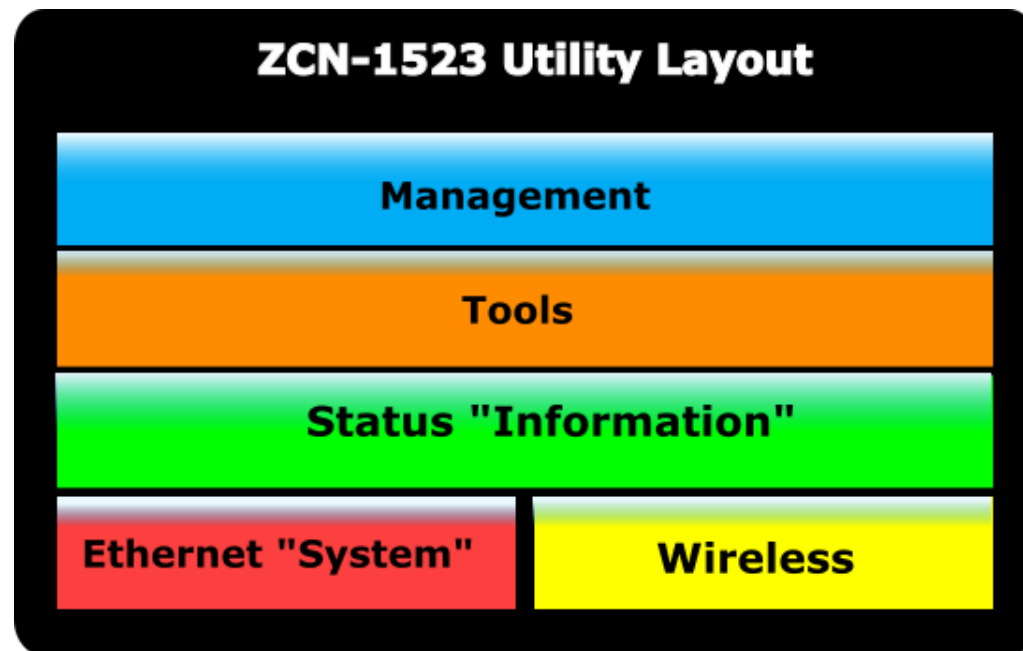


SatelliteDish.com 954-941-8883

CPE RMA / Support Training



Utility Layout



System Settings

Basic Settings

KEY FEATURES

Device Name – Contains last 6 digits of MAC Address

Network Mode – Define Ethernet port as Bridge or Router

Country Region – Will adjust the frequency channel and output power plan based on selected country

Spanning Tree– Prevent Network Loops using the STP

STP Forward Delay– Adjust how often STP will reassess the network

GPS Coordinates– Manually input the GPS Coordinates for the Radio.

Basic Settings

Use this page to configure the basic parameters of device.

Device Settings

Device Name: (max. 15 characters and no spaces)
Network Mode:
Ethernet DataRate:
Country/Region:
Spanning Tree: ☒ Enabled ☐ Disabled
STP Forward Delay: (1~30 seconds)

GPS Coordinate Settings

Latitude: ° ′ ″
Longitude: ° ′ ″

System Settings

TCP / IP

General TCP / IP

TCP/IP – Basic configuration settings

RADIUS– General configuration, other RADIUS options also available as we will see later

Time Settings– Manual or server synchronization

TCP/IP Settings

This page configures the IP address, subnet mask, DHCP, network that is connected to the LAN port of the device.

IP Address Assignment

- ☐ Obtain IP Address Automatically
- ☒ Use Fixed IP Address

IP Address : 192.168.1.1

Subnet Mask : 255.255.255.0

Gateway Ip Address : 0.0.0.0

DNS 1 : 0.0.0.0

0.0.0.0

RADIUS Settings

Use this page to set the radius server settings.

Authentication RADIUS Server

IP Address: 0.0.0.0

Port: 1812

Shared Secret:

☐ Global-Key Update

every 3600 Seconds

Time Settings

You can synchronize System Log's time stamp with a public time server over the Internet.

Current Time: Yr 2010 Mon 1 Day 1 Hr 0 Mn 21 Sec 12

Time Zone Select: (GMT)Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London ▼

☐ Enable NTP client update

☐ NTP server: 192.5.41.41 - North America ▼

☒ Manual IP: 0.0.0.0

Wireless Settings

Basic Settings

Available Operational Modes

- AP - Access Point
- Wireless Client – Station, CPE
- Bridge – P2P, PXP, WDS Bridge
- AP Repeating – Repeater

Differences Between Modes

Function	Operational Mode			
	AP	Client	Bridge	AP Repeater
SSID	✓	✓		✓
Lock AP MAC		✓		
Broadcast SSID	✓			✓
HT Protect	✓			✓
Frequency	✓		✓	✓
Ex. Channel	✓		✓	✓
MAC Clone		✓		

Wireless Basic Settings

Use this page to change the wireless mode as well as configure any associated parameters.

☐ Disable Wireless LAN Interface

Operation Mode: AP Site Survey

Wireless Network Name(SSID): Wireless [\(more...\)](#)

Broadcast SSID: ☒ Enabled ☐ Disabled

802.11 Mode: 802.11B/G/N

HT protect: ☐ Enabled ☒ Disabled

Frequency/Channel: 2437MHz (6)

Extension Channel: None

Channel Mode: 20 MHz

BW Options
5 / 10 / 20 & 40MHz

Antenna: ☒ Internal (8 dBi) ☐ External (N-Type)

Maximum Output Power (per chain): 12 26 26 dBm

Data Rate: Auto

Extension Channel Protection: None

Wireless Settings

VAP Profile List

Virtual Access Point Settings

16 Configurable VAP Profiles

802.1Q VLAN ID – VLAN pass through allows the devices user interface to be accessed through a VLAN.

Profile(x) – Each profile can be configured individually as seen on the next slide.

VAP Profile Settings

define each WLAN's attribute.

◆ #	◆ Profile Name	◆ SSID	◆ Security	Vlan ID	Enable
1	Profile1	Wireless	Open System	<input type="text" value="0"/>	Always Enabled
2	Profile2	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
3	Profile3	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
4	Profile4	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
5	Profile5	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
6	Profile6	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
7	Profile7	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
8	Profile8	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
9	Profile9	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
10	Profile10	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
11	Profile11	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
12	Profile12	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
13	Profile13	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
14	Profile14	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
15	Profile15	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>
16	Profile16	Wireless	Open System	<input type="text" value="0"/>	<input type="checkbox"/>

☐ **Enable 802.1Q VLAN**

Management VLAN ID:

Wireless Settings

VAP Profile Settings

VAP Profile 1 Settings

Fundamental Settings– Profile name, SSID, Broadcast SSID, Security including WEP, WPA and WPA2

Wireless Separation – Prevent Associated users from connecting to each other over the wireless bridge and by-passing the Ethernet port

WMM – (Wi-Fi Multimedia) Support for wireless QoS

MAX Station – Number of clients allowed to associate

VAP Profile1 Settings

Basic Settings

Profile Name:	<input type="text" value="Profile1"/>
Wireless Network Name (SSID):	<input type="text" value="Wireless"/>
Broadcast SSID:	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled
Wireless Separation:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
WMM Support:	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled
<input type="checkbox"/> Max. Station Num:	<input type="text" value="32"/> (0-32)

Security Settings

Network Authentication:	<input type="text" value="Open System"/>
Data Encryption:	<input type="text" value="None"/>
Key Type:	<input type="text" value="Hex"/>
Default Tx Key:	<input type="text" value="Key 1"/>
WEP Passphrase:	<input type="text"/> <input type="button" value="Generate Keys"/>
Encryption Key 1:	<input type="text"/>
Encryption Key 2:	<input type="text"/>
Encryption Key 3:	<input type="text"/>
Encryption Key 4:	<input type="text"/>

Wireless Settings

Advanced Settings

Advanced settings are best at default

These features can help increase network performance when used correctly, often modifying them without need will negatively impact a networks performance.

TDM Coordination – best used with multiple clients

Space in meters – 1000 meter is default and can be used in most situations

Wireless Advanced Settings

These settings are only for more technically advanced users who manage wireless LANs. These settings should not be changed unless you understand the changes will cause.

A-MPDU aggregation:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
A-MSDU aggregation:	<input type="radio"/> Enabled	<input checked="" type="radio"/> Disabled
Short GI:	<input type="radio"/> Enabled	<input checked="" type="radio"/> Disabled
RTS Threshold:	<input type="text" value="2347"/>	(1-2347)
Fragment Threshold:	<input type="text" value="2346"/>	(256-2346)
Beacon Interval:	<input type="text" value="100"/>	(20-1024 ms)
DTIM Interval:	<input type="text" value="1"/>	(1-255)
Preamble Type:	<input type="radio"/> Long	<input checked="" type="radio"/> Auto
IGMP Snooping:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
RIFS:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
Link Integration:	<input type="radio"/> Enabled	<input checked="" type="radio"/> Disabled
TDM Coordination:	<input type="radio"/> Enabled	<input checked="" type="radio"/> Disabled
Space In Meter:	<input type="text" value="1000"/>	(0-15000 m)

☐ Enable Traffic Shaping

Incoming Traffic Limit:	<input type="text" value="102400"/>	kbit/s
Incoming Traffic Burst:	<input type="text" value="20"/>	kBytes
Outgoing Traffic Limit:	<input type="text" value="102400"/>	kbit/s
Outgoing Traffic Burst:	<input type="text" value="20"/>	kBytes

Wireless Settings

LAN-to-LAN

Available in Wireless Client Mode – CPE Type

Situation: Typical WLAN packet delivery uses 3 Address Fields (DA, SA and BSSID)

Problem: Can't support multiple clients behind client

Solution: Lan2Lan Utilizes all 4 available Address fields

- RA – Receiver Address
- TA – Transmitter Address
- DA – Destination Address
- SA – Source Address

Note: AP must support LAN-to-LAN mode

Multi-Client – Traditional packet delivery method is compatible with all AP's

Wireless Advanced Settings

These settings are only for more technically advanced users who have a su wireless LANs. These settings should not be changed unless you understand changes will cause.

A-MPDU aggregation:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
A-MSDU aggregation:	<input type="radio"/> Enabled	<input checked="" type="radio"/> Disabled
Short GI:	<input type="radio"/> Enabled	<input checked="" type="radio"/> Disabled
RTS Threshold:	2347	(1-2347)
Fragment Threshold:	2346	(256-2346)
Beacon Interval:	100	(20-1024 ms)
DTIM Interval:	1	(1-255)
Preamble Type:	<input type="radio"/> Long	<input checked="" type="radio"/> Auto
IGMP Snooping:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
RtFS:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
Link Integration:	<input type="radio"/> Enabled	<input checked="" type="radio"/> Disabled
CPE Type:	<input checked="" type="radio"/> Multi-Client	<input type="radio"/> Lan-to-Lan
Space In Meter:	1000	(0-15000 m)

☐ Enable Traffic Shaping

Incoming Traffic Limit:	102400	kbit/s
Incoming Traffic Burst:	20	kBytes
Outgoing Traffic Limit:	102400	kbit/s
Outgoing Traffic Burst:	20	kBytes

Wireless Settings

Wireless ACL

Wireless Access Control

Why beneficial? = Added level of security

How does it work? = Based on a MAC address list you can include or exclude clients that attempt to associate to your AP

Wireless Access Control

If you choose 'Allowed Listed', only those clients whose wireless MAC addresses are in the control list will be able to connect to your Access Point. When 'Deny Listed' is selected, clients on the list will not be able to connect the Access Point.

Access Control Mode:

Disable ▼

MAC Address:

Apply

Cancel



MAC Address

Select

Edit

Wireless Settings

WDS Bridging Protocol

WDS (AP Repeating and Bridge Modes)

Wireless Distribution System (WDS) is a Bridging protocol that allows multiple bridges to communicate with each other

Association – Association is based on MAC address tables of remote bridges

Maximum connections – Up to 4 remote bridges may associate with each other

WDS Settings

A Wireless Distribution System allows interconnection of access point do this, you must set all interconnected APs in the same channel, in other APs which you want to communicate with in the table below and function. This function will only work in Bridge and AP Repeater mode

WDS Separation:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Local MAC Address:	<input type="text" value="00:19:70:27:dc:b3"/>
Remote AP MAC Address 1:	<input type="text"/>
Remote AP MAC Address 2:	<input type="text"/>
Remote AP MAC Address 3:	<input type="text"/>
Remote AP MAC Address 4:	<input type="text"/>

How do you configure a WDS Network?

WDS Examples

WDS applies to Wireless Bridge and AP Repeating modes.

