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| <input type="checkbox"/> Test Plan (TP) | <input type="checkbox"/> Release Note (RN) |
| <input type="checkbox"/> Bug Report (BR) | <input type="checkbox"/> Training Material (TM) |
| <input checked="" type="checkbox"/> Other <u>Outdoor Test Report 15.8KM</u> (OT) | |

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OT-2011-10-3101

Subject

Outdoor Test Report
of
APM-10xRH

Revision History

Rev.	Date	Author	Reason for Changes
1.0	Oct. 31, 2011	Jacky Cheng	<ul style="list-style-type: none">Initial draft(繁體中文版)
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			<ul style="list-style-type: none">



Contents

1.0 SCOPE.....	1
1.1 INTRODUCTION.....	1
1.2 DATE/TIME.....	1
1.3 LOCATION.....	1
1.4 EQUIPMENT.....	1
1.5 TOPOLOGY.....	1
2.0 ENVIRONMENT.....	2
2.1 GPS LOCATION.....	2
2.2 FRESNEL ZONE GRAPH.....	3
2.3 SPECTRUM.....	4
3.0 TEST RESULTS.....	5
3.2 TEST2:.....	8
3.3 TEST3 :.....	11
3.4 TEST4.....	14
APPENDIX I.....	16



1.0 Scope

1.1 Introduction

本文件主要說明 IO-Power APM-10xRH Outdoor Access Point 戶外測試報告。

1.2 Date/Time

- 測試日期：2011/10/27
- 測試時間：AM 10:00 ~ PM 18:00

1.3 Location

- 測試點 A：高鐵站旁大樓
- 測試點 B：橫山鄉樂善堂

1.4 Equipment

- 無線設備：APM-103RH x 2
- 天線設備：5GHz 2x2 MIMO 29dBi Dish Antenna x 2
- 電腦設備：ASUS A43F Series 筆電 x 2
- 軟體設備：Windows XP SP3、IxChariot 5.40
- APM-103RH Firmware Version：1.0(1110.2601)

1.5 Topology

- PtP 點對點



IP :

192.168.77.13

IP :

192.168.77.14

NB IP : 192.168.77.170



NB IP : 192.168.77.171





2.0 Environment

本章節描述本次測試之環境條件因素。

2.1 GPS Location

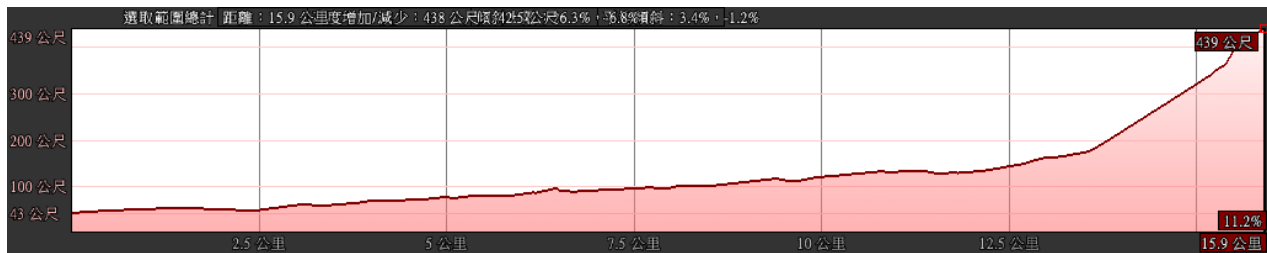
圖一、“Google Earth GPS Location 標示點”。

距離：

Point A- 高鐵站旁大樓(N24°48'26.40" E121°2'12.72")

Point B- 橫山樂善堂 (N24°41'57.57" E121°8'22.75")

Distance : 15,858m



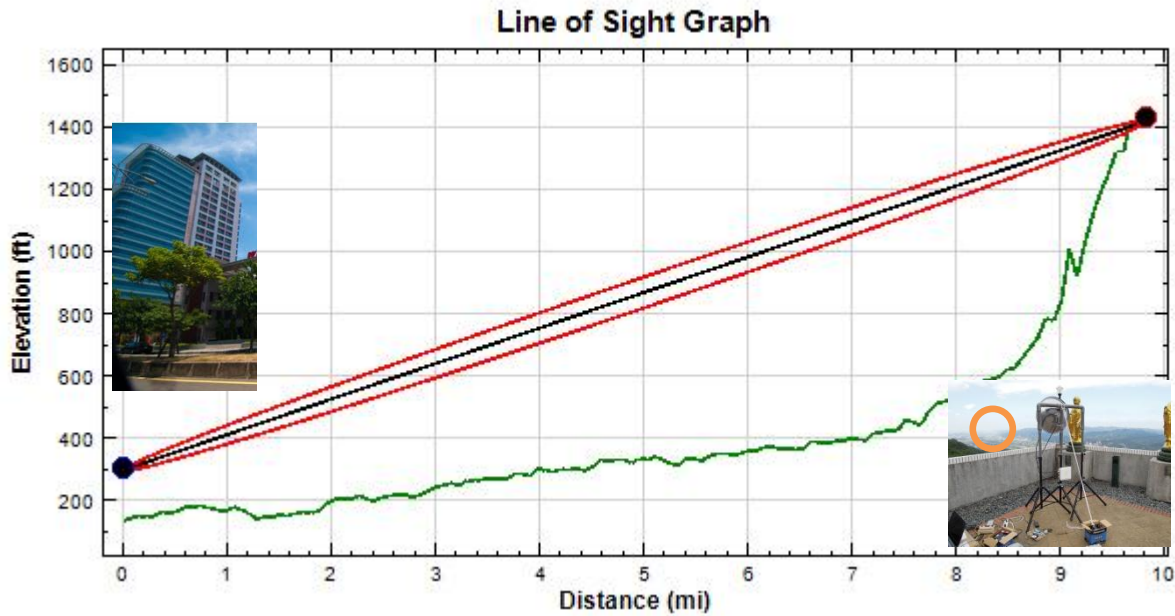


2.2 Fresnel Zone Graph

圖二、“Line of Sight 示意圖”。

Point A Antenna Height : 170ft (14 樓)

Point B Antenna Height : 23ft (樂善堂平台上)



	Elevation Data Line Plot		
	Line of Sight Line Plot (Adjusted to Consider Obstruction Caused by Earth Curvature)		
	First Fresnel Zone Line Plot		
	Point 1 Terrain Elevation: 137.80 ft Latitude: 24.807500000077	TX/RX Elevation: 170.00 ft Longitude: 121.035833333319	Total Elevation: 307.80 ft
	Point 2 Terrain Elevation: 1,407.48 ft Latitude: 24.700000000120	TX/RX Elevation: 23.00 ft Longitude: 121.139166666612	Total Elevation: 1,430.48 ft

Earth Curvature Adjustment: Off On

Saved Line of Sight Profile Name: **15_9Km**
 Approx. Distance Between Points: **9.82 Miles**
 Earth Obstruction Adjusted For: **12.06 Feet**
 First Fresnel Zone Peak Radius: **49.45 Feet**
 Transmission Frequency: **5,220.000000 MHz**



2.3 Spectrum

本次測試：

TX/RX Antenna Gain 為 29dBi

Cable Loss 約為 2dB

Frequency	RF Tx power @HT20A/N MCS15 HighPower / Normal Power	Noise Level	Pathloss 理論值	RSSI 理論值 High Power / Normal Power	Point A RSSI 量測值 High Power / Normal Power	Point B RSSI 量測值 High Power / Normal Power
5,180MHz	18dBm / 16dBm	-113dBm	130.8dB	-58.8dBm / -60.8dBm	-60~-62dBm / -66~-67dBm	-60~-62dBm / -66~-67dBm
5,500MHz	18dBm / 14dBm	-110dBm	131.3dB	-59.3dBm / -63.3dBm	-60~-61dBm / -65~-67dBm	-60~-62dBm / -66~-67dBm
5,785MHz	17dBm / 14dBm	-108dBm	131.8dB	-60.8dBm / -63.8dBm	-62~-64dBm / -63~-65dBm	-62~-63dBm / -63~-65dBm

