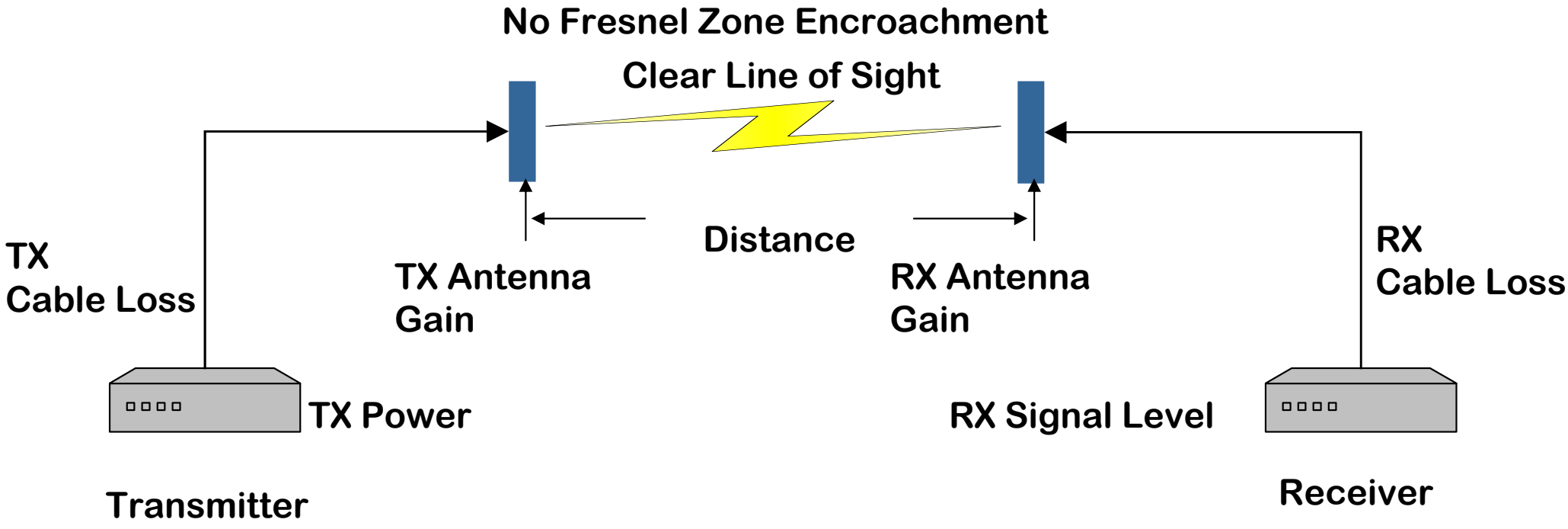
Troubleshooting EnGenius Wi-Fi Devices

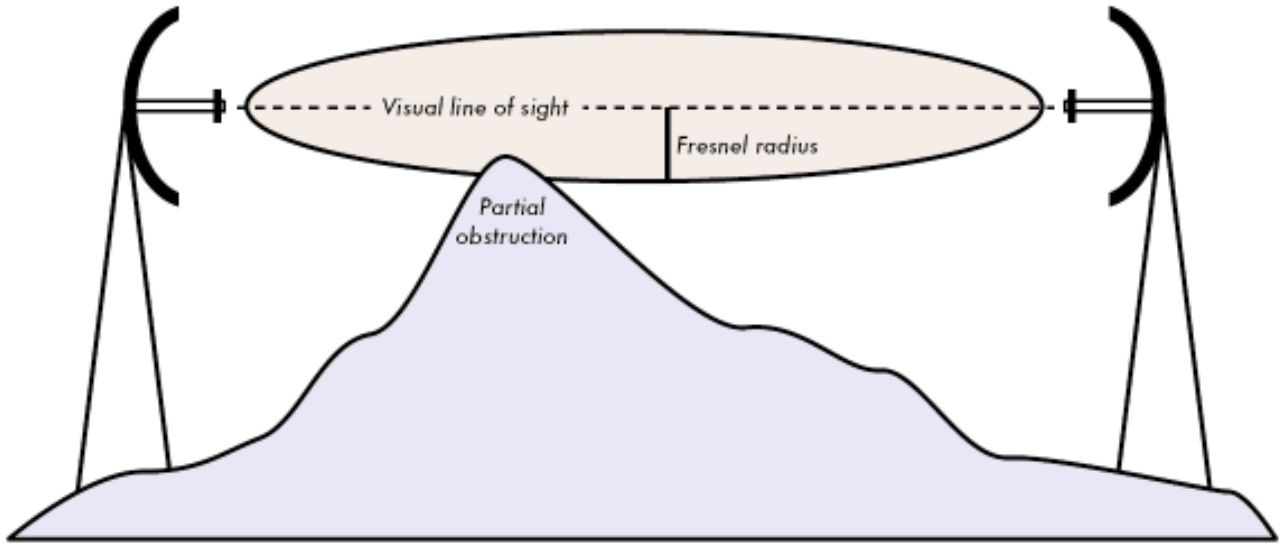
Long Range Links

- Line of sight is critical.
- Less than 30% obstruction of the Fresnel Zone.
- Proper antennas and alignment.
- Adequate Tx and Rx power on both ends.