Typical Configurations:

- **Point to Point (P2P)**
- **Point to Multi-Point (PXP)**
- **Access point with repeating (APR)**

Wireless Settings

WDS Point-to-Point

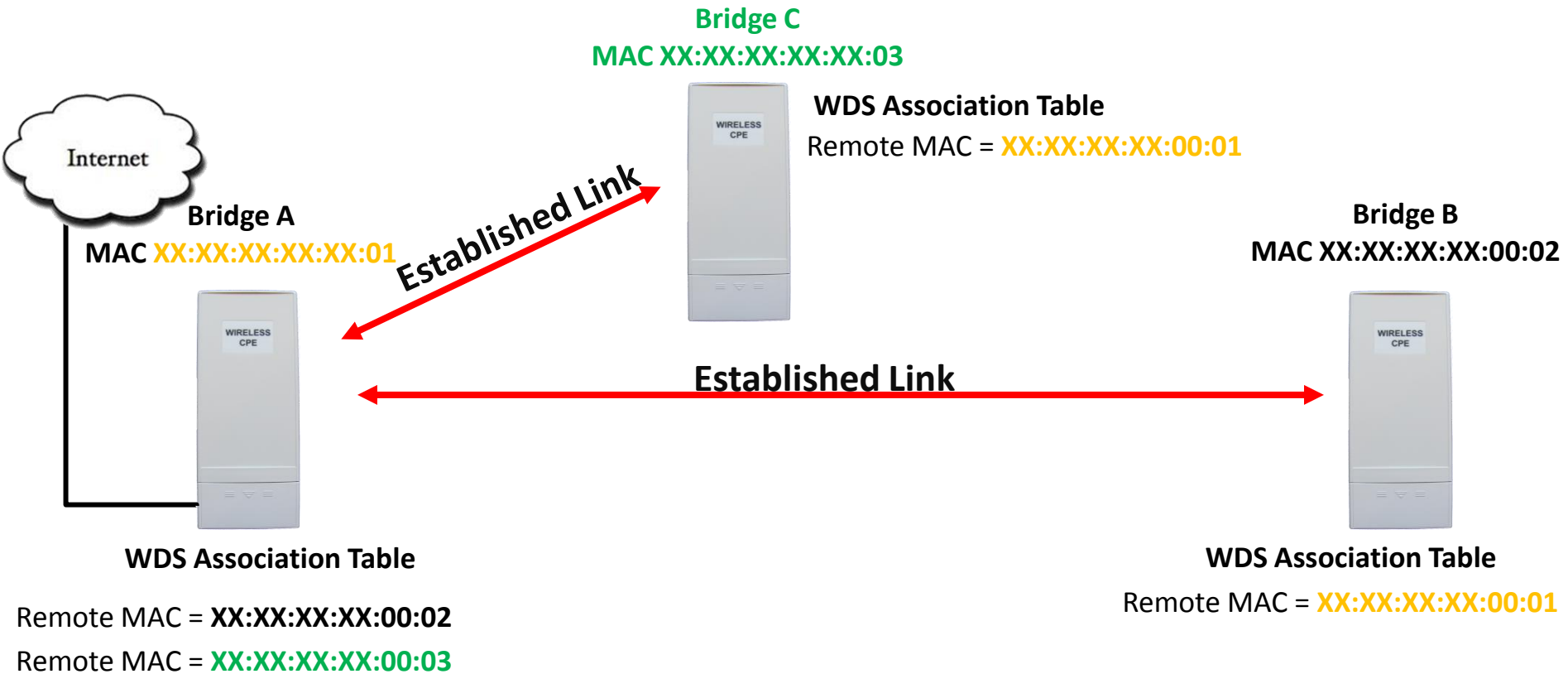
Add the remote bridge B's MAC address into Bridge A's WDS table



Add the remote bridge A's MAC address into Bridge B's WDS table

Wireless Settings

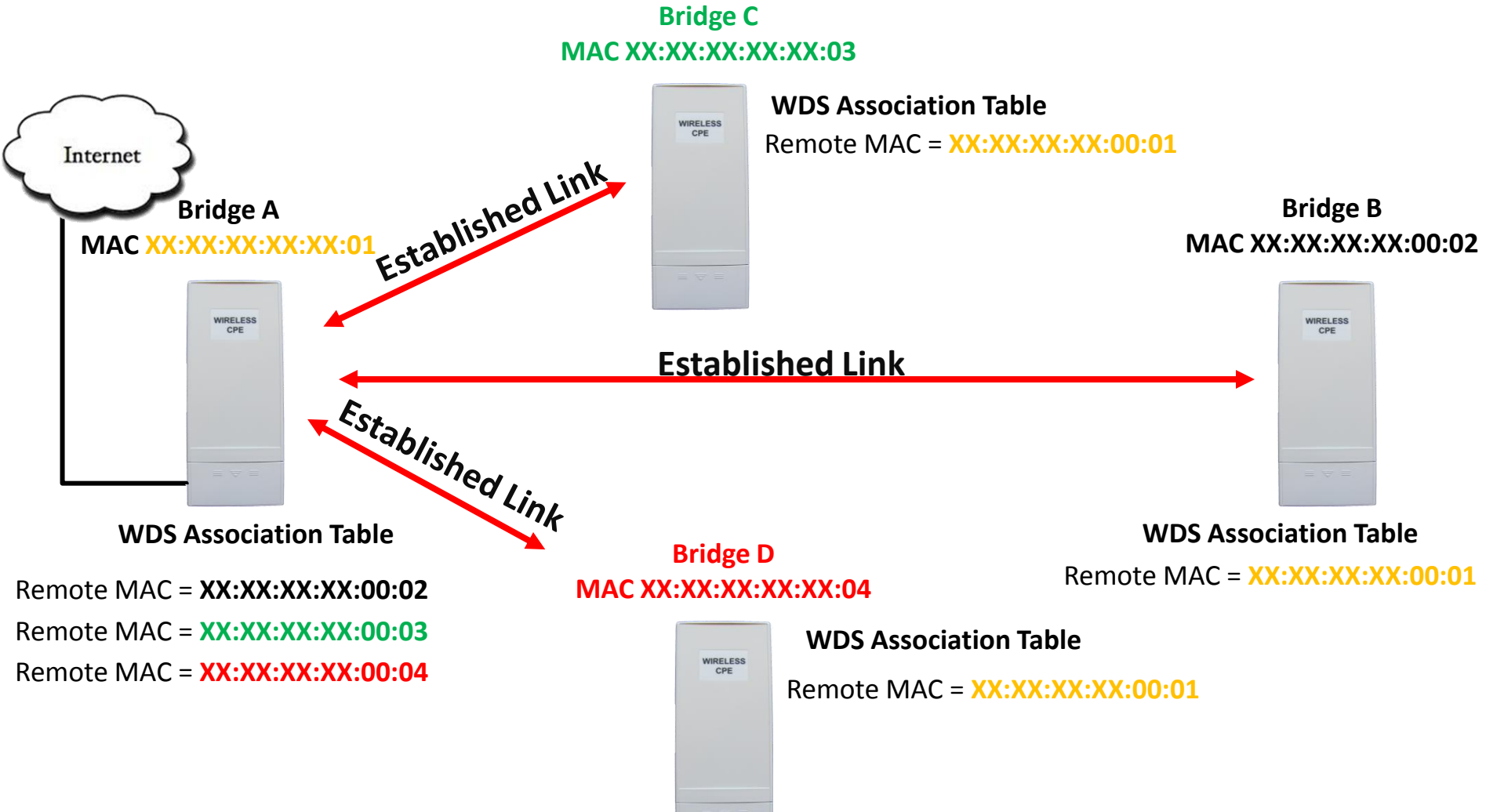
WDS Point-to-Multi-Point



Add the remote bridge C's MAC address into Bridge A's WDS table and A's into C's

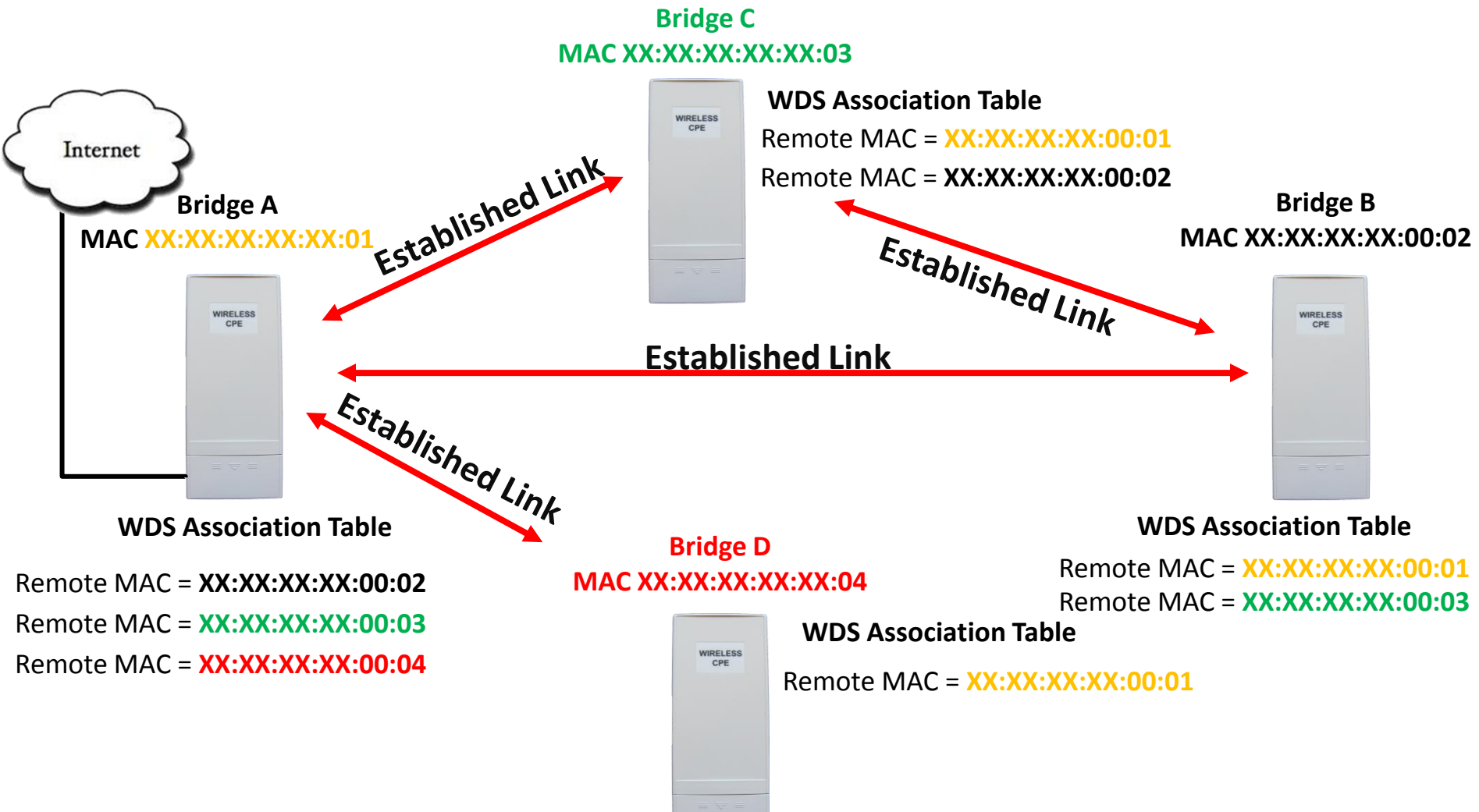
Wireless Settings

WDS Point-to-Multi-Point



Wireless Settings

WDS RELAY



Wireless Settings

WDS LOOP's

CAUTION: WDS Is Not Designed To Handle Bridge Network Loops!

What types of Networks can I Create using WDS?

WDS Bridge Networks support Star or tree topologies. Ring or mesh Networks are NOT supported and will create network Loops.

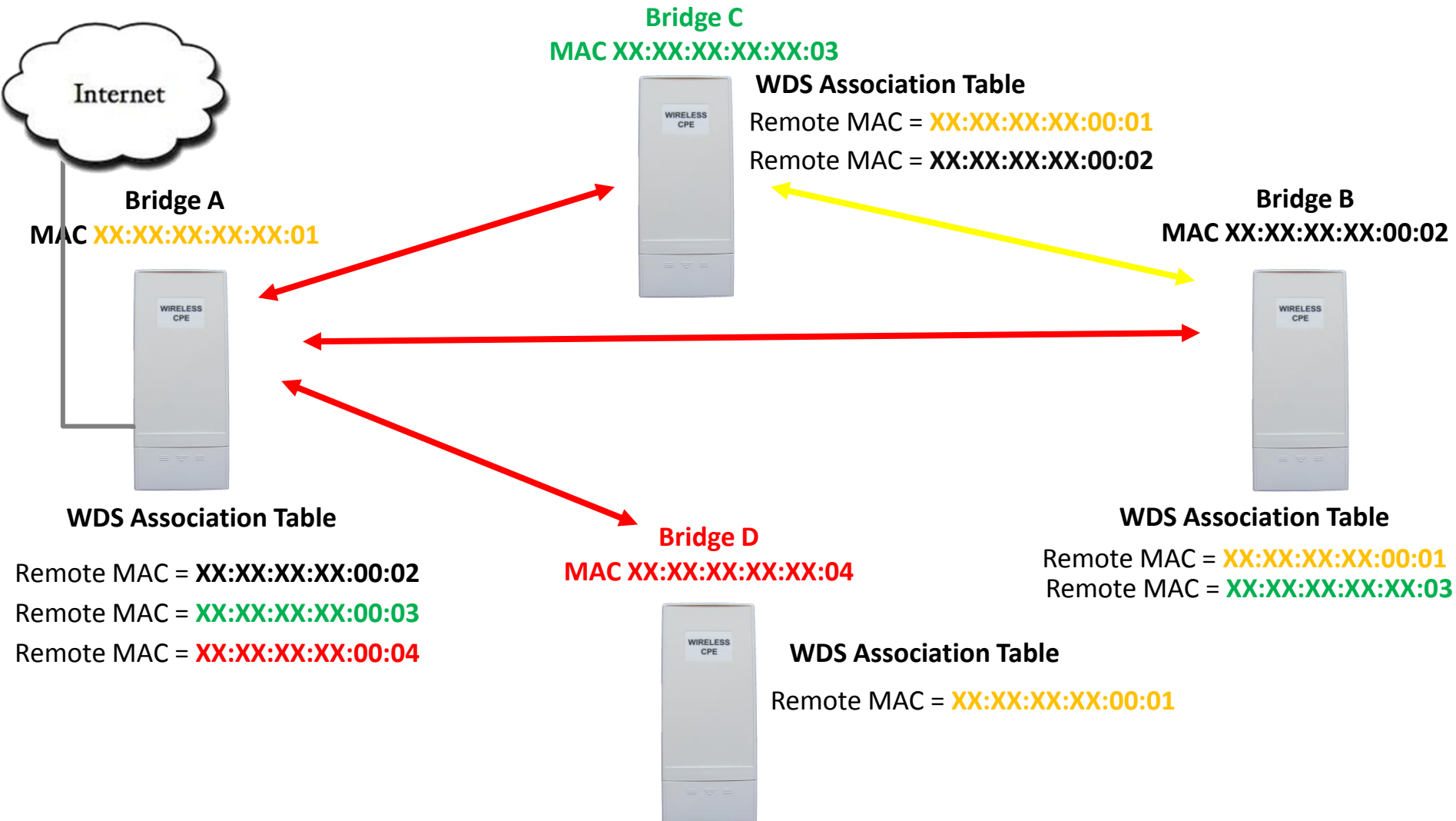
Will STP Prevent WDS Loops?