Frequency	RF Tx power @HT40A/N MCS15 HighPower / Normal Power	Noise Level	Pathloss 理論值	RSSI 理論值 High Power / Normal Power	Point A RSSI 量測值 High Power / Normal Power	Point B RSSI 量測值 High Power / Normal Power
5,190MHz	17dBm / 13dBm	-112dBm	130.8dB	-59.8dBm / -63.8dBm	-65~-66dBm / -72~-73dBm	-65~-68dBm / -71~-73dBm
5,510MHz	17dBm / 13dBm	-111dBm	131.3dB	-60.3dBm / -64.3dBm	-64~-66dBm / -73~-75dBm	-64~-65dBm / -72~-76dBm
5,795MHz	16dBm / 13dBm	-110dBm	131.8dB	-61.8dBm / -64.8dBm	-66~-67dBm / -69~-70dBm	-67~-69dBm / -69~-71dBm



3.0 Test Results

測試部份以下列參數組合進行：

Distance 參數設定為 16Km

IxChariot test pair numbers

Frequency Channel

Channel Width

RF Model (High Power / Normal Power)

所有測試使用 IxChariot High Performance.scr script。

3.1 Test1:

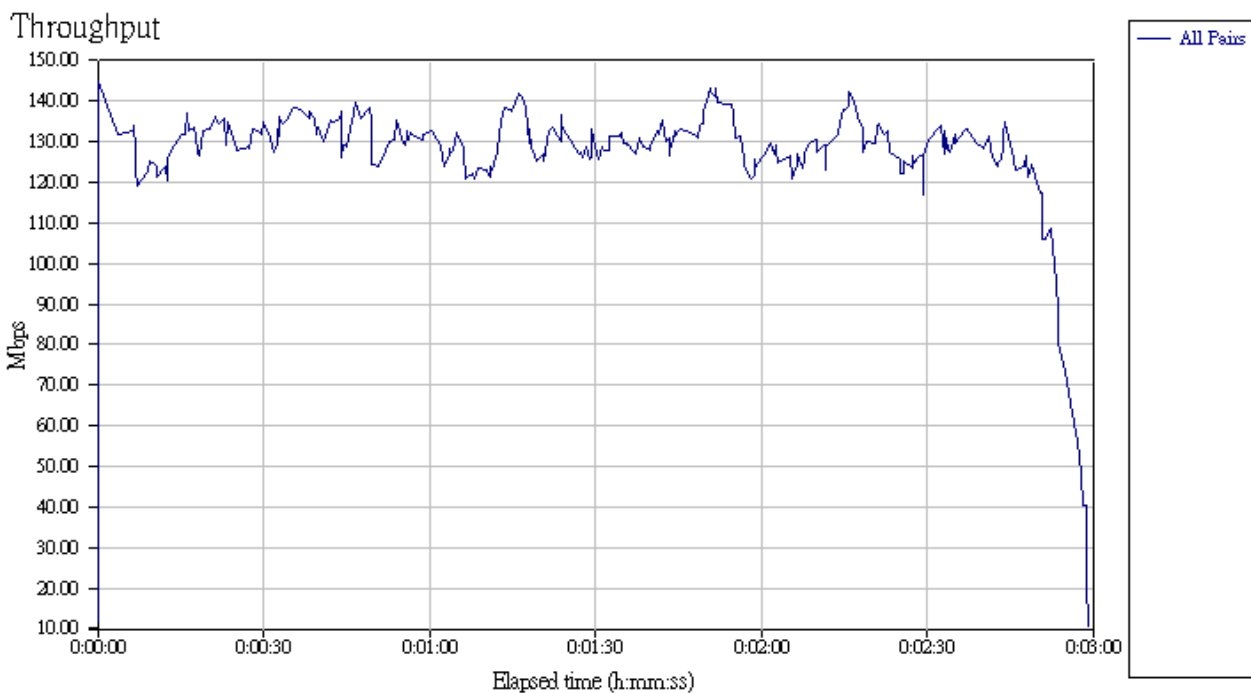
一張高功率 MIMO 網卡,以 40MHz 擴頻 + 29dBi 5GHz 雙極化 MIMO 天線 + 8 傳 8 收'間隔縮減 距離 16Km 可傳 128Mbps

(一般功率 MIMO 網卡輸出功率最大為 21dBm, 高功率 MIMO 網卡輸出功率最大為 24dBm)

Frequency	Channel Width	RF Model	IxChariot pairs
Channel - 36	40MHz	High Power	8T8R
Report	Total Throughput(Mbps)	Response Time	Transaction Rate
	128.006	9.856	1.641