Line of Sight

- The Fresnel zone for a radio beam is an elliptical area immediately surrounding the visual path. It varies in thickness depending on the length of the signal path and the frequency of the signal.
- Free space loss and curvature of the earth must also be considered.
- Elevate antennas to get above the obstruction.



High Gain Directional Antennas

- Antenna gain is how much the RF signal is focused. The higher the gain, the tighter the beam.
- Using horizontally polarized antennas can help reject 15 to 30dB of all vertical noise.
- Using a link budget calculator can help determine the antenna gain required on both ends.
- Free online link budget calculator:

  http://www.wirelessconnections.net/calcs/BudgetCalc.asp

  Frequency

  Distance between antennas

  Free Space Loss

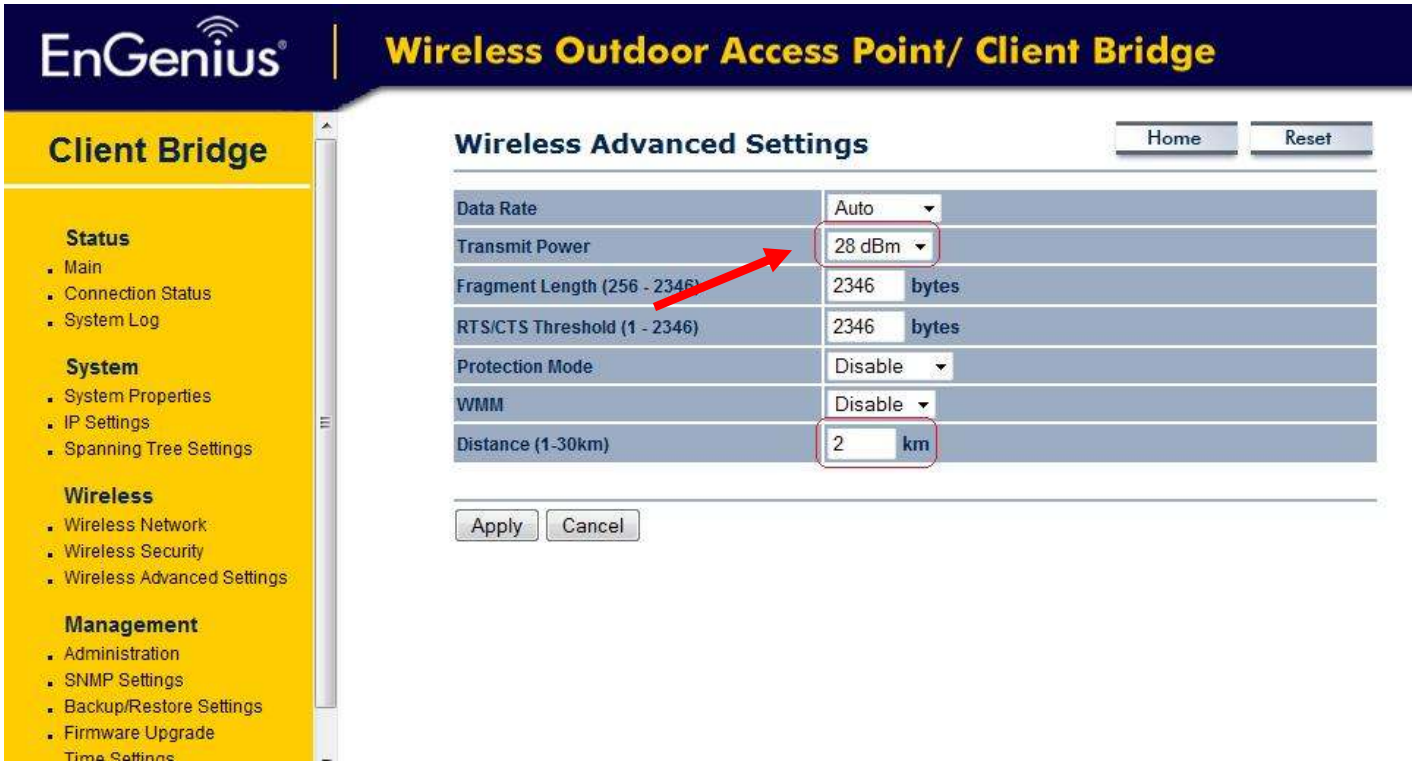
  Tx Antenna Gain — Rx Antenna Gain

  Tx Cable Loss — Rx Cable Loss

  Tx Power — Rx Sensitivity

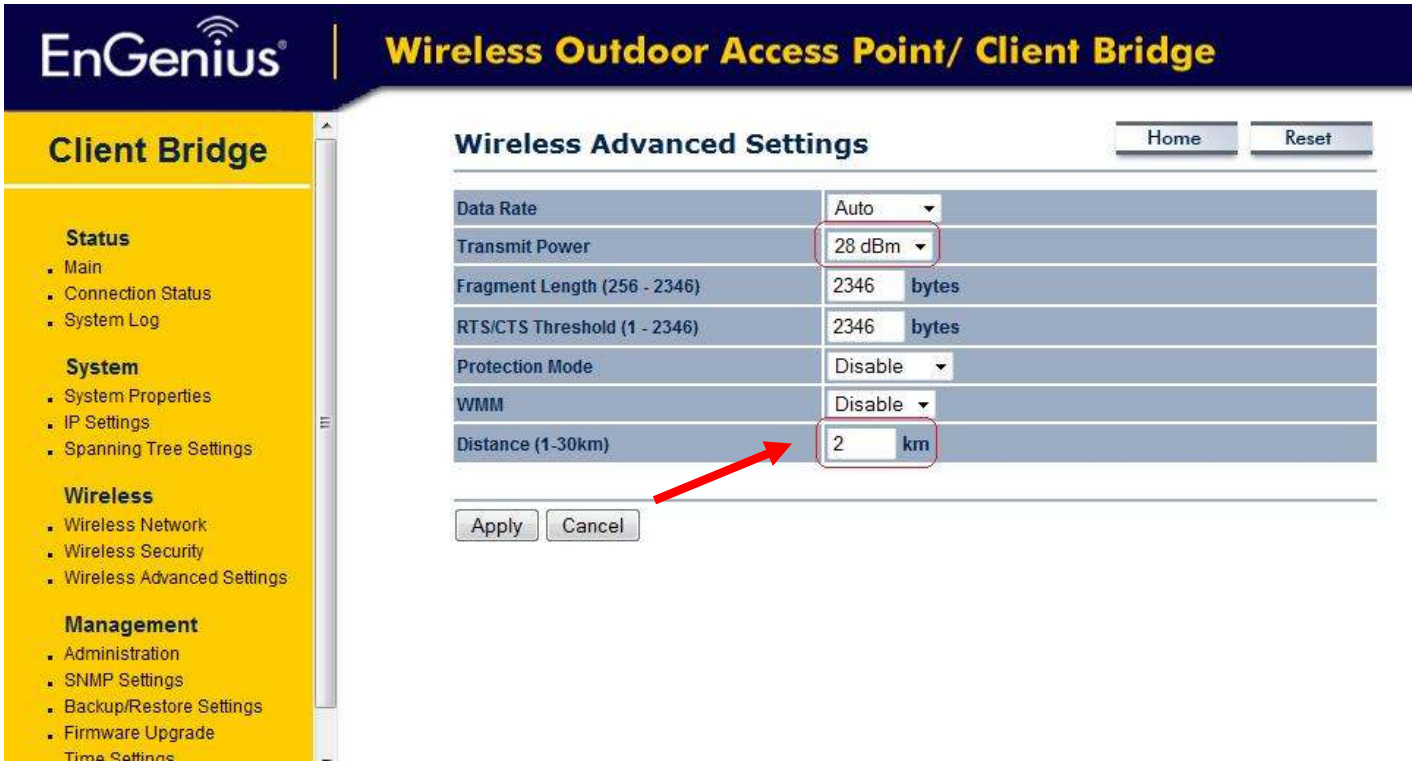
Transmit Power (Tx)

- Transmit power can be adjusted to provide better range.
- When using high gain antennas, transmit power can be turned down to stay within FCC Part 15 limits (EIRP 1 Watt).
- An increase of 3dBm = double the power in mW.



