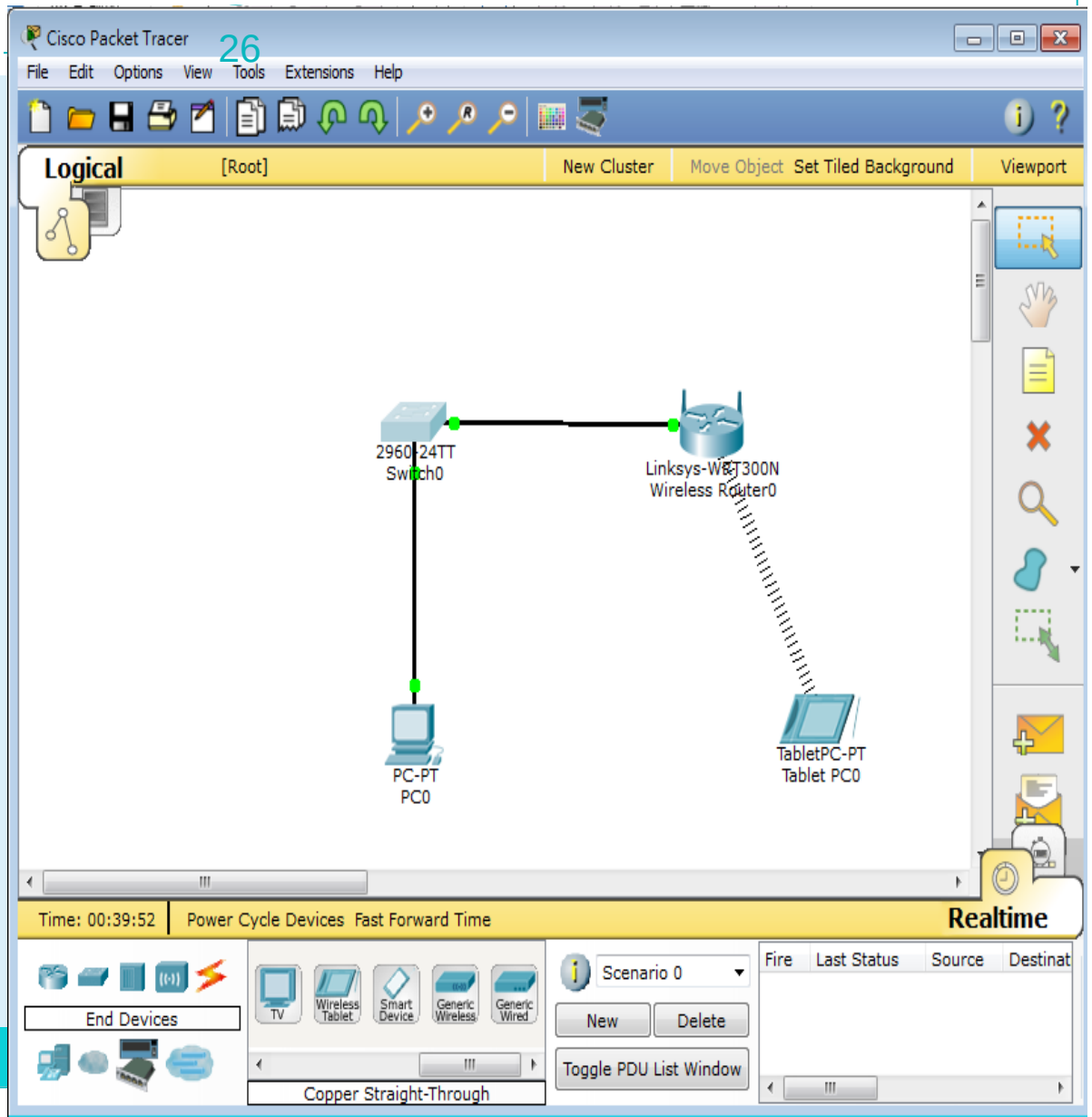
Subnet Mask

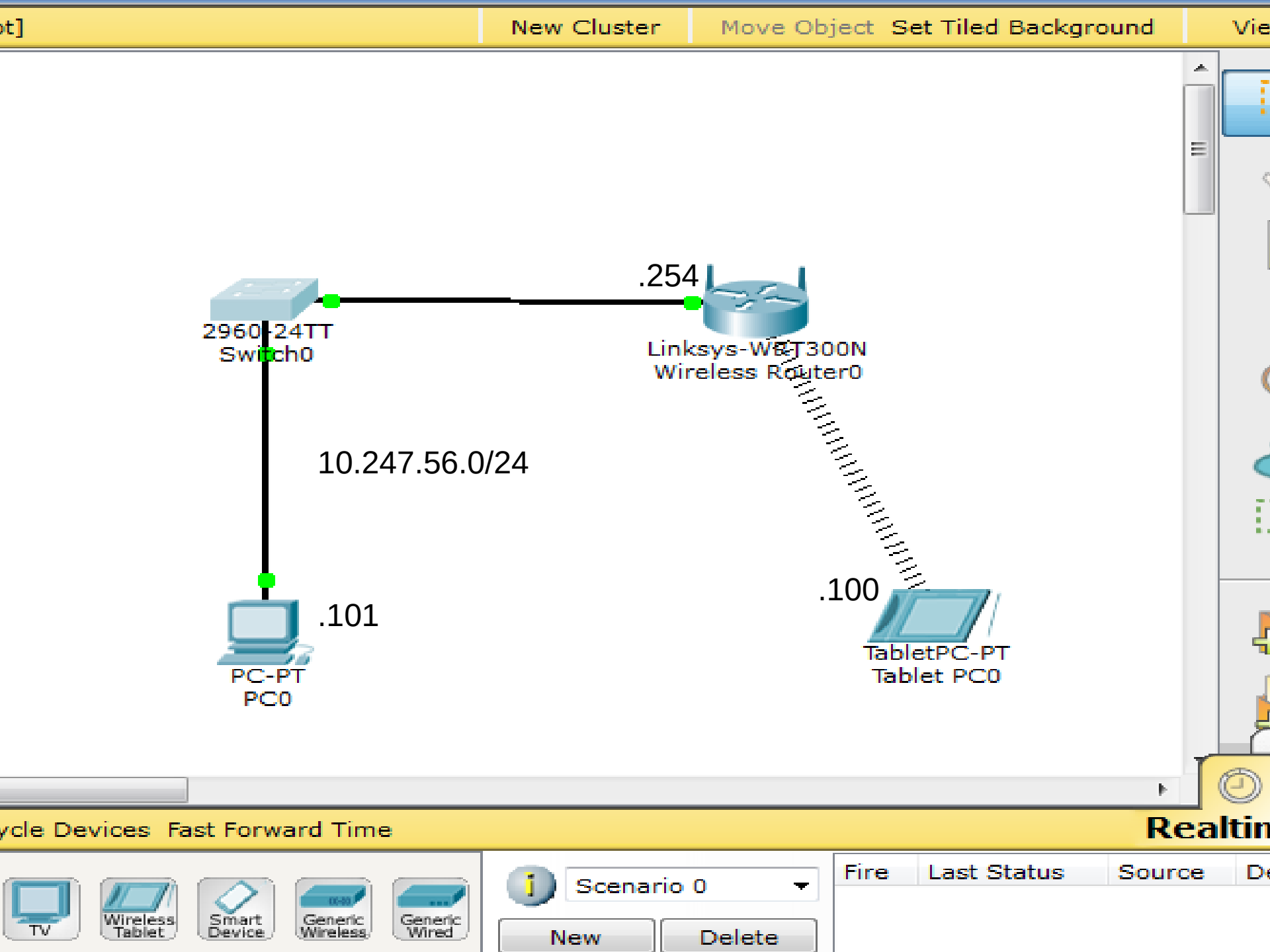
Default Gateway

DNS Server

Lab2 基本網路設定

功能要求
1.用一台L2 switch
2.接一台無線AP
3.讓PC可以取得ip
4.讓無線載具可以取得ip
5.無線載具與PC互ping會通




New Cluster
Move Object
Set Tiled Background
.254
2960-24TT
Switch0
Linksys-WRT300N
Wireless Router0
10.247.56.0/24
.100
.101
PC-PT
PC0
TabletPC-PT
Tablet PC0
Fast Forward Time
Realtim
TV
Wireless Tablet
Smart Device
Generic Wireless
Generic Wired
Scenario 0
New
Delete
Fire
Last Status
Source

DHCP問題發生原因LAB及排除

- Linksys LAB
- 內網DHCP取得192.168.X.X問題
- 判斷方式及故障排除

是否取得正確的vlan ip上enctc.ntpc.edu.tw確認

由arp table找出非法網段Gateway

若有錯誤ip,請工程師查出發dhcp的port， shutdown port

802.1Q vlan

Daniel Lee

Vlan

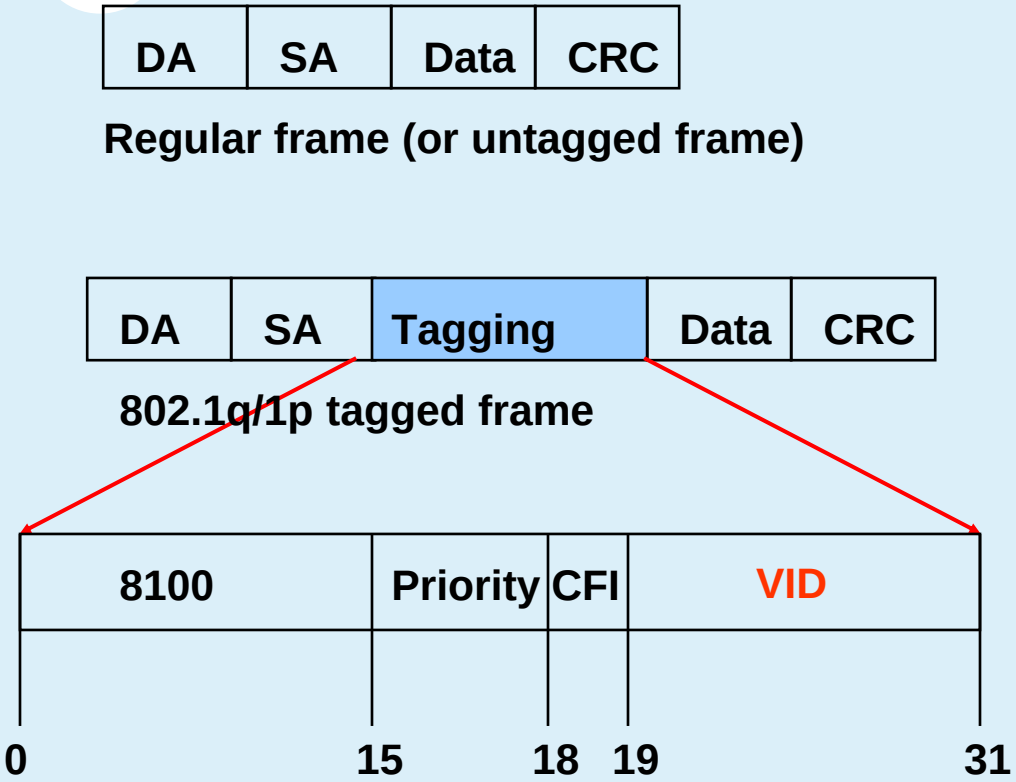
- 各個重要據點設城堡。Vlan (L2)

IEEE 802.1p/802.1q Frame Tagging

The 32-bit field (VLAN Tag) in the frame header that identifies the frame as belonging to a specific VLAN/priority.

The Max. size of a Tagged Ethernet Frame is 1522 Bytes (1518+ 4 bytes tagging).

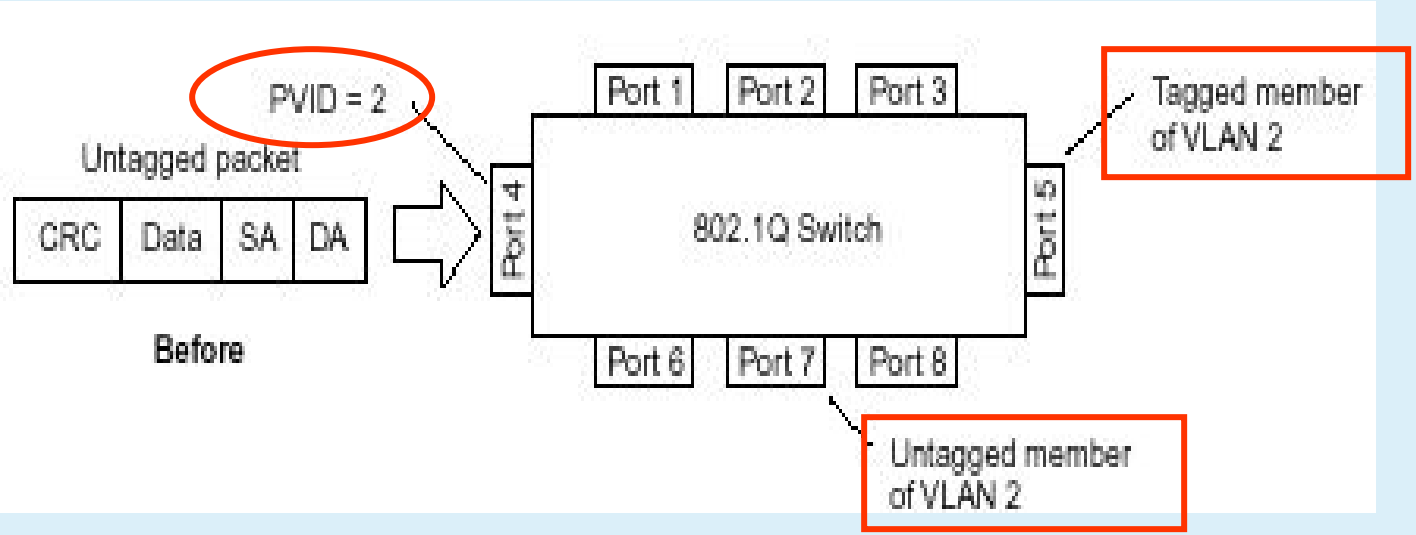
The frame without VLAN tag, we call it as Untagged Frame or Frame.



Priority (1p) has 3 bits, 0-7.