Throughput

Pair 16	7.643	4.435	15.379
Totals:	128.006	4.227	22.284

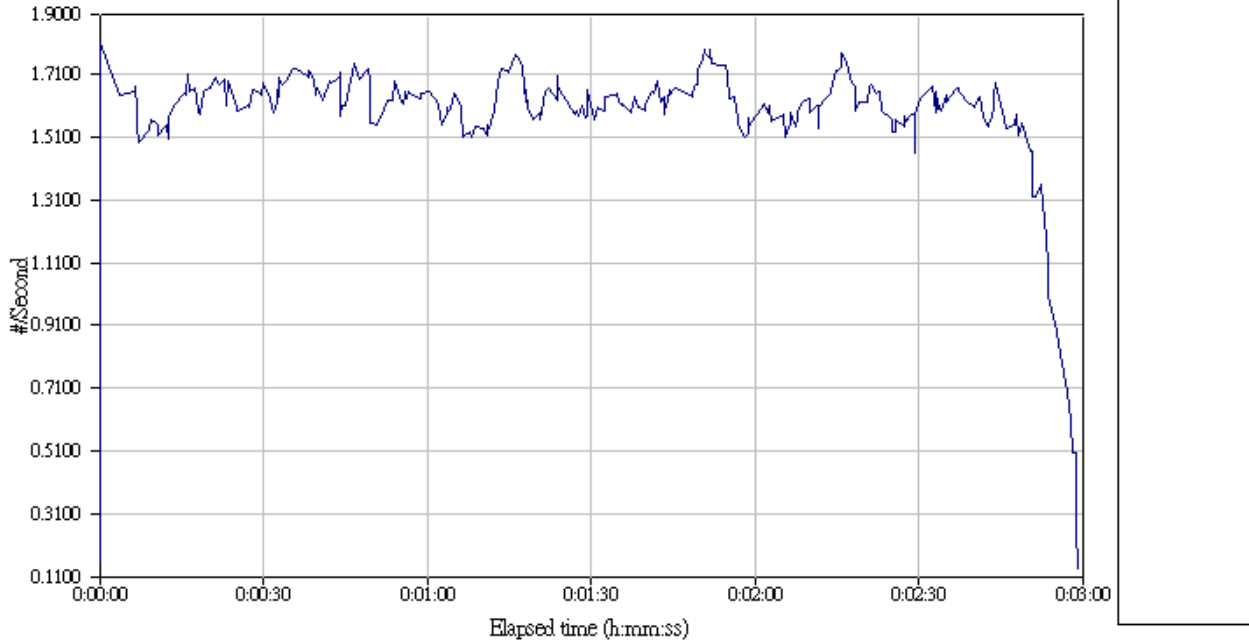




Transaction Rate

Pair 16	0.096	0.055	0.192
Totals:	1.641	0.053	0.279

Transaction rate

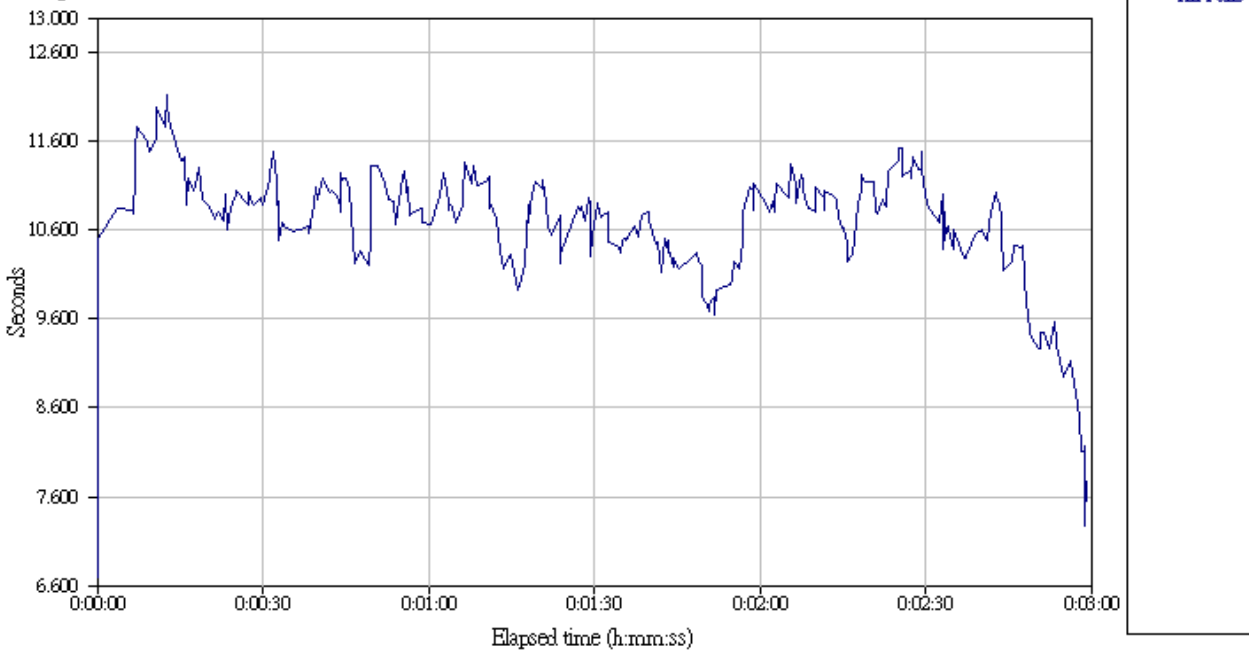


Response

Time

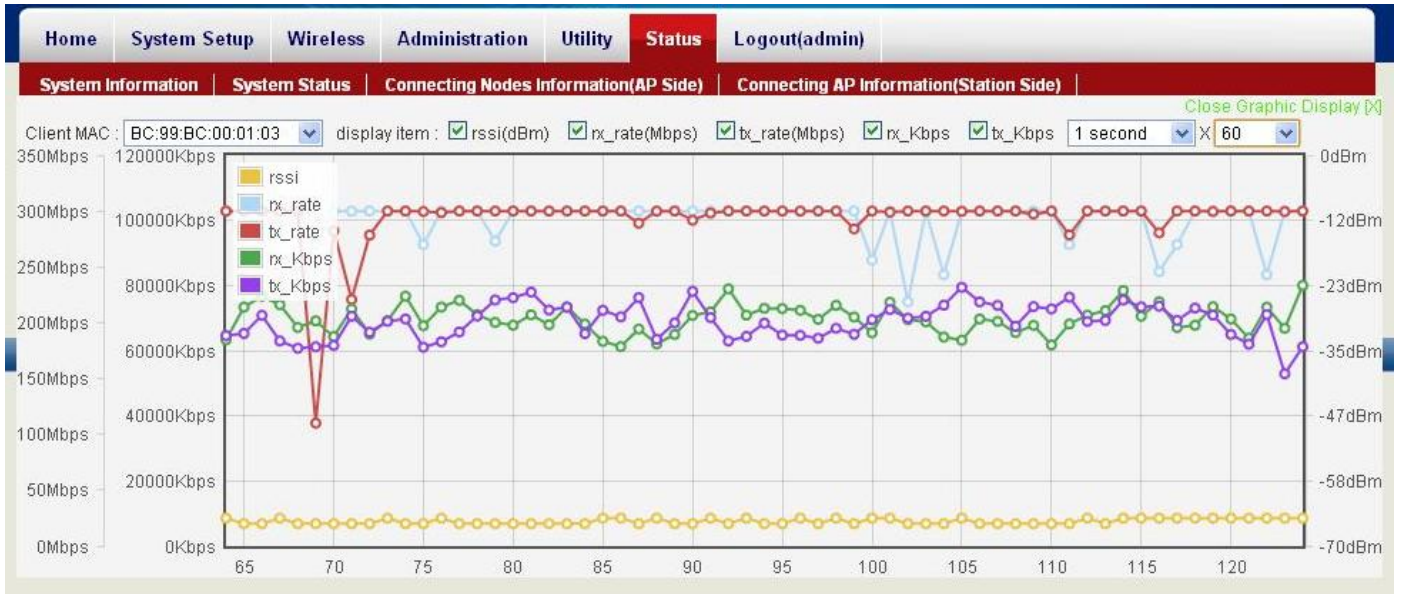
Pair 16	10.468	5.202	18.040
Totals:	9.856	3.590	18.924

