出國報告(出國類別:實習)

「汰換臺北飛航情報區北區數位微波 系統案」原廠訓練出國報告書

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派赴國家/地區:新加坡

出國期間:107/09/09~107/09/21

報告日期:107/11/09

摘要

汰換臺北飛航情報區北區數位微波系統案(下稱本案),係建置臺北飛航情報 區北區數位微波系統,傳輸本區航管無線電、行政網路、業務網路及雷達訊號等 重要資料,以提供更優質飛航服務品質。

原微波設備傳送 Ethernet 電路資料時須經 CSU/DSU 設備的轉換,且每一路 El 有 2Mbps 容量的限制,本案新設之微波系統兼容了 TDM 與 Ethernet 電路,既能符 合總臺既有語音 TDM 訊號傳輸的需求,亦能因應未來設備 IP 化所產生的網路傳輸 需求,而且總傳輸容量也大幅提升,能為各站臺間資料的傳送提供更為便利的傳 輸路徑。

此次受訓前往位於新加坡之亞太區總部訓練教室,執行為期13天原廠訓練。 回國後配合架設以及實施維護技術轉移,進而強化其他航電維護人員能力,提昇 裝備妥善率及故障排除能力。

目第	錄
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壹、 目的	1
貳、 過程	2
一、 參與人員	2
二、 日期	2
三、 行程	2
參、 內容	3
一、 系統架構	3
(一)、 本案概述	3
(二)、 微波通信基本概念	4
(三)、 MRMC 說明	5
(四)、 ACM 說明	7
(五)、 XPIC 說明	9
(六)、 MC-ABC 說明 1	0
二、 關於設備	3
(一)、 硬體設備	3
1. 簡介	3
2. RFU-A	3
3. IP20N	7
(二)、 硬體安裝	25
1. RFU-A 安裝:	25
2. IP20N 安裝 2	27
(三)、 本案各 HOP 設置	30
1. HOP1、HOP2(大屯山<->北管)	30
2. HOP3(大屯山<->桃園)3	30
3. HOP4(大屯山<->松山)	31
三、 系統設定	32
(一)、 設定前準備	32
(二)、 基礎設定	34
(三)、 射頻設定	37
1. 多樣化速率及多層次調變(MRMC)射頻劇本設定	37
2. 發射(TX)/接收(RX)頻率設定、Link ID設定、發射功率設定3	38
3. 1+1-HSB 設定 3	39
4. 1+1-HSB 保護切換優先等級 4	14

(四)、 Ethernet 服務設定	46
1. 服務 (Service) 與服務點 (Service Point 簡稱 SP)	46
2. 服務點與邏輯介面的關係	50
3. 設定 MNG 服務	50
4. 設定點對點服務 (Point-to-Point Service 簡稱 P2P)	53
5. 設定多點服務 (Multi Point Service 簡稱 MP)	57
(五)、 TDM 服務設定	59
(六)、 2+2-HSB 快速設定	63
(七)、 IP20N 系統參數備份及還原設定	70
(八)、 IP20N 系統參數備份檔 Export 及 Import 設定	72
四、 系統監測	78
(一)、 訊號接收	78
(二)、 誤碼檢查	78
(三)、 調變速率	79
(四)、 流量查詢	79
(五)、 告警狀況	79
(六)、 外接告警	80
(七)、 TDM 驗證	80
(八)、 射頻 RF 驗證	81
五、 系統權限及帳號	83
(一)、 權限建立	83
(二)、 帳號建立	84
(三)、 密碼設定	85
六、 實機演練	86
(一)、 實機設備	86
(二)、 故障與排除	88
1. 模擬 RFU-A 射頻模組發生故障	88
2. 模擬 Slot 2 Eth 介面卡故障	90
肆、 心得及建議	92
一、 心得	92
二、 建議	92
(一)、 建議增加採購網路流量測試儀器	92
(二)、 建議增加 MSTP 教育訓練課程	92
附錄一英文縮簡寫與中文意思對照表	93

壹、 目的

臺北飛航情報區北區數位微波系統連接北部飛航服務園區、桃園機場塔臺、 松山機場塔臺及大屯山助航臺等重要單位,使各站臺在原有中華電信專線路由情 況外,再增加一路由飛航服務總臺自主維護之通信路由,傳輸本區航管無線電、 行政網路、業務網路及雷達訊號等重要資料,以提供更優質飛航服務品質。

原微波系統建置於民國92年,連接北部飛航服務園區、松山機場塔臺、桃園 機場塔臺、大屯山助航臺及林口助航臺等重要站臺,並以大棟山為中繼站形成具 備環狀保護路由之系統,系統容量為STM-1之標準SDH系統。105年因林口助航臺 去任務化後,拆除微波站臺,故須調整環狀路由架構,另受限於大棟山中繼站至 松山機場塔臺間有遮蔽物影響訊號傳輸,無法維持環狀架構之穩定性,遂將原架 構改為以大屯山助航臺為中心點之放射型星狀架構,其支點分別為北部飛航服務 園區、松山機場塔臺及桃園機場塔臺。因設備已逾使用年限(8年)且囿於維修 零組件停產,亟需汰換,以維飛航服務品質,故規劃本案於107年至108年分二年 執行。

本案經公開招標最有利標決標,由廠商全濠科技股份有限公司得標,依該公司規劃,射頻單元及微波機採用以色列Ceragon公司產品,低速介面卡為得標廠商自行研發之產品,此次受訓前往Ceragon位於新加坡之亞太區總部訓練教室,執行為期將近2週的原廠訓練。回國後配合架設以及實施維護技術研討轉移,進而強化其他航電維護人員能力,提昇裝備妥善率及故障排除能力。

貳、 過程

一、 參與人員

雷政祥	民用航空局飛航服務總臺航電技術室通信氣象課副工程司
王立賓	民用航空局飛航服務總臺資訊管理中心通信設備臺幫工程司
邱偉銘	民用航空局飛航服務總臺臺北裝修區臺通信氣象臺工務員
邱聖義	民用航空局飛航服務總臺臺北裝修區臺大屯山助航臺工務員
張日曜	民用航空局飛航服務總臺桃園裝修區臺通信氣象臺工務員

二、日期

民國107年09月09日至107年09月21日

三、 行程

107年09月09日去程由桃園國際機場,搭乘長榮航空班機,飛抵新加坡樟宜機場。

107年09月10日~107年09月20日:於Ceragon原廠訓練中心,進行為期11日之微 波系統設備原廠訓練。

107年09月21日:回程由新加坡樟宜機場,搭乘長榮航空班機,返抵桃園國際機場。

參、 內容

一、 系統架構

(一)、 本案概述

臺北飛航情報區北區數位微波系統為北部各機場與重要站臺間重要之通訊傳 輸骨幹,連接了北部飛航服務園區、桃園通信氣象臺、臺北通信氣象臺及大屯山 助航臺等重要單位。

現有北區數位微波系統設備,自民國92年架設啟用後,為強化系統韌性,於 96年由星狀架構改為環狀架構,後因林口助航臺於105年撤臺,又恢復為星狀架 構,至今已服役逾15年,現有微波系統原廠維修零組件已停產,導致維護困難。 基於前述原因,本案採購4-HOP微波系統設備(含多工機),以汰新原有設備,並 新增北部飛航服務園區與大屯山助航臺間一路備援設備,以提高飛航通信服務的 可靠率及提高飛航服務品質。



圖1-1 北區數位微波系統連線拓樸圖

本案每個微波站臺的微波設備主要由微波機及E1多工機所構成,各微波站臺 將TDM訊號接進E1多工機後再以E1電路連接至微波機,而Ethernet訊號則經由網 路交換器再以網路線連接至微波機,這兩種訊號經由微波機處理後以微波形式經

天線傳送至對方站臺。



圖1-2 北區數位微波系統架構圖

(二)、 微波通信基本概念

微波通信是屬於點對點的無線電通信,每個HOP一般具有兩個相互目視可見的微波站臺。

微波傳輸一般使用的載波頻率為4~86GHz。



圖 1-3 單一 HOP 示意圖

每一微波站既是發射端也是接收端,其基本工作流程如下:

(發射端)輸入訊號→數位電路介面→調變器→發射機→濾波器→分配器→ 導波管→天線

(接收端)天線→導波管→分配器→濾波器→接收機→解調變器→數位電路 介面→輸出訊號



圖 1-4 微波通信基本工作流程

影響微波傳輸的參數有:自由空間損失、大氣條件(包含溫度、濕度、介質 折射、氣體吸收)、極化和雨衰、地形和建築物造成的反射及干擾等,不同微波 頻段受影響程度不同,一般來說頻段越高受影響程度越高。原有的微波系統在下 豪雨的天氣時,微波訊號衰減非常厲害,甚至造成微波訊號中斷,另微波訊號也 容易受建築物阻擋,因此微波站臺都儘量架設在高處避免受建築物影響。

(三)、 MRMC 說明

MRMC多樣化速率及多層次調變射頻劇本(Multi-Rate Multi-Constellation radio scripts)是Ceraogn微波系統獨有的射頻劇本,其作用為可預先設定不同 射頻的使用方式,如:頻寬、容量、規範、調變及ACM選擇等於某個特定的劇本 編號(Script ID),再依照不同配置情形,使用同編號的射頻劇本,以便於兩微 波站臺間MRMC的頻寬及調變等設定一致,可避免維修時花費過多時間進行安裝、 查修及調校等,提升維修效率。

MRMC Symmetrical ETSI So	cripts					
MRMC script configuration -	Script: 4504Interface: Radio: Slot 1, Port 1	1				
Script ID	4504					
Channel Bandwidth (MHz)	28					
Occupied Bandwidth (MHz)	26.5					
Script Name	mdN_A028028X_128_4504					
ACM Support	Yes					
Symmetry	Normal					
Standard	ETSI					
Script configuration parame	eters - Interface: Slot 1, Port 1					
MRMC Script operational me	ode Adaptive V					
MRMC Script maximum prof	file Profile 0, 2 QAM, 20.512 Mbps	~				
MRMC Script minimum profi	le Profile 0, 2 QAM, 20.512 Mbps	~				
Apply Apply • Warning: pressing 'Apply' may reset the radio interface and affect traffic.						
Page Refresh Interval (Second	s) None V Last Loaded: 13:35:14	Refresh Close				

圖1-5 MRMC設定內容

Script ID	劇本編號
Channel bandwidth (MHz)	使用頻寬
Occupied bandwidth (MHz)	占用頻寬
Script Name	劇本名稱
ACM Support	適應編碼調變狀態
Symmetry	調變與容量對稱
Standard	頻譜規範標準
ETSI	歐規頻譜頻寬選擇(7、14、28、40、 56、80MHz)
ANSI	美規頻譜頻寬選擇(10、15、20、 30、40、60、80MHz)
MRMC Script operational mode	適應編碼調變與固定調變選擇(ACM、 FIX)
MRMC Script maximum profile	適應編碼調變之最高調變度
MRMC Script minimum profile	適應編碼調變之最低調變度

表1-1 每組射頻多重速率叢集劇本

檢視MRMC Status可以看到當時的調變速率。如下圖示:

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圖1-6 MRMC頻寬及調變速率設定



圖1-7 MRMC Status檢視

(四)、 ACM 說明

ACM適應編碼調變(Adaptive Coding and Modulation)是一種可因應外在 環境條件因素下,依據FEC(前向錯誤更正)和自動降低或提升調變度等技術, 進行自動調整或補償,使該鏈路能適應其環境條件,完成正確及有效率的傳輸。 例如:

當ACM打開時,微波系統將根據接收訊號品質選擇最高容量,當訊號品質下降(衰落/干擾),將會降低調變度以獲得較佳的SNR,但是會導致可用容量減少;當訊號品質改善時,微波系統會提升調變度並恢復容量。當容量減少或擁塞期間,ACM將根據QoS優先考慮保護TDM與重要網路流量。



圖1-8 適應編碼調變(ACM)



圖1-9 調變容量圖形

MSE均方誤差(Mean-Square Error, MSE)是射頻干擾預測值與量測值之間 差異程度所產生的誤差量。

ACM	環境預估	最低可用接收值	MSE
BW=28MHz	(dB)	(dB)	(dB)
QPSK	-94	-76	-18
8PSK	-94	-75	-19
16QAM	-94	-71	-23
32QAM	-94	-68	-26

公式:環境預估-最低可用接收值= MSE(均方誤差)

64QAM	-94	-65	-29
128QAM	-94	-62	-32
256QAM	-94	-60	-34
512QAM	-94	- 57	-37
1024QAM (strong FEC)	-94	- 56	-38
1024QAM (light FEC)	-94	-53	-41
2048QAM	-94	-51	-43

表1-2 ACM與MSE關係計算表

(五)、 XPIC 說明

當微波系統使用雙極化天線時,可以同時發射一個同頻率的垂直極化(V) 與水平極化(H)射頻載波,因而具有傳輸頻寬加倍的優勢,但在同個傳輸通道 內不能完全隔離垂直極化與水平極化情形下,此優勢仍有不可避免的物理性限 制,例如降雨、降雪或大霧等氣候,將有可能導致極化傳輸資料偏移,而產生交 叉極化干擾(Cross polarization interference)。若微波系統運作於低調變度 (如QPSK調變)時,雖然較能容忍交叉極化干擾,但並不符合使用效益(通常只 有8路E1),而必須使用更大的傳輸頻寬才能滿足原有的傳輸容量,因此反而降低 了頻率使用效率。所以當使用雙極化射頻載波又想將提升調變度時,採用XPIC交 叉極化干擾消除(Cross Polarization Interference Cancelation)便是一種 最佳方案。

應用於Ceragon微波系統的XPIC技術,可以同時偵測兩個極化訊號(V和H), 在較差的環境下,消除射頻載波中的交叉極化干擾訊號(h和v),提高微波系統 的天線交叉極化鑑別能力,而能夠使用較高的調變度,所以將可提升微波系統的 傳輸容量與最佳頻率使用效率。

XPIC機制必須使用來自V和H數據控制器去接收獲取V和H訊號,若有接收的訊號含有另一極化干擾訊號V+h和H+v,將會消除彼此間的交叉極化干擾訊號h和v,並補償V和H極化之間的訊號損失。示意圖如下圖所示:





圖1-11 交叉極化

XPIC消除干擾的方法是在接收端鑑別出干擾訊號,並產生與干擾訊號反相的 相同訊號,藉以消除干擾,但Ceragon微波系統僅支援於最高1024QAM調變。



圖1-12 交叉極化干擾消除

(六)、 MC-ABC 說明

MC-ABC多載波適應頻寬控制(Multi-Carrier Adaptive Bandwidth Control)是Ceragon微波系統的創新技術,藉由該邏輯晶片,應用於多個射頻調 變介面卡(RMC),進行傳輸聚合、控制及最佳化。

MC-ABC技術可將多個Ethernet、TDM及STM-1訊號,聚合為單一可變容量的虛 擬傳輸服務通道,透過多個RMC進行分流,依據實際使用情形決定不同的服務流 量,進而最佳化傳輸管理能力,並可提供TDM為最高層級保護。

在MC-ABC模式中,當氣候或物理條件導致ACM調變不斷變化與射頻訊號衰落時,每個載波透過適當的分流控制,提供TDM的最佳可靠度,並對Ethernet進行

負載平衡分配,進而提升頻寬使用效率。

MC-ABC處理器執行方塊圖,如下圖所示:



圖1-13 MC-ABC方塊圖

舉例如下圖,MC-ABC將4路RMC整合為一路ABC Engine的虛擬傳輸服務通道。

CERAGON



圖1-14 MC-ABC RMC正常時

當有一路RMC故障時,ABC Engine立即將TDM及Ethernet訊號改分配至正常的RMC傳送。



圖1-15 當RMC異常時MC-ABC的變化

二、 關於設備

(一)、 硬體設備

1. 簡介

本案採用之射頻單元及微波機,採用Ceragon FibeAir IP20N With RFU-A產品,屬室內型模組化架構的微波系統,透過主、副控制卡上之管理介面(MGMT Port)可快速連接至管理電腦,經由一般常見作業系統(Windows、Linux、IOS、Android)之瀏覽器(Microsoft IE、Apple Safari、Google Chrome、Mozilla Firefox、Opera…等)登入網頁管理介面(Web login),以拖、拉、放的操作方式進行快速設定、查詢及維護。

微波機FibeAir IP20N(以下簡稱IP20N)所具備之韌體,皆由Ceragon公司的CeraOS提供支援,CeraOS是適用於所有IP20系列產品的作業系統;IP20N具備Ceragon公司的射頻多工技術,可在整個傳輸網路中提供高達Gigabit等級之傳輸容量。

Ceragon FibeAir IP20N With RFU-A特性如下:

無線射頻傳輸技術組合多樣化。

● 可擴充多個Gigabit無線射頻網路傳輸容量,使用MC-ABC技術,於設備操作頻段(4-86GHz),達成最高容量的可靠傳輸。

● 模組化架構具高度可擴充性,在2RU中最多可容納10個無線射頻載波。

● 統一作業系統CeraOS,可相容所有IP20系列產品。

● 在單一IP20N透過MGMT Port連接至管理電腦,可支援整個無線射頻網路 內所有IP20N的設定管理。

2. RFU-A

RFU-A是室內無線電射頻單元,具備1U尺寸單體機框,容納1+1-HSB架構,主要特性如下:

- 用於TDM和Ethernet訊號流量整合。
- 較小的設備面積,可節省機架空間。
- 使用於6-11GHz頻率的長距離微波。
- 具備ACM功能(QPSK~2048QAM)。
- 傳輸容量最高可達2Gbps。
- 可堆疊產生多種組合:1+0/1+1/2+0/2+2/4+0/8+0。
- 模組化架構,易於安裝、維護和升級。