No, WDS is implemented at the Wireless Driver level and STP works at the Layer 2 Bridge Layer. A loop will create a packet storm at the wireless driver level.

The next couple of slides will show two common loop issues operators can create.

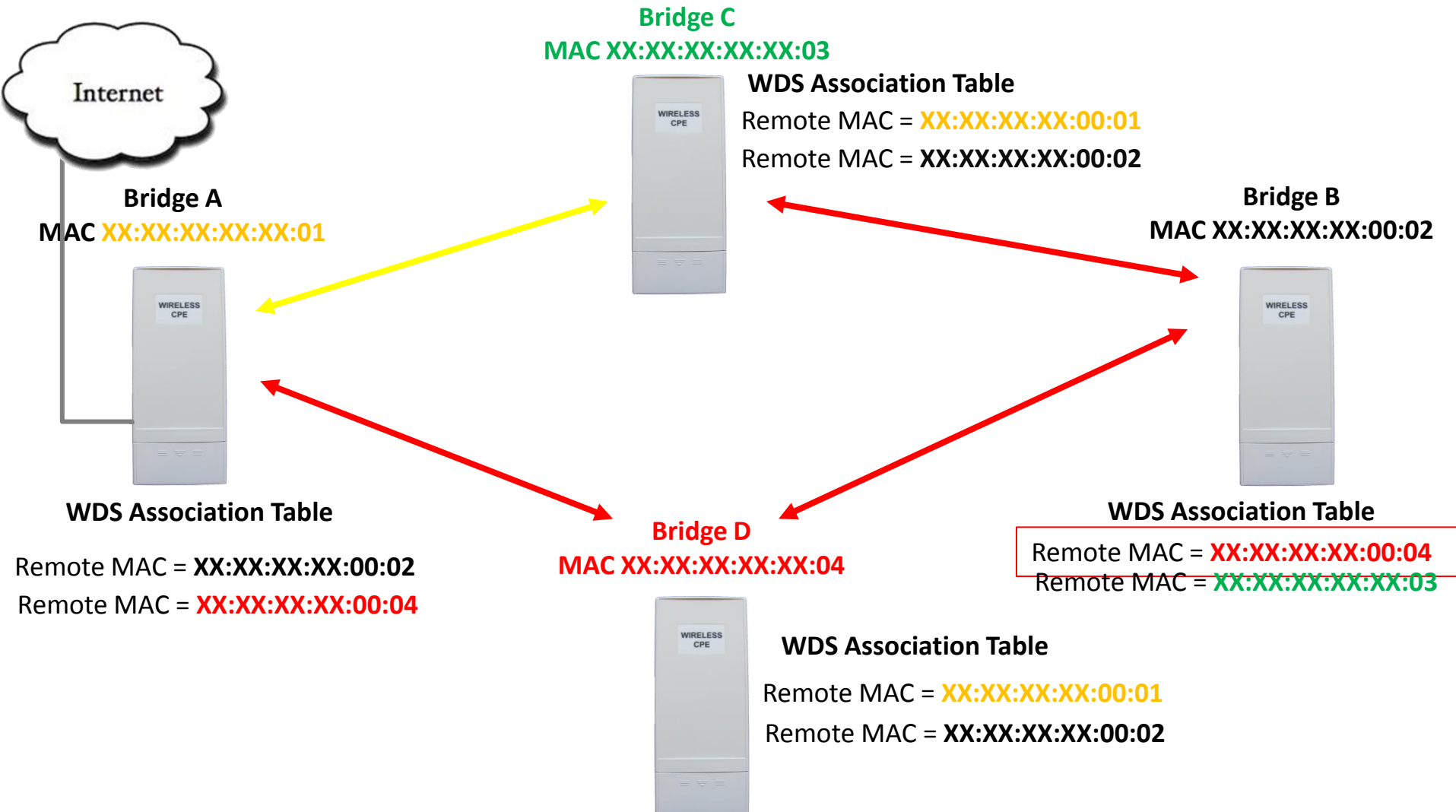
Wireless Settings

WDS LOOP Example 1



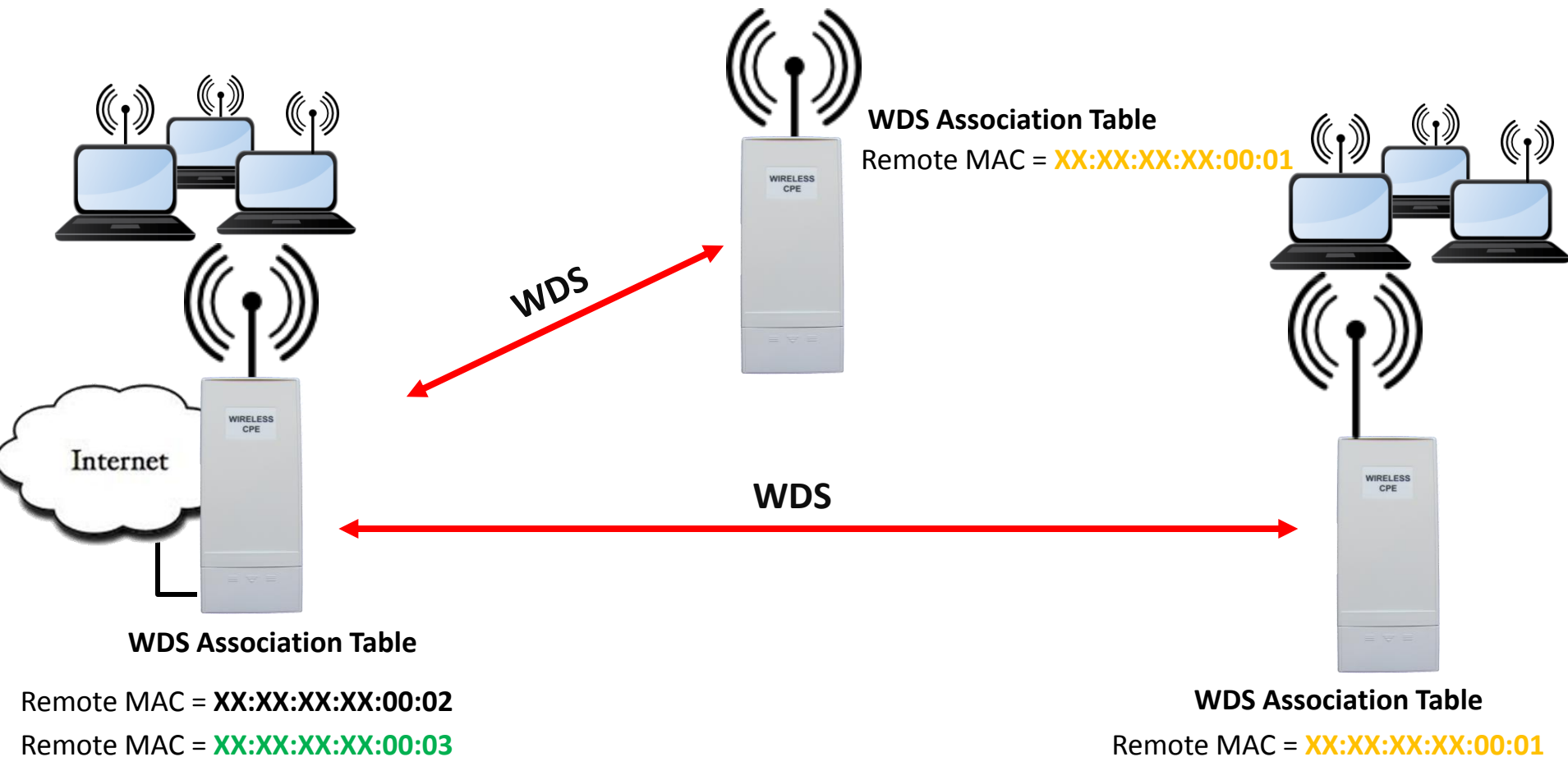
Wireless Settings

WDS LOOP Example 2



Wireless Settings

AP Repeating



Wireless Settings

WDS Performance

WDS Throughput Performance Impact.

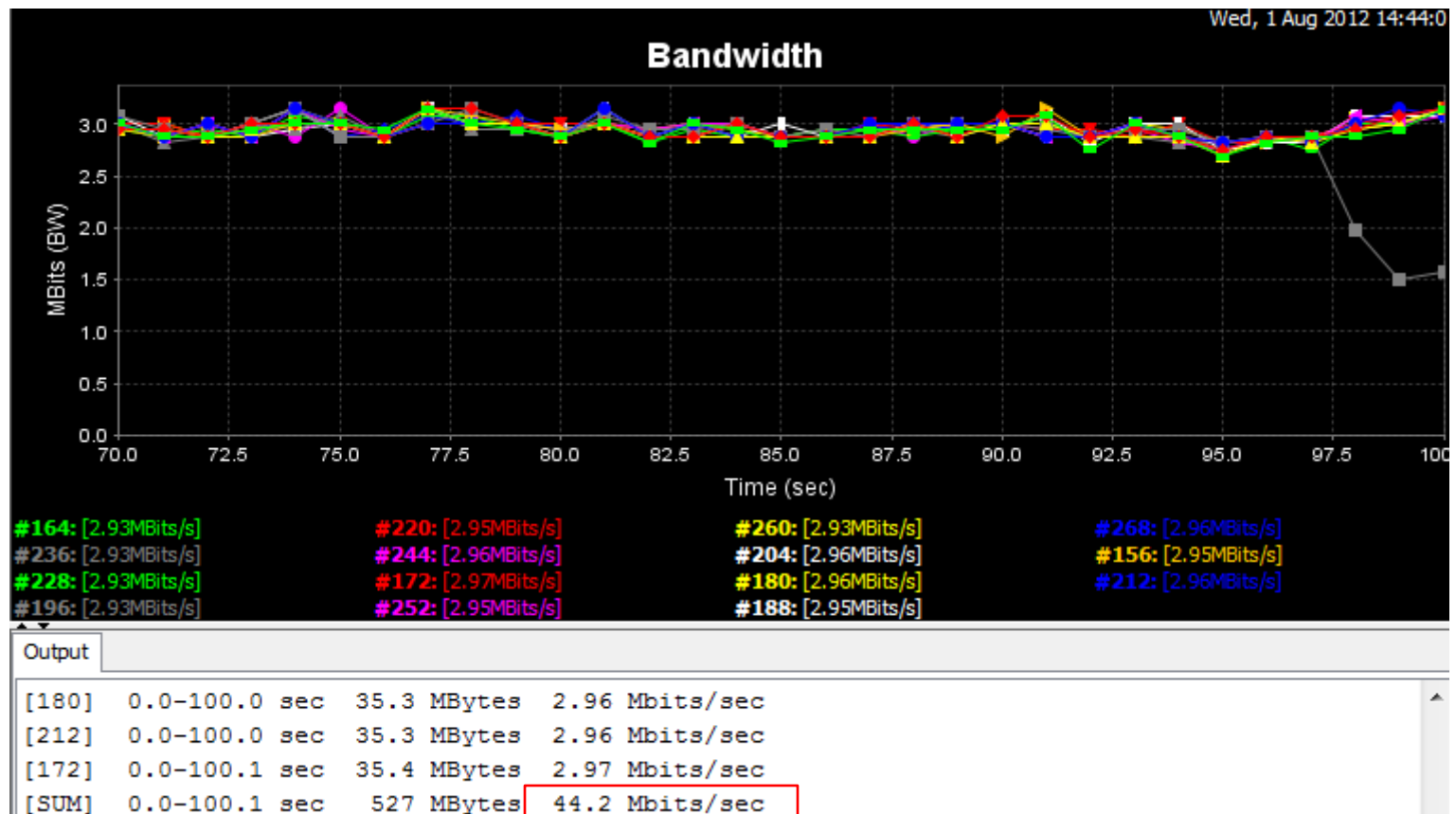
QUESTION: Does WDS Bridging affect throughput?

ANSWER: Yes, the impact on performance depends on the Network setup.
Point to Point networks suffer little to no effects.
Point-to-Multipoint networks Vary. Adding a relay point or a repeater will cut performance about 50% as it needs to Receive and Transmit every packets.

The next few slides will show some real examples.