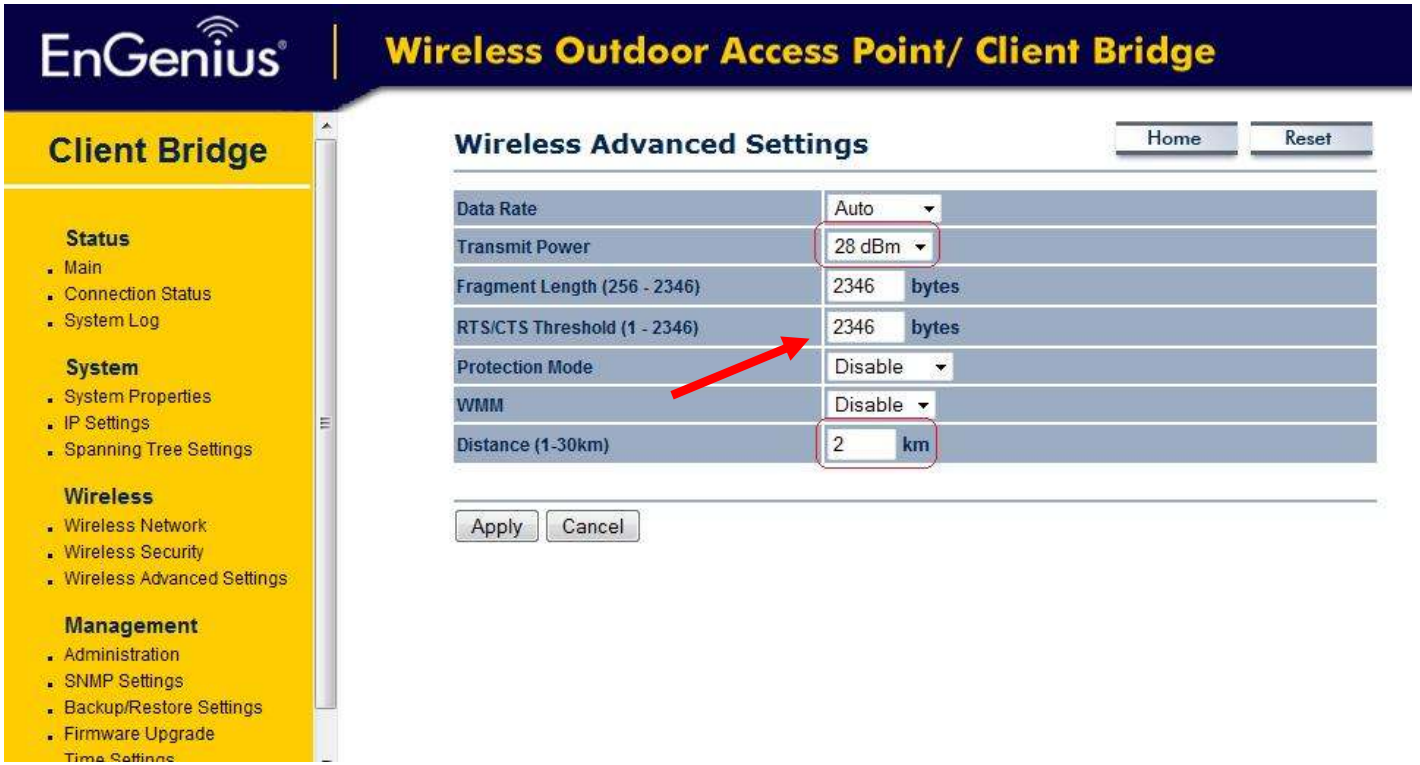
ACK Timeout

- Should only be used for distances over 2km.
- Can improve bandwidth over long distance wireless links if there is plenty of Tx power and Rx Sensitivity
- On the EOC-2610 and EOC-5610 models, the ACK is related to the Distance value in kilometers.



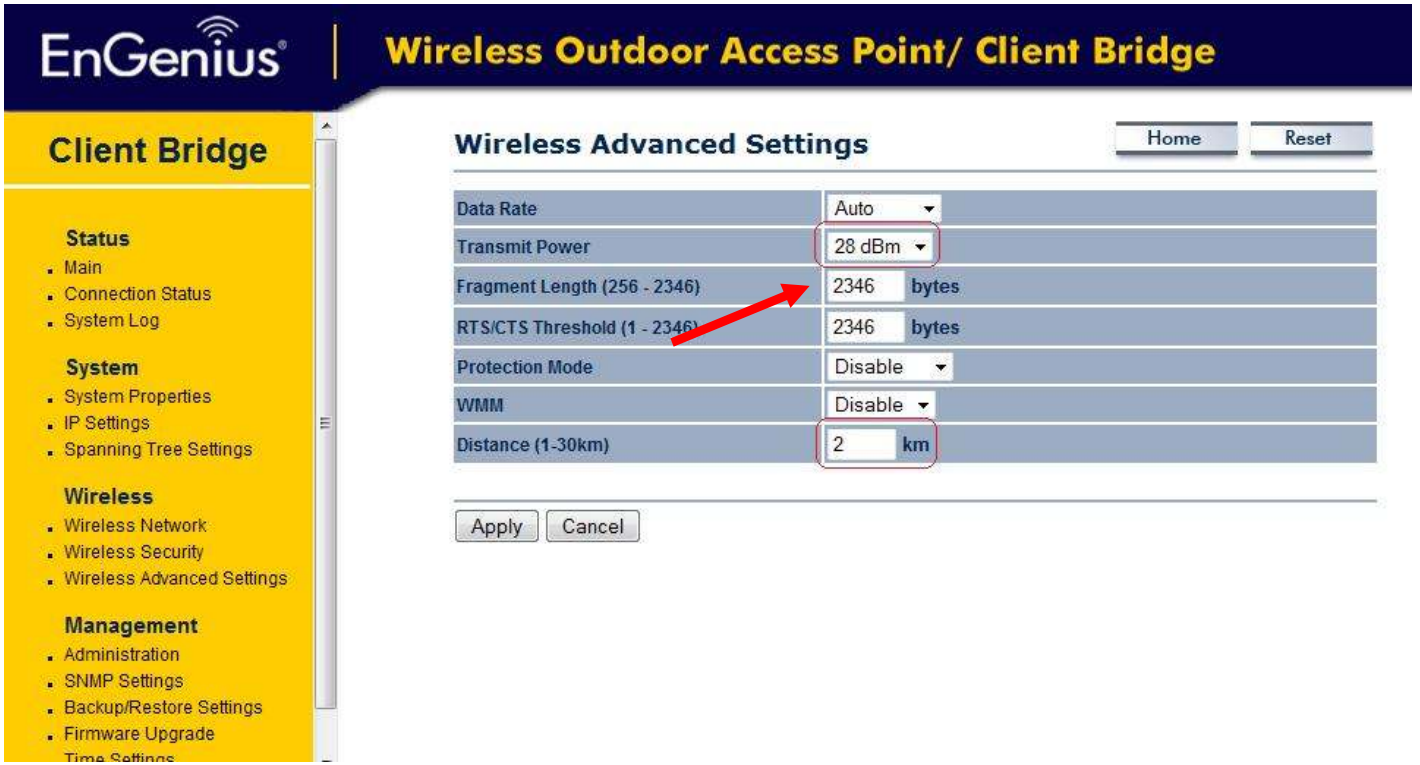
RTS / CTS

- Can reduce collisions caused by the “hidden node” problem.
- A node wishing to send data initiates the process by sending a Request to Send frame (RTS).
- The destination node replies with a Clear To Send frame (CTS).
- Any other node receiving the RTS or CTS frame should refrain from sending data for a given time