Response time

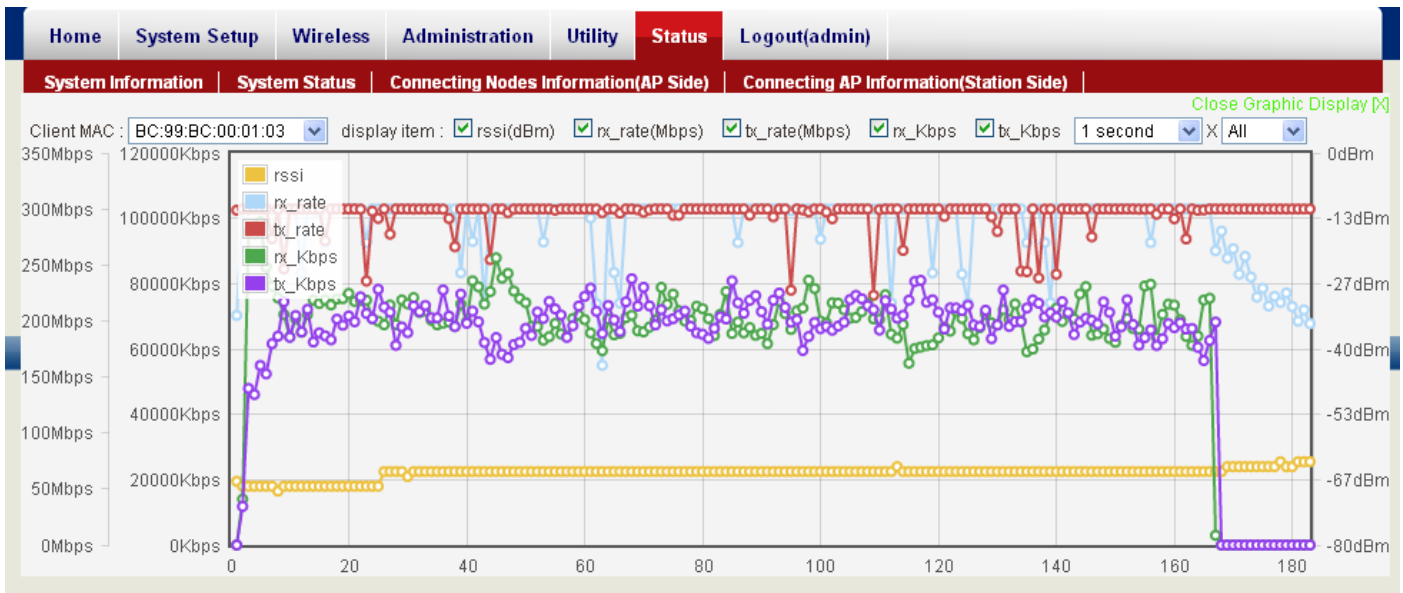




AP Side Screen



Station Side Screen





3.2 Test2:

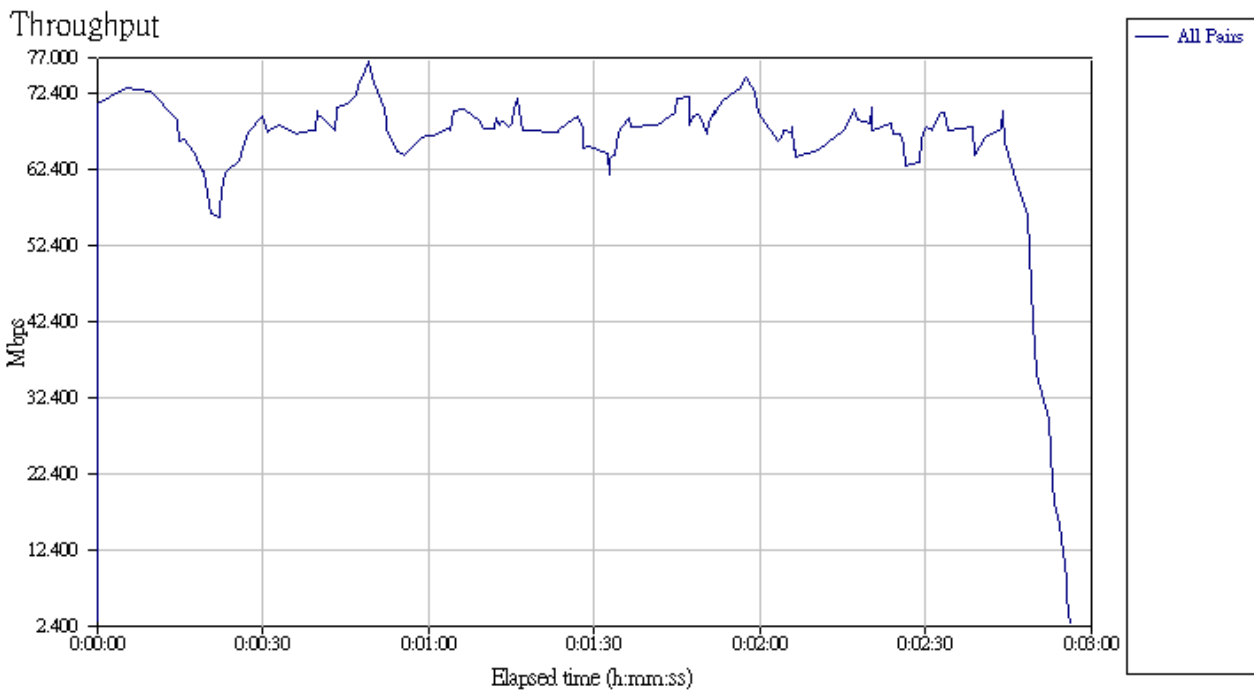
一張高功率 MIMO 網卡,以 20MHz 單頻 + 29dBi 5GHz 雙極化 MIMO 天線 + 8 傳 8 收'間隔縮減 距離 16Km 可傳 65.5Mbps

(一般功率 MIMO 網卡輸出功率最大為 21dBm, 高功率 MIMO 網卡輸出功率最大為 24dBm)

Frequency	Channel Width	RF Model	IxChariot pairs
Channel - 36	20MHz	High Power	8T8R
Report	Total Throughput(Mbps)	Response Time	Transaction Rate
	65.582	19.076	0.853