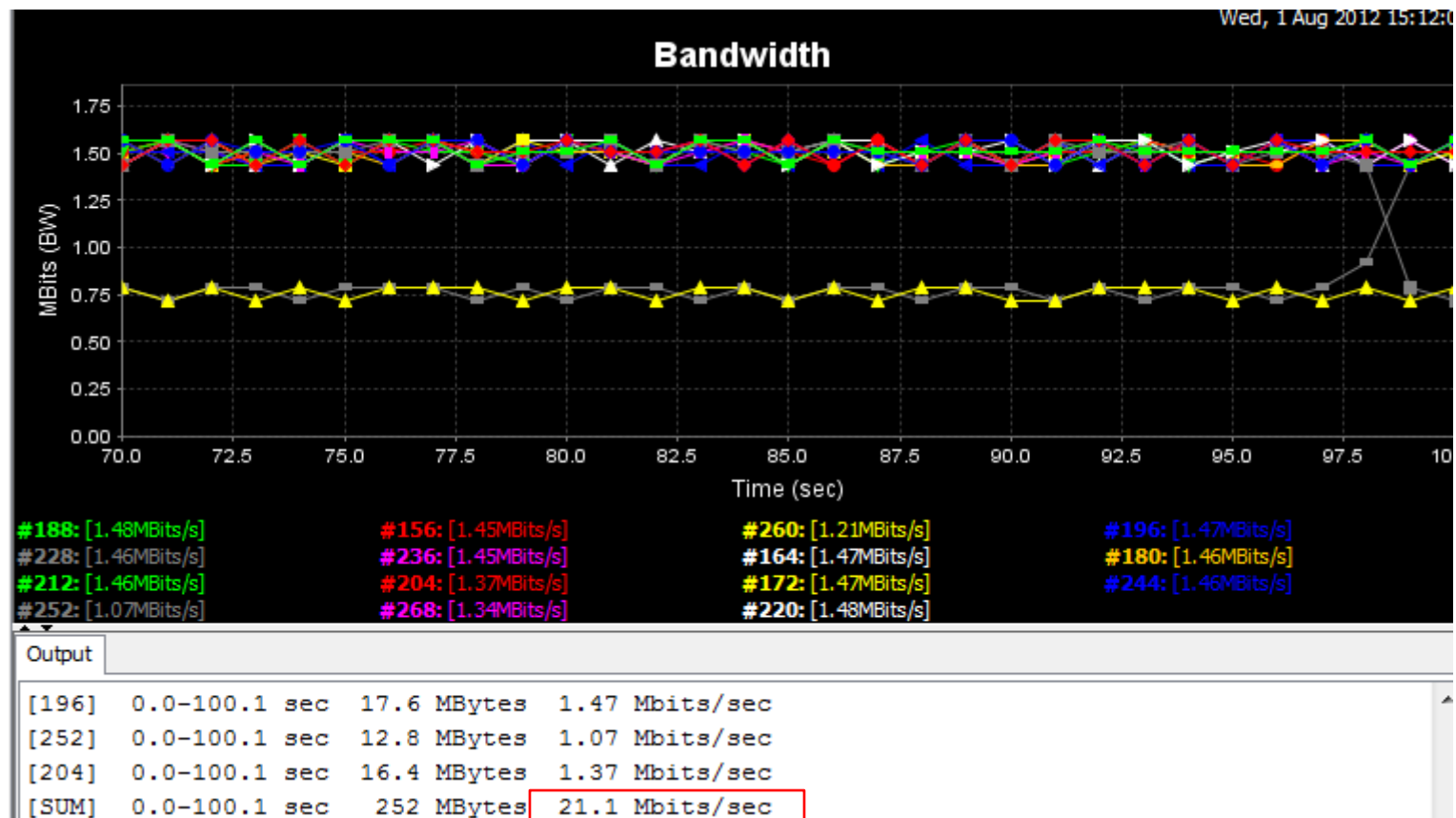
Wireless Settings

WDS P2P Performance



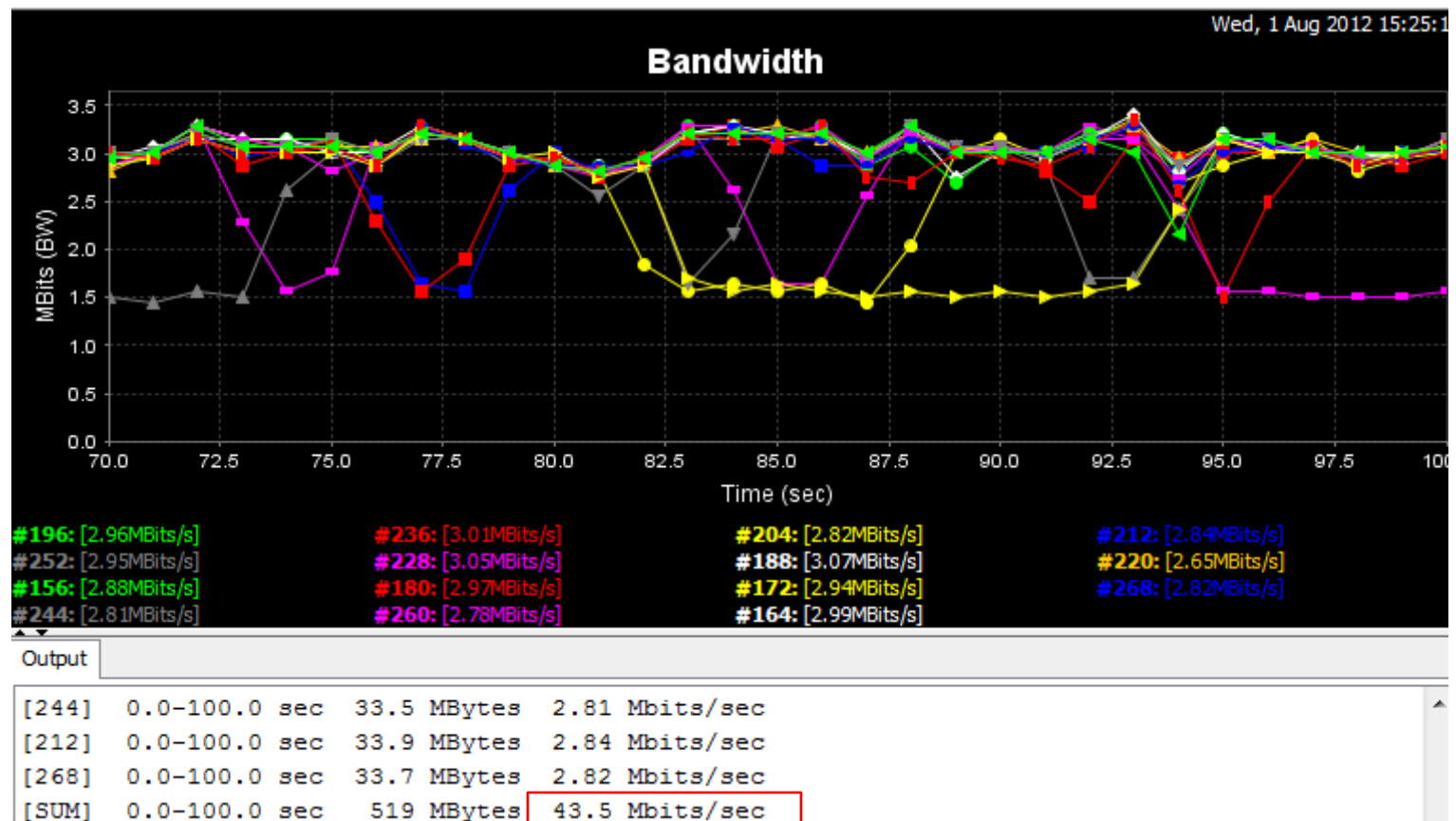
Wireless Settings

WDS P2P Relay Performance



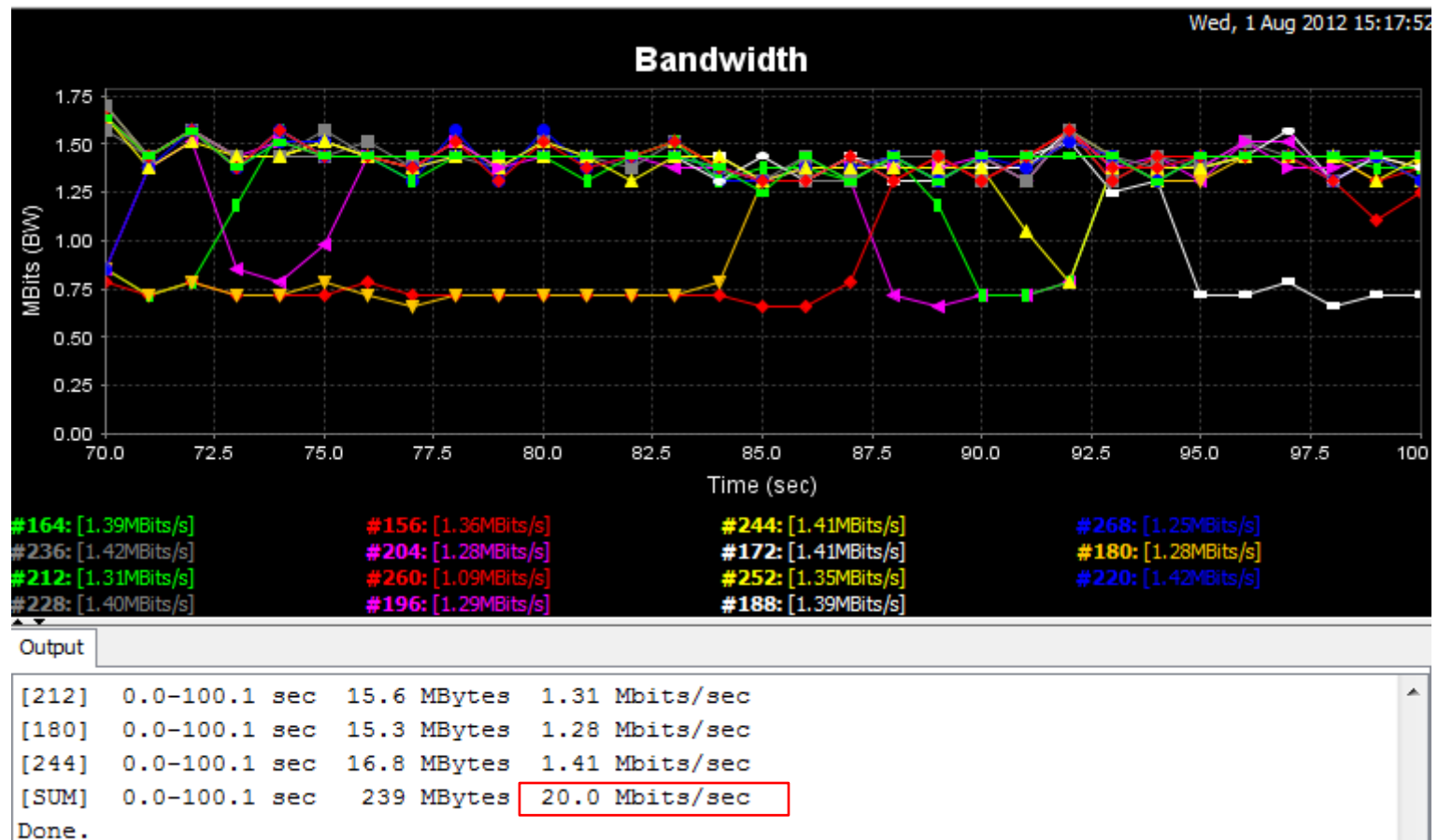
Wireless Settings

WDS AP Repeating Performance



Wireless Settings

WDS 3 AP Repeaters Performance



Status

Information

This page shows the current status and some basic settings of the device.

System Information

Device Name	ap27dcb3
MAC Address	00:19:70:27:dc:b3
Country/Region	United States
Firmware Version	3.0.8

LAN Settings

IP Address	192.168.1.1
Subnet Mask	255.255.255.0
Gateway IP Address	0.0.0.0
MAC Address	00:19:70:27:dc:b3

Wireless Settings

Operation Mode	AP
Wireless Mode	802.11B/G/N
SSID	Wireless
Encryption	Open System
ACK Timeout	35 us
WMM Enable	On
Noise Floor	-96 dBm

Association List

This table shows the MAC Address, IP Address and RSSI for each associated device(s).

VAP Index	MAC Address	Signal Strength	Noise Floor	Connection Time	Last IP	Action
1	5c:0a:5b:4d:b4:49	-52	-96	2010-1-1 00:07:37	206.214.62.102	Kick

Statistics

This page shows the packet counters for both transmission and reception over the respective wireless and Ethernet networks.

Poll Interval: (0-65534) sec [Set Interval](#) [Stop](#)

	Received	Transmitted
Wireless		
Unicast Packets	2194	2032
Broadcast Packets	1595	6911
Multicast Packets	132	0
Total Packets	3921	8943
Total Bytes	769364	958419
Ethernet		
Total Packets	46400	22087
Total Bytes	7135072	10884001

ARP Table

This table displays ARP information.

IP Address	MAC Address	Interface
192.168.1.2	00:0C:F1:D7:CF:DC	br0
192.168.1.5	20:6A:8A:4D:A8:9A	br0

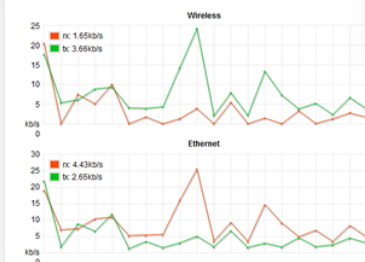
Bridge Table

This table displays bridge information.

MAC Address	Interface	Ageing Timer(s)
08:99:97	LAN	66.06
80:82:be	LAN	0.22
7a:75:a7	LAN	2.87

Network Activity

This graph displays throughput information for both the Wireless and Ethernet networks.



Tools – Wireless Client

Site Survey – For client mode

Wireless Site Survey

This page provides a tool to scan the wireless network.

↕	SSID	↕Frequency/Channel	↕ MAC Address	↕ Wireless Mode	↕ Signal Strength	↕ Security
	linksys	2412MHz(1)	00:1d:7e:40:03:72	802.11B/G	-41	WPA2
	L-COM	2437MHz(6)	00:19:70:00:f5:44	802.11B/G/N	-58	NONE
	xfinitywifi	2437MHz(6)	18:ef:63:b3:06:01	802.11B/G	-93	NONE
	fabwifi	2437MHz(6)	00:25:9c:ac:4c:f0	802.11B/G	-76	WPA

Wireless Site Survey

This page provides a tool to scan the wireless network.

↕	SSID	↕Frequency/Channel	↕ MAC Address	↕ Wireless Mode	↕ Signal Strength	↕ Security
	linksys	2412MHz(1)	00:1d:7e:40:03:72	802.11B/G	-41	WPA2
	L-COM	2437MHz(6)	00:19:70:00:f5:44	802.11B/G/N	-48	NONE
	xfinitywifi	2437MHz(6)	18:ef:63:b3:06:01	802.11B/G	-93	NONE
	fabwifi	2437MHz(6)	00:25:9c:ac:4c:f0	802.11B/G	-76	WPA
	TWCWiFi	2437MHz(6)	18:ef:63:b3:06:02	802.11B/G	-92	NONE
	CableWiFi	2412MHz(1)	68:bd:ab:6a:43:03	802.11B/G	-92	NONE
	optimumwifi	2412MHz(1)	68:bd:ab:6a:43:00	802.11B/G	-90	NONE
	xfinitywifi	2462MHz(11)	ac:a0:16:5c:37:01	802.11B/G	-92	NONE
	CableWiFi	2462MHz(11)	ac:a0:16:5c:37:03	802.11B/G	-91	NONE

Scan

Tools – Ping Watchdog

Ping Watchdog

Ping Watchdog

This page provides a tool to configure the Ping Watchdog. If the fail count of the Ping reaches a specified value, the watchdog will reboot the device.