圖2-1 RFU-A,左右各一組射頻模組,中間射頻濾波模組



圖2-2 抽拉式RFU-A模組與1+1耦合模組利於拆卸安裝





圖 2-3 RFU-A 射頻濾波(Branching Drawer) 模組



圖 2-4 RFU-A 射頻模組



圖 2-5 2+2 RFU-A 模組示意圖



圖 2-6 RFU-A 2+2 耦合模組示意圖



圖 2-7 RFU-A 射頻配件



圖 2-8 RFU-A L 型硬導波管



圖 2-9 RFU-A 射頻 2+2-HSB



圖 2-10 RFU-A 射頻 2+2-HSB 架構加硬導波管模組





圖 2-11 RFU-A 模組分解圖

3. IP20N

每個IP20N機框含主、副控制卡(TCC)、電源模組(PDC)、風扇模組(Fans tray)、濾網(Filter tray)等組件,並依電路規劃需求在對應插槽中插入 Radio介面卡(RMC-B)、E1介面卡(LIC-T16)、Eth介面卡(LIC-X-E4-Elec)等 模組。

IP20N系統架構詳如下圖



每個IP20N 2RU機框內各插槽的槽位編號為1-12及50、51,詳如下圖所示, 編號1及11的槽位是主、副控制卡插槽,編號2及12插槽是通用插槽,可以安裝 Eth介面卡、E1介面卡及STM1介面卡等,但一般是用於安裝Eth介面卡,編號3-10 是Radio介面卡、E1介面卡及STM1介面卡通用插槽。



圖 2-13 IP20N 2RU 機框及各插槽

				il A				11	(TCC)	12	PDC2	
(C) and			W	5 12	5	0	FILTER	3	4	5	6	FANS
	<u>)</u> 7	6 8	10 G	9	10	(curvery)	U		(TCC)	2	PDC1	
	3	° 💮 4	° (D)	5	6 6							
			M C	° 🍈 2	5	1						

圖 2-14 IP20N 2RU 各插槽編號



圖 2-15 通用插槽(Universal Slots)

各介面卡的說明如下:

- 主、副控制卡
- 提供IP20N的CPU功能
- 負責主機管理、交換整合(含SD卡)
- 負責IP20N的同步(含1個同步介面)
- 處理交換容量:16Gbps
- 機框控制和管理
- 網路流量管理和交換
- 含2個MGMT Port
- 含2個GbE SFP介面
- 含2個GbE RJ-45電介面
- 含外接告警介面







圖 2-17 主、副控制卡 TCC 的 SD 卡及插槽

Radio介面卡:

- 支援ACM功能
- 支援高達 2048 QAM、支援XPIC功能
- 支援報頭重複消除



圖 2-18 Radio 介面卡 RMC (Radio Modem Card)

Color	ACT	LINK	RFU
off	No power	No power	No power
green	OK, active mode	Link OK no alarms	RFU is OK
Orange	OK, standby mode	Minor or warning alarm	Minor or warning alarm
red	failure	Critical or major alarm	Critical or major alarm

圖 2-19 Radio 介面卡燈號意義

E1介面卡:

- 含1個同步介面
- 含1個16路E1的介面



圖 2-20 E1 介面卡 (LIC-T16)

Color	ACT	Sync Left LED for port	Sync Right LED for port	E1/DS1 LED	STM1/OC3
off	No power	The interface is disabled or no signal is being received	The interface is disabled	The interface is disabled	The interface is disabled
green	OK, no alarms	Indicates whether a valid signal is being received when enabled	Indicates whether the interface is configured to export a clock	No alarms	No alarms
red	Card failure or hardware failure			Any alarms	Any alarms

圖 2-21 E1 介面卡燈號意義

Eth介面卡:

- 含1個GbE SFP介面
- 含4個GbE RJ-45電介面
- 支援MDI/MDIX



圖 2-22 Eth 介面卡 (LIC-X-E4-Elec)

Color	ACT	Left LED for port	Right LED for port	SFP LED
off	No power	Interface is disabled	Interface is disabled or the interface operates at 100BaseT mode	Cable not connected, link not ok, interface is disabled
green	OK, no alarms	the interface is enabled and link is OK (Blinking = traffic activity)	Interface operates at 1000BaseT mode, Blinking means operates at 10BaseT mode	Interface is enabled and link is OK, blinking means traffic activity
red	Card failure or hardware failure			

圖 2-23 Eth 介面卡燈號意義

電源模組:

- 接受-48V 電源供電
- 通過底板將電源分配到其餘模組
- 透過Radio介面卡供給RFU-A射頻模組電源



圖 2-24 電源模組 PDC (Power Distribution Card)



圖 2-25 電源分配 (Power distribution)

風扇模組:

● 每個風扇模組內含4個散熱風扇



圖 2-26 風扇模組 (Fans tray)



圖 2-27 濾網 (Filter tray)

- (二)、 硬體安裝
 - 1. RFU-A 安裝:

將2個1U尺寸RFU-A機框裝置於機櫃,RFU-A射頻模組置入兩邊插槽。



圖 2-28 安裝 2 個 1U 尺寸 RFU-A 機框



圖 2-29 RFU-A 射頻模組置入機框兩側插槽



圖 2-30 射頻濾波模組置入 RFU-A 機框中間插槽



圖 2-31 將保護蓋安裝於 RFU-A 機框前端



圖 2-32 安裝機框後硬導波管元件



圖 2-33 依據現場環境安裝不同尺寸之硬導波管

2. IP20N 安裝



圖 2-34 將 IP20N 單體機框安裝於機櫃並確實接地



圖 2-35 將主、副控制卡安裝於機框對應模組插槽



圖 2-36 Radio 介面卡安裝



圖 2-37 電源模組 PDC 安裝

依據電源線正副極標示安裝於現場電源供應器





	amo -
ACT LED RFU Interface (TNC) Link LED RFU LED	

圖 2-39 連接 Radio 介面卡與 RFU-A



圖 2-40 連接 E1 介面卡與 TDM 多工機



圖 2-41 連接 Eth 介面卡與網路交換機



圖 2-42 連接告警盤控制線於主控制卡

(三)、本案各 HOP 設置

本案微波系統共架設於四個地點,分別為北部飛航服務園區(NNS)、桃園 通信氣象臺(CKS)、臺北通信氣象臺(SS)及大屯山助航臺(TTS)等,以大屯 山助航臺為中心點之星狀架構,與北部飛航服務園區構連為HOP1、HOP2(TTS-NNS)、桃園通信氣象臺HOP3(TTS-CKS)及臺北通信氣象臺構連為HOP4(TTS-SS),其中TTS-NNS建置2個HOP為相互備援,TTS-CKS與TTS-SS各建置1個HOP。

1. HOP1、HOP2(大屯山<->北管)

HOP1:由2台RFU-A及1台IP20N組成 2+2-HSB架構,每台RFU-A內置2個射頻模 組及1個射頻濾波模組,每台IP20N內含主、副控制卡(TCC卡)、4片Radio介面 卡(RMC卡)、5片E1介面卡、1片Eth介面卡、2片電源模組及1個風扇模組。符合 合約67路E1及8個Ethernet Port需求。

HOP2:與HOP1相同配置。



RFU-2+2 HSB

圖 2-43 HOP1、HOP2(大屯山<->北管)

2. HOP3 (大屯山<->桃園)

HOP3:由2台RFU-A及1台IP20N組成 2+2-HSB架構,每台RFU-A內置2個射頻模

組及1個射頻濾波模組,每台IP20N內含主、副控制卡(TCC卡)、4片Radio介面卡 (RMC卡)、4片E1介面卡、1片Eth介面卡、2片電源模組及1個風扇模組。符合合 約63路E1及8個Ethernet Port需求。





圖 2-44 HOP3 (大屯山<->桃園)

3. HOP4 (大屯山<->松山)

HOP4:由2台RFU-A及1台IP20N組成 2+2-HSB架構,每台RFU-A內置2個射頻模 組及1個射頻濾波模組,每台IP20N內含主、副控制卡(TCC卡)、4片Radio介面卡 (RMC卡)、5片E1介面卡、2片Eth介面卡、1片電源模組及1個風扇模組。符合合 約67路E1及8個Ethernet Port需求。

RFU-2+2 HSB



圖 2-45 HOP4 (大屯山<->松山)

三、 系統設定

(一)、 設定前準備

使用網路線連接電腦的網路Port及IP20N的MGMT1 Port,新的IP20N其預設IP 位址為:192.168.1.1,子網路遮罩為:255.255.255.0,要建立電腦和IP20N之 間的連線,需要在電腦上配置與IP20N相同網段的IP位址。本例將電腦IP位址設 置為:192.168.1.10,子網路遮罩為:255.255.255.0。

更改電腦IP為192.168.1.10、子網路遮罩255.255.255.0

Internet Protocol (TCP/I	P) Properties 🛛 🔋 🗙
General	
You can get IP settings assigned autor this capability. Otherwise, you need to a the appropriate IP settings.	natically if your network supports ask your network administrator for
O Obtain an IP address automatical	ly
• Use the following IP address: —	
IP address:	192.168.1.10
Sybnet mask:	255.255.255.0
Default gateway:	
C Obtain DNS server address autor	natically
Use the following DNS server add	dresses:
Preferred DNS server:	
Alternate DNS server:	
	Adyanced
	OK Cancel

圖 3-1 設定電腦 IP 與 IP20N 同網段

用Putty連線軟體,照下圖設定登入。

Session Logging Terminal Keyboard Bell Features Window Appearance Behaviour Translation Colours Connection Data Proxy Telnet Rlogin SSH Setal	Basic options for your PuTTY session		
	Specify the destination you want to Host Name (or IP address) 192 168 1 1	Port	
	Connection type:		
	Load, save or delete a stored session Saved Sessions		
	Default Settings	Load Save Delete	
	Close window on exit: Always Never Only on clean exit		

圖 3-2 使用 Telnet 連線登入


圖 3-3 登入畫面

P 192.:	168.1.1 - PuTTY				— — X
root> row	platform manage IPv4 Address	ment ip show ip-a IPv4 Subnet Mask	address IPv4 Default Gateway	IPv6 Address	IPv6 Pref
)	192.168.1.1	255.255.255.0	0.0.0.0	fec0::c0:a8:1:1	120

圖 3-4 查詢 IP20N 的連線 IP

如果IP20N不是新的,已經更改IP位址,而且不知IP為何,這時就無法直接 以網路連線,只能改用RS232的實體線連接電腦與IP20N的Terminal Port,接好 RS232的線之後,開啟Putty連線軟體,在Putty Configuration上選擇 Connection type:Serial,Baud rate:115200,Data bits:8,Parity: None,Stop bits:1,Flow Control:None,然後連線,輸入Login:admin, Password:admin,連上線之後再使用CLI指令:root > platform management ip show ip-address,這時會顯示IP20N的管理IP,再將電腦的網路IP設定與 IP20N同網段後,即可與IP20N以網路連線了。



圖 3-5 Putty 軟體 Sieral 連線設定

(二)、 基礎設定

因原廠訓練Lab所使用的IP20N是新機,所以啟用瀏覽器於網址列輸入預設 IP:192.168.1.1,進入系統登入畫面預設帳號:admin / 密碼:admin

Password	Password	

圖 3-6 登入 IP20N

IP20N各項功能須有Activation Key才能啟用,而原廠訓練Lab所使用的 IP20N尚未有Activation Key,只能先使用Demo Mode Configuration,而本案微 波系統在架設時就會有Activation Key,屆時就可以輸入Activation Key了。

操作路徑:Platform > Activation Key > Activation Key Configuration > 輸入Activation Key > Apply啟用設定

🜗 Logout 💈 Admin 🛛 🗹 Connection	Activation Key Configuration		
▼ Filter ×	Activation Key - Status Parame	ters	
Main View	TVD9	Demo	1
Platform	Validation number	0~0	1
Management	validauori number	0.0	1
b Software	Date code	NA.	
Configuration	Violation runtime counter (hours)	48]
a Activation Key	Sanction state	No	1
Activation Key Configuration			-
Activation Key Overview	Activation Key Configuration		
Security	, our and they contiguined of		
Faults	Default Activation Ke	Y	×
Radio			
Ethernet			
b Sync			
Quick Configuration			*
> Utilities			
	Demo Mode Configuration		
	Demo admin Enable 💌		
	Dome timor (bource) 1269		
	Denio amer (nours) 1300		
	Apply Refresh		

圖 3-7 啟用 Activation Key

進行IP20N時間設定

操作路徑:Platform > Management > Time service > UTC date and time > 設定時間

🕞 Logout 🗹 Connection 💈 Admin	Microwave radio: Time Services
 ▼ Filter × Unit Summary Radio Summary A Platform > Shelf Management > Management Unit Parameters Unit Parameters 	Date & Time Configuration UTC date and time 15-09-2018 11:00:38 Local date and time 15-09-2018 11:00:38 Offset from GMT
NTP Configuration Time Services Interface Manager Inventory Unit Info Main Card Redundancy ▶ External Alarms	UTC offset hours 0 V UTC offset minutes 0 V Daylight Saving Start Time Month 1 V Day 1 V
 Networking SNMP Software Configuration Activation Key Security 	Daylight Saving End Time Month 1 Day 1 DST offset (hours) 0
 Faults TDM 	Apply



接著進行IP20N各插槽的配置, IP20N的Chassis Configuration顯示畫面如下,圖的左側區域為樹狀設定項目、中間是設定區域、右側是卡板模組區域

	igation	Tree			Configuration	Area	Card Options – Drag& Drop
	-						
Logout V Connection 2 Admin	Microwaven	adio: Chassis Co	infiguration				
Filter	Drag a car	d from the right	t column to a slot	on the left and click '	Configure'		
Unit & Radio Summary							
Platform	•••						New Colors B
Shelf Management		1					A COMPANY OF THE OWNER OF THE OWNER
Chassis Configuration	1.1	ຸ	6)		0	a sense strategy and
Planagement	10.5	9	1.0		100 A 100110 A		
» Software		0	19.0	1		10	a the set was the set of the set
Configuration	1.1	9	201	11	1	11 🥔	
 Activation key 	•		643 Per 201	C - 1 C - 1	Contraction of the local division of the loc	etetet 1 🕴 om o	
» Security	an <u>5</u>						
rauto							- · O ·
TUM	▼ Chassis	Configuration					
Radio	in Slot	Operational	Slot admin state	Actual card type	Expected card type	Label	
Ethernet	= ID 🔺	state		recom care type	Expected card type		
Cascading	0 2	up	Enable	LIC-X E4 Elec	LIC-X E4 Elec		 Lic contract-real
sync	U 3	down	Enable	Cleared	RMC-B		100 C
Quick Configuration		down	Disable	Cleared	Cleared		an hardwar
Utabes		down	Disable	Cleared	Cleared		
	8 7	up	Enable	RMC-B	RMC-B		The All sectors when
	8	up	Enable	RMC-B	RMC-B		Contract of the second s
	8 9	up	Enable	LIC-T16 ACR	LIC-T16 ACR		
	8 10	up	Enable	RMC-B	RMC-B		do and developing
		all second second	Disable	Cleared	Cleared		

圖3-9 插槽配置示意圖

配置方法為將右側RMC卡模組、Eth介面卡模組、E1介面卡模組拖曳至圖中間 上方要配置的插槽進行配置

操作路徑:Platform > Shelf Management > Chassis Configuration > 選 取右方模組 > 拖曳至要配置的插槽

Filter K Man View 4 Platform 4 Shelf Management Chasts Configuration b Management	v Chas	C C sis Co)		ر معرفات			- O
 Software Configuration 		t.	Operational state	Slot admin state	Actual card type	Expected card type	Label	
Activation Key		2	up	Enable	LIC-X E4 Elec	LIC-X E4 Elec		
b Security		3	up	Enable	RMC-B	RMC-B		
N Faults	0	4	up	Enable	RMC-B	RMC-B		an inc years
> TOM		5	down	Disable	Cleared	Cleared		-
2 Total		6	down	Disable	Cleared	Cleared		
> Radio		7	down	Disable	Cleared	Cleared		
Ethemet		8	down	Disable	Cleared	Cleared		
Cascading		9	down	Disable	Cleared	Cleared		
Sync		10	down	Disable	Cleared	Cleared		
> Quick Configuration		12	up	Enable	LIC-T16 ACR	LIC-T16 ACR		
> Ublities	Edit Multig Slot a	Config ale Sel dmin s	gure Reset Cl lection Operation tate Enable •	n Apply	lory Default			

圖 3-10 拖拉圖示至插槽以新增卡片

配置完畢 > 勾選左方對應配置插槽的方格 > 選擇Slot admin state > Enable > Apply

2 3	up		riotaan oana type	Expected card type	Label
3		Enable	LIC-X E4 Elec	LIC-X E4 Elec	
	up	Enable	RMC-B	RMC-B	
4	up	Enable	RMC-B	RMC-B	
5	down	Disable	Cleared	Cleared	
6	down	Disable	Cleared	Cleared	
7	down	Disable	Cleared	Cleared	
8	down	Disable	Cleared	Cleared	
9	down	Disable	Cleared	Cleared	
10	down	Disable	Cleared	Cleared	
12	up	Enable	LIC-T16 ACR	LIC-T16 ACR	
	5 6 7 8 9 10 12	5 down 6 down 7 down 8 down 9 down 10 down 12 up	5 down Disable 6 down Disable 7 down Disable 8 down Disable 9 down Disable 10 down Disable 12 up Enable	5 down Disable Cleared 6 down Disable Cleared 7 down Disable Cleared 8 down Disable Cleared 9 down Disable Cleared 10 down Disable Cleared 12 up Enable LIC-T16 ACR	5 down Disable Cleared Cleared 6 down Disable Cleared Cleared 7 down Disable Cleared Cleared 8 down Disable Cleared Cleared 9 down Disable Cleared Cleared 10 down Disable Cleared Cleared 12 up Enable LIC-T16 ACR LIC-T16 ACR

圖 3-11 顯示各插槽卡片狀態 (Slot 1、11 不會顯示)