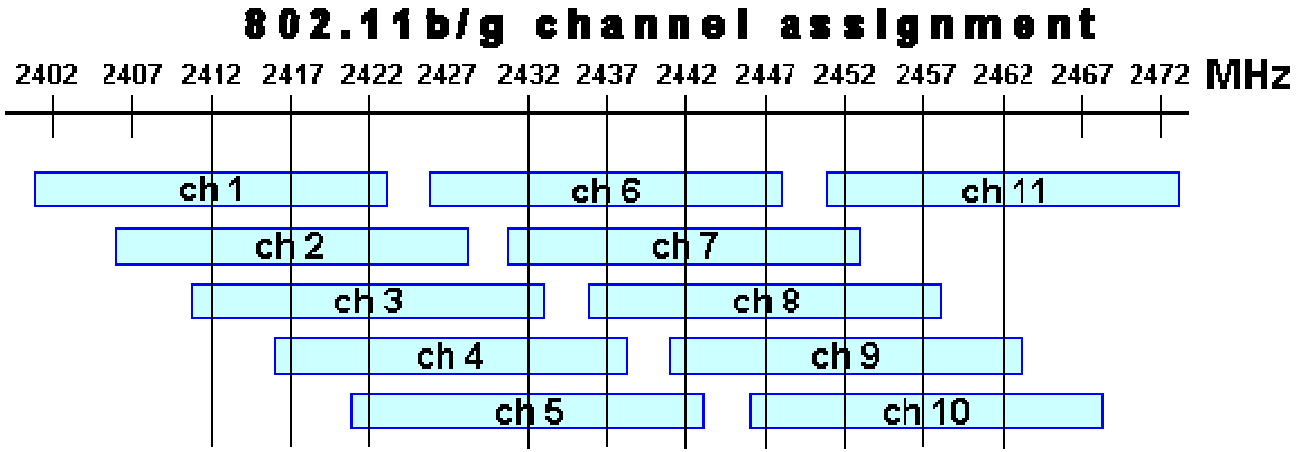
Fragment Length

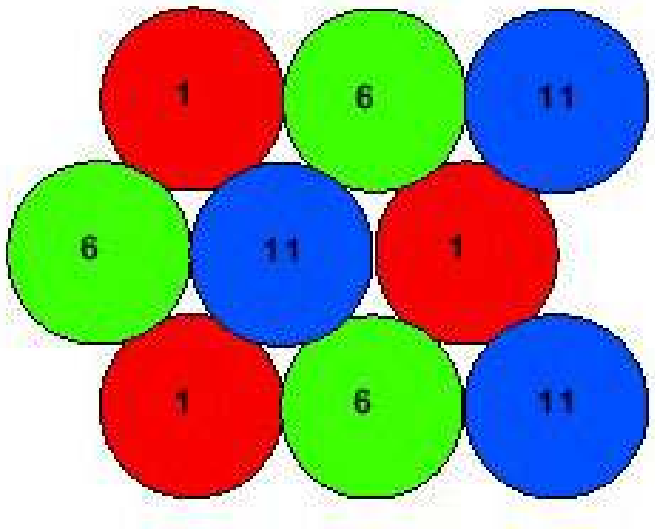
- Divides frames into smaller pieces and can increase reliability of frame transmissions.
- With smaller frames, collisions are less likely to occur.



Choosing 2.4GHz Channels

- Choose non-overlapping channels to minimize interference when deploying multiple APs that are in range of one another.
- Channels are 22MHz wide, but only separated by 5MHz.
- Using 2437 as center frequency the signal covers between 2427to 2447. The signal spans over the center frequency of 4 channels but encroaches on 6 channels signal span
- Site survey using a spectrum analyzer can determine other sources of 2.4GHz interference.





Choosing 5GHz Channels

- Channels 36-48 for indoor use.
- DFS Channels 52-60, 100-140 (UNI-II bands)
- Channels 149-161 for outdoor use.

Frequency Band	Channel ID	FCC (GHz)	ETSI (GHz)	MKK (GHz)	SG (GHz)	ASIA (GHz)	TW (GHz)
Lower Band (36 = default)	34	—	—	5.170 [1]	—	—	—
	36	5.180	5.180	—	5.180	—	—
	38	—	—	5.190	—	—	—
	40	5.200	5.200	—	5.200	—	—
	42	—	—	5.210	—	—	—
	44	5.220	5.220	—	5.220	—	—
	46	—	—	5.230	—	—	—
	48	5.240	5.240	—	5.240	—	—
Middle Band (52 = default)	52	5.260	5.260	—	—	—	5.260
	56	5.280	5.280	—	—	—	5.280
	58	5.300	5.300	—	—	—	5.300
	60	5.320	5.320	—	—	—	5.320
H Band	100	—	5.500	—	—	—	—
	104	—	5.520	—	—	—	—
	108	—	5.540	—	—	—	—
	112	—	5.560	—	—	—	—
	116	—	5.580	—	—	—	—
	120	—	5.600	—	—	—	—
	124	—	5.620	—	—	—	—
	128	—	5.640	—	—	—	—
	132	—	5.660	—	—	—	—
	136	—	5.680	—	—	—	—
	140	—	5.700	—	—	—	—
Upper Band (149 = default)	149	5.745	—	—	5.745	5.745	5.745
	153	5.765	—	—	5.675	5.675	5.675
	157	5.785	—	—	5.785	5.785	5.785
	161	5.805	—	—	5.805	5.805	5.805
ISM Band	165	5.825	—	—	5.825	—	5.825