☒ Enable Ping Watchdog

IP Address to Ping:

Ping Interval: seconds

Startup Delay: seconds(>120)

Failure Count To Reboot:

Apply

Cancel

Apply

Cancel

Failure Count To Reboot

3

```
C:\Users\Mitch>ping 206.214.62.37 -t

Pinging 206.214.62.37 with 32 bytes of data:
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
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Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Reply from 206.214.62.37: bytes=32 time=2ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
Reply from 206.214.62.37: bytes=32 time=1ms TTL=64
```

Why?

- Increases reliability
- Reduce field service calls

How?


Monitors its connection to a reference point

Data Rate test

- Increase reliability
- Increase performance

Data Rate Test

Use this page to test the link quality to the remote WDS node.

	Index	MAC Address
	1	00:19:70:00:f5:44

Refresh

Stop

Rate	Packet Size				Local Signal	Remote Signal
	64 Bytes	256 Bytes	752 Bytes	1472 Bytes		
Auto	100%	100%	100%	100%	-52	-52
1M	100%	100%	100%	100%	-52	-51
2M	100%	100%	100%	100%	-52	-51
5.5M	100%	100%	100%	100%	-53	-51
11M	100%	100%	100%	100%	-53	-51
6M	100%	100%	100%	100%	-53	-52
9M	100%	100%	100%	100%	-53	-53
12M	100%	100%	100%	100%	-53	-53
18M	100%	100%	100%	100%	-52	-54
24M	100%	100%	100%	100%	-52	-52
36M	100%	100%	100%	100%	-52	-51
48M	100%	100%	100%	100%	-52	-51
54M	100%	100%	100%	100%	-52	-51
MCS0-6.5[13.5]	100%	100%	100%	100%	-52	-51
MCS1-13[27]	100%	100%	100%	100%	-52	-51
MCS2-19.5[40.5]	100%	100%	100%	100%	-52	-51
MCS3-26[54]	100%	100%	100%	100%	-52	-51
MCS4-39[81]	100%	100%	100%	100%	-52	-51
MCS5-52[108]	100%	100%	100%	100%	-52	-51
MCS6-58.5[121.5]	100%	100%	100%	100%	-52	-52
MCS7-65[135]	100%	100%	100%	100%	-52	-52

Tools – Antenna Alignment

Antenna Alignment

Proper Antenna alignment is essential for a reliable and efficient wireless network.

- Make sure Signal Strength is stable and strong enough for intended network.
- RSSI is based on 802.11 standard.

Antenna Alignment

Use this page to align the antenna by link quality.

	Index	MAC Address
<input checked="" type="radio"/>	1	00:19:70:00:f5:44

Signal Strength:

-48 dBm

Current RSSI:

48

Transmit Packets:

22826

Receive Packets:

594

Tools – Speed Test

Measuring Throughput:

Simple and easy to run

- one Pair test
- Tx, Rx, Duplex testing
- Enter user name and password for remote device

Speed Test

This page allows you test the network speed between this device and another terminal.

Destination IP:

User Name:

Password:

Direction:

STATUS: Test complete.

TEST RESULT

Speed Test

This page allows you test the network speed between this device and another terminal.

Destination IP:	<input type="text" value="206.214.62.38"/>
User Name:	<input type="text" value="admin"/>
Password:	<input type="password" value="*****"/>
Direction:	<input type="text" value="Duplex"/>

STATUS: Test complete.

TEST RESULT

RX: 17.6 Mbits/sec

TX: 16.1 Mbits/sec

IX: 10 4 1000000000
 IX: 11 0 1000000000
 IER1 KER2NFI

Management

Management:

- Remote Management options
- Hotspot
- Updating Firmware
- Backing up config files
- Password
- Certificates

The screenshot shows the 'Management' tab selected in the top navigation bar. On the left, a sidebar lists 'Remote Settings' as the active section, with sub-items: 'CoovaChilli Settings', 'Firmware Upload', 'Configuration File', 'Password Settings', and 'Certificate Settings'. The main content area is titled 'Remote Settings' and includes a subtitle: 'Use this page to switch services of remote console.' Below this, the 'Management Privacy Mode' section has three radio buttons: 'Normal' (selected), 'Secure', and 'Customized'. Under 'Normal', there are checkboxes for 'Telnet' (checked), 'SSH' (unchecked), 'SNMP' (checked), 'Force HTTPS' (unchecked), 'FTP' (checked), and 'WISE' (checked). The 'SNMP Settings' section contains fields for 'Protocol Version' (V2), 'Server Port' (161), 'Get Community' (public), 'Set Community' (private), 'Trap Destination' (0.0.0.0), 'Trap Community' (public), and 'Location'. A link 'Configure SNMPv3 User Profile' is present. At the bottom right are 'Apply' and 'Cancel' buttons.

Configuration File

This page allows you to save current settings to a file or load the settings from the file which was saved previously. You may also reset the current configuration to factory default or reboot the device.

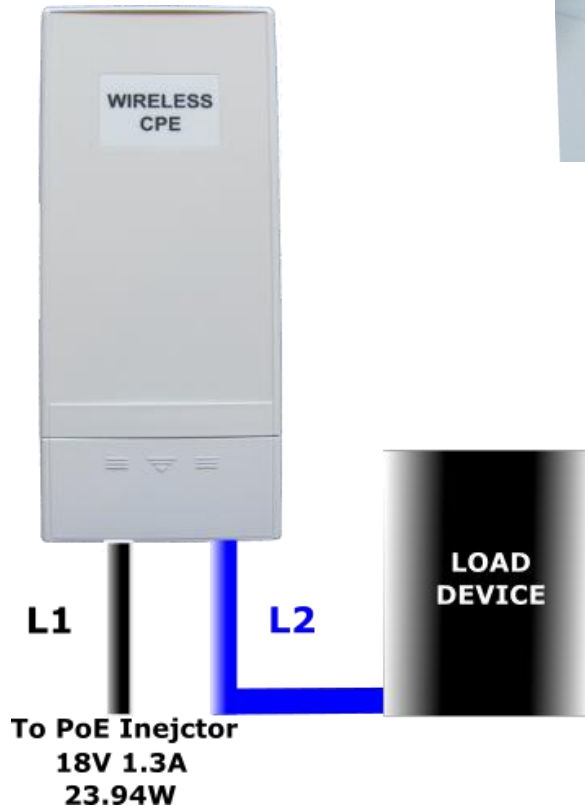
Save Settings to File:

Load Settings from File:

Reset Settings to Default:

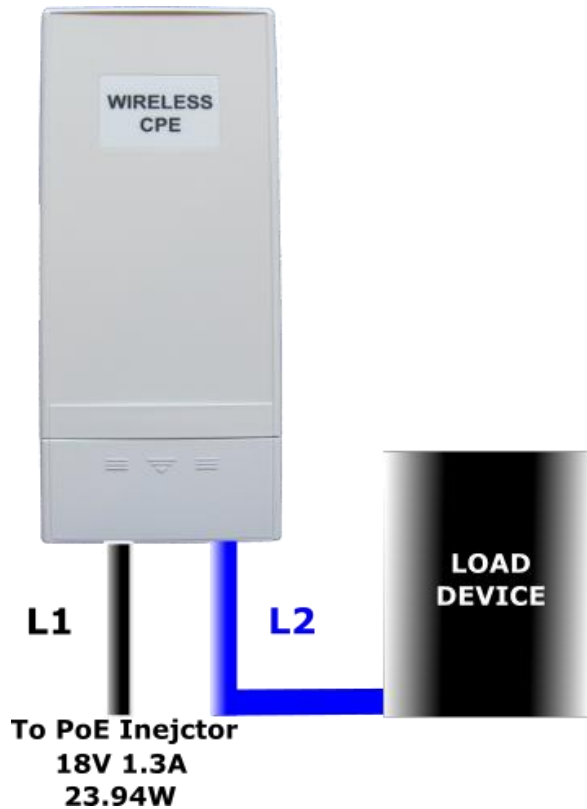
Reboot The Device:

LAN2 Overview



- Originally developed to support IP Cameras
- Power is supplied from the power supplied through LAN 1
- Lan2 has a power protection circuit, but do not insert PoE power into port, it wont work.

LAN2 Power Overview



Warning! Do not exceed 18V at the input

LAN2 power output comparison

L1 Cable Length (M)	L2 Cable Length (M)	LAN2 Max PWR (W)	LAN2 Min Voltage (V)
10	5	11.92	15.82
15	5	11.07	15.18
20	5	10.22	14.51
25	5	9.37	13.9
30	5	8.52	13.26
35	5	7.67	12.62
40	5	6.82	11.99

Note: Based on Cat5e 24AWG Ethernet Cable

Enabling LAN2

Once the load device is connected, you need to enable the power to the LAN2 port by enabling it in the firmware under basic settings.

Basic Settings

Use this page to configure the basic parameters of device.

Device Settings

Device Name:	<input type="text" value="ap00fc3f"/>	(max. 15 characters and no spaces)
Network Mode:	<input type="button" value="Bridge"/>	
Ethernet 1 DataRate:	<input type="button" value="Auto"/>	
Ethernet 2 DataRate:	<input type="button" value="Auto"/>	
Country/Region:	<input type="button" value="United States"/>	
Secondary RJ45 Power:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled	
Spanning Tree:	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled	
STP Forward Delay:	<input type="text" value="1"/>	(1~30 seconds)

External Antenna

ZCN-1523H-5-16 - Antenna Connector = 2 SMA RP female connectors.

Step 1 – Turn off power

Step 2 – Remove enclosure cover.

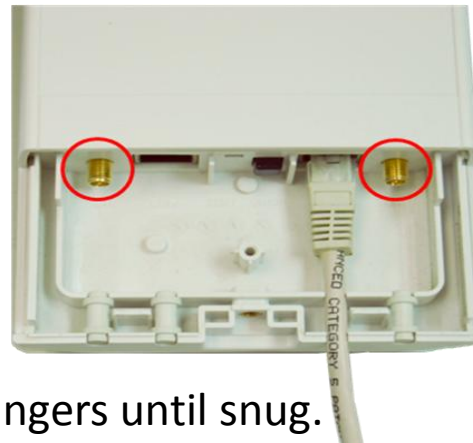
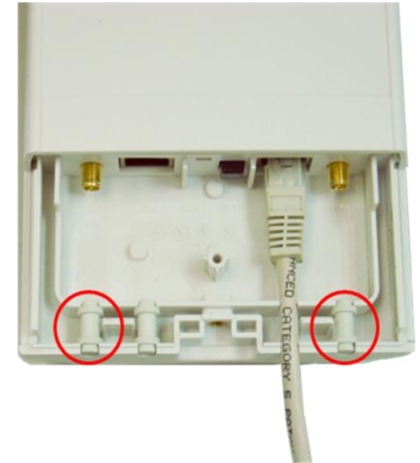
Step 3 - Remove 2 rubber plugs from enclosure.

Step 4 – Connect 2 adapter cables to antenna connectors.

Step 5 – turn on power switch and replace cover

Step 6 – enable external antenna feature in firmware.

Cable Diameter should be no larger than 5mm

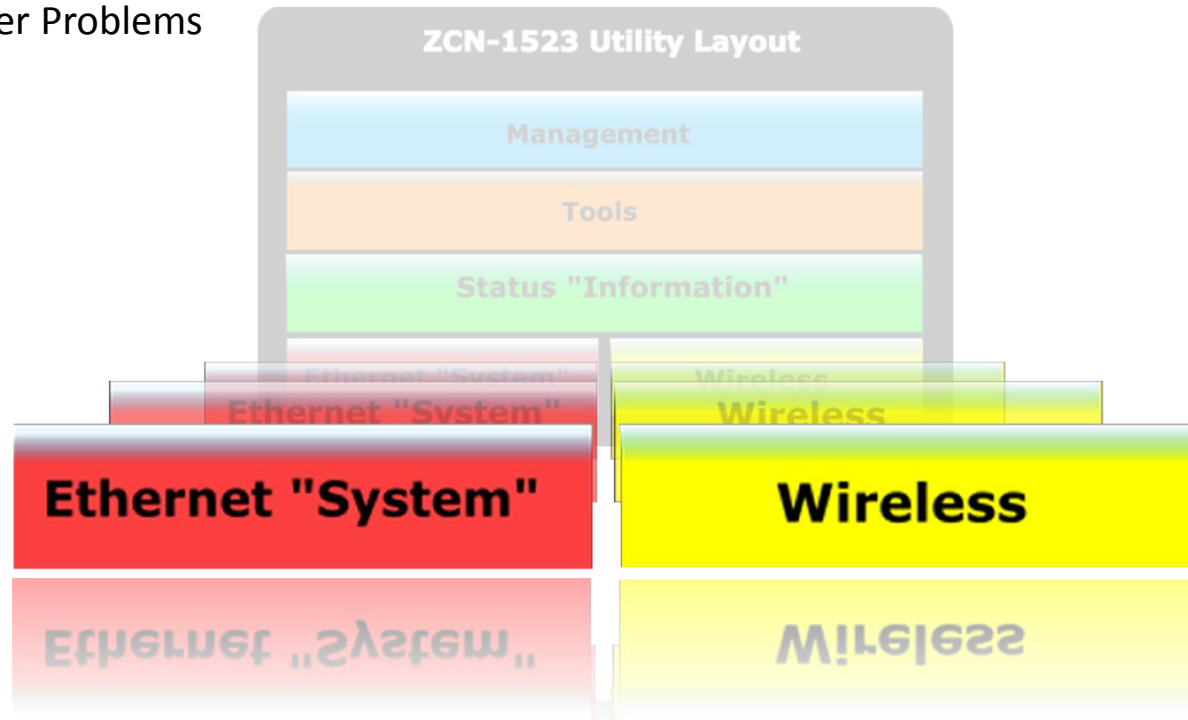


Warning – Do not over tighten, tighten with fingers until snug.