介面卡配置完成後再將所配置介面卡的各個Port啟用

操作路徑:Platform > Management > Interface manager > 勾選左方方格 除Sync Slot 1, Port 1之所有介面 > 選擇下方Admin Status為Up > Apply

▼ Filter ×	▼ Interface Manager				
Main View	 Interface location 	A	MAC address	Admin status	Operational Status
▲ Platform	Ethernet: Slot 1, F	Port 1	00:0A:25:FC:40:D4	Up	Down
▲ Shelf Management	Ethernet: Slot 1, F	Port 2	00:0A:25:FC:40:D5	Up	Down
Chassis Configuration	Ethernet: Slot 2, F	Port 1	00:0A:25:FC:40:D6	Up	Down
▲ Management	Ethernet: Slot 2, F	Port 2	00:0A:25:FC:40:D7	Up	Down
Linit Parametere	Ethernet: Slot 2, F	Port 3	00:0A:25:FC:40:D8	Up	Down
NTD Configuration	Ethernet: Slot 2, F	Port 4	00:0A:25:FC:40:D9	Up	Down
NTP Configuration	Radio: Slot 3, Por	rt 1	00:0A:25:FC:40:DA	Up	Down
Time Services	Radio: Slot 4, Por	rt 1	00:0A:25:FC:40:DB	Up	Down
Interface Manager	Management: Slo	ot 1, Port 1	00:00:00:00:00	Up	Up
Inventory	Management: Slo	ot 1, Port 2	00:00:00:00:00	Up	Down
Unit Info	Sync: Slot 1, Port	1	00:00:00:00:00:00	Down	Down
Main Card Redundancy	TDM: Slot 12, Por	rt 1	00:0A:25:FC:40:F1	Up	Up
External Alarms	Radio Protection:	: Group #1	00:0A:25:FC:40:DA	Up	Down
Networking	Edit				
▷ SNMP	Luit				
Software					
Configuration	Multiple Selection (Operation			
Activation Key	Admin status Up	 Apply 			
Security					

圖 3-12 顯示各介面狀態

設定 in-band admin為Enable,讓遠端電腦可以連線進來設定 操作路徑:Platform > Management > Networking > Local > in-band admin > Enable > Apply

🚹 Logout 💉 Connection 💈 Admin	Microwave radio: Loca	Networking Configuration			
Filter Vnit Summary Radio Summary Platform	In-Band Configuration in-band admin Enable				
Shelf Management Management <u>Unit Parameters NTP Configuration Time Services Interface Manager </u>	IP Family Configuration IP address Family IPv4 V Apply				
Inventory Unit Info Main Card Redundancy	IP Configuration Name	test			
 A Networking 	IPv4 Address	192.168.1.1			
Local	IPv4 Subnet Mask	255.255.255.0	1		
Remote	IPv4 Default Gateway	0.0.0.0			
▷ SNMP	IPv6 Address	fec0::c0:a8:1:1			
 Configuration 	IPv6 Prefix Length	120	(1 128)		
 Activation Key Security 	IPv6 Default Gateway				
▶ Faults	Apply				

圖 3-13 顯示網路狀態

(三)、 射頻設定

1. 多樣化速率及多層次調變(MRMC)射頻劇本設定

MRMC設定包含Radio介面卡槽位選擇、Script ID選擇, Radio介面卡槽位要 選擇已啟用的槽位,原廠訓練Lab是選擇Slot 3, Port 1, Script ID選擇1004 (Channel Bandwith: 28MHz Occupid Bandwith: 26.5MHz, ACM: 4-1024QAM)

操作路徑:Radio > MRMC > Symmetrical Scripts > ETSI > Radio interface > Slot 3(RMC-B) > 選擇頻寬ID:1004(BW=28MHz) > Configure Script > 在上述步驟設定Slot 3(RMC-B)

Filter K	Ra	dio interface	e Radio: Sict 3. Port 1	(RMC-8) ¥					
Unit Summary		MRMC Syn	nmetrical ETSI Scripts	(Symmetrical ETSI)	Scripta)				
Radio Summary Platform		Script	Channel Bandwidth (MHz)	Occupied Bandwidth (MHz)	Script Name	ACM Support	Supported QAM	Bit Rate (Mbps)	
Faults		1003	56.000	53.000	mdN_A5656N_156_1003	Yes	4 _ 2048	82.864 503.904	
TDM		₹ 1004	28.000	26.500	mdN_A2828N_157_1004	Yes	4 _ 2048	40.978	^
Badio		1005	28.000	28.000	mdN_A2828N_135_1005	Yes	4 _ 2048	43.389 261.357	
Pada Desentar		1006	56.000	55,700	mdN_A5656N_137_1006	Yes	4 _ 2048	87.122 . 529.505	
Remain Radia Remained		1007	40.000	37.400	mdN_A4040N_123_1007	Yes	4 _ 2048	58.224 349.341	
Remote Racio Parameters		1008	7.000	6.500	mdN_A0707N_132_1008	Yes	4 _ 2048	9.547 55.151	
Radio BER Thresholds		1009	14.000	13.300	mdN_A1414N_119_1009	Yes	4_2048	20.386 116.462	
ATPC		1023	3.500	3.267	mdN_A3535N_123_1023	Yes	4 _ 256	4.582 20.344	
Payload Encryption	100	1203	56.000	53.000	mdN_A5656X_112_1203	Yes	4 _ 2048	81.178 . 481.815	
Ethernet Interface		1204	28.000	26.500	mdN_A2828X_120_1204	Yes	4 _ 2048	39.978 _ 243.091	
# MRMC		1205	28.000	28.000	mdN_A2828X_121_1205	Yes	4 _ 2048	42.365 _ 257.391	
 Symmetrical Scripts 		1206	56.000	55,700	mdN_A5656X_110_1206	Yes	4 _ 2048	85.317 _ 506.204	
ETCI		1207	40.000	37.400	mdN_A4040X_116_1207	Yes	4 _ 2048	56.608	
6126		1209	14.000	13.300	mdN_A1414X_105_1209	Yes	4 _ 2048	19.428 113.541	
<u>EC</u>		1214	28.000	26.000	mdN_A2828X_109_1214	Yes	4 _ 2048	38.724 . 235.611	
MRMC Status		1217	40.000	33.500	mdN_A4040X_108_1217	Yes	4 _ 2048	51.104 310.488	
PM & Statistics									
Diagnostics	C	onfigure sci	ript .						

圖 3-14 勾選 MRMC Script ID:1004

操作路徑:MRMC Script operational Mode=Adaptive(啟用ACM) > MRMC

Script Maximum profile > Profile 9, 1024 QAM, 226.721 Mbps > Apply > Radio介面卡自動重新啟動

MRMC Status	
Radio location	Radio: Slot 3, Port 1 (RMC-B)
Operational MRMC script ID	1004
Script Name	mdN_A2828N_157_1004
Script Standard	ETSI
MRMC Script operational mode	Adaptive
MRMC Script maximum profile	9, 1024 QAM, 226.721 Mbps
MRMC Script minimum profile	0, 4 QAM, 40.978 Mbps
Adaptive TX power admin	Disable V
MRMC TX Status	
TX profile	9
TX QAM	1024
TX bit-rate (Mbps)	226.721
MRMC RX Status	
RX profile	9
RX QAM	1024
RX bit-rate (Mbps)	226.721
Apply	
Page Refresh Interval (Seconds)	None Last Loaded: 11:05:57 Refresh Close

圖 3-15 設定 MRMC 狀態

2. 發射(TX)/接收(RX)頻率設定、Link ID設定、發射功率設定

射頻頻率設定包含TX頻率、RX頻率,頻率設定須依照射頻模組的頻率去設定,與對方微波站台的發射及接收頻率相對應,Link ID須設定Local與Remote兩端為相同的ID,發射功率依需要設定,在原廠訓練的Lab環境是設定Adaptive TX power admin:Disable, TX Level:11dBm

操作路徑:Radio > Radio Parameters > Radio:Slot 3, Port 1 > Edit *Radio Parameters Table

Radio Location 🛦	Туре	TX Frequency (MHz)	RX Frequency (MHz)	Operational TX Level (dBm)	RX Level (dBm)	Modem MSE (dB)	Defective Blo	ocks	TX Mute
Radio: Slot 3, Port 1	RFU-A	7397.500	7236.500	11	-33	-41.94	Clear	43520	Off
Radio: Slot 5, Port 1	RFU-A	7397.500	7236.500	11	-37	-41.84	Clear	32871	On

圖 3-16 顯示現有 RMC 卡狀態

TX Frequency =7397.500 / RX Frequency =7236.500

TX Power Level= 11; Link ID = 1; Remote Unit Link ID = 1; Adaptive TX power admin = Disable > Apply

註:微波對方的對應端 Radio: Slot 3 ,Port 1頻率設定為

TX Frequency =7236.500 / RX Frequency =7397.500

Frequency control (Local)		
TX Frequency (MHz)	7397.500	(7113.250 7886.750)
RX Frequency (MHz)	7236.500	(7113.250 7886.750)
Frequency Separation (MHz)	161.000	
Set also remote unit		
Configuration Parameters		
TX Level (dBm)	11	(11 29)
TX mute	Off 🗸	
RSL Connector Source	Main 🗸	
Link ld	1	(1 65535)
Adaptive TX power admin	Disable 🗸	
RSL degradation alarm	Disable 🗸	
DOL degradation threshold	-68 🗸	

圖 3-17 設定發射(TX)/接收(RX)頻率及其他參數

3. 1+1-HSB 設定

當RFU-A的左、右插槽都裝置了射頻模組時,要使左、右插槽模組發揮HSB功 能則須設定1+1-HSB,原廠訓練Lab是將Radio:Slot 3, Port 1及Radio:Slot 5, Port 1整合為Group#1

操作路徑:Radio > Groups > Radio Protection > Create Group

Referent A Radio Protection members table Creage Group Location Activation	
A Plafform A Shelf Management Chassis Conflucation Member 2 location Conflucation Conflucation Conflucation Conflucation Activation Activation Activation Sourch	
Shelf Mragement Chass Software	tus
Create Group Edit Delete Create Group Edit Delete Note: ✓ Indicates the 'Active' member Schware Schware Scourtly Security Faults TDM Aadio Barameters	
Interface Configuration Interface Configuration Mode Mode	
 > Intraces Conjugation > Maragement > Software > Configuration > Activation Keyr > Security > Faults > ToM > ToM > Adalo farmeters 	
Protection P	
> Sommare > Comfiguration > Activation Key > Security > Faults > TDM # Radio Bado Parameters	
Vomparation Activation Key Security Faults TOM a Radio Radio Parameters	
> Security > Faults > TDM # Radio Parameters	
) Faults) TDM a Radio Radio Parameters	
≥ LDM # Radio Radio Parameters	
a Nadio Radio Parameters	
Radio Parameters	
Remote Radio Parameters	
Radio BER Thresholds	
ATPC	
Pavload Encryption	
Ethernet Interface	
> MRMC	
PM & Statistics	
Diagnostics	
4 Groups	
Radio Protection	
<u>XPIC</u>	
Multi Carrier ABC	
> Ethernet C	>
Sync Page Refresh Interval (Seconds) None	port to CSV
Quick Configuration	
> Utilities	



操作路徑	É: Group Type > 1+1-HSB > Next	
🖡 Logout 🖌 Connection 💈 Admin	Microwave radio: Radio Protection Groups	
▼ Filter ×	▼ Radio protection members table	
Platform Shelf Management Chassis Configuration Interface Configuration Chassis Configuration Interface Configuration Configura	Group location ▲ Group is an intermediate interme	status
Multi Carrier ABC		
Ethernet		>
> Sync	Page Refresh Interval (Seconds) None Last Loaded: 13:48:14 Refresh	Export to CSV
Quick Configuration		
b Utilities		Â

圖 3-19 選擇 1+1-HSB 模式

Member#1加入操作路徑:Radio:Slot 3, Port 1 > Next

Langut of Connection 6 Admin	Miscourave radio: Padia Protection Groups		
P Logout V Connection & Admin	microwave radio. Nadio Protection Groups		
▼ Filter ×	 Radio protection members table 		
A Platform	Group location A	Group Tune Member 1 location	Member 2 location Lockout status
A Shelf Management		C Radio Protection - Internet Explorer	
Chassis Configuration	Create Group Edit Delete	http://192.168.1.2/responder.fcgi1?winid=249&deviceid=0&PARAN	
Interfaces Configuration			
Management	Note: 🖌 Indicates the 'Active' member	Create Radio Protection Group	
Software		Group Type 1+1-HSB	
Configuration		Group ID Radio Protection: Group #1 V	
Activation Key		Member #1 Radio: Slot 3, Port 1 (RMC-B)	
Security		Radio: Slot 5, Port 1 (RMC-B)	
Faults			
▷ TDM			
a Radio			
Radio Parameters			
Remote Radio Parameters			
Radio BER Thresholds			
ATPC		<< Back Ne >>> Finish	
Payload Encryption			
Ethernet Interface		Last Loaded: 13:48:20 Close	
▷ MRMC			
PM & Statistics		€ 100% ▼ _	
Diagnostics			
▲ Groups			
Radio Protection			
XPIC			
Multi Carrier ABC			
Ethernet	<		>
> Sync	Page Refresh Interval (Seconds) None 🗸		Last Loaded: 13:48:14 Refresh Export to CSV
Quick Configuration			
▷ Utilities			*

圖 3-20 選擇 1+1-HSB 之 RMC 卡

Member#2加入操作路徑:Radio:Slot 5, Port 1 > Finish

🖡 Logout 🖌 Connection 🔮 Admin	Microwave radio: Radio Protection Groups			
▼ Filter ×	▼ Radio protection members table			
Vilie Vilie Vili	Croup location ▲ Create Group Lett Delete Note: ✓ Indicates the 'Active' member	Answer: Hourston Mamber: Hourston Intp://192.168.12/responder.fcgil?winid=2508.deviceid=08.PARAI Intp://192.168.12/responder.fcgil?winid=2508.deviceid=08.PARAI Create Radio Protection Group Group ID Radio Protection Group #1 Member #2 Radio: Slot 5, Port 1 (RMC-B) ▼ Last Loaded: 13:48:30 Close & Last Loaded: 13:48:30 Close	Member 2 location	Lockout status
Multi Carrier ABC Ethernet Sync Quick Configuration Utilities	Page Refresh Interval (Seconds) None		Last Loaded: 13:48:14 R	efresh Export to CSV

圖 3-21 將前述設定為 Group#1

操作路徑:Submit > 完成設定

Ille Logout ✓ Connection 2 Admin	Microwave radio: Radio Protection Groups	
▼ Filter ×	▼ Radio protection members table	-
Aredrom Aredrom Aredrom Aredrom Aredrom Interfaces Configuration Interfaces Configuration Interfaces Configuration Anagement Software Software	Group location A Member - Like action Member 2 location Lockout status Create Group Edit Delete Member 2 location Lockout status Note: Indicates the 'Active' member Create Group / 192/168.12/responder/fcg11/wind=2518/deviceid=08/PRAI Create Group / 192/168.12/responder/fcg11/wind=2518/deviceid=08/PRAI Note: Indicates the 'Active' member Create Grado Protection Group (Selection Summary) Group 10 Radio Protection Group #1 Member #1 Radio: Slot 3, Port 1 Member #2 Radio: Slot 5, Port 1 Last Loaded: 13/48.36 Close 4, 100%	
Multi Carrier ABC Ethernet Sync Quick Configuration	Cast Loaded: 13.48:14 Refresh Export to	> sv
Utilities		



設定Radio Protection Group的Hot Standby切換機制

操作路徑:Radio > Groups > Radio Protection > 選擇要管理的Group > Edit

P Logout 👻 Connection 😰 Admin	Microwave radio: Radio Protection Gro	oups			
Y Fiber X	▼ Radio protection members table				
Unit Summary	Group location A	Group Type	Member 1 location	Member 2 location	Lockout status
Radio Summary Padform P Fadform Radio Branneters Remote Radio Parameters Remote Radio Parameters Radio URE Treebholds AIRS Panisad Enconstion Ethernet Interface MRNC MRNC MRNC	Radio Protection Group #1 Create Group Eatt Delete Note ✓ Indicates the 'Active' member	1*1+458	✓ Radio: Slot 3, Port 1	Radio: Soid 5, Port 1	No

圖 3-23 點選進入前述設定之 Group#1

Logout Connection 2 Admin	Microwave radio: Radio Protection Grou	ps		
¥ Filter X	 Radio protection members table 			
Unit Summary	Group location A	Group Type	Member 1 location	Member 2 location
Radio Summary	Radio Protection: Group #1	1+1-HSB	VRadio: Slot 3, Port 1	Radio: Slot 5, Port
Platform	Create Group Edit Delete	🙆 Radio Protection Groups - Interr	net Explorer	
p TDM	Note: / Indicates the 'Artive' member	Attp://192.168.1.2/responder.fc	gi1?winid=221&deviceid=0&winsyster	mname=radio-prote
a Radio		Radio protection members table -	Edit	
Radio Parameters		Group location	Radio Protection: Group #1	
Radio BER Thresholds		Group Type	1+1-HSB	
ATPC		Member 1 location	Radio: Slot 3, Port 1 (Active)	
Payload Encryption		Member 2 location	Radio: Slot 5, Port 1 (Standby)	
Ethernet Interface		Lockout status	No	
MRMC DM & Statistics				
Diagnostics		Revertive mode admin	Enable V	
4 Groups		Primary radio location	Radio: Slot 3, Port 1 🗸	
Radio Protection		Radio protection command	Clear 🗸	
XPIC		Copy to mate source radio location	None 🗸	
Multi Carrier ABC				
Ethernet		Apply		
D Sync				
Quick configuration		Page Refresh Interval (Pagende) No	Last Londod: 10:37:16	Betrach Close