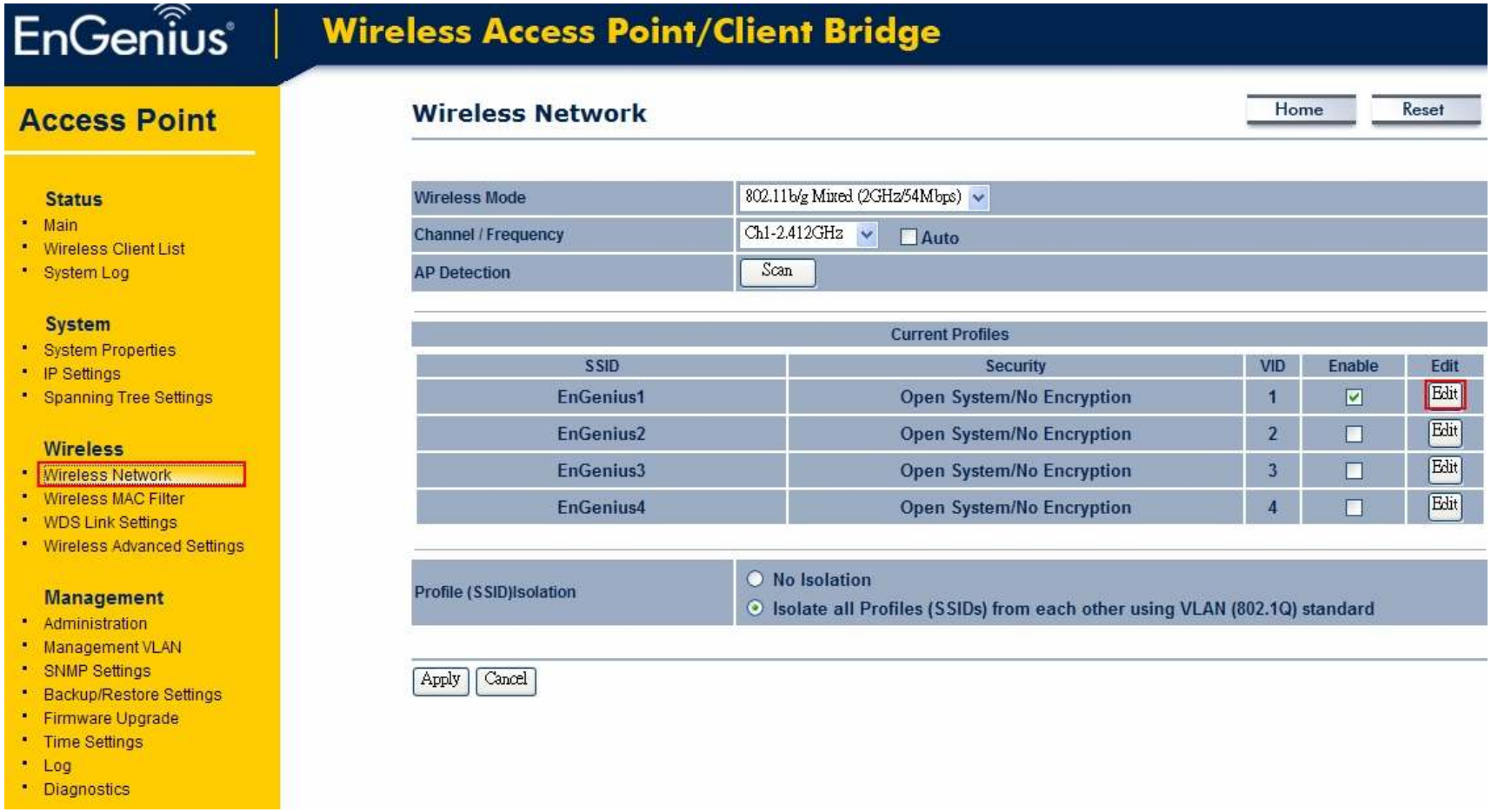
Note 1: Channel 34 is the default channel for Japan

Multiple SSIDs and VLANs

- Lowers equipment and installation cost.
- Separate networks for staff and guests using the same APs.
- Must use switches that support VLAN tagging.
- VLAN support only available in AP mode