Basic Troubleshooting

Main Testing Areas

- Ethernet
 - Ethernet Connectivity
 - Firmware Not Loading
 - Power Problems
- Wireless
 - Cannot Associate
 - Poor Performance



Ethernet Troubleshooting

Ethernet Troubleshooting

Ethernet "System"

- Main problem = no power
- What power supply is being used?
 - Customers
 - OEM
- Length of cable: injector to device
 - 50' + 12v supply
 - >50' + 15v supply
- Can each be verified/replaced?
 - Supply
 - Cable

Ethernet Connectivity

Ethernet Connection Testing

- Main problem = cannot access WEB utility
- Check with reference 50' CAT5e / CAT6 cable from injector to DUT + reference 12V power supply
 - Step 1: Default unit
 - Step 2: Check LED indicator
 - Step 3: Ping 192.168.1.1
 - Step 4: Login to 192.168.1.1
 - Step 5: Power cycle unit multiple times to check for intermittent problem



Firmware Not Loading

Ethernet Is Good but cannot Access WEB Utility

Reported Symptom = cannot access web utility

- Check the following:
 - Power and/or LAN light stay amber color
 - May be able to ping device, but nothing more
- Possible Causes
 - Improper firmware loaded
 - Firmware update was interrupted
- Solution
 - Re-load firmware using TFTP connection

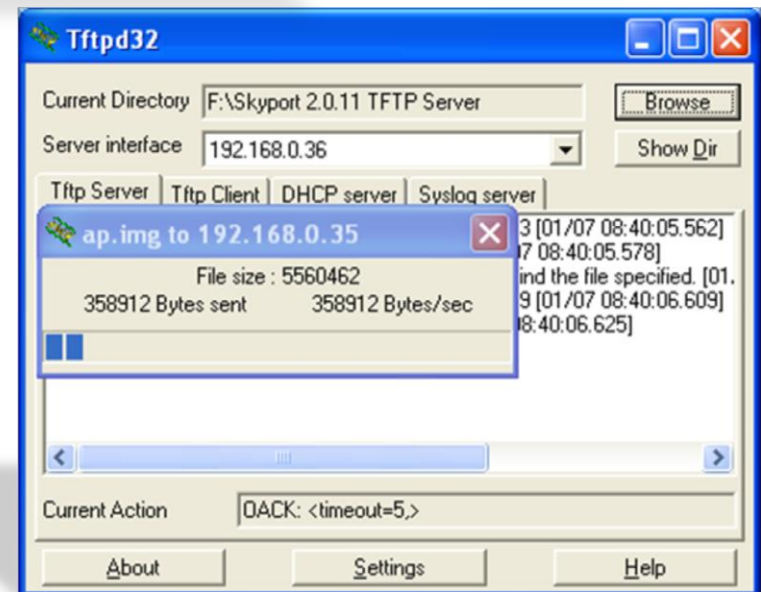
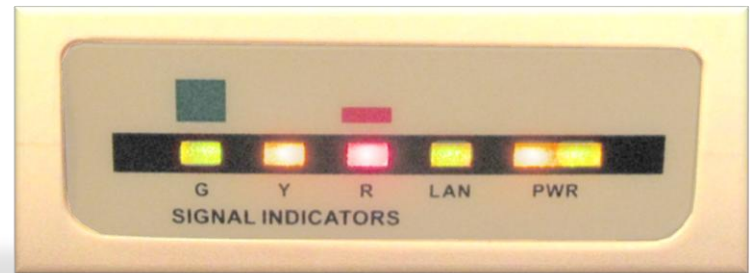


Firmware Not Loading

Re-loading firmware via TFTP connection

Configure PC as follows:

- Change IP Address to 192.168.0.36
- Install and Configure TFTP Server
 - Power and/or LAN light stay Amber color
 - May be able to ping device, but nothing more
- Possible Causes
 - Improper firmware loaded
 - Firmware update was interrupted
- Solution
 - Re-load firmware using TFTP



Wireless Troubleshooting

Cannot Associate

- Access Point Mode
 - Verify settings
 - Verify Station can “see” it (hide ssid)
- Client Mode
 - Scan (site survey)
 - Same channel as AP
 - Same ESSID as AP
 - Verify settings
 - Associate with MAC
- AP Repeater / Bridge
 - Verify WDS settings
 - Verify settings

Wireless

Acquire from the customer

→ Network Diagram

→ Configuration Files

→ Clear Description Of The Fault and How To Duplicate

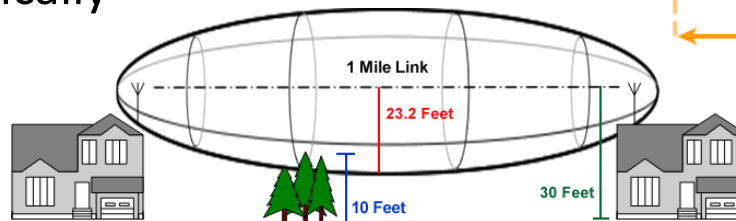
→ Site Survey / Location Info

Troubleshooting

Fresnel Zone Infringement

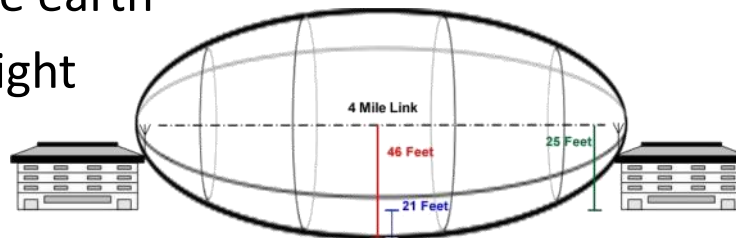
Infringement can be indicated by:

- Poor/unstable connections – RSSI values shifting dramatically

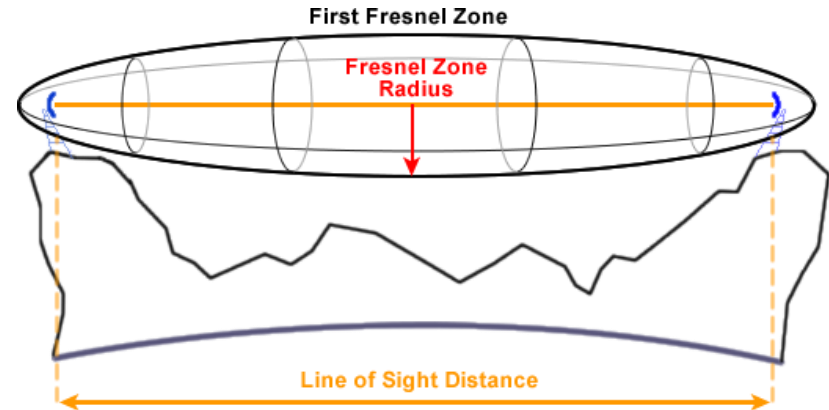


Considerations:

- Antenna height
- Curvature of the earth
- Obstruction height



Fresnel Zone Infringement By The Ground



Association List

This table shows the MAC Address, IP Address and RSSI for each associated device(s).

◊ VAP Index	◊ MAC Address	◊ Signal Strength	◊ Noise Floor	◊ Connection Time	◊ Last IP	◊ Action
1	00:19:70:00:45:44	-56	-96	2012-8-3 18:15:03	206.214.62.38	---

Refresh

Troubleshooting

Path Loss

Aggregate signal strength + adequate fade margin needed for successful communication :

- Received Signal = TxPWR-TxCableLoss +AntGain – FSP* + RxAntGain - RxCableLoss

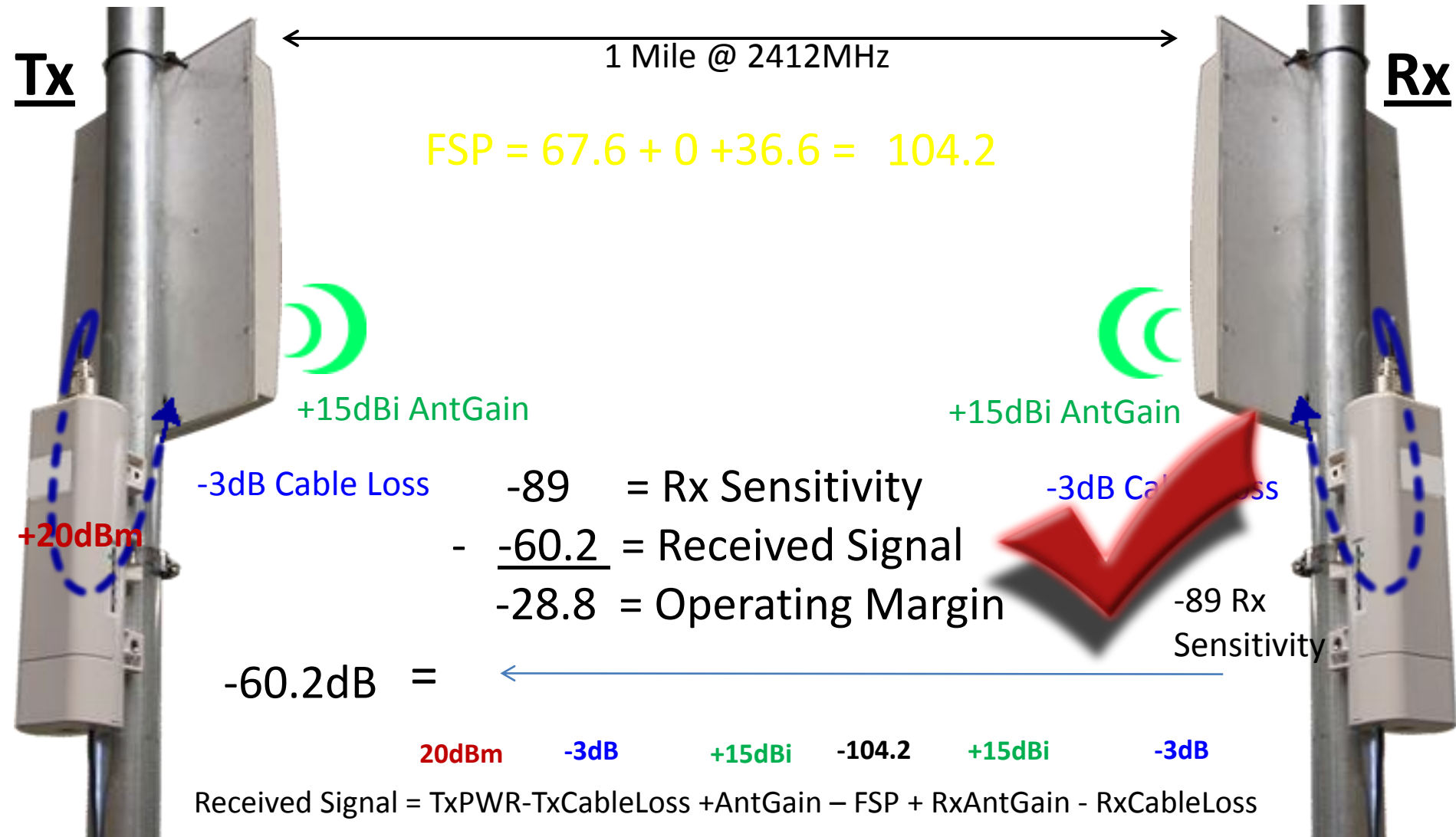
$$*FSP = 20\log_{10}(\text{MHz}) + 20\log_{10}(\text{Distance in Miles}) + 36.6$$

Fade Margin between 10-20 is normal. Greater distance = greater fade margin

Considerations:

- Refraction – from the atmosphere (changes over time)
- Diffraction – objects near radio path cause this effect
- Reflection – can be caused from objects near and far from path

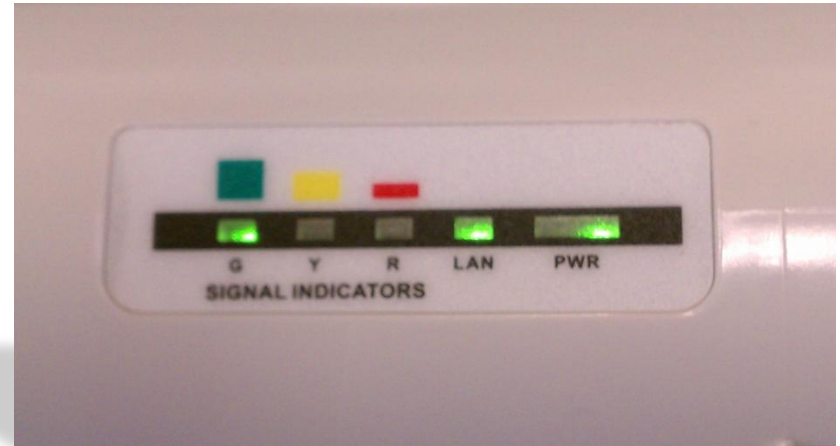
Troubleshooting



Physical Inspection

Physical Inspection

- The unit is checked for physical damage
 - Case integrity checked
 - Damage to connectors / jacks noted
 - Missing accessories noted
- The unit is checked for operation
 - Customer's power supply used if supplied
 - Known-good power supply used if customer power supply is not available or fails to power unit on
- LED operation verified
- Current draw
 - Typical with 12v supply / 50' CAT5E = 0.3A on standby