圖 3-24 顯示 1+1-HSB 資訊

1+1-HSB自動切換機制有兩種設定

當發生故障時切換,故障狀況解除後則維持在副機不切回主機

操作路徑:Radio > Groups > Radio Protection > Revertive mode admin > Disable > Apply

當發生故障時切換,故障狀況解除後自動切回主機

操作路徑:Radio > Groups > Radio Protection > Revertive mode admin > Eanble > Apply

Radio protection members table - Edit		
Group location	Radio Protection: Group #1	
Group Type	1+1-HSB	
Member 1 location	Radio: Slot 3, Port 1 (Active)	
Member 2 location	Radio: Slot 5, Port 1 (Standby)	
Lockout status	No	
Revertive mode admin	Enable	
Primary radio location	Tradio: Stor 5, Port 1 V	
Radio protection command	Clear 🗸	
Copy to mate source radio location	None 🗸	
Apply		

圖 3-25 啟用自動切回主機之功能

指定主機位置

操作路徑:Radio > Groups > Radio protection command > Primary radio > 選擇Radio:Slot 3, Port 1 > Apply

Radio protection members table - Edit		
Group location	Radio Protection: Group #1	
Group Type	1+1-HSB	
Member 1 location	Radio: Slot 3, Port 1 (Active)	
Member 2 location	Radio: Slot 5, Port 1 (Standby)	
Lockout status	No	
Revertive mode admin	Enable V Radio: Slot 3. Port 1	
Primary radio location	Radio: Slot 5, Port 1	
Radio protection command	Clear 🗸	
Copy to mate source radio location	None V	
Apply		

圖 3-26 選擇 1+1-HSB 之主介面

4. 1+1-HSB 保護切換優先等級

以下狀況是觸發1+1-HSB保護切換的優先等級,包含自動及手動切換

操作路徑:Radio > Groups > Radio Protection > Radio protection command

切換優先等級順序如下:

- 1. Clear (清除現有的鎖定狀態)
- 2. Card missing (RFU-A或射頻模組故障無法啟動);註:被動發生狀態
- 3. Lockout (鎖定固定的RFU-A或射頻模組)
- 4. Force switch (強制開關固定RFU-A或射頻模組)
- 5. Traffic failures (射頻傳輸失敗);註:被動發生狀態
- 6. Manual switch (手動切換RFU-A或射頻模組)

Radio protection members table - Edit			
Group location	Radio Protection: Group #1		
Group Type	1+1-HSB		
Member 1 location	Radio: Slot 3, Port 1 (Active)		
Member 2 location	Radio: Slot 5, Port 1 (Standby)		
Lockout status	No		
Revertive mode admin	Enable V		
Primary radio location	Radio: Slot 5, Port 1 🗸		
Radio protection command	Clear		
Copy to mate source radio location	Manual switch Force switch Lockout		
Apply			

圖 3-27 手動執行切換命令

完成設定後複製指令配對的RFU-A與射頻模組

操作路徑:Radio > Groups > Radio Protection > Copy to mate source radio location > 指定的RFU-A與射頻模組

Radio protection members table - Edit		
Group location	Radio Protection: Group #1	
Group Type	1+1-HSB	
Member 1 location	Radio: Slot 3, Port 1 (Active)	
Member 2 location	Radio: Slot 5, Port 1 (Standby)	
Lockout status	No	
Revertive mode admin	Enable 🗸	
Primary radio location	Radio: Slot 5, Port 1 🗸	
Radio protection command	Radio: Slot 3, Port 1 Radio: Slot 5, Port 1	
Copy to mate source radio location	None	
Apply		

圖 3-28 將前述設定複製於另一介面

(四)、 Ethernet 服務設定

1. 服務 (Service) 與服務點 (Service Point 簡稱 SP)

要建立IP20N的Ethernet須先建立服務(Service),服務就像是一座虛擬的 橋樑,服務連接二個以上的介面,服務ID(Service ID)可設定範圍1-1024



圖3-29 服務 (Service) 示意圖

服務點(Service Point簡稱SP)是與服務相連接的邏輯介面,若沒有服務 點,服務只是一個沒有入口或出口介面的虛擬橋



圖3-30 服務點 (Service Point 簡稱SP) 示意圖

服務(Service)是透過服務點(Service Point簡稱SP)經邏輯介面 (Logical Interface)與實體介面連接,因此建立一個服務之後要再建立服務 點,再與實體介面邏輯建立連接



圖3-31 服務點與實體介面點連接示意圖

服務(Service)分為3類:

- 1. Point-to-Point Service (P2P)
- 2. Multipoint Service (MP)
- 3. Management Service (MNG)

點對點服務Point-to-Point Service (P2P)僅提供網路2個介面之間的連接,此類服務僅包含2個服務點,PIPE 服務點僅適用在Point-to-Point 服務。



圖3-32 Point-to-Point Service (P2P) 示意圖

多點服務Multipoint Service (MP)提供2個或更多的服務點(SP)之間的 連接。



圖3-33 多點服務(Multipoint Service 簡稱MP)示意圖

管理服務Management Service(MNG)是提供維護人員管理之用,管理服務 是將2個實體管理Port與主機CPU單元連接,管理服務的服務ID=1025(預設,不 可更改),第1個實體管理Port,預設為啟用,第2實體管理Port則視使用者需要 再啟用。



圖3-34 管理服務(Management Service 簡稱MNG)示意圖

服務點分為4類:

- 1. SAP (Service Access Point)
- 2. SNP (Service Network Point)
- 3. MNG
- 4. PIPE

簡單來說IP20N與其他IP20N之間連接的服務點稱為SNP,而IP20N連接其他設備的服務點則稱為SAP,服務點MNG則專為管理服務使用,服務點PIPE僅使用於點對點服務。



圖3-35 服務點SAP與SNP示意圖



圖3-36 服務點MNG示意圖

2. 服務點與邏輯介面的關係

邏輯介面的類型可分為:

- 1. Dotlq
- 2. All-to-One
- 3. Q-in-Q
- 4. Bundle-C
- 5. Bundle-S

邏輯介面可以與服務點SAP相連接的介面類型如下:

1. Dot1q:只有單一個C-VLAN的網路封包被分類至這個服務點

2. All-to-One:所有C-VLAN和沒有VLAN的網路封包被分類至這個服務點

3. Q-in-Q:只有單一個S-VLAN和任何C-VLAN所組合的網路封包被分類至這個服務點

4. Bundle-C:一組有C-VLAN的網路封包被分類至這個服務點

5. Bundle-S:只有單一個S-VLAN的網路封包被分類至這個服務點 邏輯介面可以與服務點SNP相連接的介面類型如下:

1. Dot1q:只有單一個C-VLAN的網路封包被分類至這個服務點

2. Bundle-S:只有單一個S-VLAN的網路封包被分類至這個服務點

Service Point – Interface Types

Interface Type	Types of Frames	Applies to SP Type
Dot1q	A single C-VLAN is classified into the service point	All
S-tag	A single S-VLAN is classified into the service point	SNP, PIPE and MNG
Bundle-C	A set of C-VLANs is classified into the service point	SAP
Bundle-S	A single S-VLAN and a set of C-VLANs are classified into the service point	SAP
All-to-One	All C-VLANs and untagged frames that enter the interface are classified to the same service point	SAP
Q-in-Q	A single combination of S-VLAN and C-VLAN is classified into the service point	SAP and MNG

圖3-37 服務點與邏輯介面類型關係

3. 設定 MNG 服務

先設定Ethernet能支援傳送封包的最大尺寸 操作路徑:Ethernet > General Configuration > 修改MRU =9612(傳送封

包的最大尺寸)

MRU	9612 (6	64 9612)		
S VLAN Ether ty	pe 0x88a8 🗸			
C VLAN Ether ty	pe 0x8100			
Apply				
Instance per	Service mapping			
Service ID	L	Instance ID		
	1		0	
	2		0	1
	3		0	
	4		0	
	5		0	
	6		0	
	7		0	
	8		0	
	9		0	
	10		0	
	11		0	
	12		0	
	13		0	
	14		0	
	15		0	
	16		0	~
	47		0	

Page: 1 2 3 4 5 Rows per page 1000 V

圖 3-38 設定 MRU=9612 (傳送封包的最大尺寸)

系統在Ethernet Services內已預設好了Service ID為1025的MNG服務,所以 只要新增設MNG服務點

操作路徑:Ethernet > Services > 勾選Service type =MNG > Service Point > Add



圖3-39 新增MNG服務

		Contraction of the Contract of the Contraction of the Contraction of the Contract of the Contr	0.0 1020)						
Time Convince		<< Back to Services table							
Interface Manager	^	Select Service Point Attribute							
Inventory		General							
Unit Info									
Main Card Redundancy		⊖ ngrooo							
External Alarms		Citeress							
Networking		* Ethemet Service Points - General SP Attribut	es	Interface location	Attachod	C-\/520	S.1/50		
SNMP		ID A type	pe	interface location	interface type	encapsulation	encapsulation		
Software							:		
Configuration		Add Edit Databa Attached 30 AM							
Activation Key		Edit Delete Attached VEAN							
Security									
Faults									
TDM									
Radio									
Ethernet									
General Configuration									
Services									
▲ Interfaces									
Physical Interfaces									
Physical Interfaces Locical Interfaces									
Physical Interfaces Locical Interfaces ASP & LLF									
Physical Interfaces Locical Interfaces ASP & LLF > PM & Statistics OOS									
Physical Interfaces Logical Interfaces ASP & LLF > PM & Statistics > QOS > Proteople									
Physical Interfaces Logical Interfaces <u>ASP & LLF</u> > PM & Statistics > QOS > Protocols > Groups									
Physical Interfaces Locical Interfaces ASP & LLF D M & Statistics D QOS D Protocols D Groups Noc		Sana Batanb Jatana) (Sananda) [Mana Jur					art and at 17-55-57	Defrech	Event to (
Physical Interfaces Locical Interfaces ASP & LIP > PM & Statistics > QOS > Protocols > Groups > Groups Vinc		Page Refresh Interval (Seconds)					.ast Loaded: 17:56:57	Refresh	Export to C

圖3-40 點選Add

操作路徑:Pre defined Options 選Option#2(MNG, S-tag) > Interface Location 選Multi Carrier ABC(TCC, Group#1) > S-Vlan encapsulation 選 1025 > Apply

Ethernet Service Points	- Internet Explorer
Attp://192.168.1.2/resp	oonder.fcgi1?winid=313&deviceid=0&winsystemname=sw
Ethernet Service Points -	Add (Management Service)
Pre defined options	Option #2 (MNG, s-tag) 🗸
Service ID	1025
Service point ID	
Service point name	N.A.
Service point type	MNG V
General SP Attributes	
Interface location	Multi Carrier ABC (TCC, Group #1) 🗸
Attached interface type	s-tag 🗸
C-Vlan encapsulation	N.A. V
S-Vlan encapsulation	1025 🗸
Ingress Attributes	
Learning admin	Enable V
Allow flooding	Allow 🗸
Allow broadcast	Allow 🗸
CoS Mode	Interface-Decision V
Default CoS	
Egress Attributes	
C-Vlan CoS preservation	Enable V
C-Vlan preservation	Disable V
S-Vlan CoS preservation	Enable V
Marking admin	Enable V
Service bundle ID	
Apply	
- Apply	
	Last Loaded: 17:56:59 Refresh Close
	🔍 100% 🔻 🔡

圖3-41 設定S-Vlan為1025

🕞 Logout 🗹 Connection 💈 Admin	Microwave radio: Ethernet Service Points (Service ID - 1025)
▼ Filter ×	Rack to Services table
Time Services	Select Service Point Attribute
Inventory	General
Unit Info	Olngress
Main Card Redundancy	() Fritzes
External Alarms	Fihamet Service Points - General SP Attributes
Networking	Service point Service point name Service point Interface location Attached C-Vtan S-Vtan
▷ SNMP	ID A type interface type encapsulation encapsulation
▷ Software	✓ 1 N.A. MING Multi Carrier ABC (TCC, Group #1) s-tag N.A. 1025 C
Configuration	Add Edit Delete Attached VLAN
Activation Key	
> Security	
> TOM	
p TDM	
Ethornot	
General Configuration	
Services	
4 Interfaces	
Physical Interfaces	
Logical Interfaces	
ASP & LLF	
PM & Statistics	
⊳ QOS	
Protocols	
b Groups	
Sync	Page Refresh Interval (Seconds) None V Last Loaded: 17:57:51 Refresh Export to CSV
Quick Configuration	
Utilities	â

圖3-42 MNG服務及服務點設定完成

4. 設定點對點服務 (Point-to-Point Service 簡稱 P2P)

設定點對點服務要先新增P2P服務然後再新增服務點 操作路徑:Ethernet > Services > Add

┠ Logout 🗹 Connection 💆 Admin		Microwave radio:	Ethernet Services					
▼ Filter ×		 Ethernet Servi 	ices					
Time Services		Service	Service Type	Service sub type	EVC ID	EVC description	Admin	
Interface Manager		✓ 1025	MNG	Ethernet	N.A.	N.A.	Operational 🗘	
Inventory				1				
<u>Unit Info</u>		Add Edit	Delete Service	Details Service Points				
Main Card Redundancy		45						
External Alarms		Multinla Salact	ion Operation					
Networking		multiple Gelect						
SNMP		Admin Reserve	ed 🗸 Apply					
Software		L						
Configuration								
Activation Key								
Security								
Faults								
▷ TDM								
Radio								
4 Ethernet								
General Configuration								
Services								
▲ Interfaces								
Physical Interfaces								
Logical Interfaces								
ASP & LLF								
PM & Statistics								
▶ QOS								
Protocols								
Groups								
> Sync		Page Refresh Inter	val (Seconds) None	ev			Last Loaded: 17:58:06	Refresh
Quick Configuration								
Utilities	~							

圖3-43 新增P2P服務

🧉 Ethernet Servic	es - Internet Explorer
Attp://192.168	.1.2/responder.fcgi1?winid=312&device
Ethernet Services	s - Add
Service ID	1 🗸
Service Type	P2P V
EVC ID	N.A.
EVC description	N.A.
Admin	Operational V
MAC table size	131072 🗸
Default CoS	0 🗸
CoS Mode	Preserve-SP-COS-Decision V
Apply	
Las	t Loaded: 17:58:13 Refresh Close
	🔍 100% 🔻 🖽

操作路徑:Services Type 選擇P2P > Apply

圖3-44 選擇Service Type為P2P

再增設服務點 操作路徑:點選 Service Point > Add

₽ Logout Connection 2 Admin		Microwave radio: I	Ethernet Services				
▼ Filter ×		 Ethernet Servi 	ces				
Time Services	~	Service	Service Type	Service sub type	EVC ID	EVC description	Admin
Interface Manager		✓ 1	P2P	Ethernet	N.A.	N.A.	Operational 🔨
Inventory		1025	MNG	Ethernet	N.A.	N.A.	Operational 🗸
Unit Info					1		
Main Card Redundancy		Add Edit	Delete Service	Details Service Points			
External Alarms				8			
Networking		Multiple Selecti	ion Operation				
▷ SNMP		multiple Select					
▷ Software		Admin Reserve	ed 🗸 Apply				
Configuration							
Activation Kev							

圖3-45 設定P2P服務的服務點

操作路徑:Pre defined options選Option#7(SNP, s-tag) > Interface location選Multi Carrier ABC(TCC, Group#1) > S-Vlan encapsulation選11 > Apply

🙆 Ethernet Service Points	s - Internet Explorer	
Attp://192.168.1.2/res	ponder.fcgi1?winid=313&deviceid=0&winsystemname=s	w
Ethernet Service Points -	Add (Point to Point Service)	
Pre defined options	Option #7 (SNP, s-tag)	
Service ID		
Service point ID		
Service point name	N.A.	
Service point type	SNP V	
General SP Attributes		
Interface location	Multi Carrier ABC (TCC, Group #1) 🗸	
Attached interface type	s-tag 🗸	
C-Vlan encapsulation	N.A. 🗸	
S-Vlan encapsulation	11 🗸	
Ingress Attributes		
Learning admin	Disable 🗸	
Allow flooding	Allow 🗸	
Allow broadcast	Allow 🗸	
CoS Mode	Interface-Decision V	
Default CoS		
Egress Attributes		
C-Vlan CoS preservation	Enable 🗸	
C-Vlan preservation	Enable 🗸	
S-Vlan CoS preservation	Enable 🗸	
Marking admin	Enable 🗸	
Service bundle ID	1 🗸	
Apply		
	Last Loaded: 17:58:28 Refresh Close	
	🔍 100% 🔻	

圖3-46 設定Group#1為服務點

再增設另一個服務點

操作路徑:Add > Pre defined options選Option#5(SAP, All-2-One) > Interface location選Ethernet:Slot 1, Port 1> Apply

🥚 Ethernet Service Points	- Internet Explorer
Attp://192.168.1.2/resp	oonder.fcgi1?winid=313&deviceid=0&winsystemname=sw
Ethernet Service Points -	Add (Point to Point Service)
Pre defined options	Option #5 (SAP, All-2-One)
Cancian ID	4
Service ID	
Service point name	
Service point type	
General SP Attributes	Ethorpot: Olot 4. Doct 4
Attached interface type	
Attached Interface type	
C-vian encapsulation	
Ingress Attributes	
Learning admin	Disable V
Allow flooding	Allow
Allow broadcast	Allow
CoS Mode	Interface-Decision V
Default CoS	
Egress Attributes	
C-Vlan CoS preservation	Enable V
C-Vlan preservation	Enable V
S-Vlan CoS preservation	Disable 🗸
Marking admin	Enable V
Service bundle ID	1 🗸
Aprly	
	Last Loaded: 17:59:09 Refresh Close
	 € 100% ▼ .:

圖3-47 設定Slot 1, Port 1介面為服務

۲ [thernet Servic	e Points - General SP Attri	butes					
	Service point ID ▲	Service point name	Service point type	Interface location	Attached interface type	C-Vlan encapsulation	S-Vlan encapsulation	
Π	1	N.A.	SNP	Multi Carrier ABC (TCC, Group #1)	s-tag	N.A.	11	^
V	2	N.A.	SAP	Ethernet: Slot 1, Port 1	All-to-One	N.A.	N.A.	V
A	id Edit I	Delete Attached VLAN						