Throughput

Pair 16	3.893	2.833	5.326
Totals:	65.582	2.308	17.335

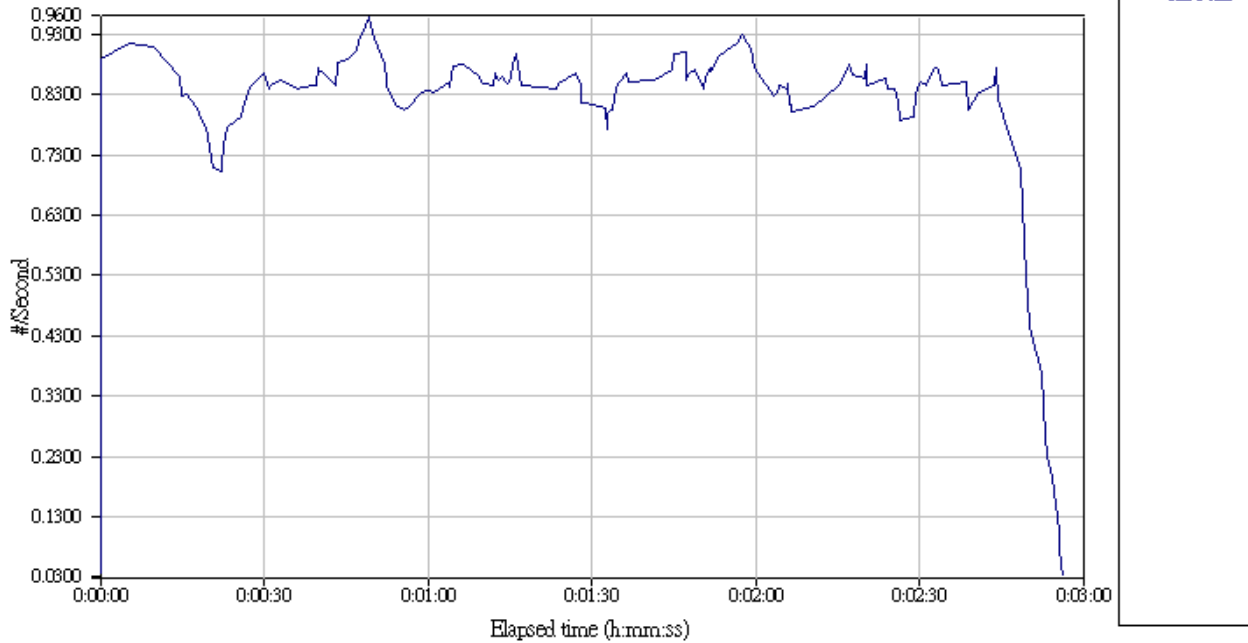




Transaction Rate

Pair 16	0.049	0.035	0.067
Totals:	0.853	0.029	0.217

Transaction rate

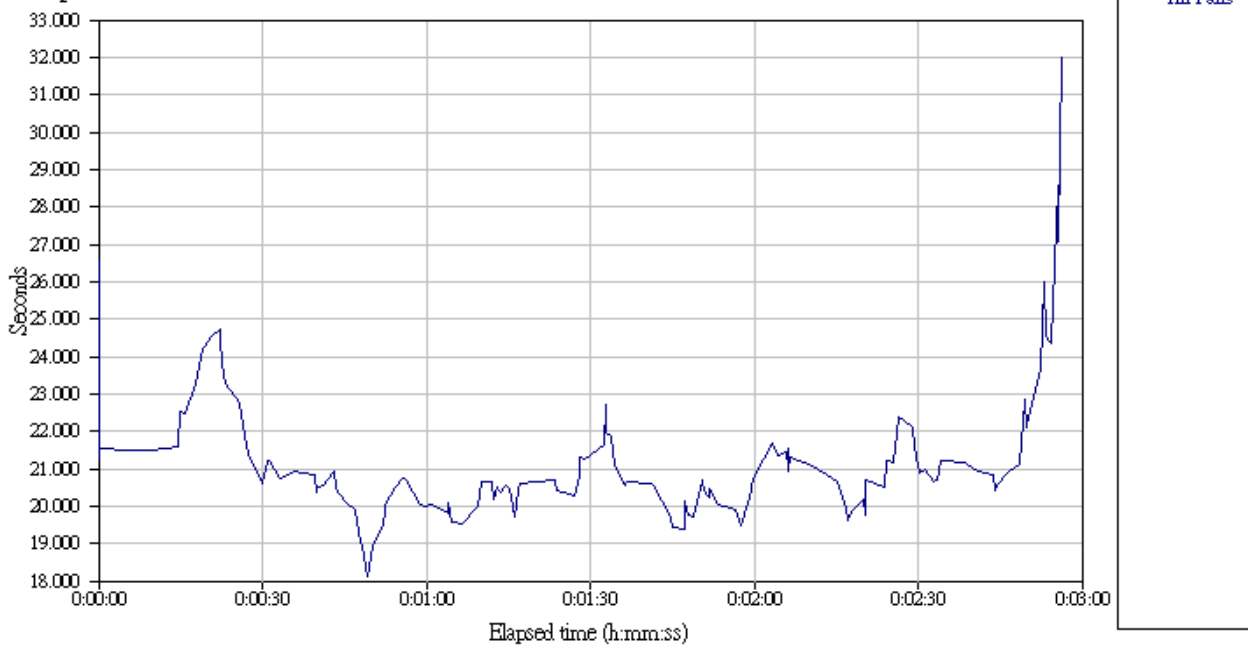


Response

Time

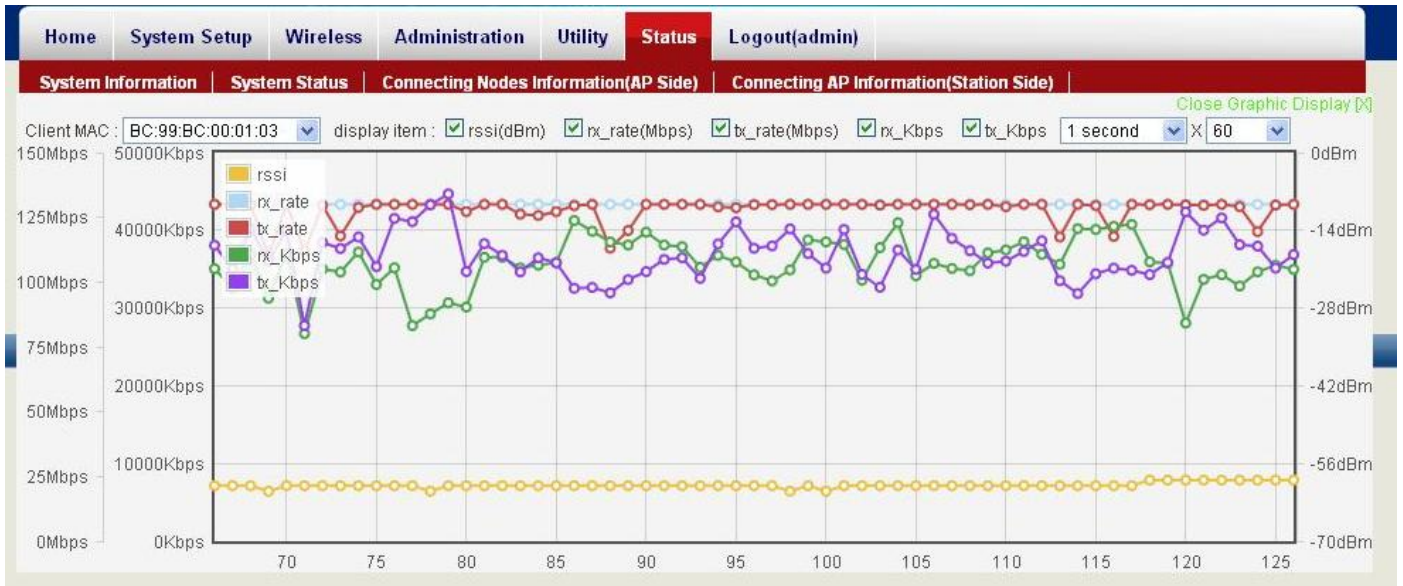
Pair 16	20.548	15.022	28.241