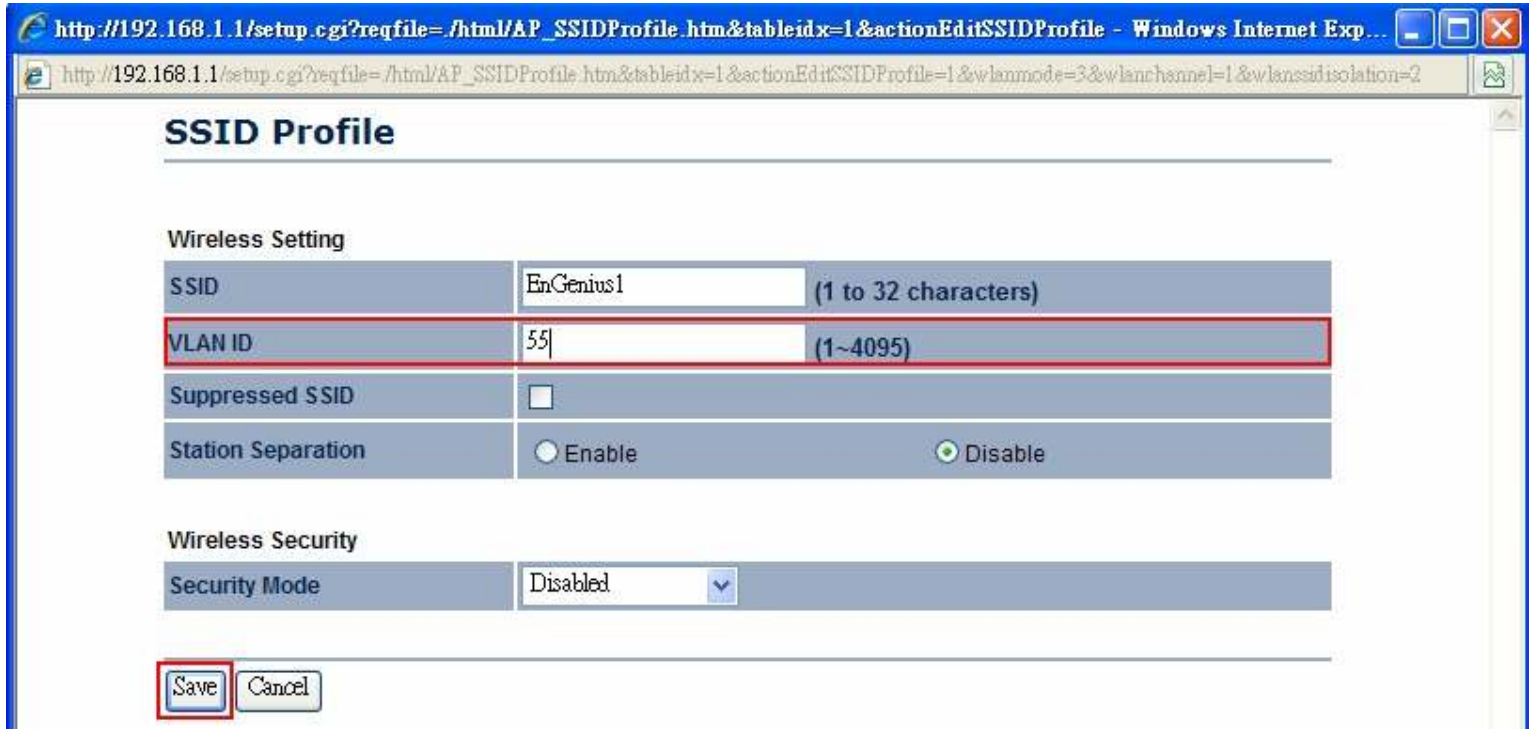
Assigning a VLAN tag to an SSID

- **Navigate to Wireless Network then click on edit for the SSID you wish to assign a VLAN tag to.**



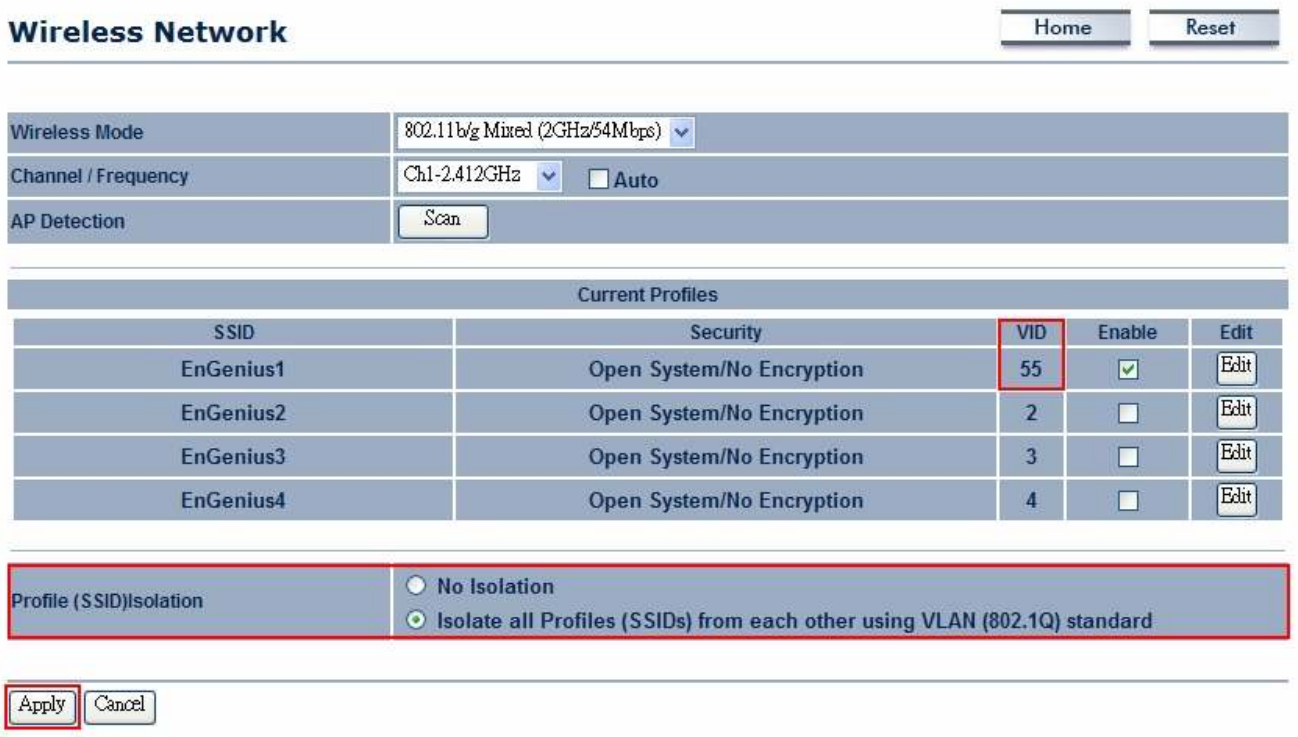
VLAN ID Tag

- In the pop up window for SSID Profile, set the VLAN ID tag, then click Save.