圖3-48 P2P服務設定完成

5. 設定多點服務(Multi Point Service 簡稱 MP)

多點服務是應用於服務需要連接2個以上的服務點時,以下就以原廠訓練Lab 作為範例進行設定,首先新增MP服務然後再新增服務點

操作路徑:Ethernet > Services>Add > Service Type > MP > Apply

Service ID	2 🗸
Service Type	MP V
EVC ID	N.A.
EVC description	N.A.
Admin	Operational V
MAC table size	131072 🗸
Default CoS	0 🗸
CoS Mode	Preserve-SP-COS-Decision V
Apply	
Apply	
Las	Loaded: 12:02:38 Refresh Close

圖 3-49 設定 MP 服務

增設服務點

操作路徑:Pre defined options 選 Option#6 (SNP, dot1q) > Service point type 選 SNP > Interface location 選 Radio Protection Group#1 > S-Vlan encapsulation > 1~4096 (任選) > Apply

Pre defined options	Option #6 (SNP, dot1q)
Service ID	2
Service point ID	1 🗸
Service point name	N.A.
Service point type	SNP V
General SP Attributes	
Interface location	Radio Protection: Group #1 🗸
Attached interface type	dot1q 🗸
C-Vlan encapsulation	Untagged V
S-Vlan encapsulation	11
Ingress Attributes	
Learning admin	Enable 🗸
Allow flooding	Allow 🗸
Allow broadcast	Allow 🗸
CoS Mode	Interface-Decision 🗸
Default CoS	0 ~
Egress Attributes	
C-Vlan CoS preservation	Enable V
C-Vlan preservation	Disable 🗸
S-Vlan CoS preservation	Enable V
Marking admin	Enable 🗸
On the local D	1 1

圖 3-50 設定 MP 服務的服務點

再增設另一個服務點

操作路徑:Pre defined options 選 Option#5(SAP, All-2-One) > Service point type 選 SAP > Interface location 選 Ethernet:Slot 1, Port 1 > C-Vlan encapsulation > N.A.> S-Vlan encapsulation > N.A. > Apply(以此類推將所有需要服務的乙太網路埠加入同一組MP)

Pre defined options	Option #5 (SAP, All-2-One) V
Service ID	2
Service point ID	1 🗸
Service point name	N.A.
Service point type	SAP V
General SP Attributes	
Interface location	Ethernet: Slot 1, Port 1
Attached interface type	All-to-One 🗸
C-Vlan encapsulation	N.A. 🗸
S-Vlan encapsulation	N.A. 🗸
Ingress Attributes	
Learning admin	Enable 🗸
Allow flooding	Allow 🗸
Allow broadcast	Allow 🗸
CoS Mode	Interface-Decision 🗸
Default CoS	
Egress Attributes	
C-Vlan CoS preservation	Enable V
C-Vlan preservation	Enable 🗸
S-Vlan CoS preservation	Disable V
Marking admin	Enable 🗸
Service bundle ID	1 🗸

圖 3-51 視需要可再增設多個服務點

(五)、 TDM 服務設定

因為需要指定無線電傳輸TDM的通信類型,必須先要為Radio介面卡建立好 Ethernet服務,然後建立與Radio介面卡連接的服務點,再建立與E1介面卡連接 的服務點

操作路徑:TDM > Native TDM Services > Creative Services Interface location選擇"Multi Carrier ABC(TCC Group#1)",VC設 為"1"然後 Next

		10M Services waard Internet Explorer			
CERAGON)		they//14216512/weptendering/Faintd-1738/decord: 0AFARAMISPORUE 15/popid: 455/5514/00/2 Interface #1 Int			
🖡 Logout 🖌 Connection 💆 Admin	Microwave radio	VC V			
T Filter	▼ Native TDM				
Unit Summary Batta Summary In Platform	Trail ID A		interface #2	ve	Cinterface loca
o Haolta a TDM	Create Service				
TDM Pseudownre Interfaces Diagnostics	Multiple Sele Administale				
PM & Statistics Groups Radio	Note: In order 1				
 Ethernet Sync Oulick Configuration 					
p UEUHes					
		ss Buch Nad iss. I minih			
	Page Refresh Inte	Lasi Loaded: 15.39.15 _Clove		Last Loaded	5.39.11 Betr
	PERSONAL PROPERTY AND ADDRESS OF ADDRES		1		

圖3-52 設定TDM服務

Interface location 選擇"TDM, Slot 7(LIC-T16 ACR)"、E1/DS1設 為"1"、Timing設定"Recovered"(對方Timing須設為Loop) 然後 Next

		Interface #1	
Logout Connecton Admin Hate Lint Summary Eado Summary Platform Platform Platform Platform Platform TDM PseudoWire Platfores Platfores Platfores Platfores PM & Statistics P	Microwave radic	E1031 I	Thinface #2 NC v/ Interface location
	<		>
	Page Refresh into	Last Loaded: 15.39.15 <u>Close</u> % 100% +	Last Loaded: 15:39:11 Refresh

圖 3-53 選擇 E1 介面卡為 Interface 1

如要設定其他路E1則重複上述步驟,若不再設定則按Next

(=) (=) (=) http://192168.1.2/responses/ (=) (=) (=) (=) (=) (=) (=) (=) (=) (=)	der.Fcgil?winid+1ss	(# http://1921681.2/1.fcoil	and the second second			n ★ ¤
CERAGON		Interface #2				
🖡 Logout 🖌 Connection 💈 Admin	Microwave radio	VC 1 V				
▼ niber	▼ Native TDM					
Unit Summary Radio Summary	Trai ID 🛦			Interface #2	VC	✓ Interface location
• Faults 4 TDM	Create Service					
Native TDM Services	Multiple Sele					
> Interfaces	Admin state					
 Diagnostics PM & Statistics 						
> Groups	Note: In order to					
Radio e Rhernet						
o Sync						
Quick Configuration Utilities						
o conces						
		oc Back Next so Pilitin				
	Page Refresh Int		Last Loaded: 15:39:48 Close		Last Load	ed 15:39:11 Retresh
	111		€_100% -			

圖 3-54 選擇 MC-ABC 介面為 Interface 2

Local 選"2"、Remote 選"1"(對方站臺則要反過來設定),然後按 Finish

Г

(=) (=) http://192.168.1.2/respon	derfogi19mmid=188	http://192.168.1.2/1.fcg/1	(er				n ★ ‡
CERAGON		Trail Selection				0.00	
Logout 🗹 Connection 💈 Admin	Microwave radid	Trail Description					
Filter	▼ Native TDM	Trail Protection Unprotected	~		Juliothea #1		
Mini Summary Rado Summary • Platform • Paulis • TDM <u>Native TDM Services</u> • TDM Pseudolivire	Create Service	Local Remote			menoce #2	VC	✓ Interface location
 Internations Diagnostics Diagnostics Reado Reado Ethermet Sync Quick Configuration Utilities 	Admin state	<< Back Next >> Finish					
	Page Refresh Inte			Last Loaded 15:40-13 Close		Last Loa	ded 15:39.11 Refresh

圖 3-55 設定起迄端

檢查設定是否正確,若正確按Submit,否則按Back 回上述步驟修改完成後

再按Submit

The map // 142 105 1 2 mapp	iden sc Bit skinig - 120	8 http://192.168.1.2/L fogil	H X V
	Microwave radio	Interface #1. TDM, Sigt 7 (LIC-T16 ACR), E1/DS1 #1	
Inter x Unit Summary Bado Sammary Platform Faults Faults Faults Faults Faults Fault Faults Fault Faults Fault Faul	Note: In order to	Interface #2 Multi Carrier ABC (TCC, Group #1), VC #1 Trail Selection: Trail D: 1 Trail Description: Press Submit to configure the selected parameters.	Interface #2 VC v/ Interface location
	C Page Refresh Into	≪Back Nert >> Submr Last Loaded: 15.4	1.05_Close

圖 3-56 再次確認前述 TDM 設定是否正確

A Map //19216812/response	der fog 1 Numd = 138	http://19216812/1.ftgil - Internet Explorer http://19216812/1.ftgil			n * ¤
CERAGON		Submit the selected values Configuration completed successfully 1			
🖡 Logout 🖋 Connection 🧟 Admin	Microwave radio				
▼ Filter	Show services for				
Unit Summary	 Native TDM S 				
Radio Summary	Trail ID 🔺		Interface #2	1112	
> Faults	7 1		Group #1)	VC #1	N/A
4 TDM					
Native TDM Services	Create Service				
D TDM PseudoWire					
Diamostics	Multiple Select				
PM & Statistics	Admin state				
> Groups					
b Radio	Note: In order to				
 Ethernet Sanc 					
 Ouick Configuration 					
> Utilmes					
		New Service			
	<				\$
	Page Refresh Inte	Last Loaded: 15:41:09 Close		Last L	aded 15.41.10 Refresh
	E	\$ 1006 ×	-		

圖 3-57 成功完成 TDM 設定

設定完成

(六)、 2+2-HSB 快速設定

系統設定除了個別項目逐步的設定之外,亦提供整合各項的快速設定,使用 者可針對1+0、1+1-HSB、2+0、2+2-HSB等不同射頻保護架構需求進行快速設定, 以簡化設定流程,節省設定時間,以下就以2+2-HSB為例進行快速設定 操作路徑:Shelf Configuration > Chassis Configuration

CERAGON)				and the second second		
Logout 🗸 Connection 💈 Admin	Microwave r	adio: Chassis Configu	ration			
Filter X	Drag a car	d from the right col	umn to a slot on the left	and click 'Configure'		
Alufform A Shelf Management Chassis Configuration Interfaces Configuration Management Software			11			• • • • • • • • • • • • • • • • • • •
 Configuration Activation Key Security Faults Ethernet 	Chassis Slot	Configuration Operational S	ot admin state Actual car	d type Expected card type	Label	•
Sync Dutck Configuration		state	Alexand	Climand		States - Venter - Party -
1 filltae		down D	sable Cleared	Cleared		
	Ū 4	down D	sable Cleared	Cleared		O
	5	down D	isable Cleared	Cleared		
	6	down D	sable Cleared	Cleared		and the second se
	0 7	down D	isable Cleared	Cleared		and Longitud
	8	down D	isable Cleared	Cleared		- 100000
	9	down D	isable Cleared	Cleared		1
	10	down D	isable Cleared	Cleared		v - 2
	12	down D	isable Cleared	Cleared		Sector Sector
				1 mar 10		

圖3-58 準備開始進行快速設定

CERAGON						
Logout 🗸 Connection 💈 Admin	Microwave radio: Chassis	Configuration				
▼ Filter ×	Drag a card from the m	ght column to a slot o	on the left and click '	onfigure'		~
Unit Summary						
a Platform	••			-		Barry P. P. P. P. B.
 Shelf Management 		- 145	2.11			and and and and and
Chassis Configuration		100			48 4	
Interfaces Configuration	1		100	I		
Management	Ter o			-		- "AT 100 - 00
» Software	@ -	O				
Configuration	0			011		
 Activation Key 			يسلس الشا الشا			March Street and Street
Security	and the second s	THE R. LEWIS				
Faults	 Chassis Configuration 					After at
b Ethernet	Slot Operation	al Slot admin state	Actual card type	Expected card type	Label	E STREET
> Sync	ID 🛦 state	90 Sec. 0302				
D Quick Configuration	2 down	Disable	Cleared	Cleared		
	3 down	Disable	Cleared	Cleared	<u>^</u>	
b Utilities		Disable	Cleared	Cleared		
) Utilities	4 down	(The ship	CIES ED	Ciesued		- La since and
o Utilities	4 down 5 down	Disable	Cleaned	Cleared		
b Utilities	4 down 5 down 6 down 7 down	Disable Disable	Cleared	Cleared		
⊳ Utilities	4 down 5 down 6 down 7 down 8 down	Disable Disable Disable Disable	Cleared Cleared Cleared	Cleared Cleared Cleared		and the second s
> Utilities	4 00wm 5 dowm 5 dowm 6 dowm 7 dowm 8 dowm 9 dowm	Disable Disable Disable Disable Disable	Cleared Cleared Cleared Cleared	Cleared Cleared Cleared Cleared	_	
> UCINES >	4 down 5 down 6 down 7 down 8 down 9 down 10 down	Disable Disable Disable Disable Disable Disable	Cleared Cleared Cleared Cleared Cleared	Cleared Cleared Cleared Cleared Cleared		
> UCREES	4 down 5 down 5 down 6 down 7 down 8 down 9 down 10 down 12 down	Disable Disable Disable Disable Disable Disable Disable	Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Cleared Cleared Cleared Cleared Cleared Cleared	×	

圖 3-59 將 Radio 介面卡拖拉到 Slot 3~6 位置

CERAGON					1			• • • • • • • •
In Logout ✓ Connection	Microwave ra	dio: Chassis Co	nfiguration					
Y Filter X	Drag a card	from the right	column to a slot	on the left and click '	Configure'			
Unit Summary	_							
Platform Chalf Management	0					• (0))o • •	
A Sreit Management. Chassis Configuration			1919			(d)		All and a second second
> Interfaces Configuration				3	1	31	2	The second second second
Management	-	22	1 1 1 1 1 1		- HE.	10 10 10 10 10		Territorian territorian (
Software	6	٥.	C	-	0 -	© -	and in success	100 A
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 Activation Key 	the second second	- Commo		والكر الكالكا			· · ·	
 Security 	and the second second							0 -
> Paulos	V Chassis C	Configuration						
a Sunt	Slot	Operational	Slot admin state	Actual card type	Expected card type	Label		
> Quick Configuration		down	Disable	Cleared	Cleared			g water to be a second water of
> Utilities	3	down	Disable	Cleared	Cleared		^	
	4	down	Disable	Cleared	Cleared			
	5	down	Disable	Cleared	Cleared			- accounter and
	6	down	Disable	Cleared	Cleared			
	1	down	Disable	Cleared	Cleared			And Andrewson
	H o	down	Disable	Cleared	Cleared			
	10	down	Disable	Cleared	Cleared			the at the state
	12	down	Disable	Cleared	Cleared		*	Real and Arrest
	Carlos I Frank							The sector
	FOE CO	ntigure Hese	t unassis Set to	Factory Default				
								· · · · · · · · · · · · · · · · · · ·
	5							-

圖 3-60 將右側圖示 Eth 介面卡拖拉到 Slot 2 位置

CERAGON								
Logout 🖌 Connection 💆 Admin	Microwave ra	idio: Chassis Co	infiguration					
Filter	Drag a care	t from the right	t column to a slot	on the left and click (Configure'			
Unit Summary	-							
A Shalf Management						0000		
Chassis Configuration				6		A12	-	
Interfaces Configuration		d=		2		M		
Management		20 0.000 F M			- 96.6		-	
▶ Software	C	D.)	0.		A COLORADO	
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Activation Key		🕋 • 🃟 •			i interest and			aria at
	THE PARTY OF THE P							
b Security	10110	-	the second second second			and that was set on		0
 Security Faults 	T Chassis (Configuration	comment interf interfy			1011 1003 1014 PC - 480		<u>.</u> . • • •
) Security Faults Ethernet	▼ Chassis 0	Configuration Operational	Slot admin state	Actual card type	Expected card type	Label		
 Security Faults Ethernet Sync 	▼ Chassis (Slot ID ▲	Configuration Operational state	Slot admin state	Actual card type	Expected card type	Label		. •. •••• 66
 Security Faults Ethernet Sync Quick Configuration 	▼ Chassis (Stot ID ▲ 2	Configuration Operational state down	Slot admin state Disable	Actual card type Cleared	Expected card type Cleared	Label		o. [www.1912]
 Security Faults Ethernet Sync Quick Configuration Utilities 		Configuration Operational state down down	Slot admin state Disable Disable	Actual card type Cleared Cleared	Expected card type Cleared Cleared	Label	_	. ©.
 Security Faults Ethernet Sync Quick Configuration Utilities 	▼ Chassis (Slot ID ▲ 3 4	Configuration Operational state down down down	Slot admin state Disable Disable Disable	Actual card type Cleared Cleared Cleared	Expected card type Cleared Cleared Cleared	Label	Ŷ	
 Security Faults Ethernet Sync Quick Configuration Utilities 		Configuration Operational state down down down down	Slot admin state Disable Disable Disable Disable	Actual card type Cleared Cleared Cleared Cleared Cleared	Expected card type Cleared Cleared Cleared Cleared Cleared	Label		
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) Security Faults Ethernet Sync Quick Configuration Utilities	▼ Chassis (Slot D.▲ 2 3 3 4 5 6 6 7 8	Configuration Operational state down down down down down down down	Slot admin state Disable Disable Disable Disable Disable Disable Disable	Actual card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Expected card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Label	Î	
) Security Faults Ethernet Sync Quick Configuration Utilities		Configuration Operational state down down down down down down down down	Slot admin state Disable Disable Disable Disable Disable Disable Disable	Actual card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Expected card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Label	Î	
 Security Faults Ethernet Ethernet Quick Configuration Quick Configuration Utilities 	▼ Chassis Slot D 2 2 3 4 5 5 6 7 8 9 9 10 10 2 10 10 10 10 10	Configuration Operational state down down down down down down down down	Slot admin state Disable Disable Disable Disable Disable Disable Disable Disable Disable	Actual card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Expected card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Label	Ĵ	
 Security Faults Ethernet Sync Quick Configuration Utilities 		Configuration Operational state down down down down down down down down	Siot admin state Disable Disable Disable Disable Disable Disable Disable Disable Disable Disable	Actual card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Expected card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Label	Ĵ	
) Security Faults Ethernet Sync Quick Configuration Utilities	▼ Chassis (Slot 10 2 2 3 3 4 4 5 6 6 7 7 8 9 9 10 10 2 2 3 3 4 4 5 5 6 6 7 8 9 9 10 10 10 10 10 10 10 10 10 10	Configuration Operational state down down down down down down down down	Siot admin state Disable Disable Disable Disable Disable Disable Disable Disable Disable Disable	Actual card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Expected card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Label	Ĵ	
) Security Faults Ethernet Sync Quick Configuration Utilities		Configuration Operational state down down down down down down down down	Stot admin state Disable Disable Disable Disable Disable Disable Disable Disable Disable Disable Disable Disable Disable Disable Disable	Actual card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Expected card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Label	Ŷ	
) Security Faults Ethernet Sync Quick Configuration Utilities		Configuration Operational state down down down down down down down down	Slot admin state Disable Disable Disable Disable Disable Disable Disable Disable Disable Disable Disable State State State Disable	Actual card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Factory Default	Expected card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Label	Ĵ	
I- Security Faults Ethernet Sync Quck Configuration Utilities	Chassis (Siot Si	Configuration Operational state down down down down down down down down	Stot admin state Disable Disable Disable Disable Disable Disable Disable Disable Chassis & Chassis Set to	Actual card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Expected card type Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared Cleared	Label	Ŷ	