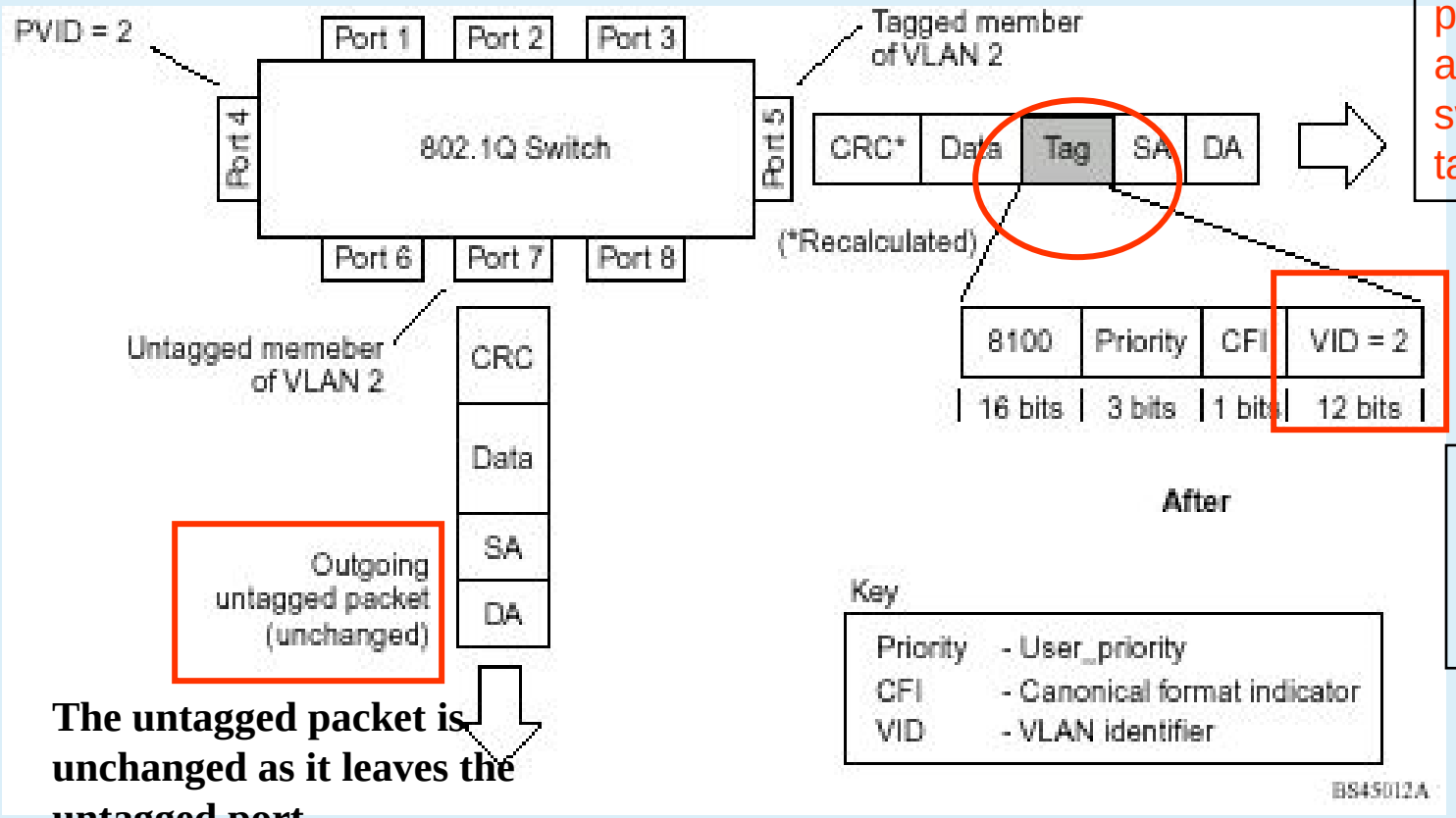
VLAN (1q) has 12 bits, 0-4095

802.1p/1q Untagged Incoming Frame



Assumed the PVID of port4 is 2 and default priority=0
The incoming untagged packet will be assigned to VLAN 2/priority=0
Port5 is tagged and port 7 is untagged egress member of VLAN 2
This packet will be forwarded to port5 and port7 with tagged and untagged respectively.
Priority tagging (802.1p) follows the similar rule as 802.1q tagging.

802.1p/1q Untagged Incoming Frame

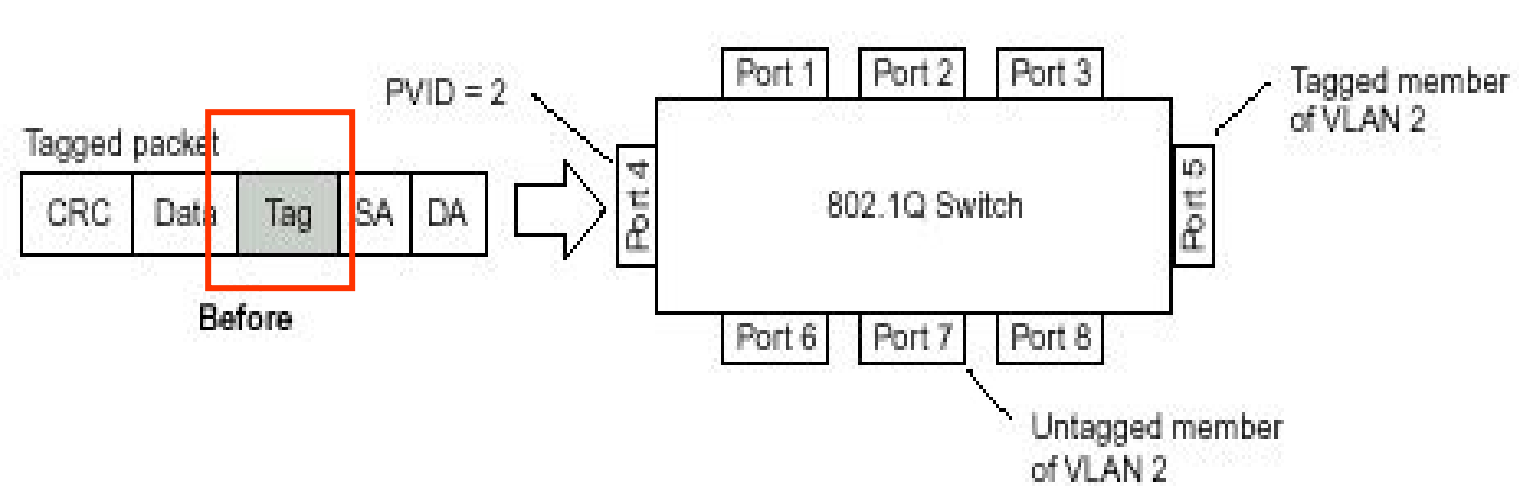


The untagged packet is tagged as it leaves the switch through tagged port

The VID is related to PVID of the incoming port

The untagged packet is unchanged as it leaves the untagged port

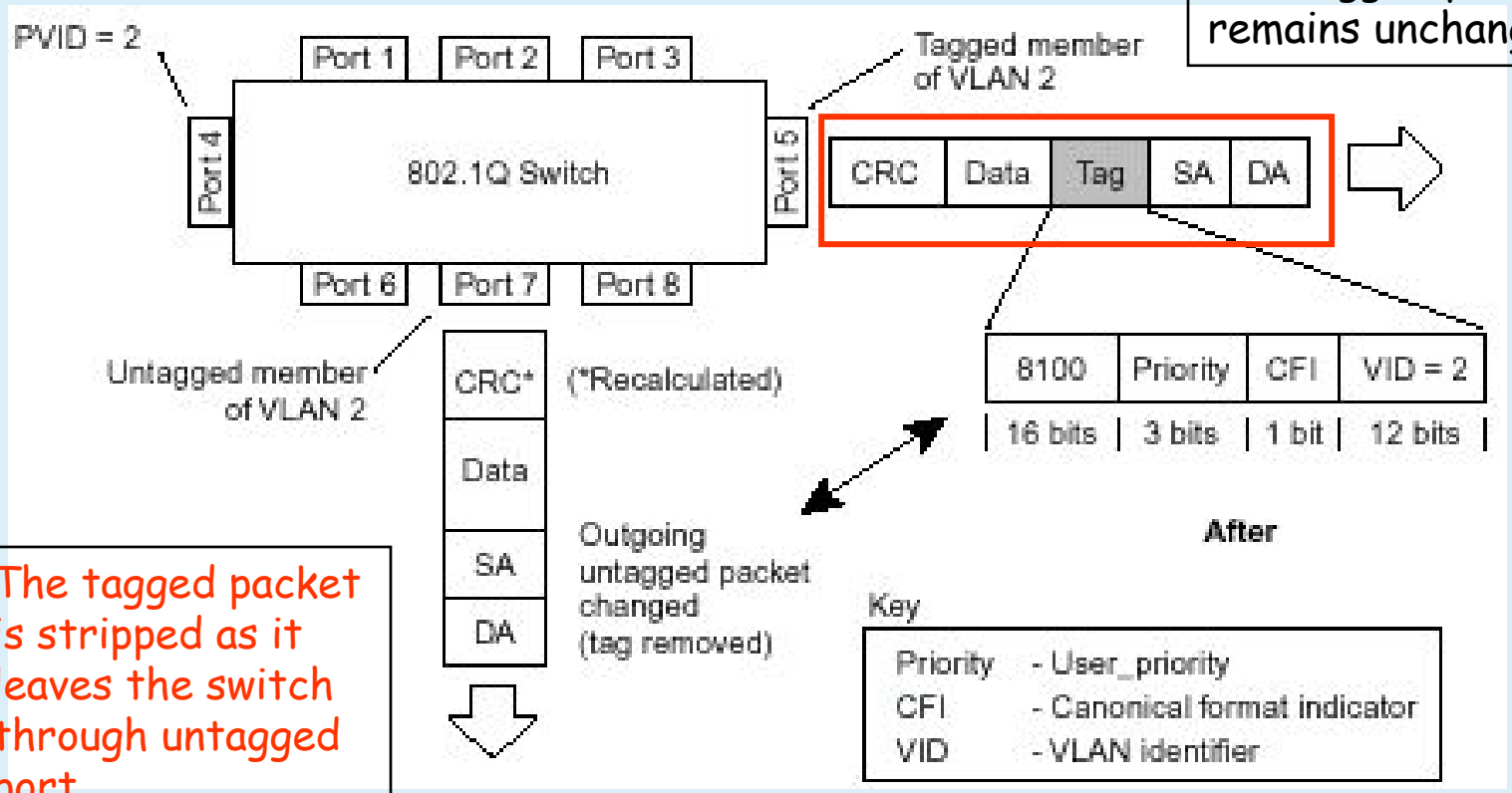
802.1p/1q Tagged Incoming Frame



Assumed tagged incoming packet having vid=2/priority=0
Port5 is a tagged and port 7 is an untagged egress member of VLAN 2
This packet will be forwarded to port5 and port7

802.1p/1q Tagged Incoming Frame

The tagged packet remains unchanged



The tagged packet is stripped as it leaves the switch through untagged port

802.1p/1q Tagging summary

Ingress (incoming frame):

- If receiving **untagged** frame, add the tag into this frame with VID=PVID and priority= 802.1p default priority
- If receiving **tagged** frame, the VID/priority values are unchanged.

Inside the Switch (all frames are tagged)

- For VLAN, based on the VID to lookup the VLAN table, and forward frame to member ports of this VLAN.
- For priority, based on the "Class of Service mapping" to process the frame with associated priority Queue.

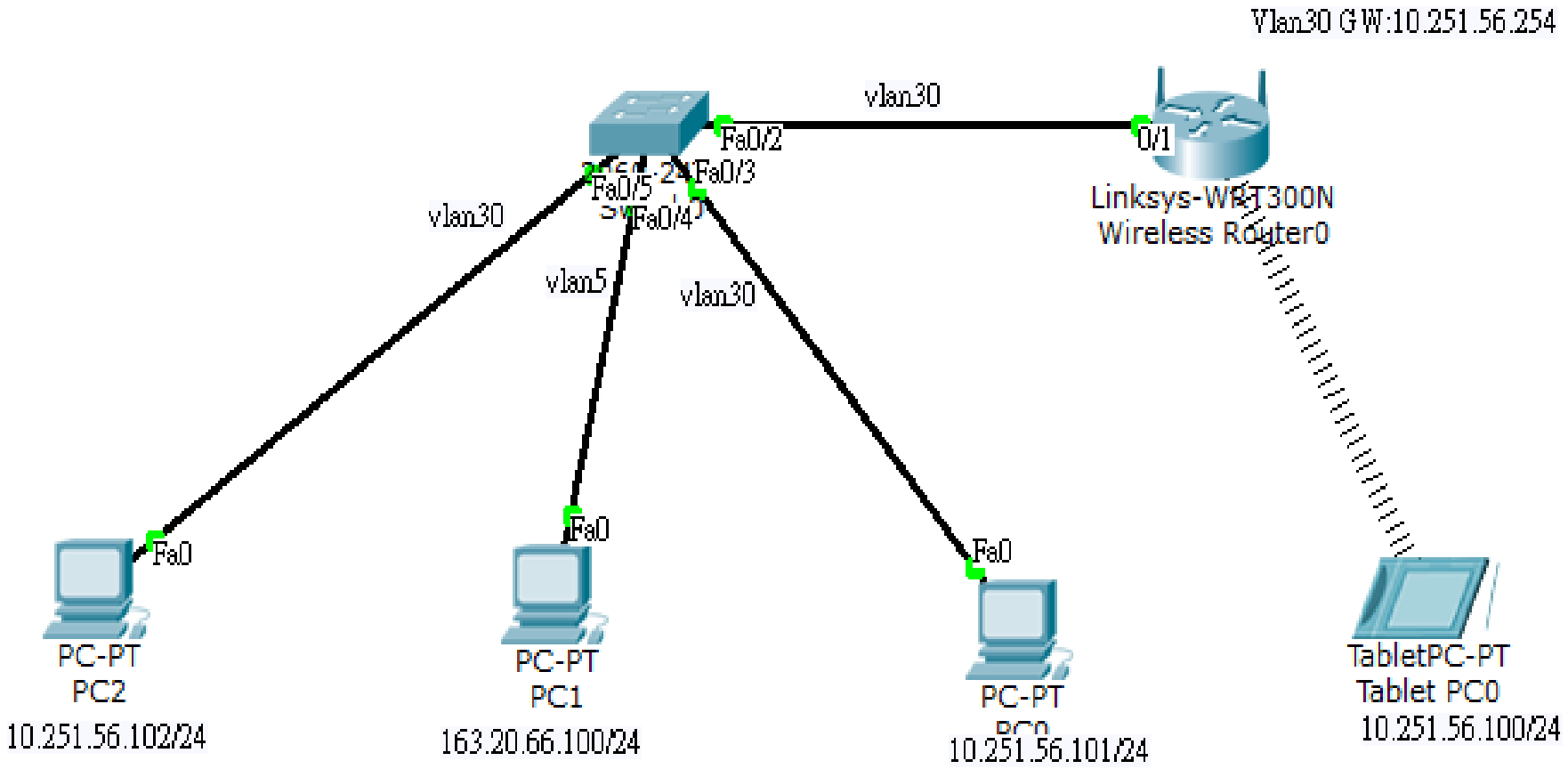
Egress (outgoing frame):

- **Untagged** egress port: Remove the tagging.
- **Tagged** Egress port: Un-change the tagging, so that the 1p/1q info can be carried to next 802.1p/q aware switch.