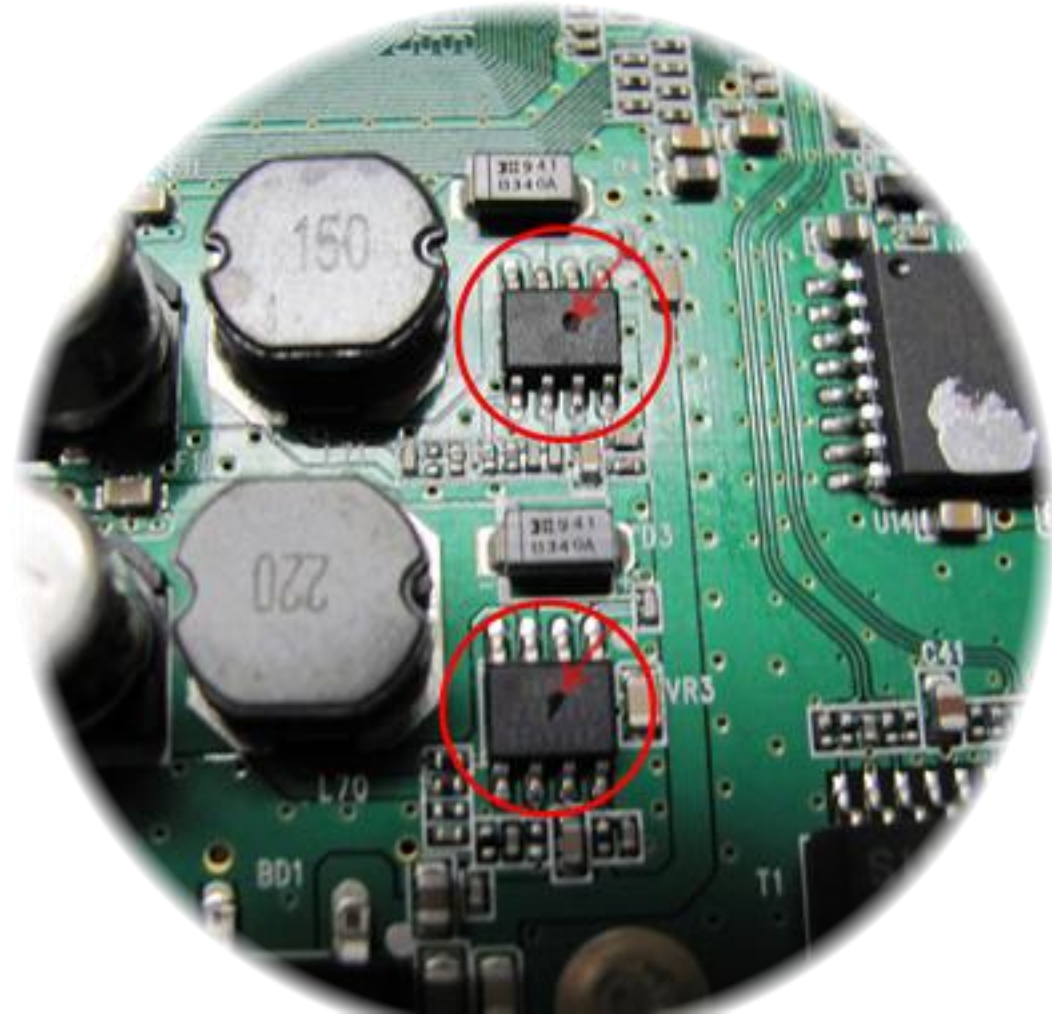
Improper Power Used

How to tell if customer used
wrong power supply?

VR2 / VR3 are voltage regulators as
shown here circled in red.

When one or both units are burned it
shows that an unacceptable level of
voltage was applied to it.

We recommend power supplies
between 12 ~ 15V



Throughput Testing Setup

Throughput Testing - Baseline

- Use CAT5e or CAT6 shielded cables
- Test PxP between 2 PCs to ensure reference
 - TCP overhead = ~8%
 - UDP overhead = ~6%

Throughput Reference:

100Mbps NIC:

TCP = ~>92Mbps

UDP = ~>94Mbps

1000Mbps NIC:

TCP = ~>920Mbps

UDP = ~>940Mbps

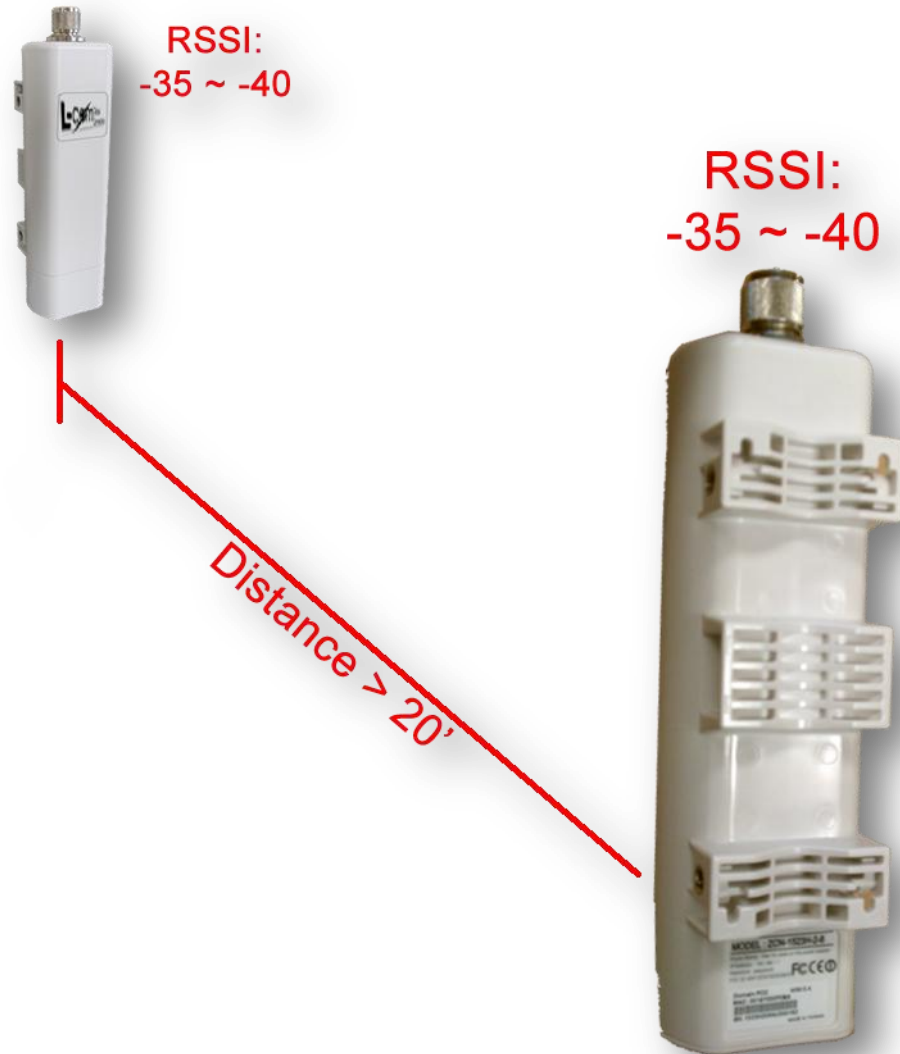


Throughput Testing Setup

Wireless Testing

- Setup should be so that RSSI at either unit is approximately -35~-40 when both units are known reference units (conducted or radiated)
 - If displayed RSSI is $\sim > 8-10\text{dB}$ worse at DUT, the receive is most likely defective
 - If displayed RSSI at the reference unit is $\sim \leq 3\text{dB}$ less than reference, the Tx fails (DUT is in AP mode)

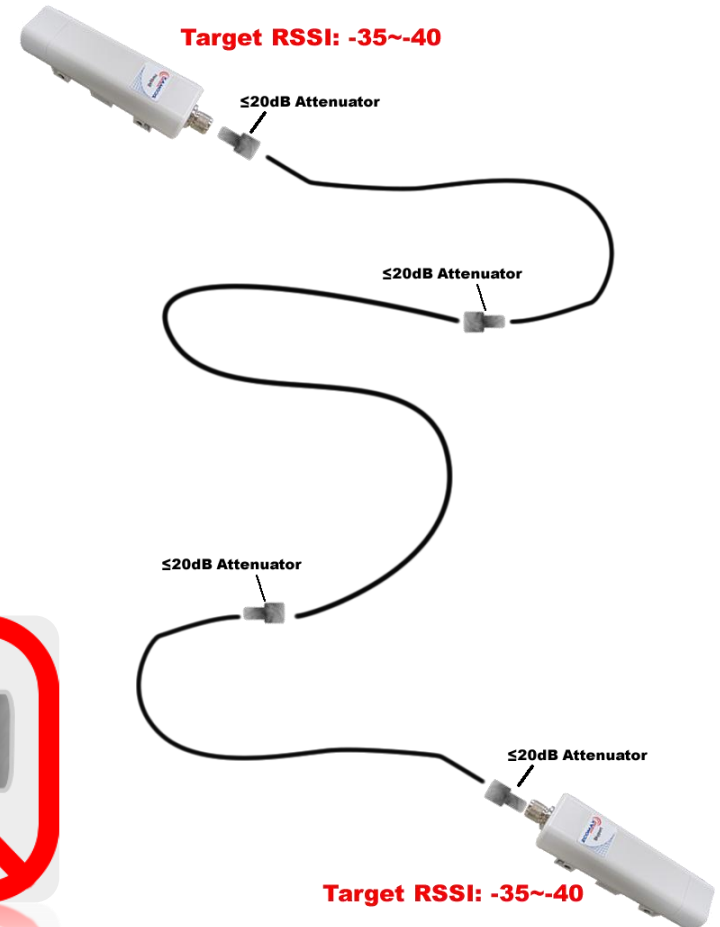
NOTE: RSSI should never be higher than -28dB as this can permanently damage the unit.



Throughput Testing Setup

Conducted Testing

- Provide enough cable separation between attenuators
- Use attenuators $\leq 20\text{dB}$ if possible
- If possible, do not string multiple attenuators in sequence

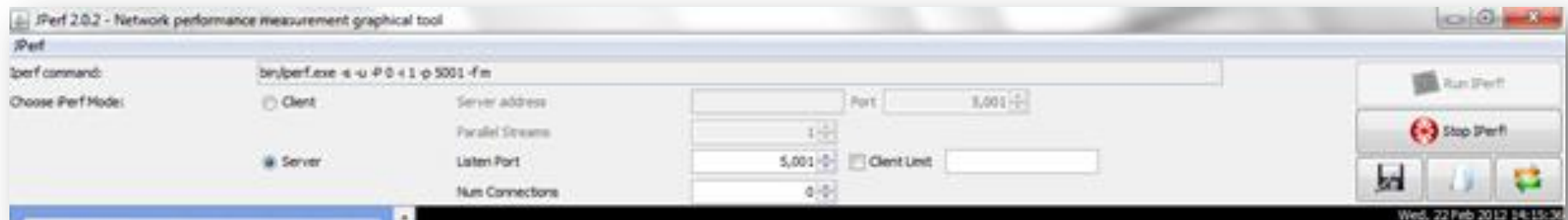


Throughput Testing Config

Throughput Settings

- JPerf Settings
 - 10 parallel streams
- Expected Performance (MCS7-20MHz BW) :
 - TCP = ~ 45Mbps

Server Settings



TCP Client Configuration

JPerf 2.0.2 - Network performance measurement graphical tool

JPerf

Iperf command: `bin/iperf.exe -c 192.168.1.165 -P 10 -i 1 -p 5001 -fm -t 60`

Choose Iperf Mode: ☒ Client ☐ Server

Server address: Port:

Parallel Streams: Listen Port: ☐ Client Limit:

Num Connections:

Wed, 22 Feb 2012 14:06:44

Application layer options

☐ Enable Compatibility Mode

Transmit: ☐ Bytes ☒ Seconds

Output Format:

Report Interval: seconds

Testing Mode: ☐ Dual ☐ Trade

test port:

Representative File:

☐ Print MSS

Transport layer options

Choose the protocol to use

☒ TCP

☐ Buffer Length: MBytes

☐ TCP Window Size: KBytes

☐ Max Segment Size: KBytes

☐ TCP No Delay

☐ UDP

UDP Bandwidth: MBytes/sec

☐ UDP Buffer Size: KBytes

☐ UDP Packet Size: Bytes

IP layer options

TTL:

Type of Service:

Bind to Host:

☐ IPv6

Bandwidth

Time (sec)

MBits (BW)

#176: [4.53MBits/s] #168: [4.62MBits/s] #128: [4.52MBits/s] #184: [4.62MBits/s]
#160: [4.52MBits/s] #152: [4.62MBits/s] #144: [4.52MBits/s] #192: [4.52MBits/s]
#136: [4.62MBits/s] #200: [4.61MBits/s]

Output

Conn	Time	Size	Bandwidth
[200]	0.0-60.0 sec	33.0 MBytes	4.61 Mbits/sec
[136]	0.0-60.0 sec	33.1 MBytes	4.62 Mbits/sec
[168]	0.0-60.0 sec	33.1 MBytes	4.62 Mbits/sec
[184]	0.0-60.0 sec	33.0 MBytes	4.62 Mbits/sec
[152]	0.0-60.0 sec	33.1 MBytes	4.62 Mbits/sec
[SUM]	0.0-60.0 sec	327 MBytes	45.7 Mbits/sec

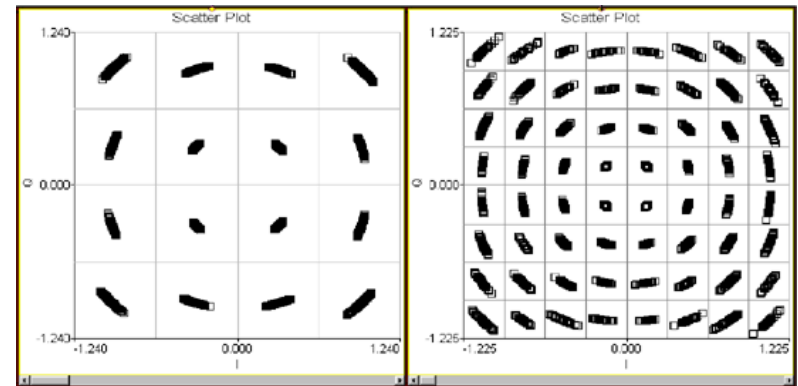
Done.