圖 3-61 將右側圖示 E1 介面卡拖拉到 Slot 7 位置

CERAGON									
Logout 🖌 Connection 💈 Admin	Microw	ave rad	io: Chassis Co	nfiguration					
Filter X	Drag	a card	from the right	column to a slot	on the left and click	'Configure'			
Unit Summary A Platform A Shelf Management				- 19					-
Chassis Configuration Interfaces Configuration Management 				-1	7		1	1	
Software Configuration Activation Key	-	© . [).]••	© -¶ ■■■					⊙.
Security Faults Ethernet.	▼ Ch	assis Co	Oniguration	Club actions while	Actual court have	Exampled and have	1 shall		- ⊙ .
) Sync		2.4	state	citor auritiri state	Petal cara type	Expected card type	Label		
> Quick Connguration > Utilities	(4) 4] 4] 4] 4	2 3 4 5 6	down down down down down	Disable Disable Disable Disable Disable	Cleared Cleared Cleared Cleared Cleared	Cleared Cleared Cleared Cleared Cleared		^	
		7 8 9	down down down	Disable Disable Disable	Cleared Cleared Cleared	Cleared Cleared Cleared			
	8	10 12	down down	Disable Disable	Cleared Cleared	Cleared		~	See 28 means the
	Edit	Cor	gure Reset	Chassis Set to	Factory Default				

圖 3-62 勾選 Slot ID 2-7 後點選 Configure

	der.tcgi1/winid=	13&deviceid=0		p-d	1921681.2 - Microwa	NP f X		n ★ ¢
CERAGON								
🖡 Logout 🗹 Connection 💆 Admin	Microwave r	adio: Chassis Co	nfiguration					
▼ Riter ×	Drag a car	d from the right	t column to a slot	on the left and click 1	Configure'			^
Unit Summary	100		_				-	
Platform		92				21		
# Shelf Management	- 10000	-		¢.		CIT.	6	
Chassis Configuration		a		-	1	21		The surgery same and
Interfaces Configuration	-	-	88.			10-0	1	Lease and the second second
> Management	1.00	ອ -	0			- O -	Contraction in the local division of the loc	
Software	■ 10.4 ML			F-1F-1	· · · · · · · · · · ·	statest all		
 Contigurability 					a second law and	Call Cold Cold Cold		100 C
> ALLIVAUUN Nety								© .
b Faults	▼ Chassis	Configuration						
> TDM	ILI SIOL	Operational state	Slot admin state	Actual card type	Expected card type	Label		
> Radio	× 2	down	Disable	Cleared	LIC-X E4 Elec			
Ethernet	۲ ع	down	Disable	Cleared	RMC-8		^	
> Sync	✓ 4	down	Disable	Cleared	RMC-B			Line Contraction
Quick Configuration	× 2	down	Disable.	Cleared	RMC-B			· DESERVATION CONTRACTOR
b Ubilities	× 1	down	Disable	Cleared	LIC-TIS ACR			
	0 8	down	Disable	Cleared	Cleared			
	9	down	Disable	Cleared	Cleared			
	10	down	Disable	Cleared	Cleared		~	we do exercise solar
	12	down	Disable	Cleared	Cleared			and the second of
	Edit Ci	onfgure Rese	t Chassis Set to	Factory Default				ab yes second
	12		1					
	<							>

圖 3-63 Expected Card Type 顯示已設定的卡片類型

操作路徑:Quick Configuration > PIPE > Multi Carrier ABC > 2+2 (HSB-SD) > PIPE Type選"dot1q"、Ethernet Interface選"Ethernet Slot 1, Port 1"、Radio#1 Interface選"Radio:Slot 3, Port 1 " > Next



圖 3-64 Radio#1 Interface 選" Radio: Slot 3, Port 1"



圖 3-65 Radio#2 Interface 選" Radio: Slot 5, Port 1"

(→	nder/togi1/huind=138/desiceid=0 D + C 😂 192.188.1.2 - Microwave r. ×	n * ¤
CERAGON		
Logout 🗸 Connection 💈 Admin	Microwave radio: Link Setup (PIPE) 2 + 2 Multi Carner ABC HSB-SD	
▼ Riter X		
Badic Summary > Partierm > Partierm > Partierm > TAUS > Badic > Badic > Since > Opic Konfiguration > Bine Partierm > Badicens Security > UPIC > Sincy Cartier > Sincy Cartier > Multip Cartier ABC > Linds Face > 2 + 2 (HBS-SD) X + 0 > URities		
		Last Loaded: 14-53-25

圖 3-66 Radio#3 Interface 選" Radio: Slot 4, Port 1"



圖 3-67 Radio#4 Interface 選" Radio: Slot 6, Port 1"



圖 3-68 勾選 Radio XPIC Configuration

CERAGON	
Logout 🗸 Connection 💈 Admin	Microwave radio: Link Setup (PIPE) 2 + 2 Multi Carrier ABC HSB-SD
Filter IX Unit Summary Radio Summary Platform Fourts TDM Radio Ethernet. Sync Sync Quick Configuration Promotifie Patform Setue # PIPE > Single Carrier = Mult Carrier ABC 1 + 1 (HSR-SD) 2 + 2 (HSR-SD) N + 0 Utilities	Link Setup Progress 3946 Image: Setup Progress Setup Progress Image: Setup Progress Setup Progre

圖3-69 設定TX Frequency、RX Frequency、TX Level、TX Mute"Off"

Script ID 選"Script:1024, BW:28MHz"、Operational Mode 選"Fixed"、Profile 選"Profile:9, 1024 QAM" > Next(註: Operational Mode 選"Fixed",為原廠訓練LAB的設定)
🔶 🕞 👩 http://192.168.1.2/respon	der f.cg11/winid=13&.deviceid=0	n * ¤
Logout 🗸 Connection 💈 Admin	Microwave radio: Link Setup (PIPE) 2 + 2 Multi Carrier ABC HSB-SD	
Filter x Lht/Surmary Patriom Patriom Patriom Patriom Patriom Patriom Value Patriom Value Patriom Value Patriom Value Patriom Patriom Patriom Single Patriom Single <t< th=""><th>Link: Setup Progress State Image: Setup P</th><th></th></t<>	Link: Setup Progress State Image: Setup P	
		Last Loaded: 14-54-14
		Last Luaded. 14.34, 14

圖3-70 選擇Script ID設定

🔶 🛞 🦉 http://192.168.1.2/respon	nder frys13 winid=13&deviceid=0 🖉 • C 🧭 192168.12 • Microwave r x	n * 4
CERAGON	······································	
Logout 🗸 Connection 💈 Admin	Microwave radio: Link Setup (PIPE) 2 + 2 Multi Carrier ABC HSB-SD	
• rate: (X) • Faitomay Rado Summary > Plaform > Plaform > TM > Stads > Baits > TM > Baits > Sync > Quick Configuration Exemption Selation Platform Selation - Sync > Single Camier - Multi Camier ADC 1+1 (Hst9-St0) 2 + 2 (Hst8-St0) 2 + 2 (Hst8-St0) N ± 0 > Ublices	Link: Setup Progress 25% Image: Setup Progress Radio #1, MSB SD Group #1 (Kalove) Radio #1, MSB SD Group #1 (Kalove) Radio #2, MSB SD Group #2 (Active) Management Configuration, 2 + 2 (HSB-SD) In Band Management V(AN Im Band Includes Elitement Interface Im Band Includes Elitement Interface Im Band Includes Elitement Interface Im Band Includes Elitement Interface	
		Last Loaded: 14:54:4

圖 3-71 In Band Management 選"Yes"、Management VLAN 選"10"

檢視設定是否都正確,有錯誤修改好之後 > 按Submit

CERAGON		
Logout 🗹 Connection 💈 Admin	Microwave radio: Link Setup (PIPE) 2 + 2 Multi Carrier ABC HSB-SD	
Filter ac With Swimmary Patform Platform Faults Flautis Faults Flautis Store Value Value Value Value Value Configuration Etom.File Etomote Value Cartier Value Cartier ABC L + 1 Value	Link Setup Progress Journe Following are the parameters that you have selected, 2 + 2 (HSB-SD) Ethermet Interface: Ethernet: Slot 1, Port 1 PIPE Type: dot1q Radio Protection: Radio: Slot 3, Port 1 & Radio: Slot 5, Port 1, Reventive: No Radio Protection: Radio: Slot 4, Port 1 & Radio: Slot 6, Port 1, Reventive: No XPIC - Radio: Slot 3, Port 1 & Radio: Slot 6, Port 1, Reventive: No XPIC - Radio: Slot 3, Port 1 & Radio: Slot 6, Port 1 XPIC - Radio: Slot 3, Port 1 & Radio: Slot 6, Port 1 XPIC - Radio: Slot 3, Port 1 & Radio: Slot 6, Port 1 XPIC - Radio: Slot 3, Port 1 & Radio: Slot 6, Port 1 XPIC - Radio: Slot 3, Port 1 & Radio: Slot 6, Port 1 XPIC - Radio: Slot 3, Port 1 & Radio: Slot 6, Port 1 XPIC - Radio: Slot 3, Port 1 & Radio: Slot 6, Port 1 XPIC - Radio: Slot 3, Port 1 & Radio: Slot 6, Port 1 XPIC - Radio: Slot 3, Port 1 & Radio: Slot 6, Port 1 XPIC - Radio: Slot 6, Port 1 XPIC - Radio: Slot 7, Port 1, Radio: Slot 6, Port 1 XPIC - Radio: Slot 7, Port 1, Radio: Slot 7, Port 1 XPIC - Radio: Slot 7, Port 1, Radio: Slot 7, Port 1 XPIC - Radio: Slot 7, Port 1, Port 1 XPIC - Radio: Slot 7, Port 1, Port 1 XPIC - Radio: Slot 7, Port 1, Port 1 XPIC - Radio: Slot 7, Port 1, Port 1	
2 + 2 (H68-50) h + 0 b Oblises	In Band Management, Yes, Management VLAN: 10. Ethernet included; No Wanney after you click Submit, the system will be configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with these parameters and the interfaces will be reset. Configured with the interface	Last Loaded: 14:54:5

圖 3-72 再次確認前述快速設定是否正確

CERAGON	
🕞 Logaut 💉 Connection 😰 Admin	Microwave radio: Link Setup (PIPE) 2 + 2 Multi Carrier ABC HSB-SD
Vitter X Unit Summary Validournanty > Pladitor > Fladitor > Pladitor > Fladitor > Radio > Unit > Radio > Unit > Radio > Unit > Sync > Quick Conflocation > Sync > Quick Conflocation > Single Carrier > Mild Contrer ADC 1 - 11:H59-500 2 + 2 H58-500 N + 0 N + 0	Submit the selected values Configuration completed successfully I
> udites	Last Loaded 14.5

圖 3-73 成功快速設定

(七)、 IP20N 系統參數備份及還原設定

IP20N系統設定完成後的系統參數可透過參數備份操作,將參數儲存在IP20N 的記憶體中,當須要還原系統參數時就可以將儲存在IP20N的備份檔進行還原程

序,以下是備份及還原的步驟

操作路徑:Platform > Configuration > Configuration Management > 選 Restore Point 2(最多備份三組) > Backup(備份)

Export/Import file status	
File transfer status	ready
File transfer progress	0%
Backup file creation status	
Backup file creation status	Succeeded
Backup file creation progress	100%
Configuration restore status	
Configuration restore status	succeeded
Configuration Parameters	
File number	Restore point 2 🗸
Timed installation	No
Apply Export Impor	t Delete Backup Restore FTP Parameters FTP Port

圖 3-74 備份成功

操作路徑:Platform > Configuration > Backup Files

	2			
File number 🛦	Original system type	Software version	Time of creation	Original IP address
1	IP-20N	10.3.0.0.286	12-12-2018 11:44:12	192.168.1.2
2	IP-20N	10.3.0.0.0.286	15-09-2018 11:53:53	192.168.1.2
3	N/A	0.0.0	01-01-1970 00:00:00	0.0.0.0

圖 3-75 檢視是否已存為備份檔

操作路徑:Platform > Configuration > Configuration Management > 選 Restore Point 2(最多可選三組) > Restore(還原) > 確定

File transfer status	ready	
File transfer progress	0%	網頁訊息
Backup file creation status		
Backup file creation status	Succeeded	Restore
Backup file creation progress	100%	
Configuration restore status	3	
Configuration restore status	succeeded	
Configuration Parameters		
File number	Restore point 2	
Timed installation	No 🗸	

圖 3-76 將備份檔還原

(八)、 IP20N 系統參數備份檔 Export 及 Import 設定

儲存在IP20N的系統備份檔,可以透過 FTP Server Export到電腦儲存,當 須要還原系統參數時就可以將儲存在電腦的檔案透過 FTP Server Import到 IP20N然後進行還原程序,以下是Export及Import的步驟





開啟FileZilla Server > Edit > Users > Add > Add user account輸入"user" > ok

File Zilla server	-		
FileZilla Server version 0.9.26 beta Copyright 2001-2006 by Tim Kosse (tim Connecting to server Connected, weiting for authentication Logged on Retrieving account settings, please wait Done retrieving account settings	Users Page: General Shared folders Speed Limits IP Filter	Account settings Enable account Password: Group membership: Add user account Please enter the name of the user account that should be added: user Co User should be member of the following group: conne> Cancel	Users Add Remove Rename Copy
ID & Account	OK Cancel	You can enter some comments about the user	0 bytes received 0 B/s 0 bytes sent 0 B/s @ @

圖 3-78 建立 FileZilla Server 使用者帳號

選Shared folders > 瀏覽資料夾 選擇要存放備份檔的資料夾 > 確定



圖 3-79 選擇欲傳送之資料夾

Files的 4個選項全部勾選, Directories的 4個選項全部勾選 > ok > 完成 安裝

FileZilla server		4 11 18				23
File Server Edit ?						
78 52 2 ? 10	Users			x		
FileZilla Server version 0.9.26 beta Copyright 2001-2006 by Tim Kosse (tim Connected, waiting for suthentication Logged on Retrieving account settings, please wait Done retrieving account settings ID Account ID Account	Users Page: General Shared folders Speed Limits IP Filter	Shared folders Directories Aliases H C:\Users\谢安\D 《 Add Remove Rename	Files Ø Read Ø Write Ø Delete Ø Append Directories Ø Create Ø Delete Ø List Y + Subdirs Set as home dir	Users User Add Remove Rename Copy		
	OK Cancel	A directory alias will also appear at the spec path. Separate multiple aliases for one direc If using aliases, please avoid cyclic director	filed location. Aliaese mu tory with the pipe charact y structures, it will only co	st contain the full local ter (1) nfuse FTP clients. 0 bytes received 0 B/s	0 bytes sent 0 B/s	
indusy.				o bytes telefield o bys	o bytes serie o bys	11

圖 3-80 勾選權限



圖 3-81 測試傳送正常

操作路徑:Platform > Configuration > Configuration Management > FTP Parameters

C (C http://192.168.1.2/respor	der fcgi17winid=13&deviceid=0		Q = C 👩 192.1	168.1.2 - Microwave r ×	10.00		□ <u>→</u>
					 	00	30
Logout 🖌 Connection 💈 Admin	Microwave radio. Configuratio	n Management					
Riker X Unit Summary Radio Summary Partorn p Shelf Management b Management b Software a Configuration <u>Timer Parameters</u> Backon Files	Export/Import file status File transfer status File transfer progress Backup file creation status Backup file creation status Backup file creation progress Configuration restore status	Succeeded 100% Succeeded 100%					
Conflouration Management Activation Kay Activation Key Conflouration Activation Key Conflouration Activation Key Conflouration ToM Radio Ethernet Sync Quick Configuration	Configuration restore status Configuration Parameters File number Timed installation Apply Export Import	Restore point 1 V No V Delete Backup R	Restore FTP Parameter	FTP Port			
Utilities					Last Loade	d: 11:02:26	Refre



CERAGON	
Logout 🗹 Connection 😰 Admin	Microwave radio: Configuration Management
riker X Unit Summary Management Management Management Monagement Software Configuration Time: Parameters Backsu: Files Configuration Management Activation Key Configuration Socurity Foults TDM Radio Ethermet Sync Quick Configuration Vullities	Export/import file status File transfer status File transfer progress Backup file creation status Configuration restore status Configuration restore status File number File number Paper Telefaltes Paper Telefaltes