L2 Lab Vlan建置說明

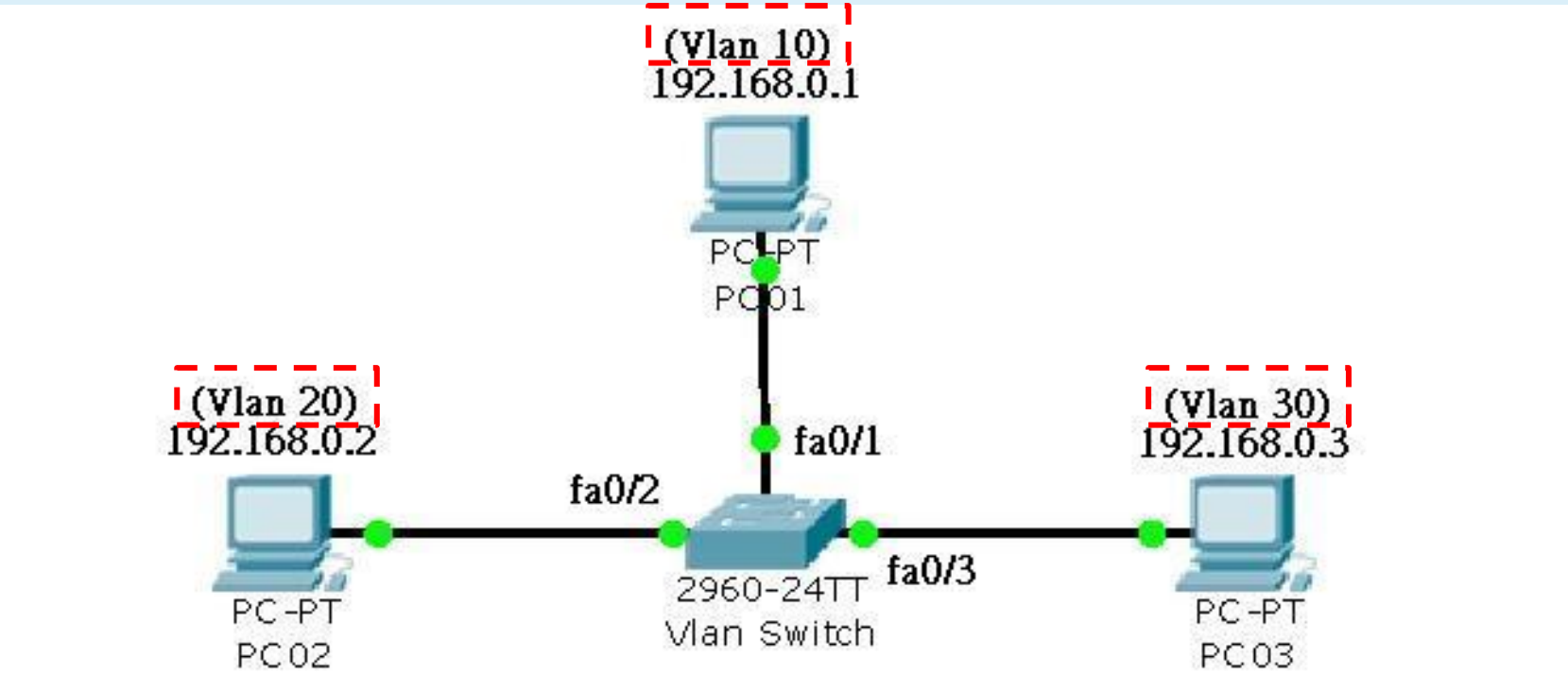
- 建立vlan 30 and vlan 5
- 將接L2與PC相連的port設定為正確vlan access port
- 測試
  - 相同vlan可以取得DHCP派發ip
    - 不同vlan，ip
    - 互 ping不通
    - 相同vlan相同網段可以互ping

Lab3 L2 Vlan


Vlan30 GW:10.251.56.254
vlan30
Fa0/2
0/1
Fa0/3
Fa0/5
Fa0/4
vlan30
Linksys-WRT300N
Wireless Router0
vlan5
vlan30
Fa0
Fa0
Fa0
PC-PT
PC2
10.251.56.102/24
PC-PT
PC1
163.20.66.100/24
PC-PT
10.251.56.101/24
TabletPC-PT
Tablet PC0
10.251.56.100/24

Lab 3-2 基本練習Vlan

三個Vlan間三個網段 PC相互不通(Broadcast Domain)。



山城 城門在哪?

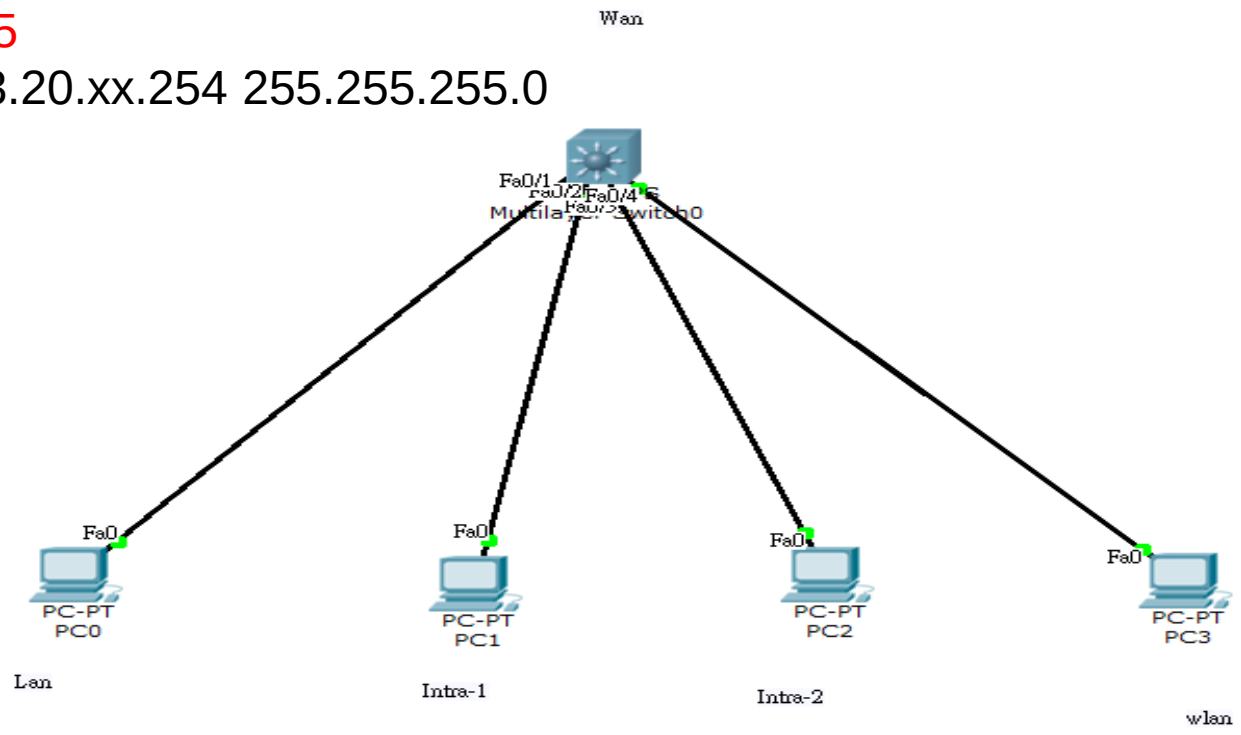
Gateway(閘道)