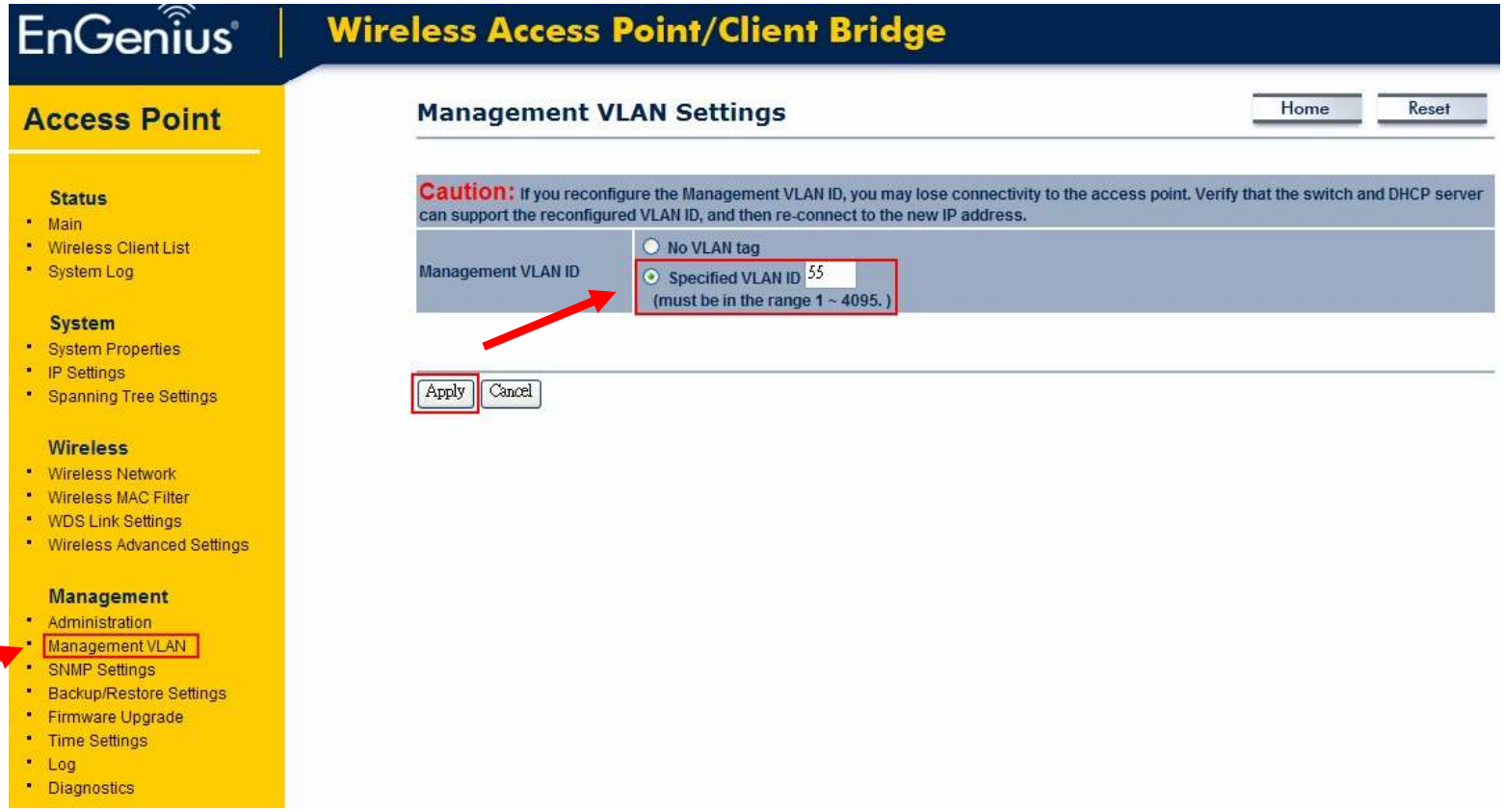
Profile (SSID) Isolation

- The newly assigned tag will appear in the VID column.
- Next to Profile (SSID) Isolation, make sure to select Isolate all Profiles (SSIDs) from each other using VLAN (802.1Q) standard.
- Make sure to click Apply.



Management with VLAN

- When VLAN with Profile Isolation enabled, you can only access the AP from the profile with the same VLAN tag specfied in the Management VLAN page.



L2.5 Bridging

- In L2.5 bridging, the Client Bridge inserts it's MAC address in the source MAC field of any frame that passes though it.
- Can prevent applications using MAC registration is a requirement such authentication gateways and VoIP SIP registrars from working properly.
- A work around is to use WDS Bridge mode which is transparent.

Firmware Upgrades

- Many times a new firmware may be available to fix bugs or add new features.
- Download the firmware here.
- Firmware can be easily upgraded via the web based GUI.