圖3-83 輸入已設的Username 及 Password

操作路徑:Platform > Configuration > Backup Files > 檢視File number1為最新的備份檔

	-		-				
CERAGON	nder togi Lovinia	=130xdeviceid=0		0.0	9 192.168.1.2 - Microwave r ×		
Logout 🗸 Connection 💈 Admin	Microwave	radio: Backup File	85				
Filter	▼ Configu	uration manageme	ent status table				
Jnit Summary	File	Original system	Software version	Time of creation	Original IP address	System ID	valid
<u>adio Summary</u> latform ⊳ Shelf Management	1 2 3	IP-20N N/A N/A	10.3.0.0.0.205 0.0.0.0 0.0.0.0	19-09-2018 11:02:47 01-01-1970 00:00:00 01-01-1970 00:00:00	192.168.1.2 0.0.0 0.0.0	Modular IDU, 1RU, 5 slots / Modular IDU, 2RU, 10 slots 0 0	Yes No No
Configuration Imer Parameters Backup Files Configuration Management Activation Key Configuration Activation Key Configuration Activation Key Configuration South South							
	K Roman						

圖 3-84 檢視備份檔

操作路徑:Platform > Configuration > Configuration Management > File number選擇Restore point1 > Apply > Export > 確定 > 檢視 Export file status ,若顯示succeeded即完成Export

		-
RAGON		
gout 🗹 Connection 💈 Admin	Microwave radio: Configuration Management	
X Summary Solution Solution	Export/import file status File transfer status succeeded Backup file creation status Backup file creation status Backup file creation status Succeeded Backup file creation status Succeeded Configuration restore status succeeded Configuration restore status succeeded Configuration Retransfers File number File number Restore points Import No Import Delete Backup Restore FIP Parameters FIP Port	
		uled 11.02.00

圖 3-85 Export 備份檔

Import 備份檔,將備份檔Import至Restore point2

操作路徑:Platform > Configuration > Configuration Management > FTP Parameters > 輸入已設的Username及Password, 輸入要Import的File name(註:須輸入副檔名為zip) > Apply

Logout V Connection & Admin	Microwave radio: Configura	on Management		
Viher Vint Summary Radio Summary Radio Summary Pietform Pishef Management Management Management Software Configuration Timer Parameters Backour Files Configuration Activation Key Activation Key Activation Key Activation Key Activation Key Security Paults Software Such Configuration Utilities	Export/Import file status File transfer status File transfer storus Backup file creation statu Backup file creation statu Backup file creation prop Configuration restore stat Configuration restore stat Configuration Parameter File number Timed installation	http://19216812/responder.fcgi1?winid=144&deviceid=0&winsyst. http://19216812/responder.fcgi1?winid=144&deviceid=0&winsystemname=configur FIP Parameters File transfer protocol FTP Usemame user Password Server IPAdress 192168.1.10 Server IPAG address Path Ele name 20180019.2p Pape Refresh Interval (Seconds) None Last Loaded: 11:02:42 Refresh Close 4, 10:0%	Last Loaded: 11:02:26	Refresh

圖 3-86 輸入要 Import 的備份檔

操作路徑:Platform > Configuration > Configuration Management > File number選擇Restore point2 > Apply > Import > 確定 > 檢視 Import file status ,若顯示succeeded即完成Import

C (http://192168.1.2/respon	nder fcgil?vmid=13&deviceid=0	-	P - C 🥖 19	2.168.1.2 - Microwave r ×	1000	n ★ ¤
CERAGON						• •
Logout & Connection & Admin	Microwave radio: Configurat	on Management				
Viter x V	Export/Import file status File transfer status File transfer progress Backup file creation status Backup file creation status Backup file creation status Backup file creation progress Configuration restore status Configuration restore status Configuration restore status Configuration Parameters File number Timed installation	succeeded 100% Succeeded Succeeded Restore point 2 V No V rt Delete Backup	Restore FTP Parame	ters FTP Port		
					Last Loaded: 1	1:03:19 Refresh
						(A)

圖 3-87 完成備份檔 Import

四、 系統監測

系統監測是系統維護的重要課題,維護人員透過系統監測所提供的各項數 值,以判斷系統是否正常,一般監測項目有Radio訊號接收、誤碼檢查、調變速 率、流量查詢、告警狀況等,而外接告警則可以在系統發生異常時即刻通知維護 人員處理,維護人員也可以利用TDM驗證及射頻 RF 驗證等方法以判斷系統問題 之所在。

(一)、 訊號接收

操作路徑:Radio > PM & Statistics > Signal Level

Filter X	Interfac	e Radio: Slot 3, Port 1	(RMC-B) V Interval Ty	pe 15 minutes 🗸					
Unit Summary Radio Summary	▼ PM	Table							
Platform	. 8	Interval 🔺	Max TSL (dBm)	Min TSL (dBm)	Max RSL (dBm)	Min RSL (dBm)	TSL exceed threshold seconds	RSL exceed threshold1 seconds	RSL exceed threshold2 seconds
Faults	-	Current (12:28:00)	11	11	-33	-34	0	0	1
TDM	1	15-Sep-18 12:15	11	11	-33	-35	0	0	1
Radio	2	15-Sep-18 12:00	17	11	-24	-99	7	2	1
Radio Parameters	3	15-Sep-18 11:45	17	11	-24	-99	7	2	i ŝ
Remote Radio Parameters	4	15-Sep-18 11:30	11	11	-33	-99	0	189	16
Radio BER Thresholds	5	15-Sep-18 11:15	11	11	-33	-33	0	0	1
ATPC	6	15-Sep-18 11:00	11	11	-32	-33	0	0	
Payload Encryption	7	15-Sep-18 10:45	11	11	-31	-34	0	0	1
Ethernet Interface	8	15-Sep-18 10:30	17	11	-32	-99	7	2	1
MRMC	9	14-Sep-18 16:00	11	11	-40	-42	0	0	1
# PM & Statistics	10	14-Sep-18 15:45	11	11	-40	-41	6	0	1
Counters	11	14-Sep-18 15:30	11	11	-40	-41	0	0	1
Signal Level	12	14-Sep-18 15:15	17	11	-24	-99	7	2	1
Diversity	13	14-Sep-18 14:45	17	11	-24	-99	6	2	1
Combined	14	14-Sep-18 14:30	17	11	-24	-99	6	2	1
Annanata	15	14-Sep-18 14:15	17	.11	-24	-99	7	3	1

圖 4-1 顯示射頻訊號參數

(二)、 誤碼檢查

操作路徑:Radio > PM & Statistics > Aggregate

▼ Filter ×	Interfac	e Radio: Slot 3, Port 1	I (RMC-B) V Inter	val Type 15 minutes 🗸	1			
Unit Summary Radio Summary	▼ PM	Table						
> Platform	#	Interval 🛦	ES	SES	UAS	BBE	Integrity	
Faults		Current (12:28:44)	0	0	0	0	*	
b TDM	1	15-Sep-18 12:15	0	0	0	0	*	_
4 Badio	2	15-Sep-18 12:00	0	0	13	0	×	
Radio Parameters	3	15-Sep-18 11:45	0	0	13	0	×	
Remote Radio Darametere	4	15-Sep-18 11:30	12	0	168	875	×	
Parto DEP Throsholds	5	15-Sep-18 11:15	0	0	0	0	~	
ATOC	6	15-Sep-18 11:00	0	0	0	0	*	
AIPC .	7	15-Sep-18 10:45	0	0	0	0	×	
Payload Encryption	8	15-Sep-18 10:30	11	0	14	172	×	
Ethernet Interface	9	14-Sep-18 16:00	0	0	0	0	×	
> MRMC	10	14-Sep-18 15:45	0	0	0	0	*	
A PM & Statistics	11	14-Sep-18 15:30	0	0	0	0	*	
Counters	12	14-Sep-18 15:15	0	0	13	0	×	
Signal Level	13	14-Sep-18 14:45	0	0	82	0	×	
Diversity	14	14-Sep-18 14:30	0	0	27	0	×	~
Combined	15	14-Sep-18 14:15	0	0	13	0	X	



(三)、 調變速率

點選Radio > PM & Statistics > MRMC

▼ Filter	×	Interf	ace Radio: Slot 3, Port 1	(RMC-B) V Inte	rval Type 15 minutes 🗸	1			
Unit Summary Radio Summary		▼ Pl	M Table		Victoria -				
Platform		#	Interval 🛦	Min profile	Max profile	Min bitrate	Max bitrate	Integrity	
o Faults			Current (12.29.27)	9	9	226721	226721	1	
b TDM			1 15-Sep-18 12:15	9	9	226721	226721	*	
a Radio			2 15-Sep-18 12:00	9	9	226721	226721	×	
Radio Daramete	re		3 15-Sep-18 11:45	0	9	40978	226721	×	
Remeto Radio R	L2		4 15-Sep-18 11:30	0	9	40978	226721	×	
Relia OCD These	and meters		5 15-Sep-18 11:15	9	9	226721	226721	*	
Kadio BER Three	snoids		6 15-Sep-18 11:00	9	9	226721	226721	*	
ATPC			7 15-Sep-18 10:45	9	9	226721	226721	*	
Pavload Encrypt	200		8 15-Sep-18 10:30	0	9	40978	226721	×	
Ethernet Interfa	ce		9 14-Sep-18 16:00	9	9	226721	226721	*	
MRMC		1	0 14-Sep-18 15:45	9	9	226721	226721	*	
A PM & Statistics		1	1 14-Sep-18 15:30	9	9	226721	226721	*	
Counters		1	2 14-Sep-18 15:15	0	9	40978	226721	×	
Signal Level		1	3 14-Sep-18 14:45	0	9	40978	226721	×	
Diversity		1	4 14-Sep-18 14:30	0	9	40978	226721	×	~
Combined		1	5 14-Sep-18 14:15	0	9	40978	226721	×	
Aggregate									
MSE		Vie	w Graph						
XPI									
MRMC									
h Traffic									

圖 4-3 顯示射頻 MRMC 狀態

(四)、 **流量查詢**

點選Ethernet > PM & Statistics > RMON

	Page Refresh Interval (Seconds) No	ue 🔨				Last Loaded: 12:28:56	Refresh
	<						>
	RX multicast frame court	a	0	0	0	0	-
> Obites	RX frame count	0	0	0	0	0	
P. Quick Configuration	Rot bybe count	0	0	0	0	0	
II SYDC	TX 1519-1522 frame count	0	0	0	0	0	
b Groups	TX 1024-1518 frame count	0	0	0	0	0	
b Protocols:	TX 512-1023 frame count	0	0	0	0	0	
≥ QOS	TX 256-511 frame count	0	0	0	0	0	
Port RX	TX 128-255 frame count	0	0	0	0	0	
Port TX	TX 65-127 frame count	0	0	0	0	0	
Egress CoS Statistics	TX 64 frame count	96	88	96	88	96	
RMON	TX Jabber frame count	0	0	0	0	0	
 PM & Statistics 	TX fragment frame count	0	0	0	0	0	
AGP & LLF	TX undersize frame count	0	0	0	0	0	
Lookal Totachoras	TX oversize frame count	0	0	0	0	0	
Physical Interfaces	TX length error frame count	0	0	0	0	0	
SHINPER	TX fca error frame count	0	0	0	0	0	
CHILINA COULDRIADOU	TX pause frame count	0	0	0	0	0	
* Ethemet	TX control frame count	0	0	0	0	0	
K900	TX broadcast frame count	0	0	0	0	0	
P TDM	TX multicast frame count	89	88	98	88	86	
b Faults	TX frame count	86	88	98	68	86	
Platform	TX byte count	6,272	6,272	6,272	6,272	6,272	
Radio Summary	Clear on read	No	No	No	No	No	
Unit Summary		Ethemet: Slot 1, Port 1	Ethemet: Slot 1, Port 2	Ethernet: Slot 2, Port 1	Ethernet: Sot 2, Port 2	Ethemet: Slot 2, Port 3	0.04
* Filter	 Interface physical Port RMON is 	statistics					~
🔒 Logout 💉 Connection 😰 Admin	Microwave radio: RMON						

圖 4-4 顯示網路流量狀態

(五)、 **告警狀況**

點選Faults > Current Alarms

Logout Connection	Admin	Micro	wave	radio: Current Alarms				
▼ Filter	×	V Ci	ment	Alarms				
Unit Summary				Time	Severity A	Description	User Text	Origin
Radio Summary			1	12-12-2018 11:47:19	4	Loss of Carrier		Ethernet: Slot 1, Port 1
Platform			2	12-12-2018 11:47:08	4	Under voltage		PDC #1
Platform			3	12-12-2018 11:47:08	0	Unexpected Card Type in slot		Slot 7
a Faults			4	12-12-2018 11:47:08	4	Unexpected Card Type in slot		Slot 2
Current Alarms			5	12-12-2018 11:46:25	4	Demo mode is active		Slot 1
Alarm Statistics		-						
Event Log		Vie	W.					
Alarm Configuration								

圖 4-5 顯示告警訊息

(六)、外接告警

操作路徑:Platform > Management > External Alarms > Output > Admin > enable > Group > all groups > Apply

• Filter		External Alarms Output
Unit Summary Radio Summary Platform Shelf Management Management Unit Parameters NTP Configuration Time Services Interface Manager Inventory Unit Info Main Card Redundancy External Alarms Input	^	State off Admin enable Group all groups Apply

圖 4-6 設定外接告警

(七)、 TDM 驗證

操作路徑:TDM > Diagnostics > PDH Loopback > TDM loopback timeout > 設定測試時間(0為持續測試) > Apply > Edit > Loopback Type > 選擇每路 的測試方式 > Apply

r Logour V Connex	aon z Aanan	INICIOWAVE FAULO.	PDITEOOploack		
• Filter	×	Slot Slot 7: LIC-	T16 ACR	2	
Unit Summary Radio Summary Platform Faults		TDM loopback fi	meout 0	(0 1440)	PDH Loopback - Internet Explorer Difference Diference Difference Difference Difference Diff
Nativa TDM Canvir	toe	Port number 🔺	Loopback type	Counter	PDH Loopback - Status Parameters
A TOM BeaudeMilino		1	None	0	Slot ID Slot 7: LIC-T16 ACR
Samilos		2	None	0	
Services		3	None	0	Port number
p Advanced		4	None	Port number E1/T1: Slot 7, Port 1	
Interfaces		5	None	0	Counter 0
Diagnostics		6	None	0	
PDH Loopback		/	None	0	PDH Loopback - Configuration Parameters
PM & Statistics		°.	None	0	Loopback type None V
b Groups		3	None	0	No
Radio		10	None	0	Reads.
Ethernet		12	None	0	(ADDs)
Sync		12	None	0	
Ouldk Configuration		14	None	0	Page Refresh Interval (Seconds) None V Last Loaded: 12:35:22 Refresh Close
Utilities		15	None	0	
		16	None	0	* 100% -

圖 4-7 Loopback 測試

(八)、 射頻 RF 驗證

操作路徑:Radio > Diagnostics > Loopback > 選擇驗證的 RF Port > Edit > Apply

Logout V Connection & Admin	Microwave radio: Radio Lo	oopbacks		
Filter	Radio Loopbacks table			
Unit Summary	Radio Location 🔺	Loopback timeout (minutes)	RF Loopback	IF Loopback
Badio Summary	Radio: Slot 3, Port 1	1	Off	Off
Platform	Radio: Slot 5, Port 1	1	Off	Off
Faults	Edit			
> TDM				
Radio				
Radio Parameters				
Remote Radio Parameters				
Radio BER Thresholds				
ATPC				
Pavload Encryption				
Ethernet Interface				
MRMC				
DM 8. Statistics				
P FM & Stausuits				
Diagnostics				

圖 4-8 顯示射頻 Loopback 狀態

操作路徑:Loopback timeout > 設定測試時間(0為持續測試) > RF Loopback > On > IF Loopback > 選擇測試方式

Radio Loopbacks Configur	ation	
Radio Location	Radio: Slot 3, Port 1	
Loopback timeout (minutes)	1	(0 1440)
RF Loopback	On 🗸	
IF Loopback	Towards System V	
Apply		

圖 4-9 設定射頻 Loopback

五、 系統權限及帳號

(一)、 權限建立

操作路徑:Platform > Security > Access Control > User Profiles > 勾選右方方格

Logout 🗸 Connection 😰 Admin	Microwave radio: Access Control	User Profiles	
▼ Filter ×	 Users profile configuration tab 	le	
Unit Summary	Profile	Permitted access channels	Usage counter
Radio Summary	🔲 🕢 tech	Serial+Telnet+SSH+Web+NMS	0
Platform	🔲 🛨 admin	Serial+Telnet+SSH+Web+NMS	1 ^
- Chalf Management	Viewer	Serial+Telnet+SSH+Web+NMS	0
p Shen Management	Derator	Serial+Telnet+SSH+Web+NMS	0
Management	snmpv1v2	SNMP	1 🗸
Software	security-officer	Serial+Telnet+SSH+Web+NMS	0
Security General X.509 Certificate Access Control General			
User Profiles			
- Colorisation Charles Ball			
User Accounts			
User Accounts Password Management			
User Accounts Password Management Change Password			
User Accounts Password Management Change Password PRADIUS			



Edit > 設定每個Profile權限 > Apply

🖡 Logout 🖌 Connection 💈 Admin	Microwave radio: Access Control User Profiles	Access Control User Profiles - Internet Explorer
▼ Filter	Users profile configuration table	http://192168.1.2/responder fcgi1?winid=1698/deviceid=08/winsystemname=secunty-t-profile-c
Unit Summary Redio Summary Platform > Shelf Management	Profile Permitted access channels	VS Access Control User Profiles - Edit VS Profile admin VS Usage counter 1
Management Software Configuration Activation Key Security General X:509 Certificate Access Control General Marcal Marcal	a snmpv1v2 SNMP a security-officer Serial+Teinet+SSH+Web+N Add Edit Delete	AS Permitted access channels Serial Teinet SSH Web NMS Select All Security write level Advanced Management write level Advanced Radio write level Advanced Radio write level Advanced TDM write level Advanced TDM write level Advanced
Start Accounts Password Manadement Chinage Password RADIUS Protocols Control Protocols Control Protocols Control RADIUS RADIO RADIO Starts Sta		TDM read level Advanced v Ethermet write level Advanced v Ethermet read level Advanced v Sync write level Advanced v Sync read level Advanced v