Lab 4 基本練習Vlan Interface

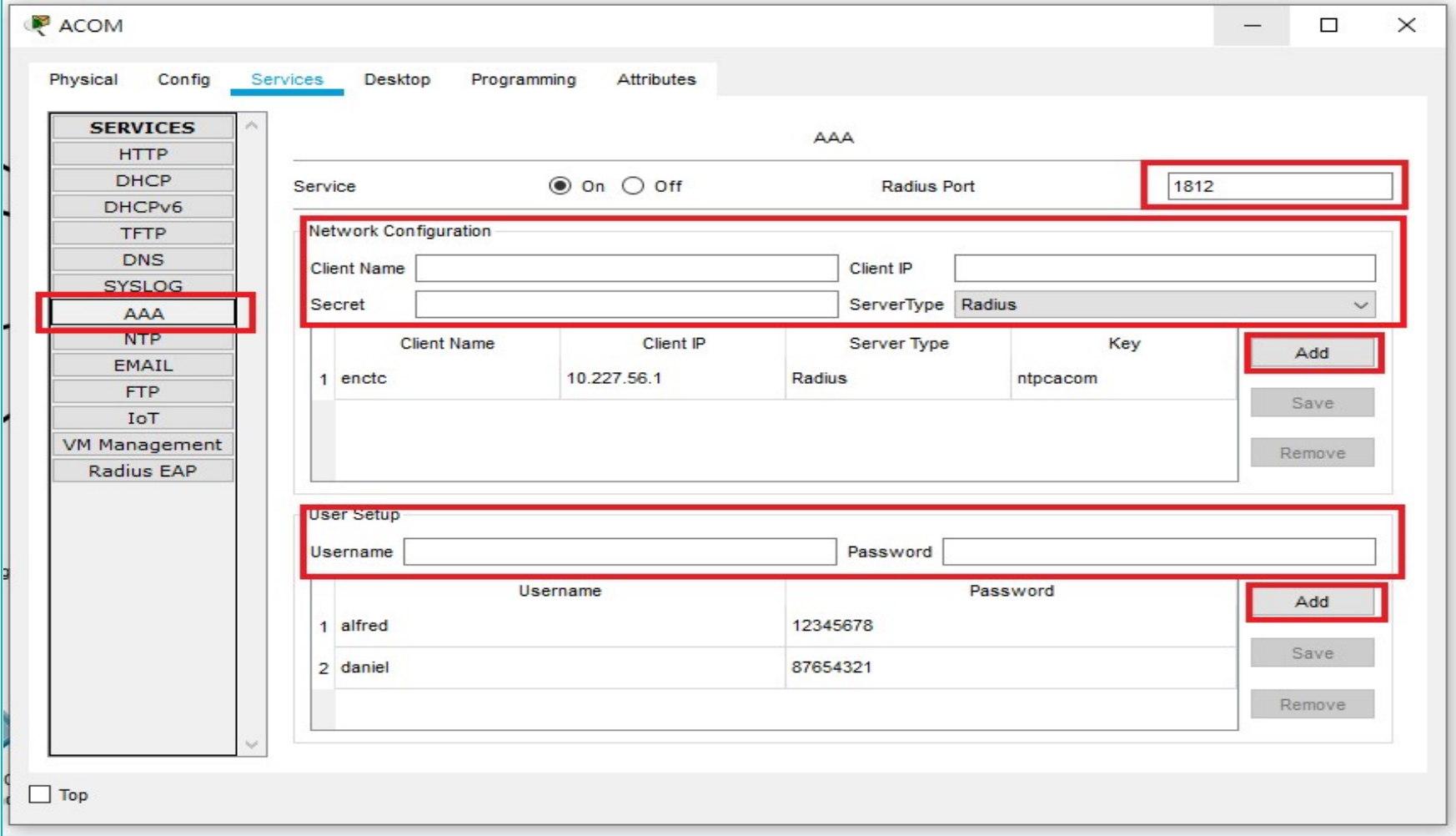
三個Vlan間三個網段 PC相互不通，做出每個網段Gateway。

Inter vlan 5

Ip add 163.20.xx.254 255.255.255.0



Radius Server 203.72.154.101



DHCP Server 203.72.153.8 (Vla

DHCP

Physical | Config | Services | Desktop | Programming | Attributes

SERVICES
- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

DHCP

Interface: FastEthernet0 — Service: On / Off

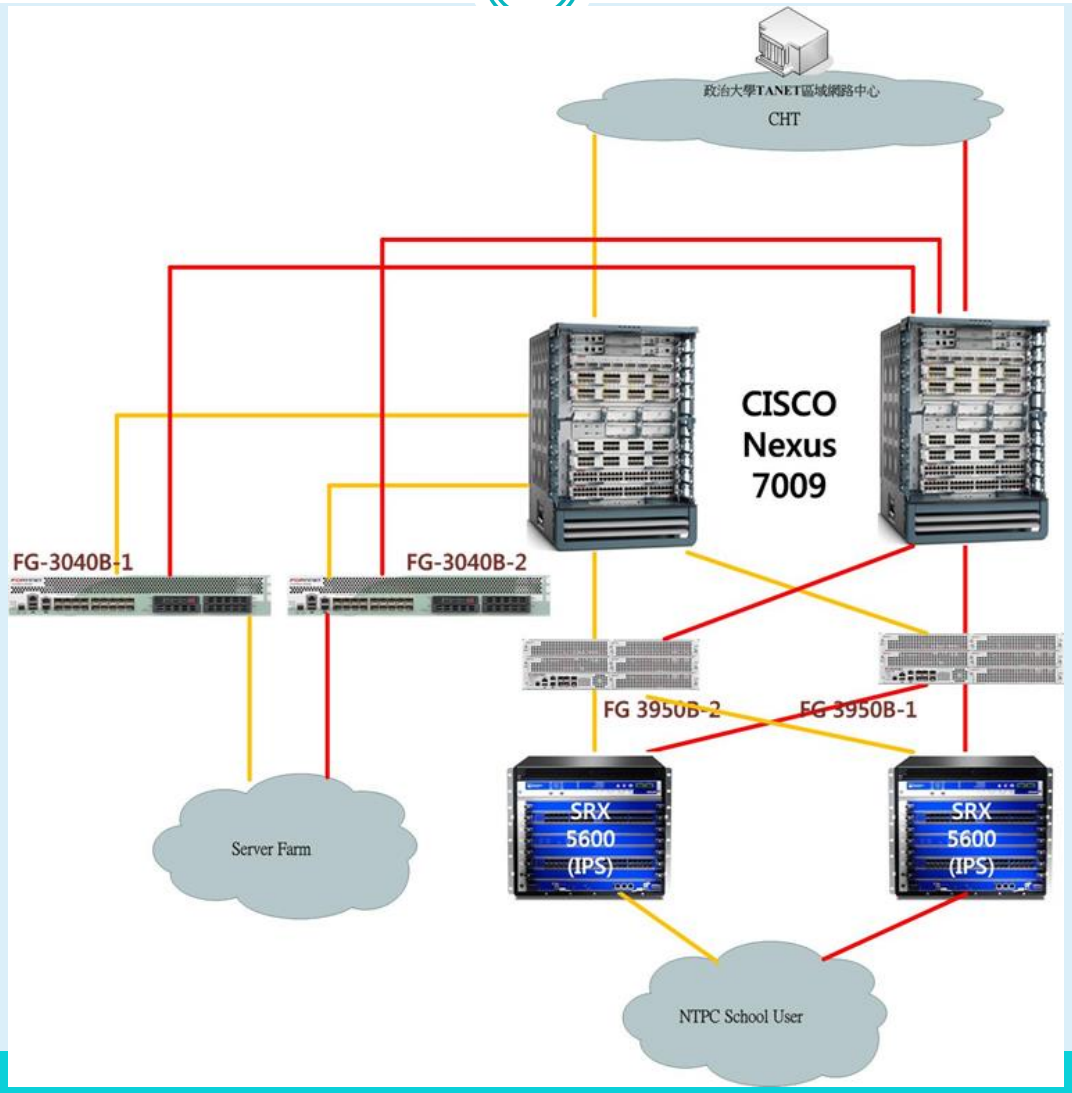
Pool Name	eduroam
Default Gateway	10.215.56.254
DNS Server	203.72.153.153
Start IP Address :	10 215 56 100
Subnet Mask:	255 255 255 0
Maximum Number of Users :	156
TFTP Server:	0.0.0.0
WLC Address:	0.0.0.0

Add | Save | Remove

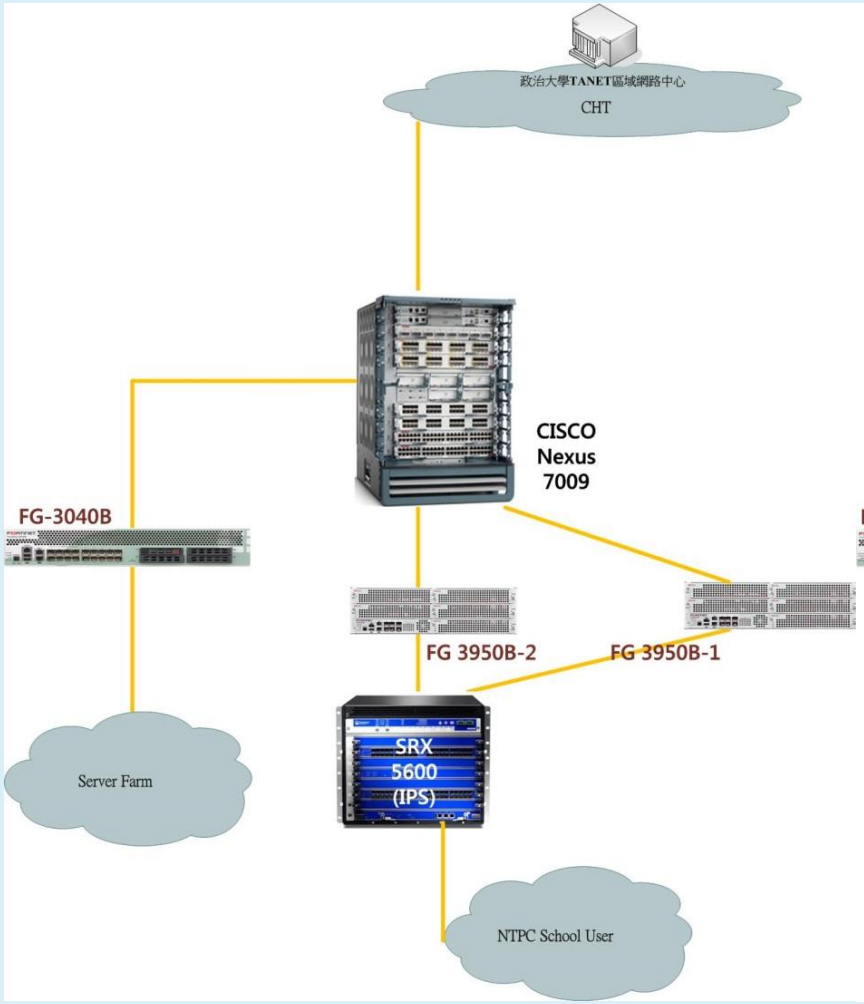
Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
class	10.217.56.254	203.72.153.153	10.217.56.100	255.255.255.0	100	0.0.0.0	0.0.0.0
eduroam	10.215.56.254	203.72.153.153	10.215.56.100	255.255.255.0	156	0.0.0.0	0.0.0.0
Mobile	10.213.56.254	203.72.153.153	10.213.56.100	255.255.255.0	156	0.0.0.0	0.0.0.0
capwap	10.227.56.254	203.72.153.153	10.227.56.100	255.255.255.0	156	0.0.0.0	10.227.56.1
serverPool	0.0.0.0	0.0.0.0	203.72.153.0	255.255.255.0	255	0.0.0.0	0.0.0.0

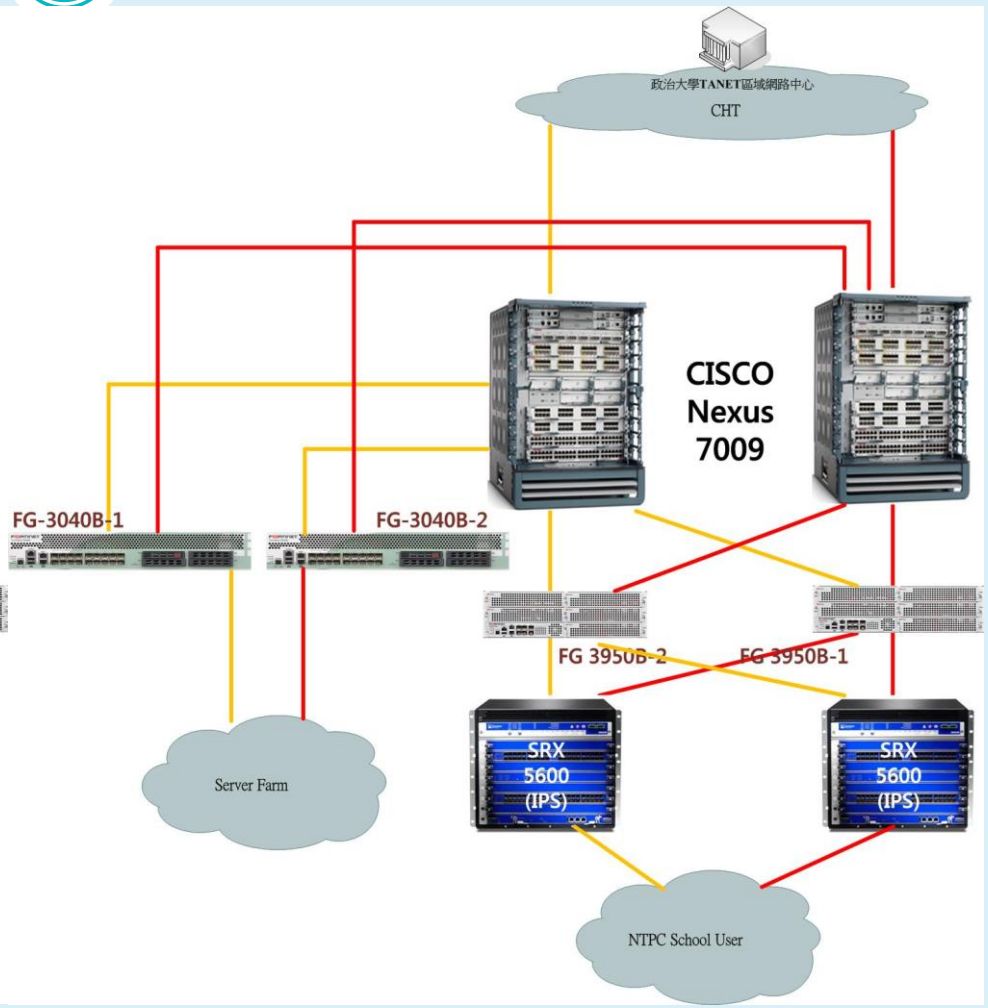
Top

L3 Switch Routing (ipv4 and ipv6)