Totals:	19.076	4.615	34.660

Response time

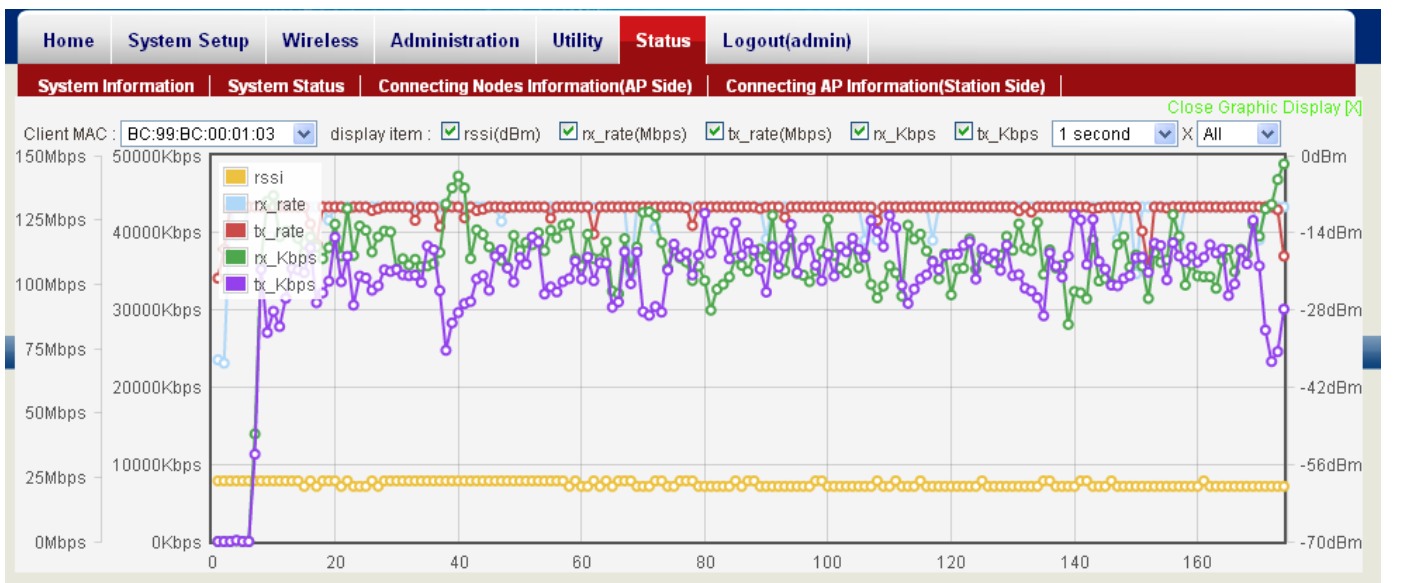




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3.3 Test3 :

一張 MIMO 網卡,以 40MHz 擴頻 + 29dBi 5GHz 雙極化 MIMO 天線 + 8 傳 8 收'間隔縮減 距離 16Km 可傳 91.5Mbps

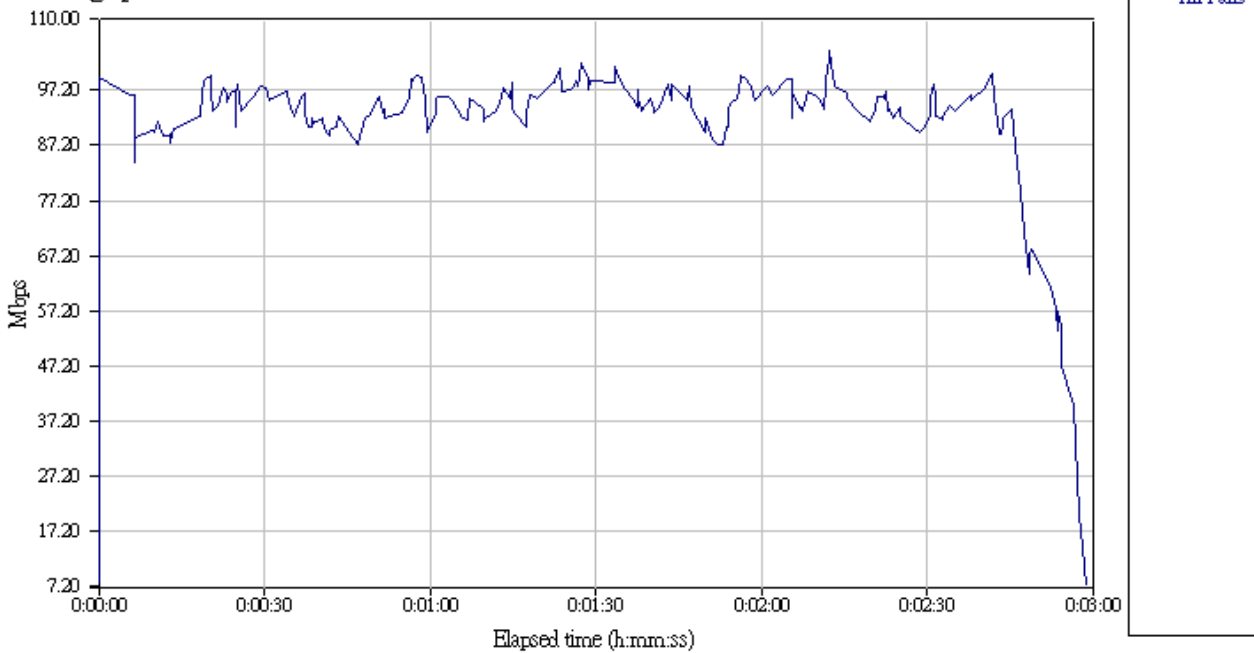
(一般功率 MIMO 網卡輸出功率最大為 21dBm, 高功率 MIMO 網卡輸出功率最大為 24dBm)