☐ Clear Output on each Iperf Run

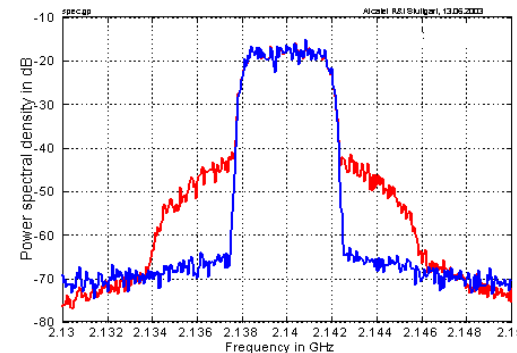
Wireless Considerations

Poor Performance

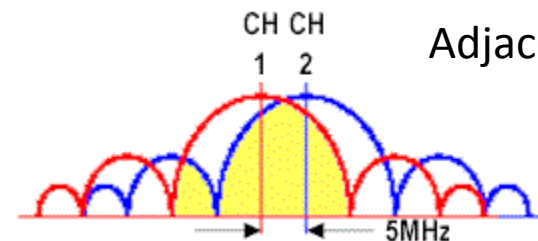
- Slow Utility Access
 - Check length of cable vs. power supply
 - Change Ethernet cable
 - Make sure not remotely connected through a wireless device
- Poor Wireless Performance
 - Verify no physical obstruction
 - Scan for wireless interference (site survey)
 - Same channel as AP
 - Same ESSID as AP
 - Exchange unit
 - Check wireless characteristics (VSA)
 - Output power
 - EVM



EVM



Compression



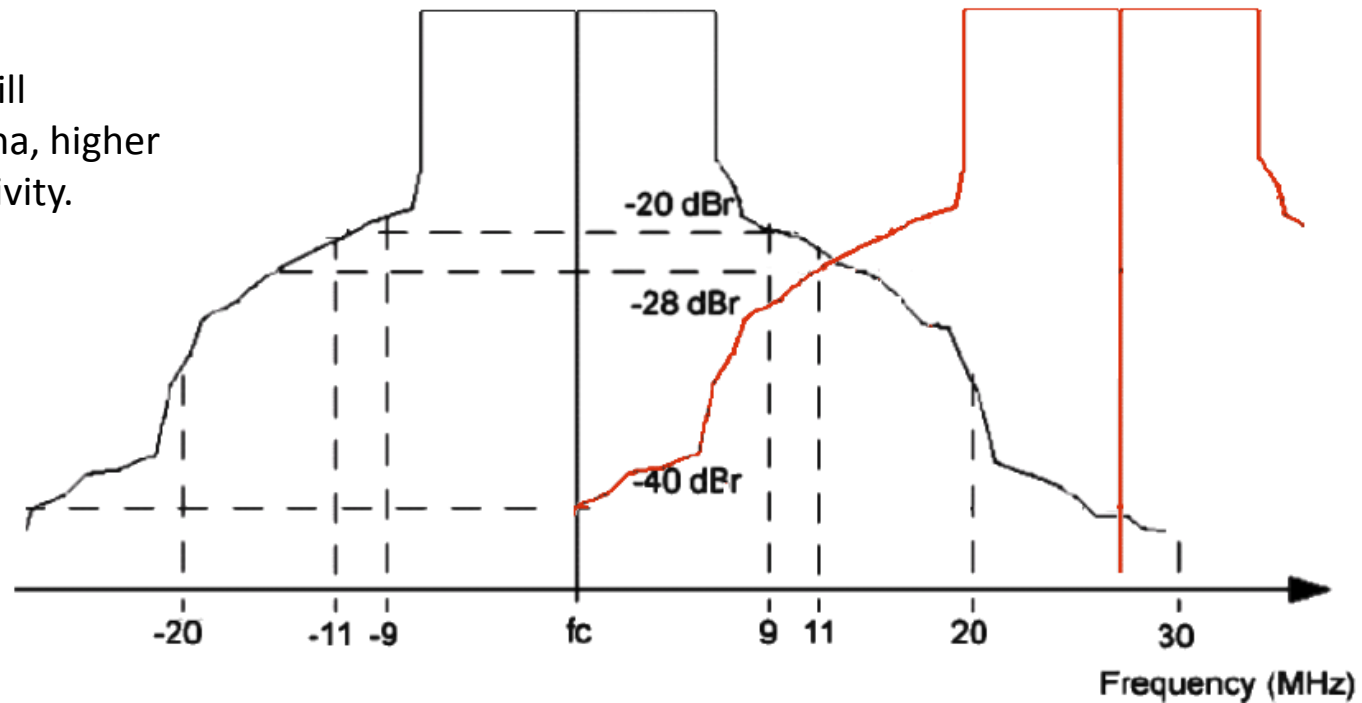
Adjacent Channel
Interference

Installation Considerations

Are Channels 1 and 6 truly non-overlapping?

Consider Side bands

Directivity – Some signal will transmit behind the antenna, higher the gain, further the directivity.



Best Practices

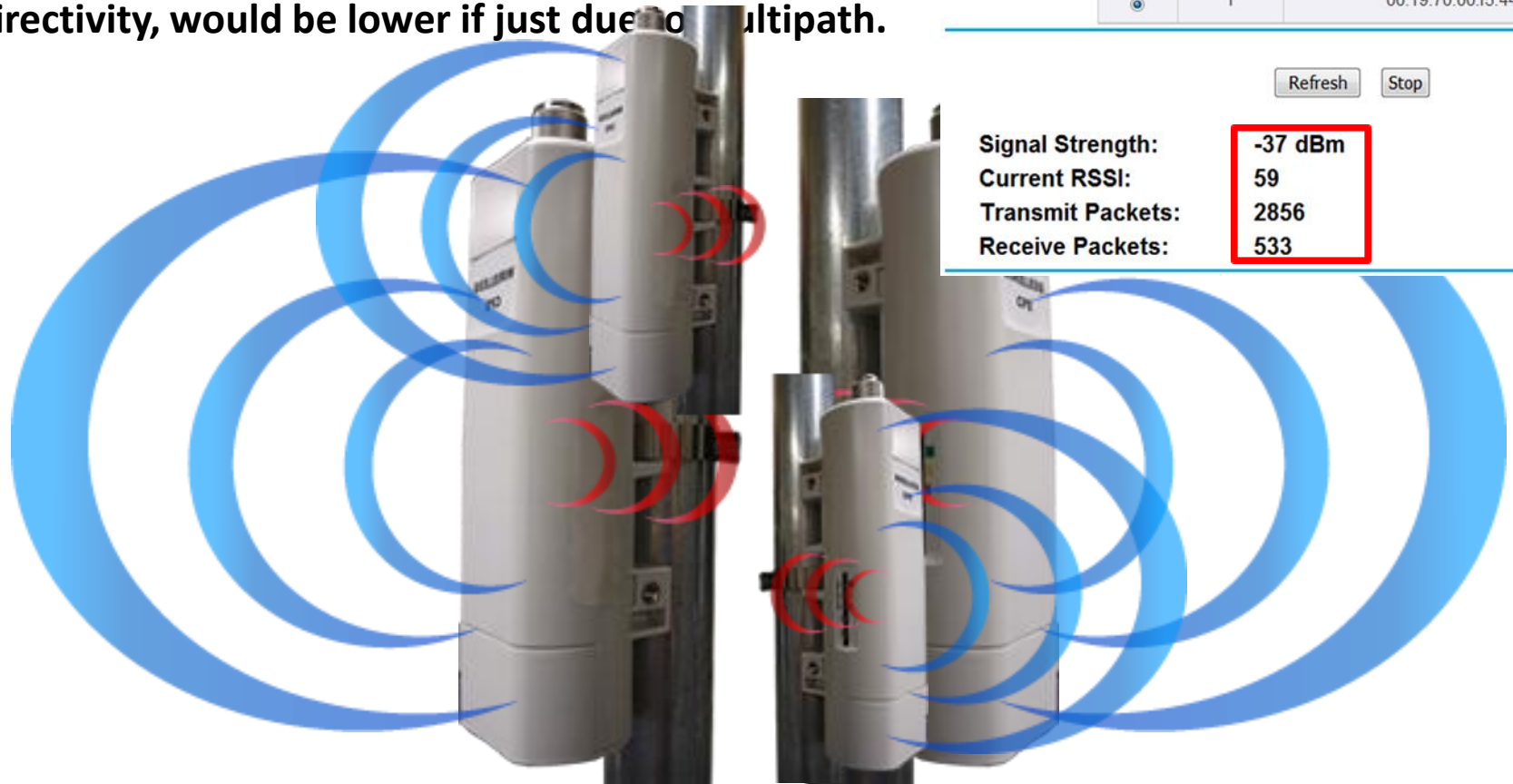
Installation

- Preconfigure units before installation
 - This ensures that the unit and accessories will work as expected
- Perform site survey to select optimal channel
- Determine and circumvent obstructions to Fresnel zone

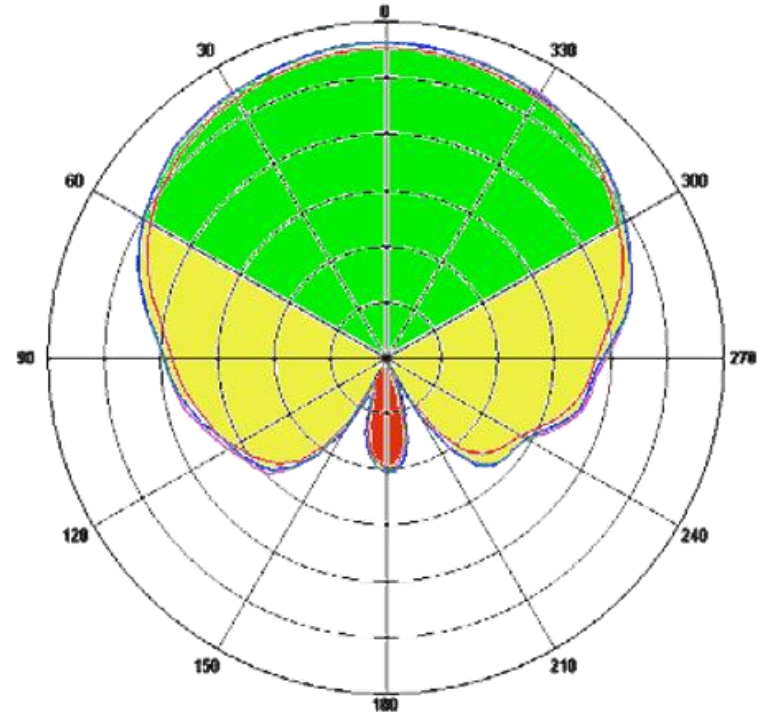
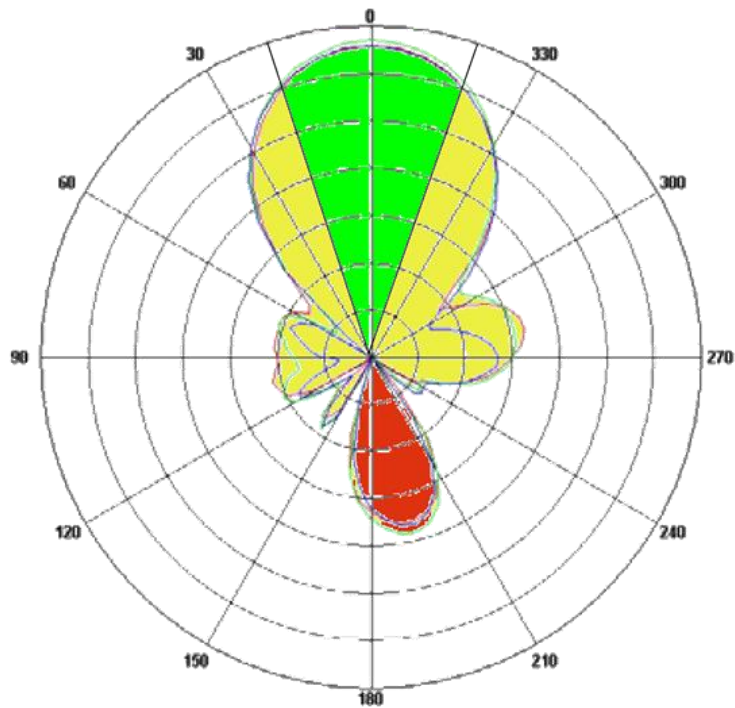
Antenna Directivity

2 Pole mounted Skyport's

Back to Back with 8' Signal Vertical separation. Antenna directivity, would be lower if just due to multipath.



Antenna Radiation

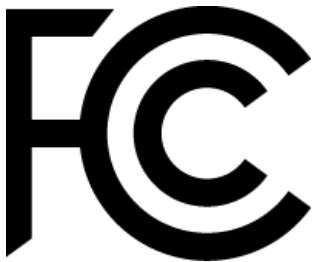


Regulatory Overview

Title 47 Part 15 subpart C section 247 ()

Point to Multi-point

- Radio = 30dB Max Peak Power
- Antenna = 6dBi Max Gain
- Antenna > 6dBi, the Radio must be reduced by corresponding amount?



? Why would someone want to have a higher gain antenna and reduce the TX power of the radio ?

Regulatory Overview

Title 47 Part 15 subpart C section 247 ()

2.400 – 2.483 GHz

If Antenna gain is > 6dBi, then for each 3 dBi of gain requires a 1dB decrease in Radio TX power.

5.725 – 5.850 GHz

Antenna may have > gain than 6dBi without any reduction in Radio TX Power.

Radio (dBm)	Antenna Gain (dBi)	Total EIRP (dB)
30	6	36
...
30	50	80

2.4GHz P2P Rule 1 ↓ 3 ↑ up

Radio (dBm)	Antenna Gain (dBi)	Total EIRP (dB)
30	6	36
29	9	38
28	12	40
...
20	36	56



Regulatory Overview

Title 47 Part 15 subpart E section 407 ()



UNII Band	Max conducted power	Max Antenna Gain (dBi)	DFS + TPC
1 – (5.15–5.25 GHz)	50 mW	6 *	NA
2 – (5.25–5.35 GHz and 5.47–5.725 GHz)	250 mW	6 *	Required
3 – (5.725–5.825 GHz) – Multi-point	1 W	6 *	NA
3 – (5.725–5.825 GHz) – Fixed P2P	1W	23 #	NA

* If Antenna gain is > 6dBi, then the radiator must be decreased by a corresponding amount.

If Antenna gain is > 23dBi, then the radiator must be decreased by a corresponding amount

SatelliteDish.com 954-941-8883