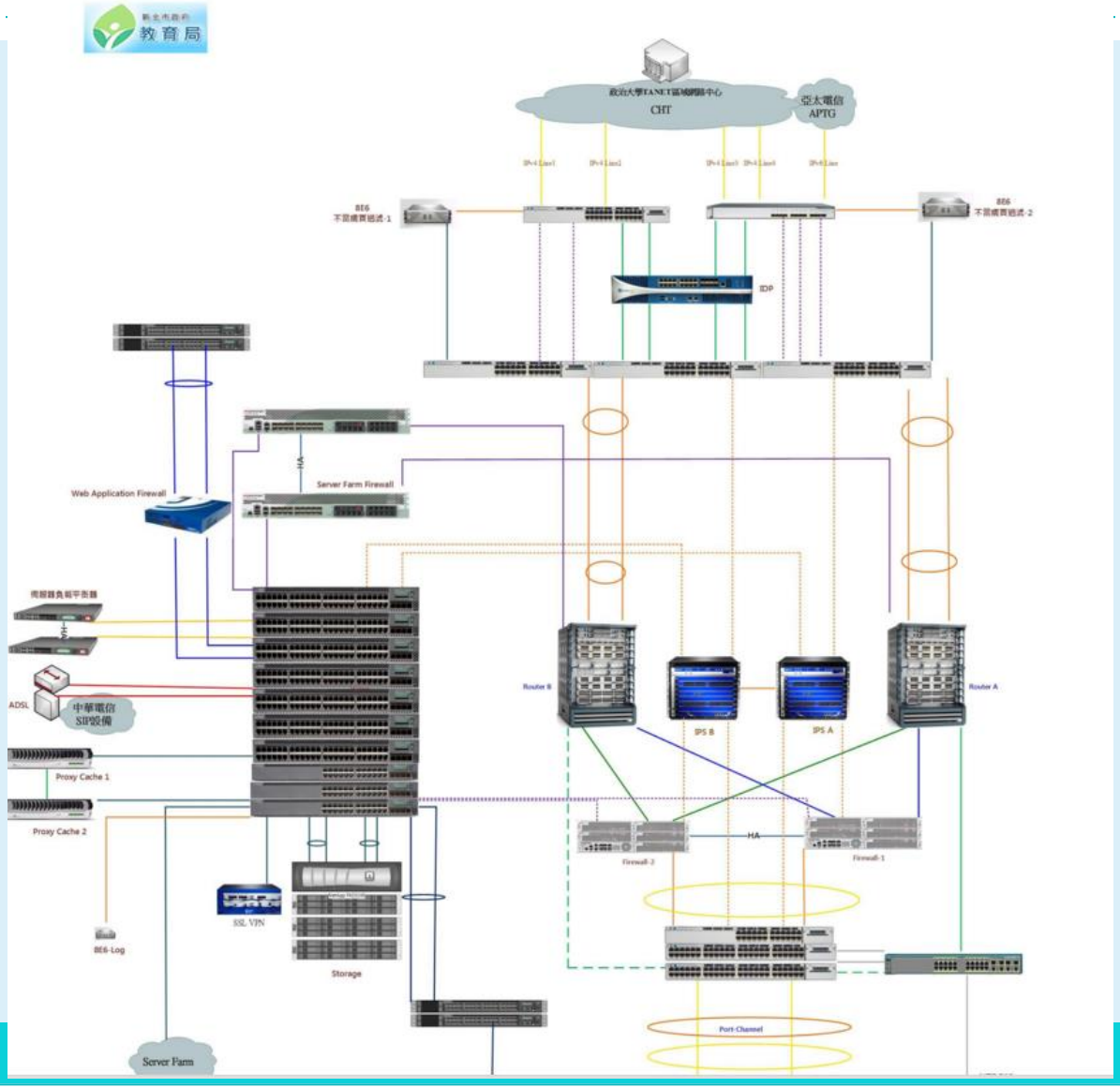
新北市教育網骨幹新舊比較圖





新北市拓譜圖

20150327



校園網路Lab拓譜圖

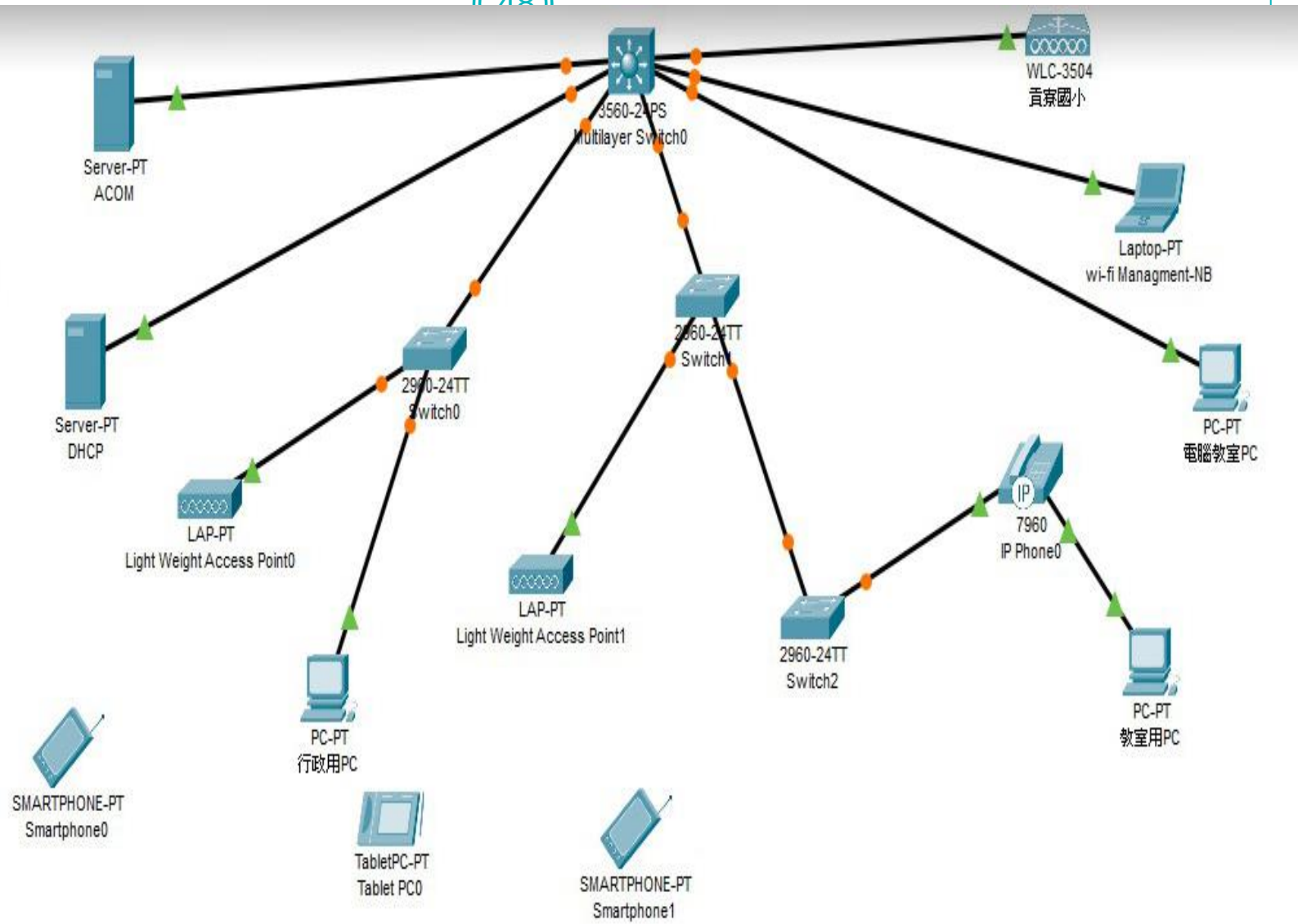
貢寮國小:
Gateway:10.229.12.254

LAN:163.20.53.192/24
intra-1: 10.232.12.0/24
intra-2:10.242.12.0/24
VoIP:10.244.12.0/24

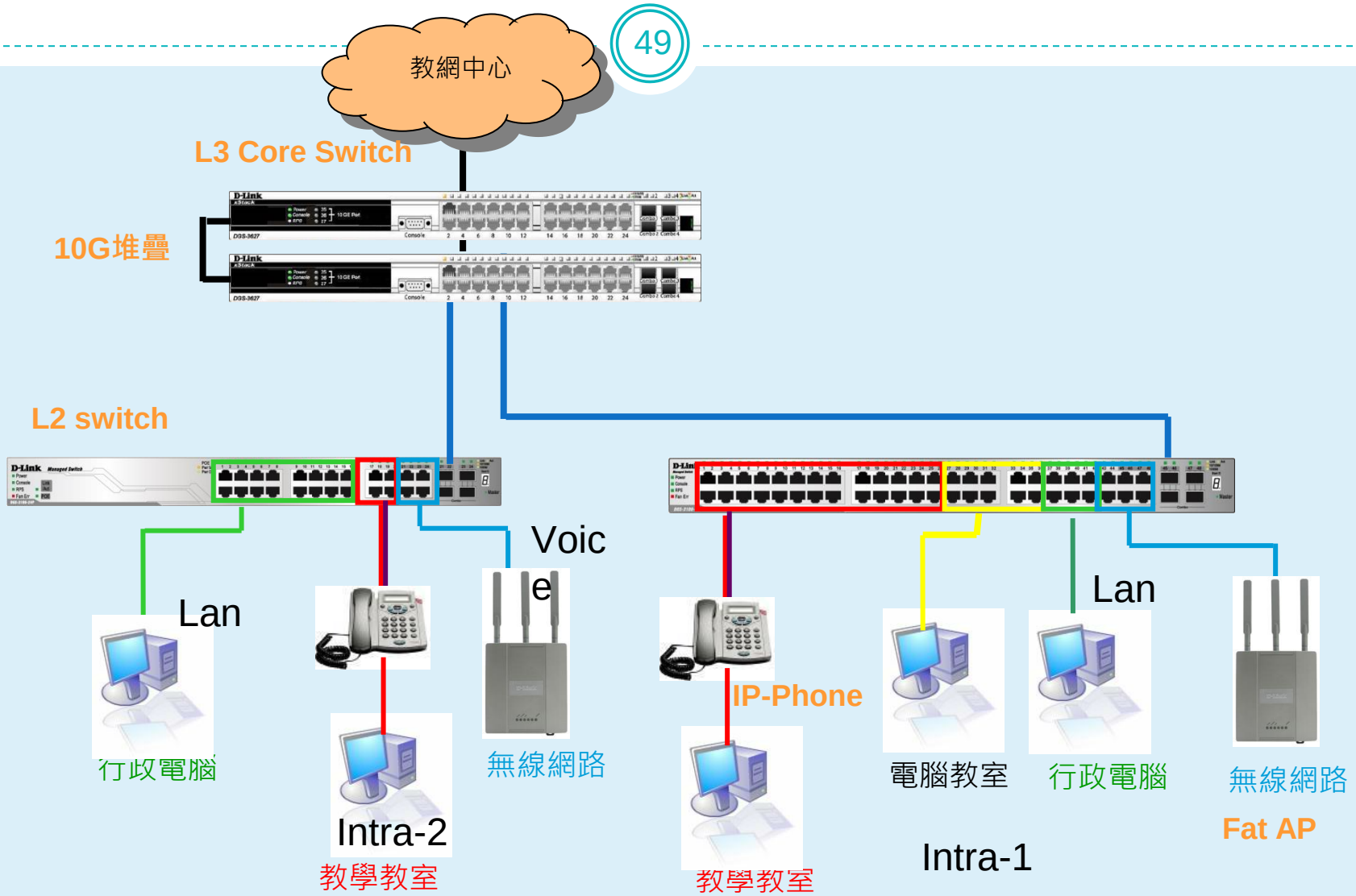
無線用31-TANetRoaming:10.212.12.0/24
無線用32-NTPC-Mobile :10.214.12.0/24
無線用33-Eduroam :10.216.12.0/24
無線用34-class:10.218.12.0/24

WLC:10.229.12.1/24
admin/Admin123
DNS:203.72.153.153/24
DHCP:203.72.153.8
Acom:203.72.154.101

VLAN3-WLC
VLAN5-LAN
VLAN10-intra-1
VLAN20-intra-2
VLAN25-VOIP
VLAN31-TANetRoaming
VLAN32-NTPC-Mobile
VLAN33-eduroam
VLAN34-class
VLAN121-DHCP-DNS
VLAN122-Acom



新北市高國中小學校園網路架構圖



(實作資料) 學校ip分配表

- http://mis.ntpc.edu.tw
- 網路服務
- 網路設定
- 連線單位Ipv4分配
- 連線單位Ipv6分配
- 光纖連線單位

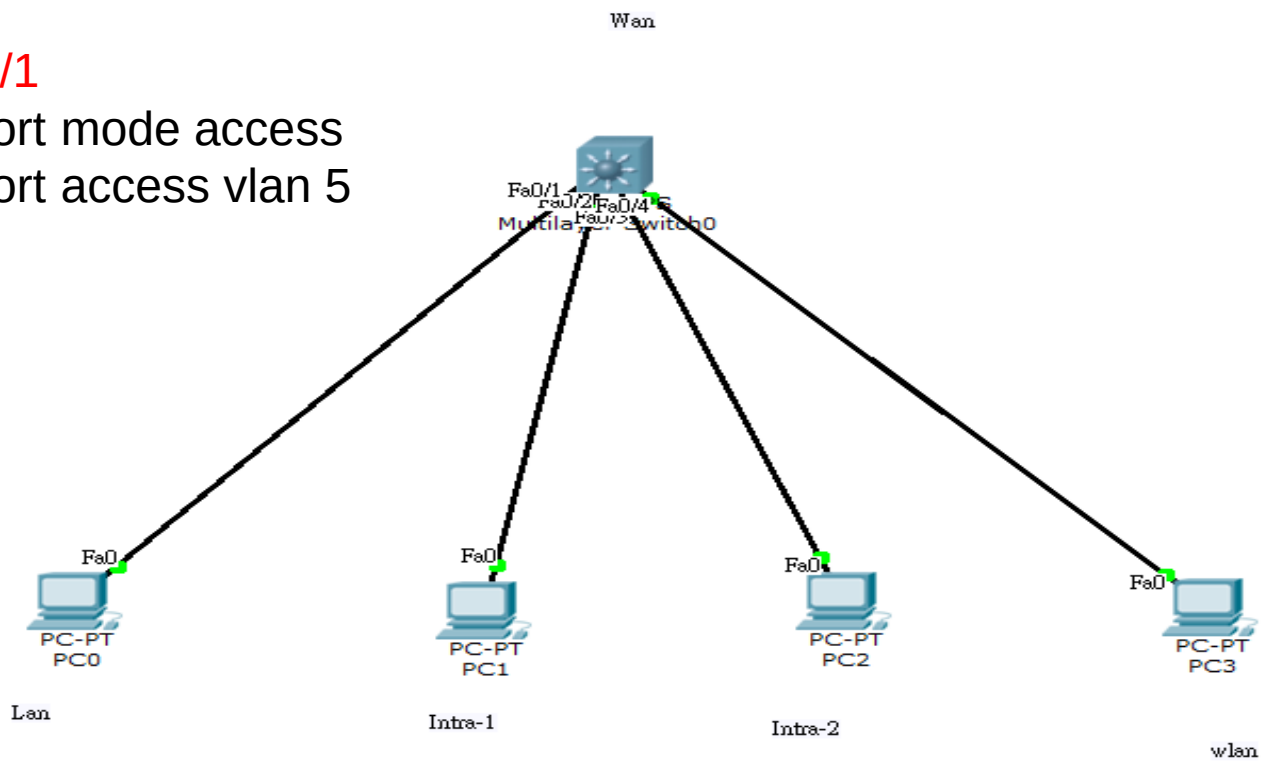
學校IP基本網段

Vlan	VID	網段	IPv6	用途
Mgt	1	10.226.56.254	2001:288:22xx:1::/64	網管用 >101 L2,>201 AP
Wan	2	163.20.202.184/29	2001:288:2201::xx/124	對外連結網段
Lan	5	163.20.66.254/24	2001:288:22xx:5::/64	行政用 保留<10 ; >250
dsa_wan	8	10.253.56.254/24	2001:288:22xx:8::/64	DSA-WAN IP (10.253.56.1)
Intra-1	10	10.231.56.254/24	2001:288:22xx:10::/64	電腦教室
Intra-2	20	10.241.56.254/24	2001:288:22xx:20::/64	教學教室
Voice	25	10.243.56.0/24	2001:288:22xx:25::/64	VoIP
Wlan	30	10.251.56.254/24	2001:288:22xx:30::/64	無線網路 (IP移至DSA-3600使用)
WPA2	35	10.245.56.0/24	2001:288:22xx:35::/64	無線WAP2用
MAC	36	10.247.56.0/24	2001:288:22xx:36::/64	無線Mobile用