Frequency	Channel Width	RF Model	IxChariot pairs
Channel - 157	40MHz	Normal Power	8T8R
Report	Total Throughput(Mbps)	Response Time	Transaction Rate
	91.681	13.634	1.197

Throughput

Pair 16	6.257	4.511	10.793
Totals:	91.681	2.183	20.111

Throughput

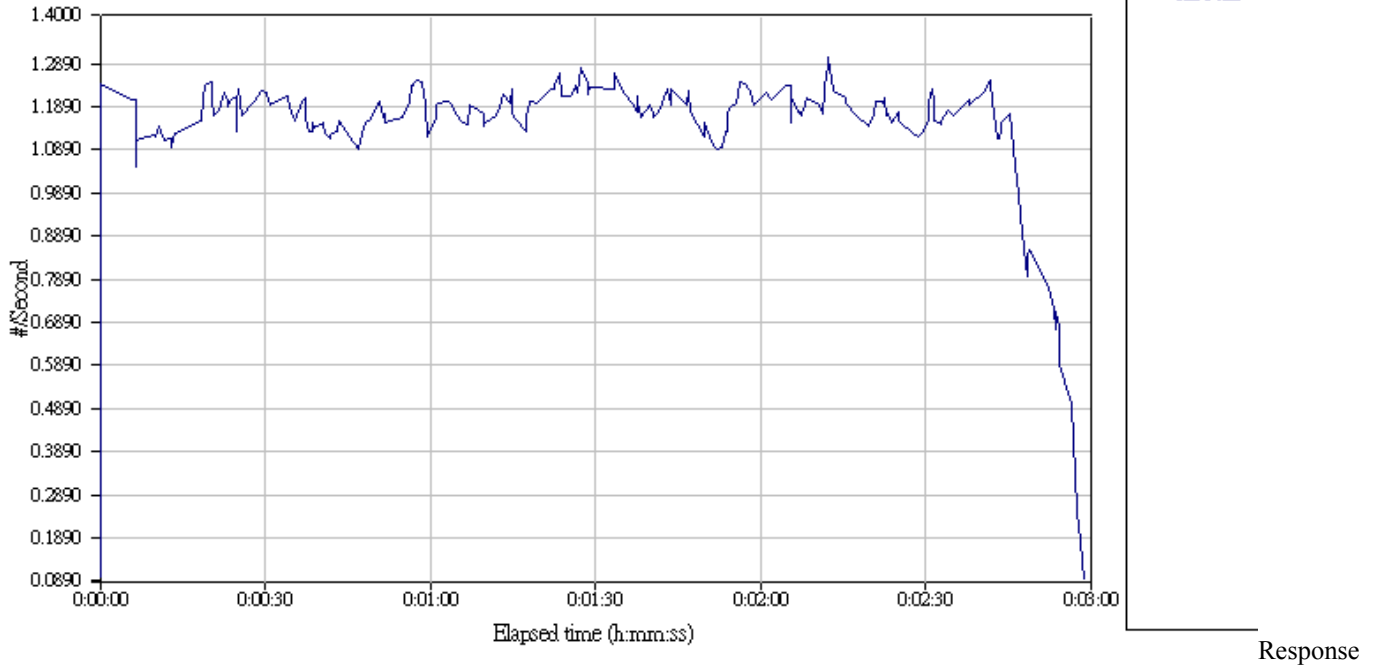




Transaction Rate

Pair 16	0.078	0.056	0.135
Totals:	1.197	0.027	0.251

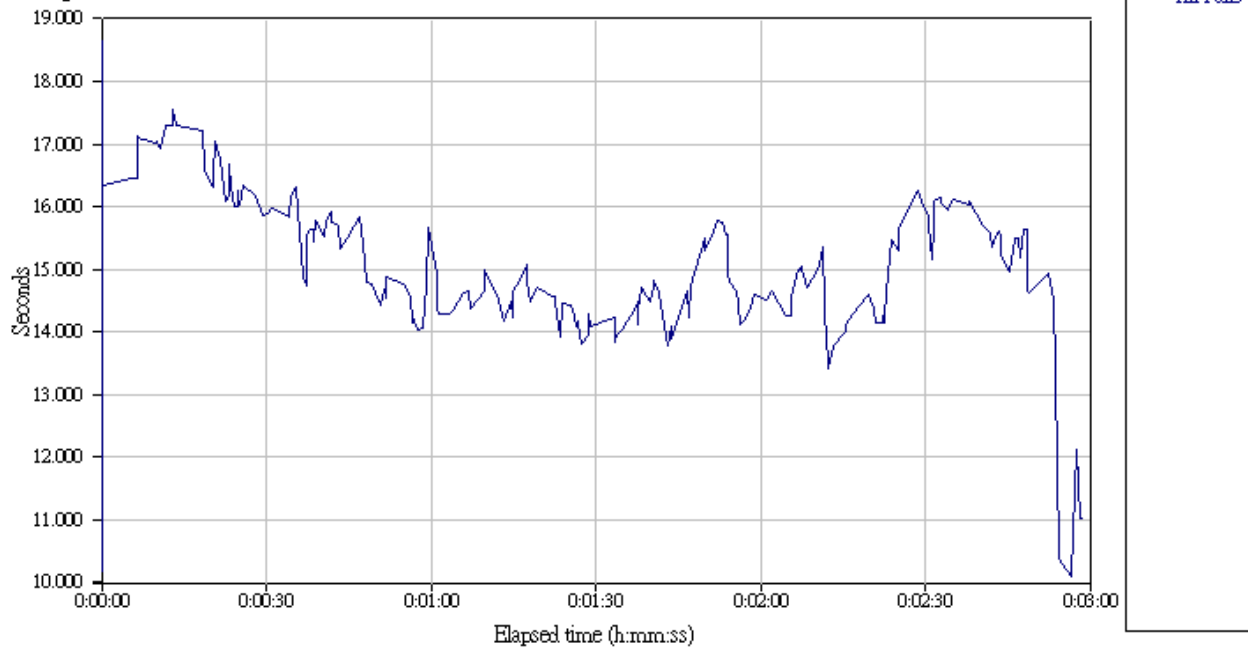
Transaction rate



Time

Pair 16	12.787	7.412	17.734
Totals:	13.634	3.978	36.645

Response time

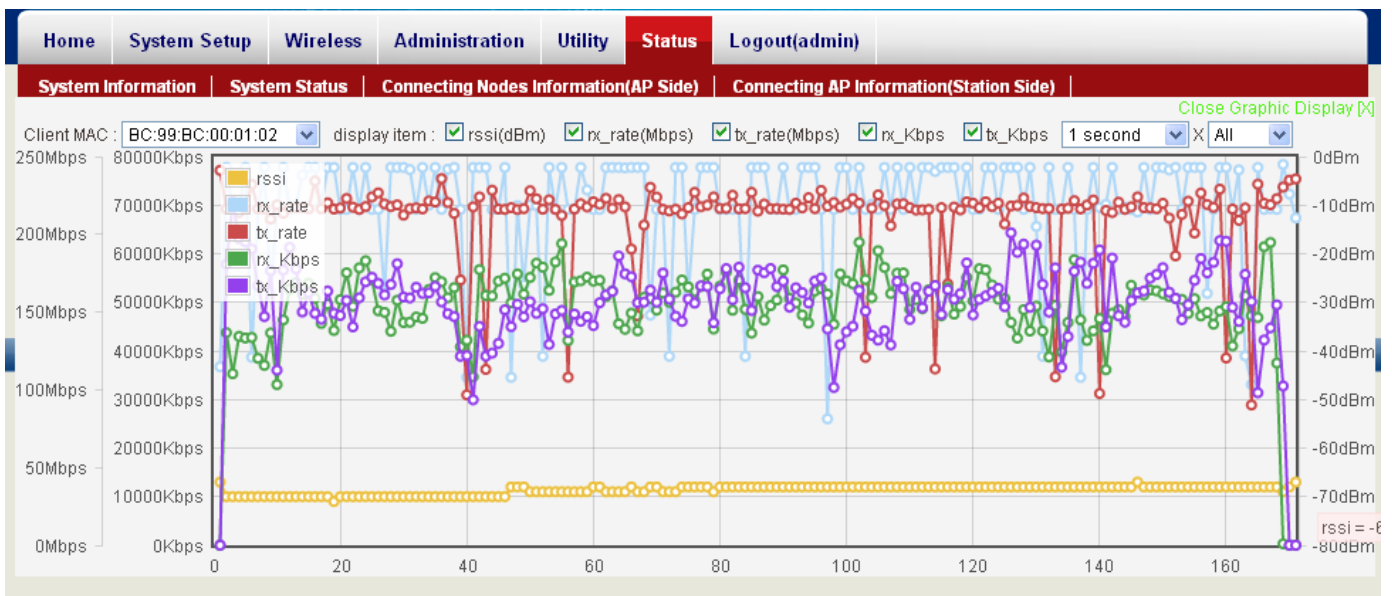




AP Side Screen



Station Side Screen





3.4 Test4

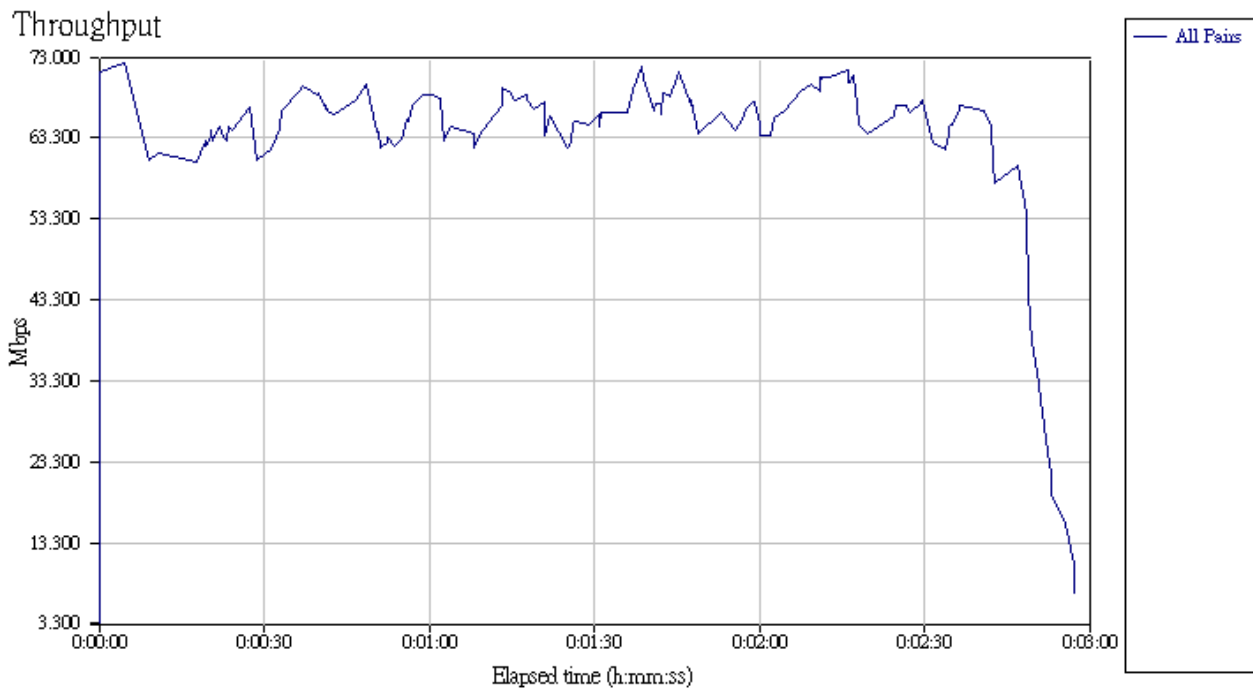
一張 MIMO 網卡,以 20MHz 單頻 + 29dBi 5GHz 雙極化 MIMO 天線 + 8 傳 8 收'間隔縮減 距離 16Km 可傳 63.5Mbps

(一般功率 MIMO 網卡輸出功率最大為 21dBm, 高功率 MIMO 網卡輸出功率最大為 24dBm)

Frequency	Channel Width	RF Model	IxChariot pairs
Channel - 100	20MHz	Normal Power	8T8R
Report	Total Throughput(Mbps)	Response Time	Transaction Rate
	63.567	19.990	0.835