圖 5-2 設定 admin 使用者所有權限

操作路徑:Platform > Security > Access Control > User Profiles > Add (新建Profile)

Logout 🗸 Connection 💆 Admin	Microwave radio: Access Control U	Jser Profiles	
▼ Filter ×	 Users profile configuration table 	e	
Unit Summary	Profile	Permitted access channels	Usage counter
Radio Summary	🗌 🛨 tech	Serial+Telnet+SSH+Web+NMS	0
4 Platform	🔲 🕀 admin	Serial+Telnet+SSH+Web+NMS	1 ^
- Chalf Management	U viewer	Serial+Telnet+SSH+Web+NMS	0
p Shen Management	🔲 🖃 operator	Serial+Telnet+SSH+Web+NMS	0
p Management	snmpv1v2	SNMP	1 🗸
Software	security-officer	Serial+Telnet+SSH+Web+NMS	0
Configuration	Add Edit Dalata		
Activation Key	Add Edit Delete		
 Security 			
General			
X.509 Certificate			
 Access Control 			
General			
User Profiles			
User Accounts			
Password Management			
Password Management Change Password			
Password Management Change Password > RADIUS			



Profile > 依據需求設定名稱 > Permitted assess channels > 勾選管理 方式 > 選擇下方管理功能 > Apply

CERAGON		Access Control User Prof	iles - Interne	t Explorer		-		
-		Attp://192.168.1.2/respo	onder.fcgi1?v	vinid=1698	deviceid=	08:winsyste	mname=se	curity-t-profile-co
🖡 Logout 🛛 Connection 🙎 Admin	Microwave radio: Access Control Us	Access Control User Prof	iles - Add					
Filter X Unit Summary Radio Summary	Users profile configuration table Profile ech admin	Profile Usage counter	0					
Platform Platform Nanagement Management Management Software Configuration Activation Key Security General X.509 Certificate Access Control General User Profiles User Accounts Password Management Change Password RADIUS Protocols Control Faults Radio Radio Radio Radio	Add Edit Delete	Permitted access channels Security write level Security read level Management write level Radio write level Radio read level TDM write level TDM read level Ethernet write level Ethernet read level Sync write level Sync read level	Serial None None		⊠SSH	⊠ Web	⊠ NMS	Select All

圖 5-4 修改操作權限

(二)、 帳號建立

操作路徑:Platform > Security > Access Control > User Accounts > Add > Username > 自訂需求設定名稱 > Profile > 選擇權限 > Apply

Logout 🗸 Connection 💈 Admin	Microwave radio: Access Co	ntrol User Accounts			
Filter ×	 Access Control User Acc 	ounts			
Unit Summary Radio Summary	Username Z admin	Profile admin	Blocked No	Login status Yes	last logout 15-09-2018 12:44:5
Platform Shelf Management Management Software	Add Edit Delete	Access Control User Ar	counts - Internet Explorer ponder.fcgi1?winid=1708cd	eviceid=08cwinsystemname	e SS =security-
Configuration Activation Key Activation Key General S.X.509 Certificate Access Control General User Profiles		Access Control User Advector Username admin Login status Yes last logout 15-09-201 Profile admin Blocked No V	counts - Edit 8 12:44:59		
User Accounts Password Management Change Password NRADIUS Protocols Control Protocol		Expiration date		4	,
> TDM > Radio > Ethernet		Page Refresh Interval (Sec	onds) None 🔽 Last L	oaded: 12:44:29 Refresh	Close 0% -

圖 5-5 新增使用者帳號

(三)、 密碼設定

操作路徑:Platform > Security > Access Control > Change Password > 更改密碼

┠ Logout 🗹 Connection 💆 Admin	Microwave radio: Change User Password		
V Filter X	Change your password		
 Platform Shelf Management Management Software Configuration Activation Key Security General X.509 Certificate Access Control General User Profiles User Accounts Password Management Change Password RADIUS 	User Name admin Old password New Password Reenter Password Apply Clear		

圖 5-6 設定使用者帳號密碼

六、 實機演練

(一)、 實機設備

本次原廠訓練,上課第一天講師Angelito先講述微波基本概念,到了第2天開始即進行Lab實機架設,模擬北管與大屯山兩個微波連線的情境,設備包含2台 RFU-A、2台IP20N及1台DC電源供應器,初步先以1+0的架構呈現,分別在RFU-A左 側插槽裝入射頻模組及中間插槽裝入射頻濾波模組,IP20N則裝入主控制卡及Eth 介面卡。



圖 6-1 實機模擬 Lab

將設備接線完成後,開啟電源,後續課程進行則是以講義解說配合實機操作 設定,使學員快速進一步了解,另一方面,系統設定畫面投影至教室電視上,可 便於所有學員同時清楚上課內容,而能即時共同討論,達到深入學習效果。



圖 6-2 操作畫面投影於教室電視

	System	ols Help	11150-1000-1000 fait Laws 11 Vices	2 (1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2	
and a second sec	Port 1: 10/100/1000 Eth Layer 2 Tr Messages logged. Click to see.	affic Term	Running	1m:13s	
	Ethernet Payload J4	Connect 50 7 (highest) \$ 1522 VLM ID Fronty Fre	e j	C. Restart	
	Summary Ships Acquired Ships	€ Status € 65 402,675 149,158,494	Summary Is SLA. Procupport: Current III Rx Mipps, L1 Tx Mipps, L2 Tx Mipps, L2 Tx Mipps, L2 Tx Mipps, L2 Trame Loss - FLR III Prame Loss - FLR III Round Trip Delay - FD (us) III Average Maxemum	KPI S 222.37 Weg 300.00 Weg 220.47 Weg 220.47 Weg 200.47 Weg 0.255 Weg 6.022.58 Weg 0.0256 Weg	
	Actions Service Disruption	n Errors Capture	ne e e e e e e e e e e e e e e e e e e	V Inches Dest les	
	Startes Up Do	win LLB Insert		and the second se	
	C	IDI 📀	รบ		

圖 6-3 在講解建立 Ethernet 設定時,以儀表實測 Ethernet 電路通聯情形

當課程進行到了1+1-HSB架構時,則在RFU-A右側插槽裝入射頻模組,然後進 行系統設定。繼續課程進行到了2+0架構時,則將RFU-A右側插槽射頻模組抽出, 模擬2個RFU-A相疊形成2+0架構然後進行系統設定。



圖 6-4 串聯可調式衰減器,模擬傳輸路徑

(二)、 故障與排除

架設Lab實機操作提供了學員最直接的學習,而且在Lab上可以模擬許多的故障狀況,讓學員了解當系統發生故障時所顯現的現象,進而能判斷故障原因並將故障排除,以下是所模擬故障的狀況及排除方法。

1. 模擬 RFU-A 射頻模組發生故障

當射頻模組發生故障時,在管理電腦上Current Alarms Origin欄位立即顯 示Radio:Slot 4, Port 1告警,並產生告警聲通知維護人員,維護人員聽到告 警聲後查看管理電腦上Current Alarms的告警訊息,得知是Radio:Slot 4, Port 1異常。

C () (http://192.168.1.2/responder	der.fcgi1?winid=13&deviceid=	0	<mark>157233-51</mark> ター さ <i>(会</i> 192	▼ 2.168.1.2 - Microwave r ×		ļ	× □ −
CERAGON		-21		• • • • • •	• • • • • • • • • • • • •		• • •
🖡 Logout 🖌 Connection 💈 Admin	Microwave radio: Unit Sun	imary				Related P	ages 🔽
▼ Filter ×	 Unit Parameters 						
Unit Summary	Description Modu	lar IDU, 1RU, 5 slots	/ Modular IDU, 2RU, 10 slots				
Radio Summary	System up time 2 hou	rs. 1 minute. 31 seco	nds	-			
▷ Platform	Local date and time 17.00	2010 18:51:20					
Faults	Local date and time 17-08	-2018 10.51.50					
▷ TDM	Running Version 10.3.	0.0.0.286					
⊿ Radio	Unit Temperature 39°C.	102.2°F					
Radio Parameters	Voltage input (Volt) 52						
Remote Radio Parameters	Current Alarme						
Radio BER Thresholds	Time	Severity A	Description		Origin	Alarm	id
ATPC	17-09-2018 16:43:53		Remote communication failure		Radio: Slot 4. Port 1	/ 10/111	150
Payload Encryption	17-09-2018 16:43:46		Radio loss of frame		Radio: Slot 4, Port 1		60
Æthernet Interface	Probable Cause						
Configuration	 Fade in the link. Defective IE cable 						
Counters	3) Fault in RFU.						
▷ MRMC	 Fault in RMC (Radio 5) Different radio scripts 	Modem Card).	k				
PM & Statistics		at the chub of the lin	n.				
Diagnostics	Corrective Actions						
b Groups	2) Check link performan	ice. replace if required.					
⊿ Ethernet	▼ IDU Inventory						
General Configuration	Slot Location	Card name		Part number	Serial number		
Services	Slot 1	TCC-B-MC		24-T004-1H	E348O10049		
p Interfaces	Slot 3	RMC-B		24-R002-1B	H338O14991		
PM & Statistics	Slot 4	RMC-B		24-R002-1B	H338115026		
p QUS	Slot 5	RMC-B		24-R002-1B	H338H15036		
> ProtoCols	Slot 6	RMC-B		24-R002-1B	H338214983		~
p Groups	<						>
 P Sync Ouide Configuration 	Page Refresh Interval (Seco	nds) None 🗸			Last Loaded: 16:50:48	Refresh	Export to CSV
P Quick configuration							
p oundes							*

圖 6-5 系統首頁即顯示告警訊息

維護人員接著檢視IP20N上Radio介面卡上的燈號,ACT燈號顯示綠燈但LINK 及RFU-A燈號顯示紅燈,這表示可能是Radio介面卡與射頻模組間連接線不良或是 射頻模組發生異常。



圖 6-6 亦可藉由設備燈號判斷可能故障原因

故障排除方法為,先檢查連接線是否正常,兩端接頭是否有鬆脫情形,若有 鬆脫則予以鎖緊,若連接線檢查後都正常而故障仍存在,則更換RFU-A射頻模 組,更換後Radio介面卡上的燈號恢復正常,管理電腦上Current Alarms的告警 也消失了。



圖 6-7 故障排除後,設備燈號皆為綠燈

2. 模擬 Slot 2 Eth 介面卡故障

當Eth介面卡發生故障時,在管理電腦上Current Alarms Origin欄位立即顯示Slot 2告警並產生告警聲通知維護人員,維護人員聽到告警聲後查看管理電腦上Current Alarms的告警訊息,得知是Slot 2異常

	•						• ×
() () () () () () () () () ()	er.fcgi1?winid=13&device	eid=0	,Q - C <i>(</i> €) 192.	168.1.2 - Microwave r ×		4	n 🛧 🔅
CERAGON		-16			• • • • • • • • • • • •		
🕞 Logout 💉 Connection 🙎 Admin	Microwave radio: Unit	Summary				Related Pages	~
▼ Filter ×	 Unit Parameters 						~
Unit Summary	Description N	Modular IDU, 1RU, 5 slots	Modular IDU, 2RU, 10 slots				
Radio Summary	System up time 2	24 minutes, 24 seconds					
a Platform	Local date and time	17-09-2018 17:40:56					
Shelf Management	Rupping Version 1	0 2 0 0 0 296					
Management		10.0.0.0.0.200					
Unit Parameters	Unit l'emperature	38°C, 100.4°F					
NTP Configuration	Voltage input (Volt) 5	52					
Time Services	 Current Alarms 						
Interface Manager	Time	Severity A	Description		Origin	Alarm id	
Inventory	17-09-2018 17:25:	27 🌲	Radio loss of frame		Radio: Slot 6, Port 1		60
<u>Unit Info</u>	17-09-2018 17:25:	12 🌲	Radio loss of frame		Radio: Slot 5, Port 1		60
Main Card Redundancy	17-09-2018 17:39:	04 🔔	Expected Card is missing in slot		Slot 2		174
External Alarms	1) Card is missing.						
Networking	2) Expected Card T	Fype configured on empty s	slot.				
> SNMP	Corrective Actions						
Software	1) Insert Expected	Card.					
> Configuration	2) Clear Expected (Card Type.					
Activation Key	∃ 17-09-2018 17:25:	30	Cable open		Radio: Slot 6, Port 1		170
Activation Key Configuration	 IDU Inventory 						
ACTIVATION Ney Overview	Slot Location A	Card name		Part number	Serial number		
> Security	Slot 1	TCC-B-MC		24-T004-1H	E348O10049		
> TDM	Slot 3	RMC-B		24-R002-1B	H338O14991		
4 Padio	Slot 4	RMC-B		24-R002-1B	H338115026		
Radio Darameters	SIDE 5	RMC-B		24-RUU2-1B 24 R002 1R	H338H15U36		~
Pomoto Padio Daramatere	Slot 7	KING-D		24-R002-10	E200210904		
Radio RER Thresholds	<					6	>
ATDC	Page Refresh Interval (S	Seconds) None 🔽			Last Loaded: 17:38:59 _	Refresh Expo	rt to CSV
Payload Encryption							
							×

圖 6-8 登入系統即可知道告警訊息

檢視IP20N Slot 2的Eth介面卡上的燈號都沒有亮燈



圖 6-9 藉由設備燈號不亮判斷可能為網路中斷

故障排除方法,先檢查Eth介面卡是否未確實裝入插槽,將卡板取出再重新 裝入,檢視故障狀況是否消失。若故障仍存在則須更換Eth介面卡,更換後Eth介 面卡上的燈號恢復正常,管理電腦上的告警也消失了。



圖 6-10 設備正常燈號變回綠燈

肆、 心得及建議

一、 心得

本案新設之微波系統為北部各機場與重要站臺間重要之通訊傳輸骨幹,新微 波設備兼容了TDM與Ethernet電路,既能符合總臺既有語音TDM訊號傳輸的需求, 亦能因應未來設備IP化所產生的網路傳輸需求,而且總傳輸容量也大幅提升至 450Mbps,可以有效解決目前微波E1不足,造成行政網路塞車的問題。另外過去 舊微波設備傳送Ethernet電路資料時須經CSU/DSU設備的轉換,且每一路有2Mbps 容量的限制,新微波設備兼有TDM與Ethernet電路就無這些問題,能為各站臺間 資料的傳送提供更為便利的傳輸路徑。此外新微波具有Ceragon所研發之MRMC、 MC-ABC等專利技術,對於外在環境與天氣的變化,能夠自動調節調變的速率,優 先保護重要電路,提高傳輸可靠度,比起舊微波,更能承受環境與天氣的變化。

在本次原廠訓練中所建立的Lab是由講師與學員合作一起架設的,使學員在 實作中深刻了解微波系統組成架構及其運作的模式,其中在課程期間因為RFU-A 的射頻模組散熱風扇所發出的噪音嚴重影響上課品質,於是講師將散熱風扇拆除 直到本次訓練課程結束,我們對於RFU-A的射頻模組在沒有散熱風扇的情況下依 然能正常工作感到驚奇,RFU-A的射頻模組的耐熱能力實在是令人佩服。

本次原廠訓練學員係由本案相關單位各派一員組成,得以兼顧各單位工作性 質;講師由基礎理論開始,並採用最新版本的軟硬體進行實機演練,且每位學員 都必須進行實機架設及故障排除,理論與實務並進,使本課程豐富而踏實。

二、 建議

(一)、 建議增加採購網路流量測試儀器

在本次原廠訓練中,我們以Lab做了各種微波傳輸或設定的測試,而這些測 試都需要進行驗證,因此需搭配網路測試儀器,根據儀器的送收流量來得知傳輸 的結果是否符合預期,並進行除錯,顯然網路測試儀器能夠在工作上能有相輔相 乘的效果。建議日後若有相關設備汰換,可以搭配必要的網路流量測試儀器採 購,能夠在維護實務上有所幫助。

(二)、 建議增加 MSTP 教育訓練課程

學員們對於能獲總臺遴選深感榮幸,除了在課堂上非常認真學習,也自發性 利用僅有的二日週末假期,進行超過16小時的實機演練與討論,以加深所學印 象,惟原廠提供之微波設備,具有Multiple Spanning Tree Protocol (MSTP) 功能,若總臺未來微波架構改變,亦可作為技術發展參考,建議廠商可增加MSTP 教育訓練課程,以增進學員網路專業知識。

附錄——英文縮簡寫與中文意思對照表

縮簡寫	英文	中文意思
ACM	Adaptive Coding and Modulation	適應編碼調變
ANS I	American National Standards Institute	美國國家標準協會
BER	Bit Error Rate	位元錯誤率
BW	Bandwidth	頻寬
CLI	Command-line Interface	命令列介面
CSU/DSU	Channel Service Unit/Data Service Unit	數位電路數據機
Eth	Ethernet	網路
ETSI	European Telecommunications Standards Institute	歐洲電信標準協會
FEC	Forward Error Correction	前向錯誤更正
HSB	Hot Standby	熱備援
ID	Identity	辨識
MC-ABC	Multi-Carrier Adaptive Bandwidth Control	多載波適應頻寬控制
MRMC	Multi-Rate Multi-Constellation radio scripts	多樣化速率及多層次調變 射頻劇本
MRU	Maximum Receive Unit	最大封包單位
MSE	Mean Square Error	均方誤差
MSTP	Multiple Spanning Tree Protocol	多重生成樹

PDC	Power Distribution Card	微波主機電源模組
QAM	Quadrature Amplitude Modulation	正交振幅調變
QoS	Quality of Service	服務品質
QPSK	Quadrature Phase Shift Keying	二維相位偏移調變
RMC	Radio Modem Card	無線電介面卡
SDH	Synchronous Digital Hierarchy	同步數位階層
SNR	Signal to Noise Ratio	訊雜比
STM	Synchronous Transport Module	同步傳送模組
TCC	Traffic Control Card	微波主機控制卡
TDM	Time Division Multiplexing	分時多工
XPIC	Cross Polarization Interference Cancellation	交叉極化干擾消除