Lab 5 基本練習Routing

三個Vlan間三個網段 PC相互通。

Config t
Inter fa0/1
Switchport mode access
Switchport access vlan 5



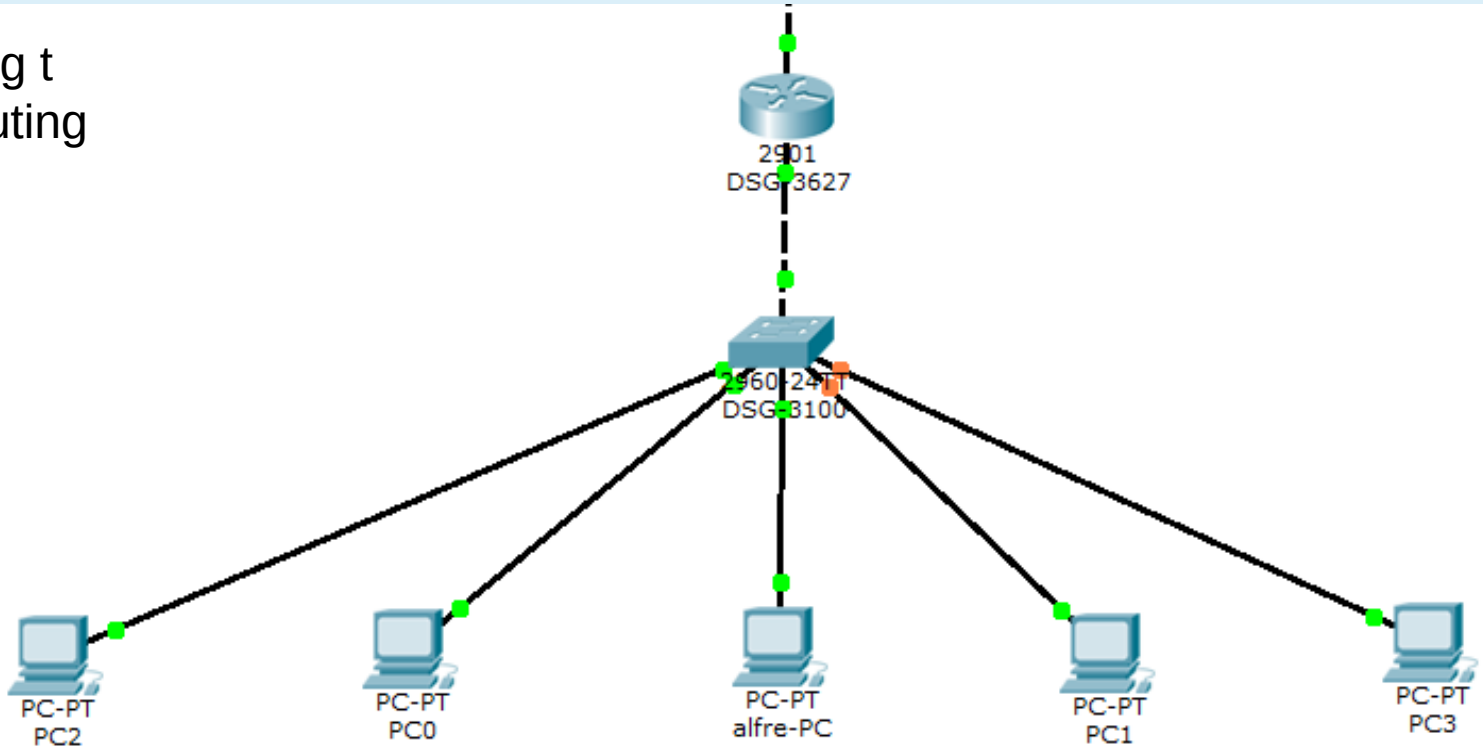
唯一出口通往他國

- 目的:了解GateWay設定
- 城池出口(Gateway)。
- WAN Route。
- ECMP

Lab 6基本練習Default Route

三個Vlan間三個網段 PC相互通，可上Internet。

Config t
Ip routing
變L3



Lab 7 與骨幹連結

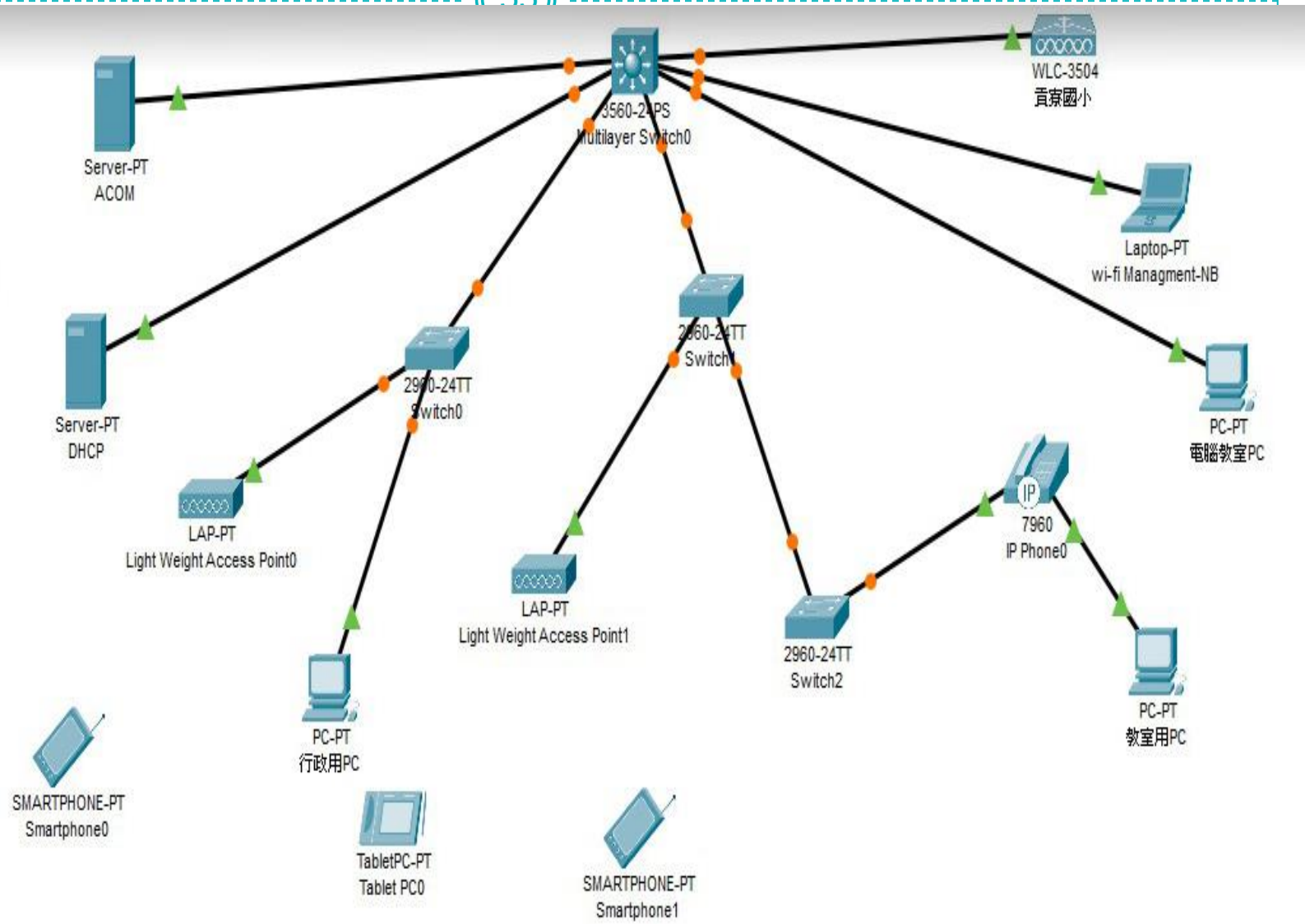
貢寮國小:
Gateway:10.229.12.254

LAN:163.20.53.192/24
intra-1: 10.232.12.0/24
intra-2:10.242.12.0/24
VoIP:10.244.12.0/24

無線用31-TANetRoaming:10.212.12.0/24
無線用32-NTPC-Mobile :10.214.12.0/24
無線用33-Eduroam :10.216.12.0/24
無線用34-class:10.218.12.0/24

WLC:10.229.12.1/24
admin/Admin123
DNS:203.72.153.153/24
DHCP:203.72.153.8
Acom:203.72.154.101

VLAN3-WLC
VLAN5-LAN
VLAN10-intra-1
VLAN20-intra-2
VLAN25-VOIP
VLAN31-TANetRoaming
VLAN32-NTPC-Mobile
VLAN33-eduroam
VLAN34-class
VLAN121-DHCP-DNS
VLAN122-Acom



網路資安常用軟體及網站

- Wapplayzer網站分析工具
  - 配合cvedetail.com查詢版本
- SSL安全性測試
  - https://www.ssllabs.com/ssltest/
- 校園網段開放服務查詢
  - https://censys.io/
- **惡意檔案檢測服務Virus Check**
  - https://viruscheck.tw/
- **Process Explorer(microsoft執行中的程式查詢)**
- https://www.shodan.io/ (設備查詢)
  - https://www.slideshare.net/TonyLin31/shodanio-70219922

Case Study

1、校園電子圍牆案。

◯需求:校內通，可以讓特定IP通內網，校內有行政網段可以看監控。(Firewall)

2、 DHCP轉移工程，同一個Vlan不連續兩個網段。

◯(竹林中學例)

3、因學校縮班，導師或行政辦公室搬家。變更教室為辦公室。

◯混合環境設定

5、中華電信進線因大樓擴柱工程，改校門口警衛室進線。

◯Vlan Wan

6、無線網路特殊用途規範。因應活動需求新增SSID。

◯Thin AP SSID

7、特殊教學需求，尖峰流量需求申請。

◯N7k PBR route and Fortinet Tunnel Mode

8、無線行動包對教學運用的特殊需求及設定。

◯Tunnel Mode with Splite Tunnel

Case實作

- 1.問題討論
- 2.拓譜圖
- 3.路由設計
- 4.動手實作

Cisco指令 and Dlink指令對照表

- L3維護指令
- L2常用維護指令
- Cisco維護指令

創Vlan

- DGS-3620
- create vlan lan tag 5

- DGS-1510
- configure terminal
- vlan 5
- name lan

- Cisco-3750X
- C3750X_CHT_F1-3(config)#vlan 5

設定vlan_port Accesc port

DGS-3620

- Config vlan lan add untagged 1
-

DGS-1510

- configure terminal
- interface ethernet 1/0/1
- switchport hybrid native vlan 5
- switchport hybrid allowed vlan untagged 5
-

Cisco-3750X

- C3750X_CHT_F1-3(config) interface TenGigabitEthernet1/1/1
- C3750X_CHT_F1-3(config) switchport mode access
- C3750X_CHT_F1-3(config) switchport access vlan 5
-

trunk port

- DGS-3620
- Config vlan default add untagged 1
- Config vlan intra-1 add tagged 1
- Config vlan intra-2 add tagged 1
- DGS-1510
- configure terminal
- interface ethernet 1/0/1
- switchport hybrid native vlan 1
- switchport hybrid allowed vlan untagged 1
- switchport hybrid allowed vlan tagged 10,20
- Cisdo-3750X
- interface TenGigabitEthernet1/1/1
- switchport trunk encapsulation dot1q
- switchport trunk allowed vlan 10,20
- switchport mode trunk

查看arp

- DGS-3620
- Sh arpentry

- DGS-1510
- Sh arp

- Cisco-3750X
- Sh arp

DGS-3620

```
ERDC-L3:admin#show arpentry
Command: show arpentry


 ARP Aging Time : 20
 ARP Retry Times : 4

Interface       IP Address        MAC Address         Type
-------------   ---------------   -----------------   ---------------
System          10.226.56.0       FF-FF-FF-FF-FF-FF   Local/Broadcast
System          10.226.56.2       54-B8-0A-C6-39-E0   Dynamic
System          10.226.56.4       54-B8-0A-C6-78-00   Dynamic
System          10.226.56.5       54-B8-0A-C6-78-80   Dynamic
```

DGS-1510

```
ERDC-L2-02>sh arp


S - Static Entry

IP Address          Hardware Addr       IP Interface    Age (min)
-----------------   -----------------   -------------   ---------------
  10.226.56.2       54-B8-0A-C6-39-E0   vlan1           forever
  10.226.56.254     3C-1E-04-B6-C2-00   vlan1           20

Total Entries: 2
```

Cisco-3750X

```
C3750X_CHT_F1-3#sh arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  10.1.1.1                -   c067.af06.a2c0  ARPA   Vlan1
Internet  163.20.202.185        191   0009.0fab.7a9d  ARPA   Vlan256
Internet  163.20.202.187        119   3c1e.04b6.c201  ARPA   Vlan256
Internet  163.20.202.188          -   c067.af06.a2c3  ARPA   Vlan256
Internet  163.20.202.190          0   0009.0f09.0008  ARPA   Vlan256
```

查看mac

```
ERDC-L3:admin#sh fdb
Command: show fdb

 Unicast MAC Address Aging Time  = 300

 VID  VLAN Name                          MAC Address       Port  Type    Status
 ---- -------------------------------- ----------------- ----- ------- -------
 1    default                          00-21-91-A7-1E-00 20    Dynamic Forward
 1    default                          00-21-91-A7-1E-FF 20    Dynamic Forward
 1    default                          3C-1E-04-B6-C2-00 CPU   Self    Forward
 1    default                          54-B8-0A-C6-39-E0 23    Dynamic Forward
 1    default                          54-B8-0A-C6-6E-C0 20    Dynamic Forward
 1    default                          54-B8-0A-C6-77-E0 23    Dynamic Forward
```

DGS-1510

```
ERDC-L2-02>sh mac-address-table

VLAN  MAC Address        Type        Ports
----  ----------------   ----------  ------------------------
   1  3C-1E-04-B6-C2-00  Dynamic     eth1/0/24
   1  3C-1E-04-B6-C3-16  Dynamic     eth1/0/24
   1  54-B8-0A-C6-39-E0  Static      CPU
   1  54-B8-0A-C6-77-E0  Dynamic     eth1/0/24
   1  54-B8-0A-C6-78-1A  Dynamic     eth1/0/24
```

Cisco-3750X

```
C3750X_CHT_F1-3#sh mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
 All    0100.0ccc.cccc    STATIC      CPU
 All    0100.0ccc.cccd    STATIC      CPU
 All    0180.c200.0000    STATIC      CPU
```

Sh vlan

六.查看vlan

DGS3620

```
ERDC-L3:admin#show vlan
Command: show vlan

VLAN Trunk State          : Disabled
VLAN Trunk Member Ports   :

VID                  : 1                    VLAN Name        : default
VLAN Type            : Static               Advertisement    : Enabled
Member Ports         : 5,8,19-23,26-28
Static Ports         : 5,8,19-23,26-28
Current Tagged Ports    :
Current Untagged Ports: 5,8,19-23,26-28
Static Tagged Ports     :
Static Untagged Ports   : 5,8,19-23,26-28
Forbidden Ports         :
```

DGS1510

```
ERDC-L2-02#show vlan

 VLAN 1
   Name : default
   Tagged Member Ports    :
   Untagged Member Ports : 1/0/24-1/0/26,2/0/24-2/0/26

 VLAN 5
   Name : lan
   Tagged Member Ports    : 1/0/24-1/0/26,2/0/24-2/0/26
   Untagged Member Ports :
```

Cisco3750X

```
C3750X_CHT_F1-3#sh vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------
1    default                          active    Gi1/0/22, Gi1/0/23
```

Sh port

五.查看port状態

DGS-3620

```
ERDC-L3:admin#show ports
Command: show ports

Port        State/          Settings            Connection          Address   AutoSpeed
            MDIX     Speed/Duplex/FlowCtrl Speed/Duplex/FlowCtrl Learning  Downgrade
-------- -------- --------------------- --------------------- -------- ---------
1        Enabled  Auto/Disabled         1000M/Full/None       Enabled  Disabled
          Auto
2        Enabled  Auto/Disabled         1000M/Full/None       Enabled  Disabled
          Auto
3        Enabled  Auto/Disabled         1000M/Full/None       Enabled  Disabled
```