Throughput

Pair 16	3.313	2.414	4.612
Totals:	63.567	2.328	17.929

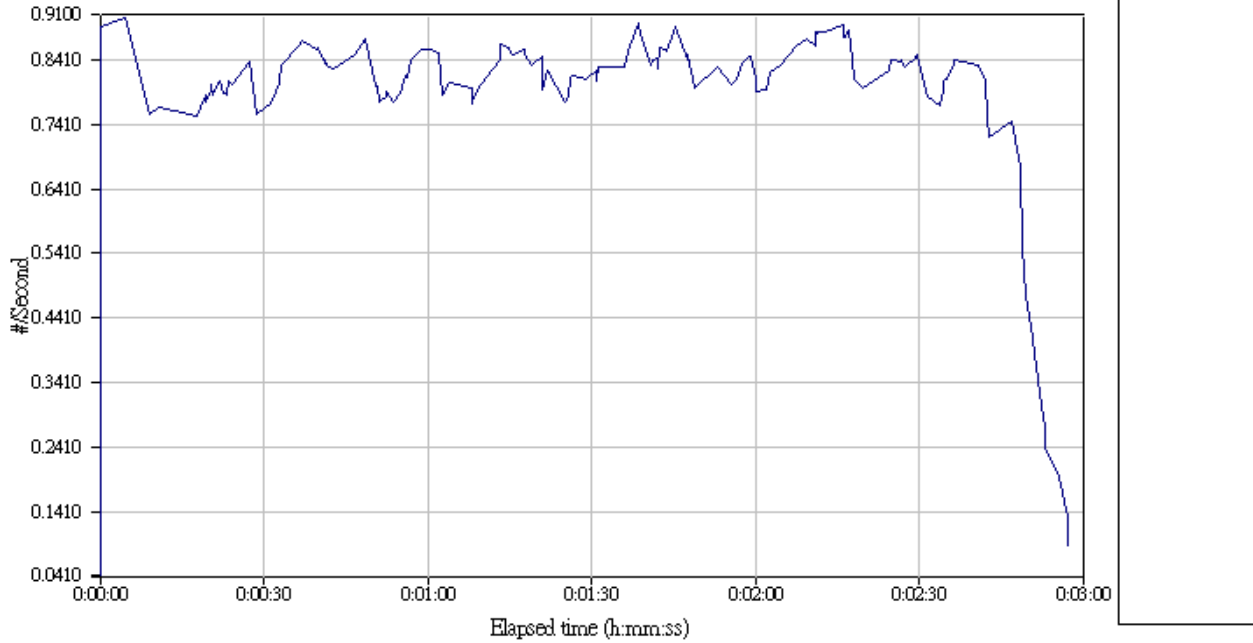




Transaction Rate

Pair 16	0.041	0.030	0.058
Totals:	0.835	0.029	0.224

Transaction rate

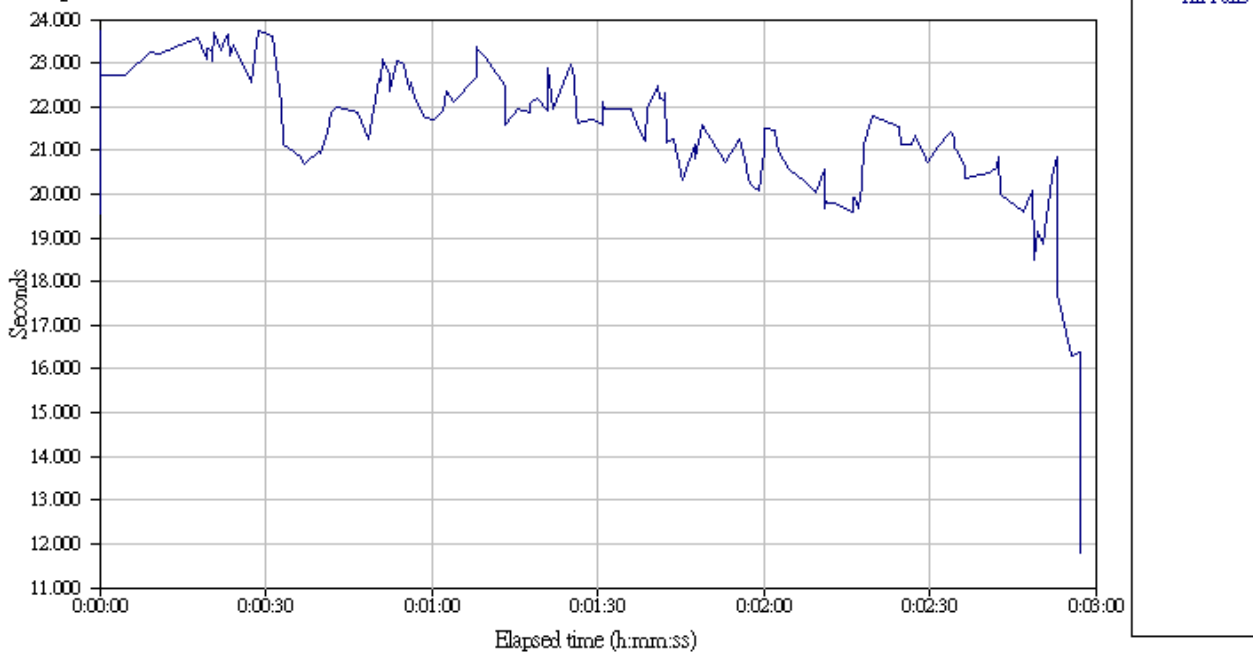


Response

Time

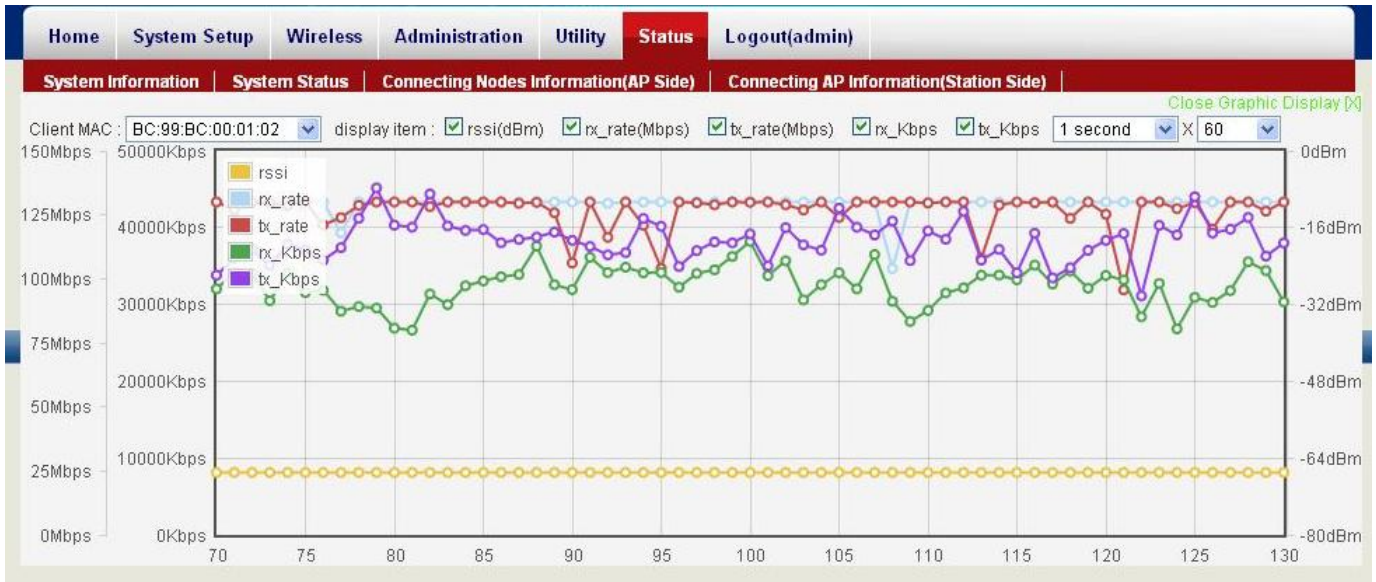
Pair 16	24.147	17.345	33.140
Totals:	19.990	4.462	34.370

Response time

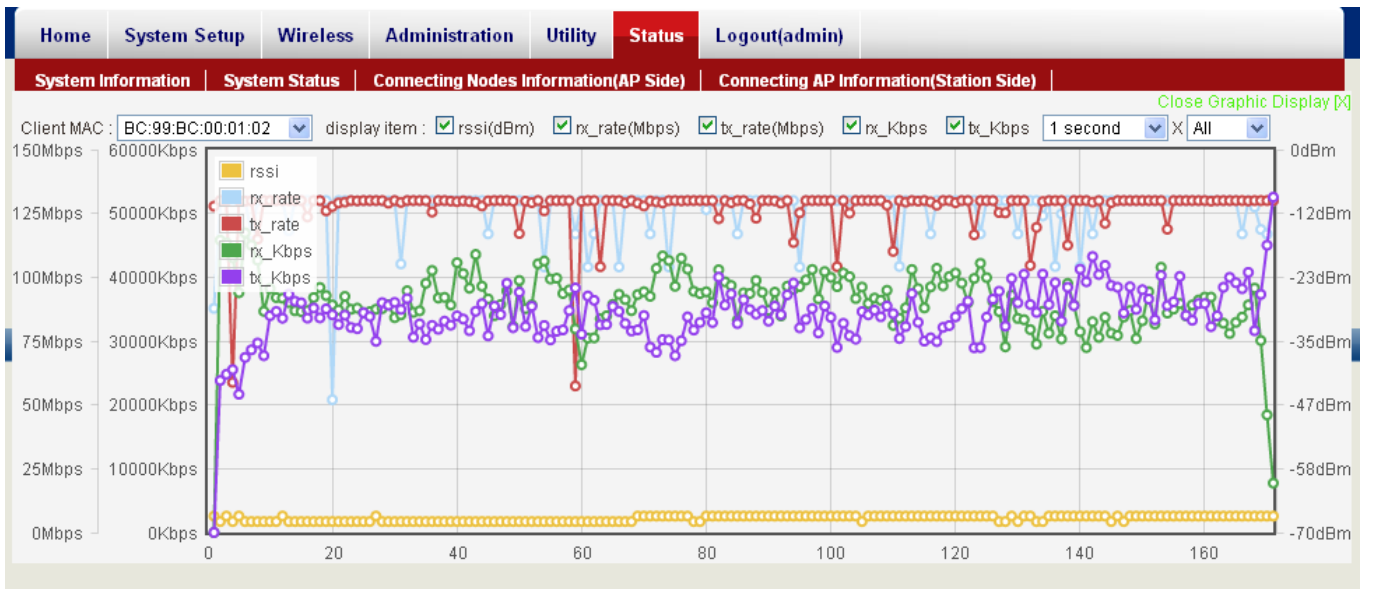




AP Side Screen



Station Side Screen



Appendix I

無。