DGS-1510

```
ERDC-L2-02#sh interfaces status

Port           Status         VLAN           Duplex  Speed           Type
------------- ------------- ------------- ------- --------------- -------------
eth1/0/1       not-connected 20             auto    auto            1000BASE-T
eth1/0/2       not-connected 20             auto    auto            1000BASE-T
eth1/0/3       not-connected 20             auto    auto            1000BASE-T
eth1/0/4       connected     20             a-full  a-100           1000BASE-T
eth1/0/5       not-connected 20             auto    auto            1000BASE-T
eth1/0/6       not-connected 20             auto    auto            1000BASE-T
```

Cisco-3750X

```
C3750X_CHT_F1-3#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
Vlan1                  10.1.1.1        YES NVRAM  up                    down
Vlan40                 163.20.250.254  YES NVRAM  up                    up
Vlan200                unassigned      YES unset  up                    up
Vlan256                163.20.202.188  YES NVRAM  up                    up
Vlan626                unassigned      YES unset  up                    up
FastEthernet0          unassigned      YES NVRAM  administratively down down
GigabitEthernet1/0/1   unassigned      YES unset  down                  down
GigabitEthernet1/0/2   unassigned      YES unset  down                  down
GigabitEthernet1/0/3   unassigned      YES unset  down                  down
GigabitEthernet1/0/4   unassigned      YES unset  up                    up
GigabitEthernet1/0/5   unassigned      YES unset  up                    up
```

LAB用指令

- Vlan database
- Config t
- Interface vlan interface fa0/X
- Switchport mode
- Switchport access vlan xx
- Switchport trunk allow vlan xx
- Ip add xx.xx.xx.xx xx.xx.xx.xx xx.xxx.xx.xx
- Ip route xx.xx.xx.xx xx.xx.xx.xx aa.aa.aa.aa

模擬斷線除錯

- 1.vlan斷線 或是被攻擊(要做出三台電腦測試)
- 2.學校L3故障
- 3.中華電信到教網線路斷線。
- 4.教網firewall掛點
- 5.教網ServerFarm掛點
- 教網核心交換器掛點
- 政大區網掛點

一般公文、公務雲除錯

- 需協助，Teamviewer裝起來。
- 公務雲在骨幹GOV段
- Nslookup看DNS解析是否為172.18.x.x not 61.60.x.x
- Ping cloud.ntpc.gov.tw doc2.ntpc.gov.tw
- Tracert看路由走法

一般學校網路除錯

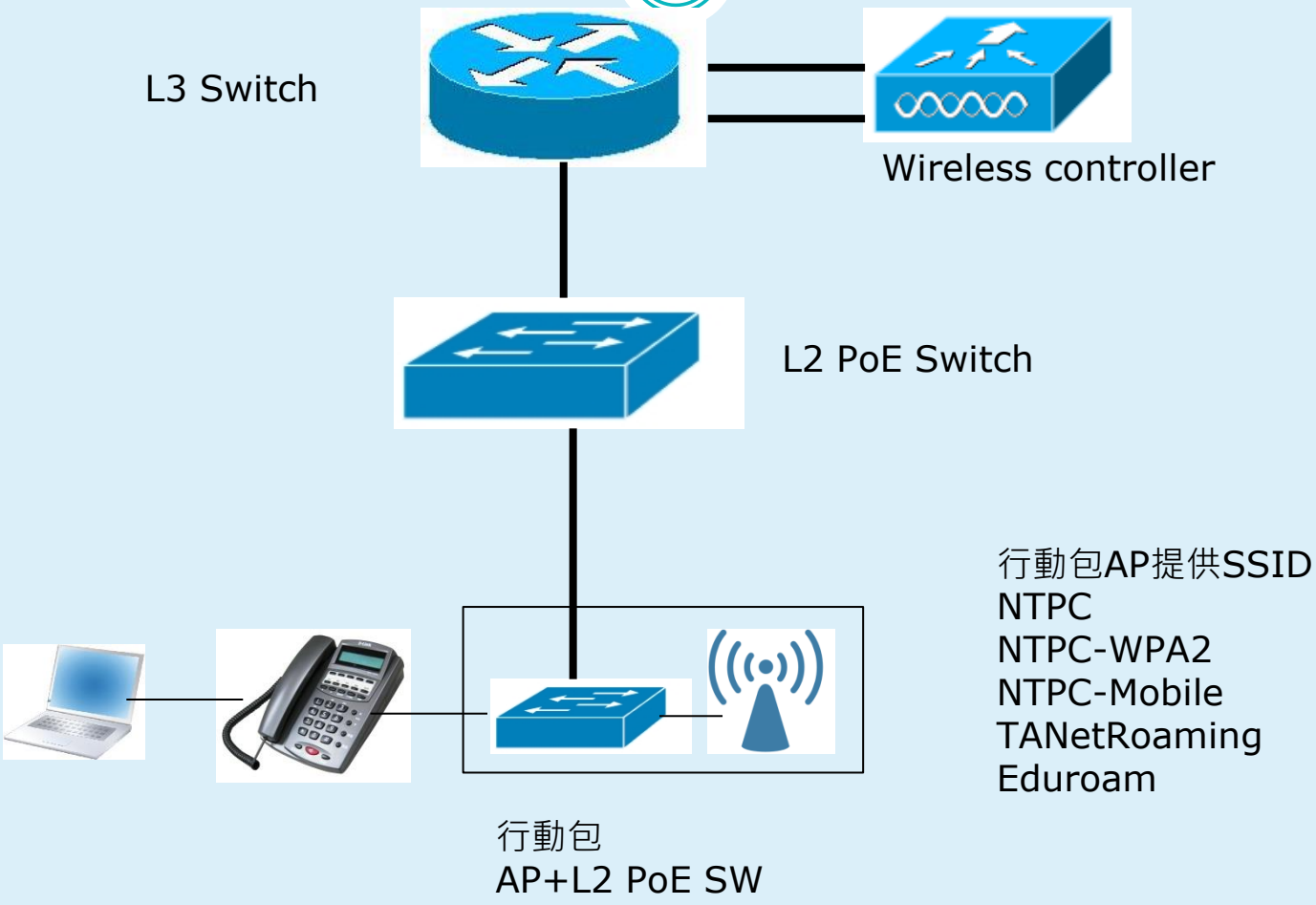
- 電話:80723456----542 工程師
- Ping gateway
- Ping wan
- Ping firewall
- Ping serverfarm
- Ping gov
- Ping nccu
- Ping www.google.com
- Tracert看路由

校園無線網路簡介

行動包Thin AP架構

D-Link Taiwan 友訊科技台灣分公司
TTSS 電信技術支援課
Name:
Phone:02-66000123,
Email:

行動包Thin 架構


L3 Switch
Wireless controller
L2 PoE Switch
行動包AP提供SSID
NTPC
NTPC-WPA2
NTPC-Mobile
TANetRoaming
Eduroam
行動包
AP+L2 PoE SW

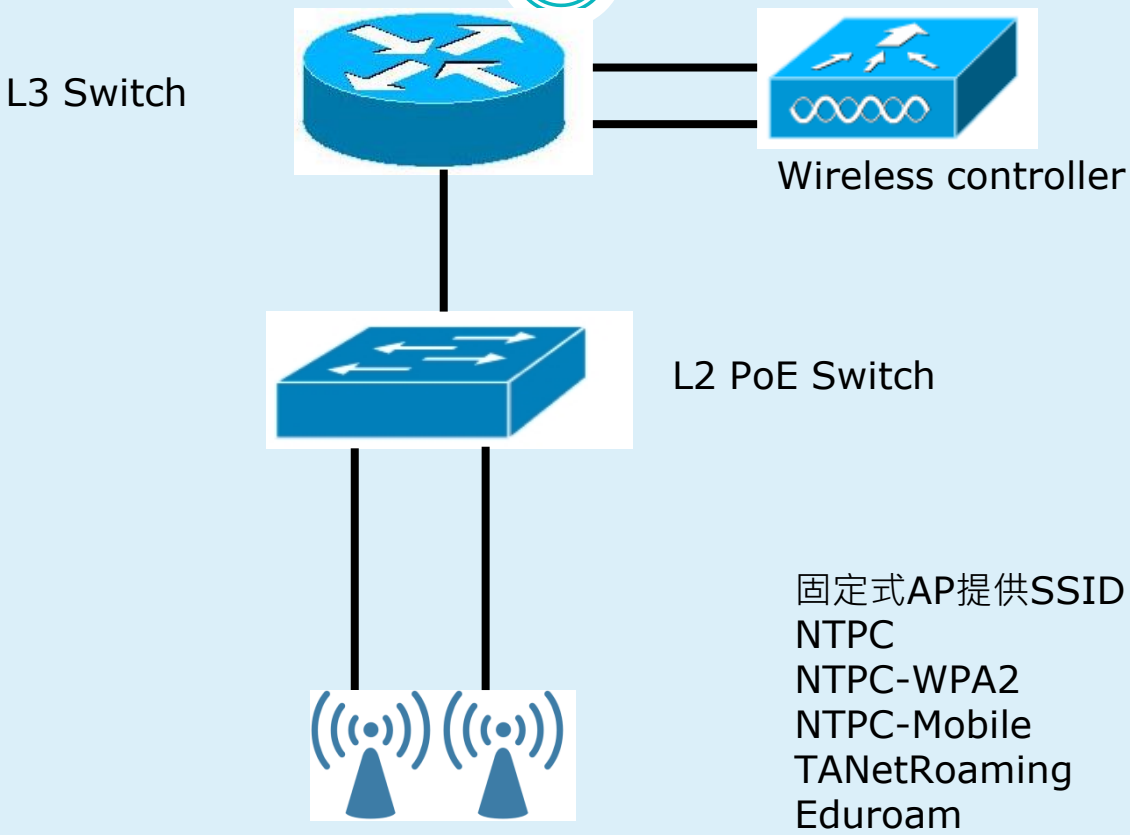
行動包架構說明

- 行動包無線AP透過行動包內的PoE switch供電
- 行動包的PoE Switch可以任意接上L2 PoE Switch的Port上,AP可以自動連回無線控制器上更新資訊!
- 行動包如果使用話機的網點,將可將話機接上PoE switch,後端電腦接於話機上,依然可以正常使用
- 行動包AP須提供5組SSID提供後端WEB認證,WPA2認證與MAC認證的接入點!

固定式Thin AP架構

D-Link Taiwan 友訊科技台灣分公司
TTSS 電信技術支援課
Name:
Phone:02-66000123,
Email:

固定式Thin AP架構

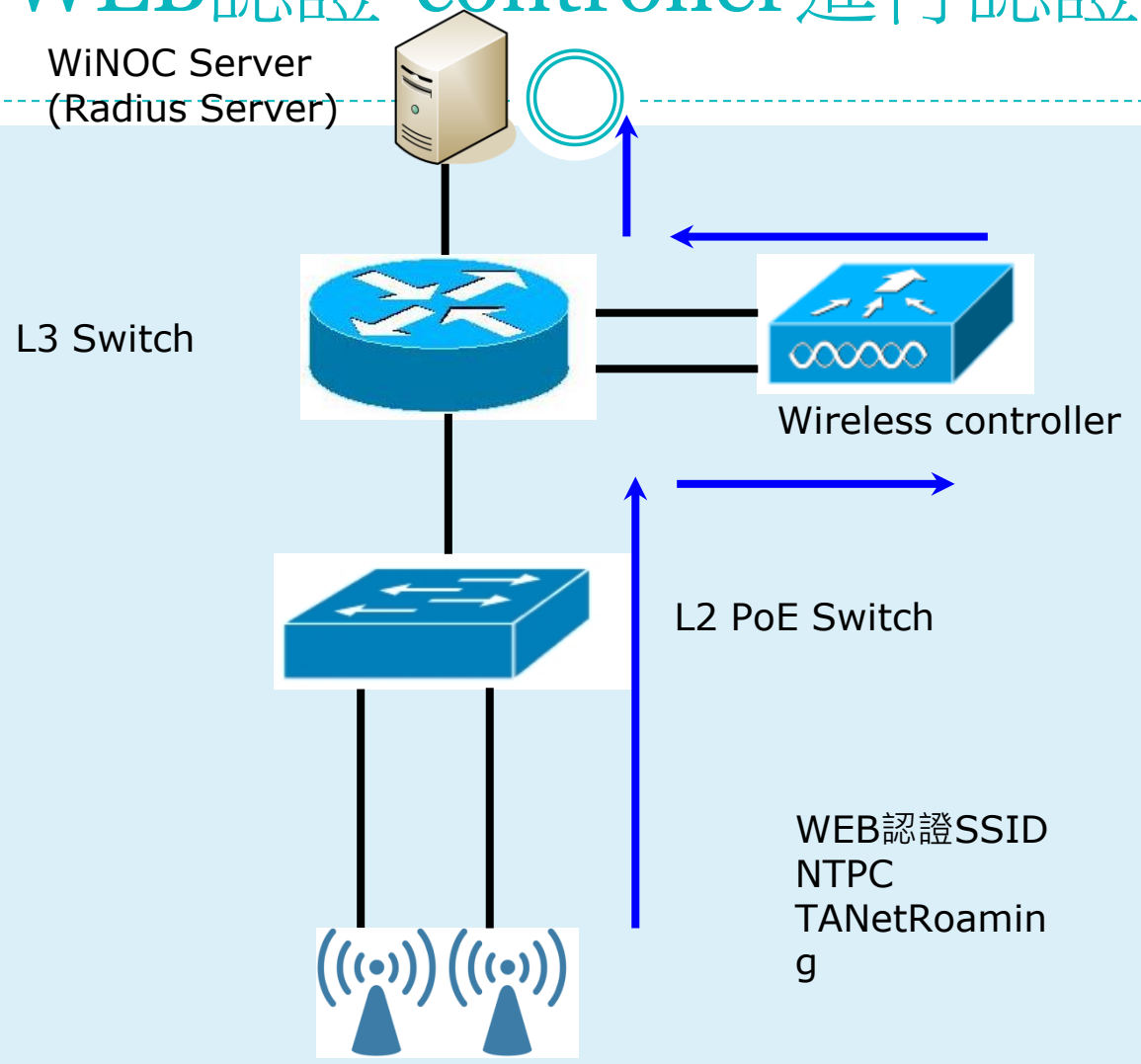


固定式AP提供SSID
NTPC
NTPC-WPA2
NTPC-Mobile
TANetRoaming
Eduroam

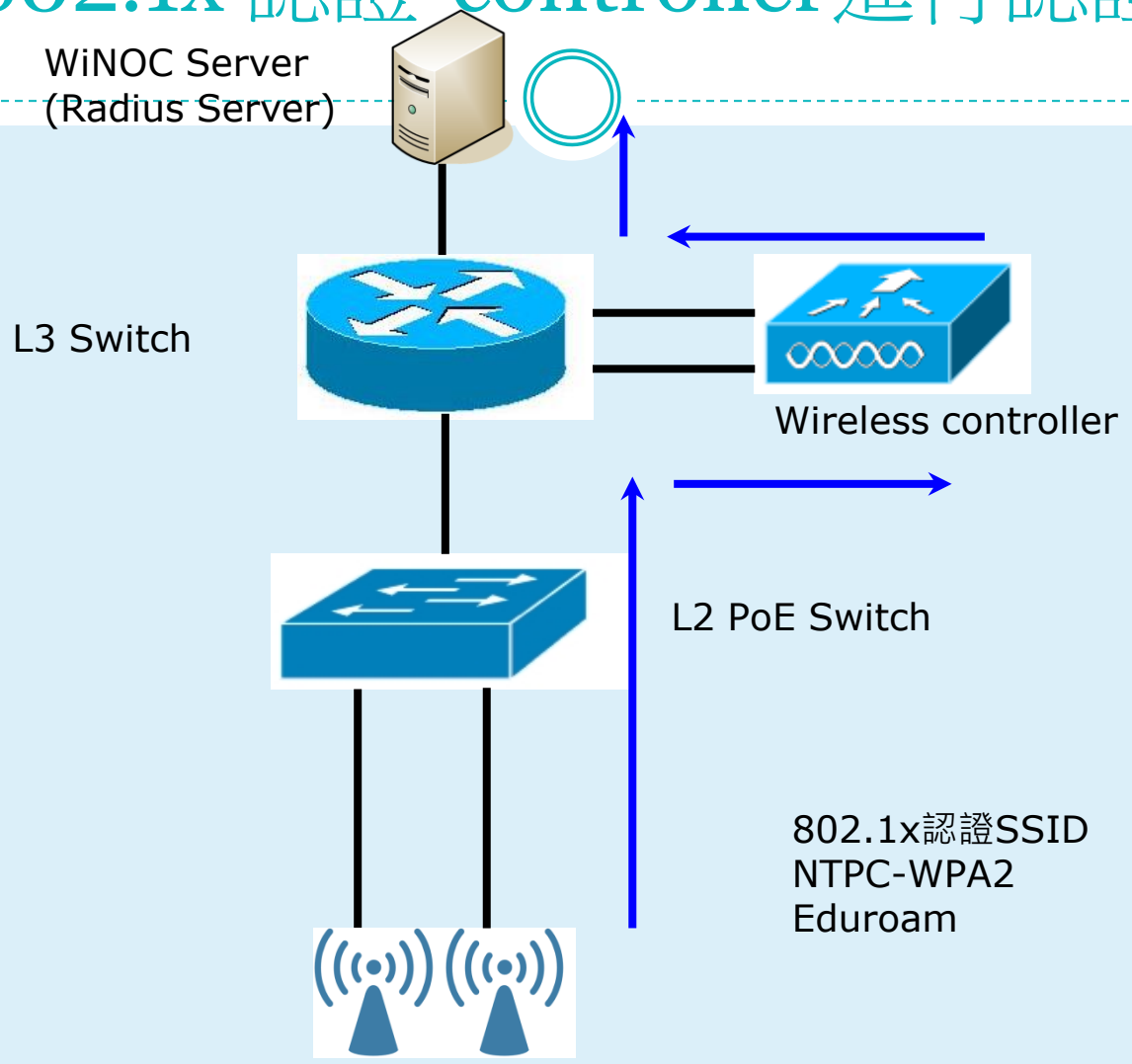
固定式架構說明

- 固定式無線AP透過L2 PoE switch供電
- 固定式無線AP建立5組SSID提供後端WEB認證,WPA2認證與MAC認證的接入點!
- 固定式無線AP由無線網路控制器進行控管,可統一配發設定資料與韌體升級等

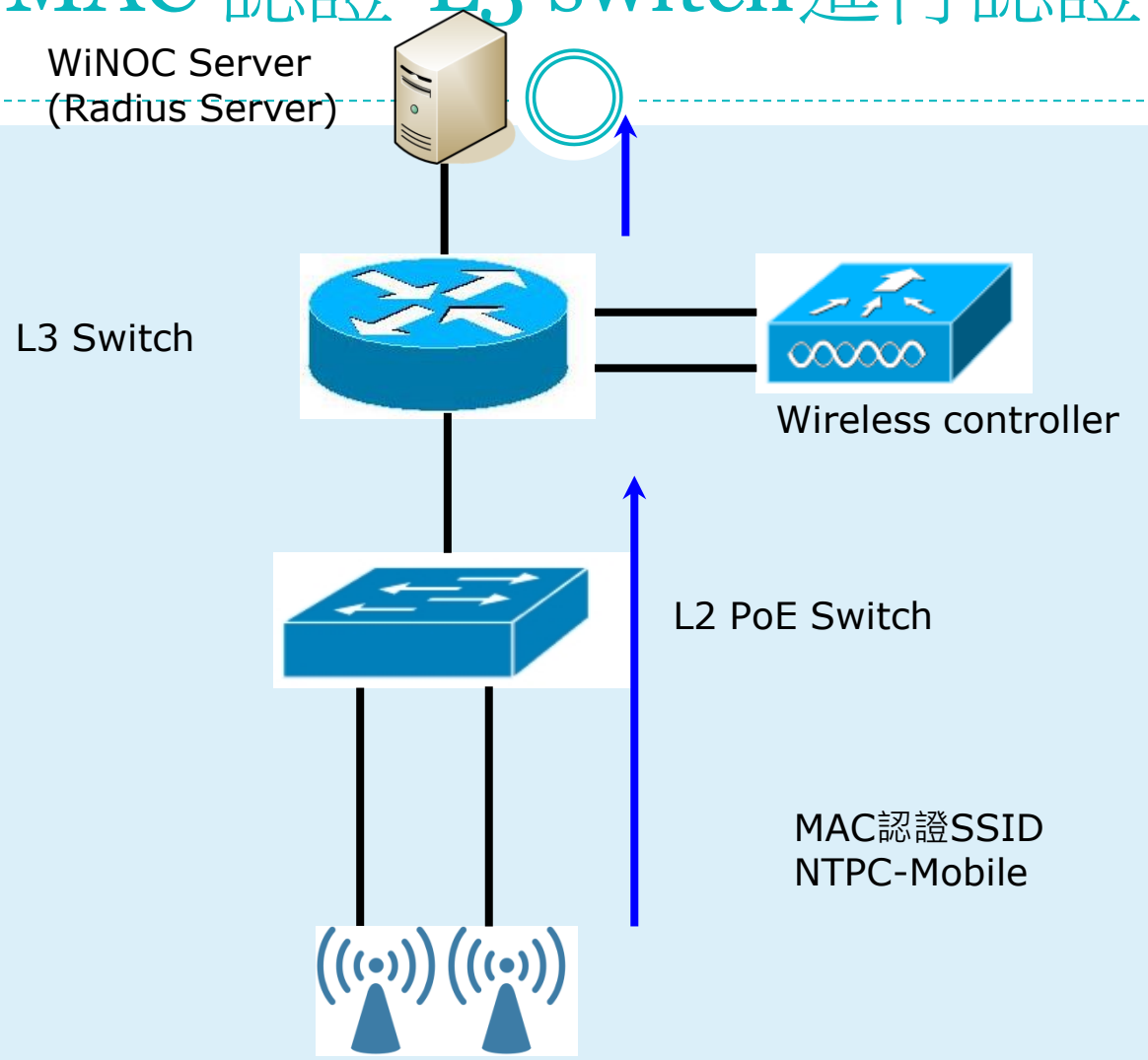
WEB認證-controller進行認證



802.1x 認證-controller進行認證



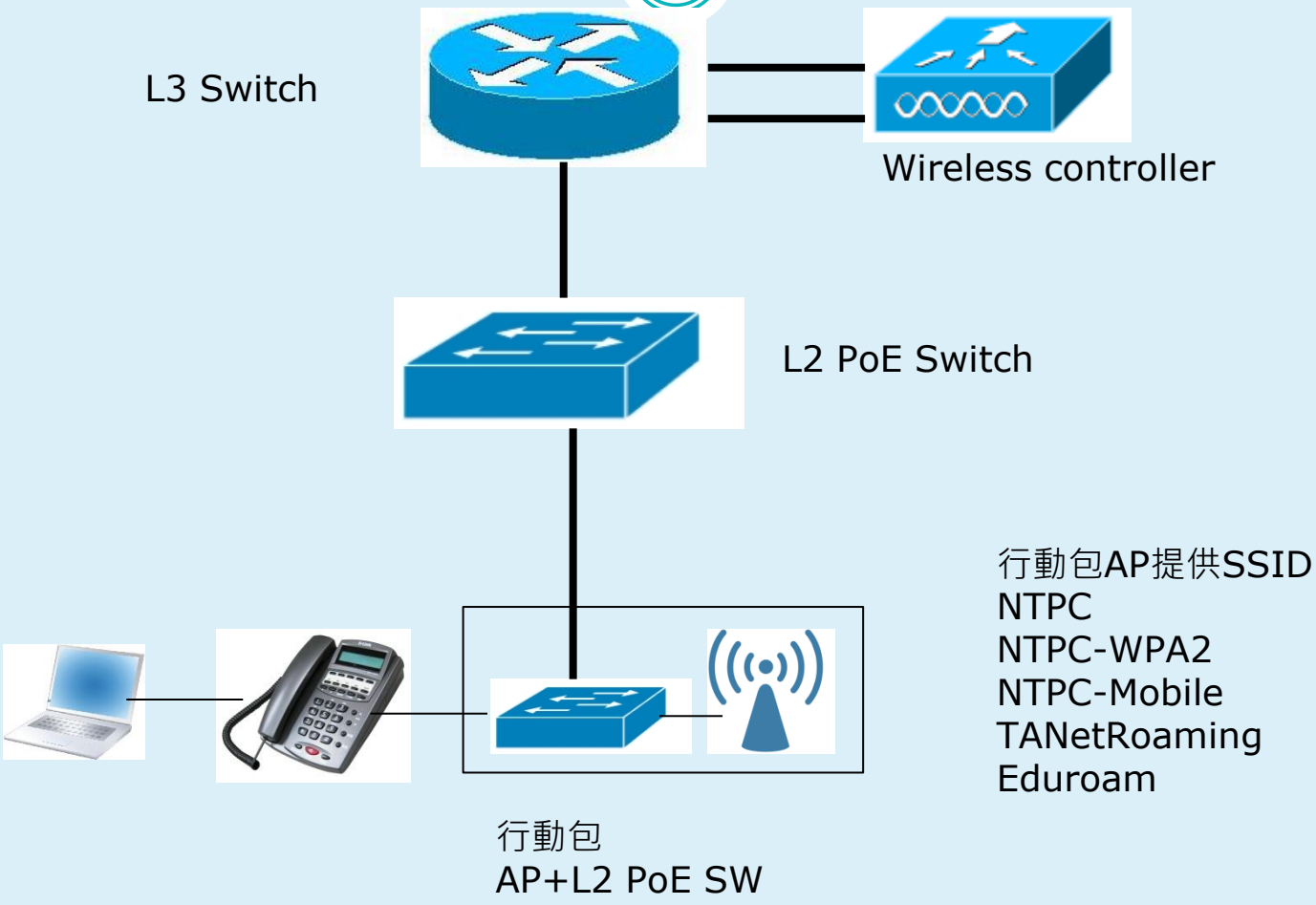
MAC 認證-L3 switch進行認證



行動包Thin AP架構

D-Link Taiwan 友訊科技台灣分公司
TTSS 電信技術支援課
Name:
Phone:02-66000123,
Email:

行動包Thin 架構


L3 Switch
Wireless controller
L2 PoE Switch
行動包AP提供SSID
NTPC
NTPC-WPA2
NTPC-Mobile
TANetRoaming
Eduroam
行動包
AP+L2 PoE SW

行動包架構說明

- 行動包無線AP透過行動包內的PoE switch供電
- 行動包的PoE Switch可以任意接上L2 PoE Switch的Port上,AP可以自動連回無線控制器上更新資訊!
- 行動包如果使用話機的網點,將可將話機接上PoE switch,後端電腦接於話機上,依然可以正常使用
- 行動包AP須提供5組SSID提供後端WEB認證,WPA2認證與MAC認證的接入點!
- Ap透過WPA2 vlan至AC取得config後啟動。因此行動包AP manager ip為10.245.x.x or 10.246.x.x
- 固定式為10.226.x.x or 10.227.x.x
- Tips : WPA2阻擋認證位置在AP，因此有線直接接WPA2 Vlan是可以直接work

Case Study

1、校園電子圍牆案。

需求:校內通，可以讓特定IP通內網，校內有行政網段可以看監控。(Firewall)

2、 DHCP轉移工程，同一個Vlan不連續兩個網段。

3、大樓老舊拆除，整棟大樓搬遷作業，L2 Switch搬家。

4、因學校縮班，導師或行政辦公室搬家。變更教室為辦公室SOP。

5、中華電信進線因大樓擴柱工程，改校門口警衛室進線。

6、無線網路特殊用途規範。因應活動需求新增SSID。

7、特殊教學需求，尖峰流量需求申請。

8 、無線行動包對教學運用的特殊需求及設定。

9、KMS是否開放無線網路認證?

10、snm拓譜圖之重要性。