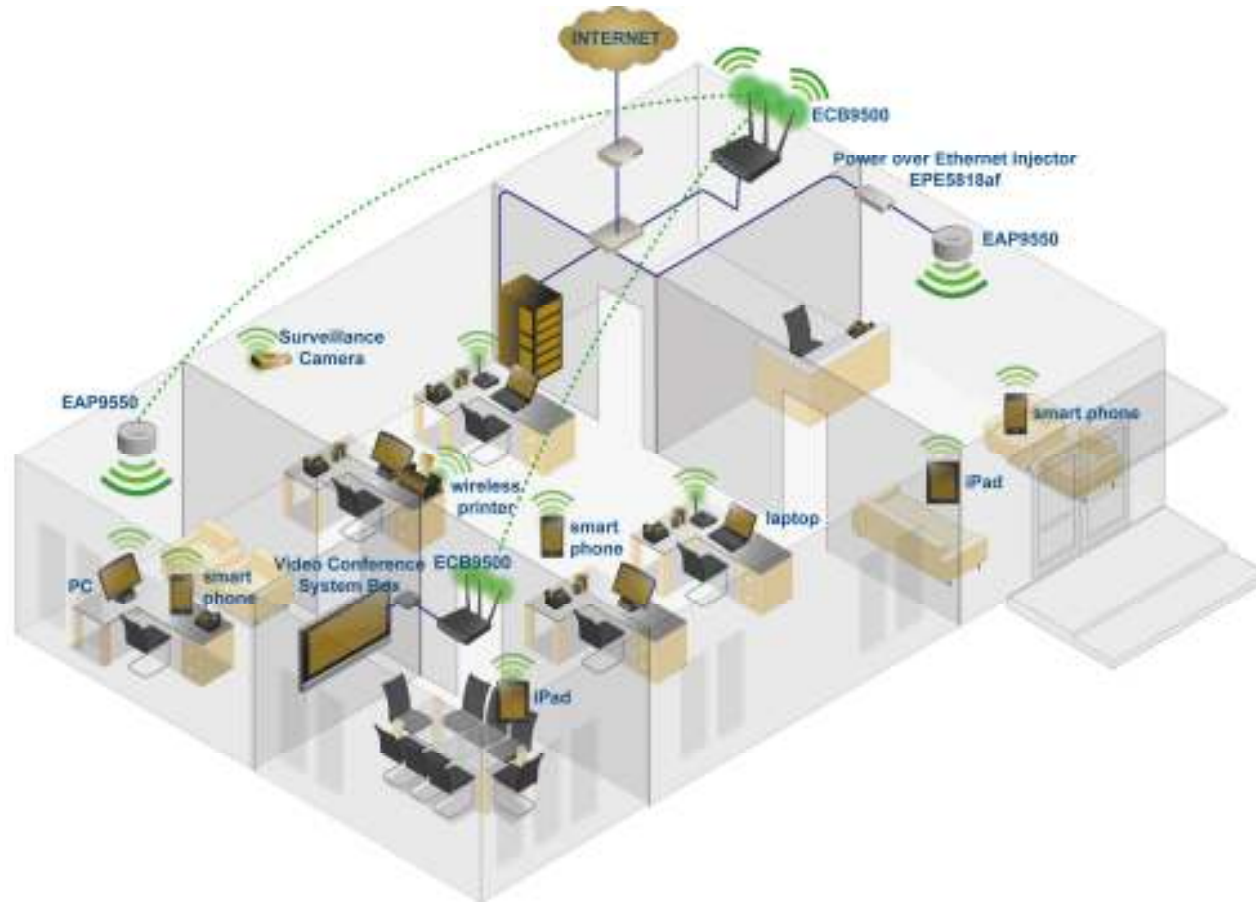


Welcome to EnGenius Versatile Wireless Networking Applications and Configurations - Part 2

Indoor Wireless Networking Products



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Topics

About Engenius

Key Specifications

- 802.11 Standards

- 802.3af PoE

- Transmit Power

RF Basics

General Application Models

- Hotspot

- Point to Point Long Range

- CPE

- Dual Radio Repeater

- Campus

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About EnGenius

EnGenius® Technologies, Inc. is an industry expert in wireless communications and radio frequency (RF) technology. The company pioneered “Affordable Long-Range Wireless” communication solutions, and creates wireless voice and data products for home, SOHO and SMB use that are versatile, feature-rich, business-class and affordable. Our complete line of award-winning devices is designed to deliver long-range, fast speeds, robust security, and ease-of-use. Established in 1999, EnGenius Technologies, Inc. is a wholly-owned subsidiary of Senao Networks, a Taiwan RF communications manufacturing company.

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Key Specifications

- IEEE802.11a/b/g/n wireless standards
- 802.3af PoE
- Up to 600mW TX power
- WEP/WPA/WPA2 Encryption

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Wi-Fi Standards

- 802.11**b**
2.4GHz, 11Mbps throughput, DSSS modulation
- 802.11**a**
5GHz, 54Mbps throughput, OFDM modulation
- 802.11**g**
2.4GHz, 54Mbps throughput, OFDM modulation
- 802.11**n**
2.4GHz and 5GHz, 300Mbps throughput, MIMO and Spatial Multiplexing, 20-40MHz channels

Understanding 802.11n

Higher data throughput achieved by adding:

- MIMO for Spatial Multiplexing
- 20-40MHz channels
- Can be 2.4GHz or 5GHz

Facts:

“Under the best conditions, many 802.11n routers deliver throughput between 100 Mbps and 120 Mbps near the router. However, speeds degrade quickly to about 45 Mbps in the 300- to 600-foot range”

“The truth about the 802.11n specification is that it does not really increase your wireless coverage area.”

-Quoted from Laptopmag.com

The same RF physics still apply, so the wireless connection will still drop out at the same signal levels.

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802.3af PoE

- EnGenius indoor models can be powered by 802.3af spec switches
- Eliminates the need to run 110/220 VAC power to wireless access points and other devices.
- System installers need to run only a shielded CAT5 Ethernet cable that carries both power and data to each device.
- Allows greater flexibility in the locating of AP's and network devices and significantly decreasing installation costs in many cases.

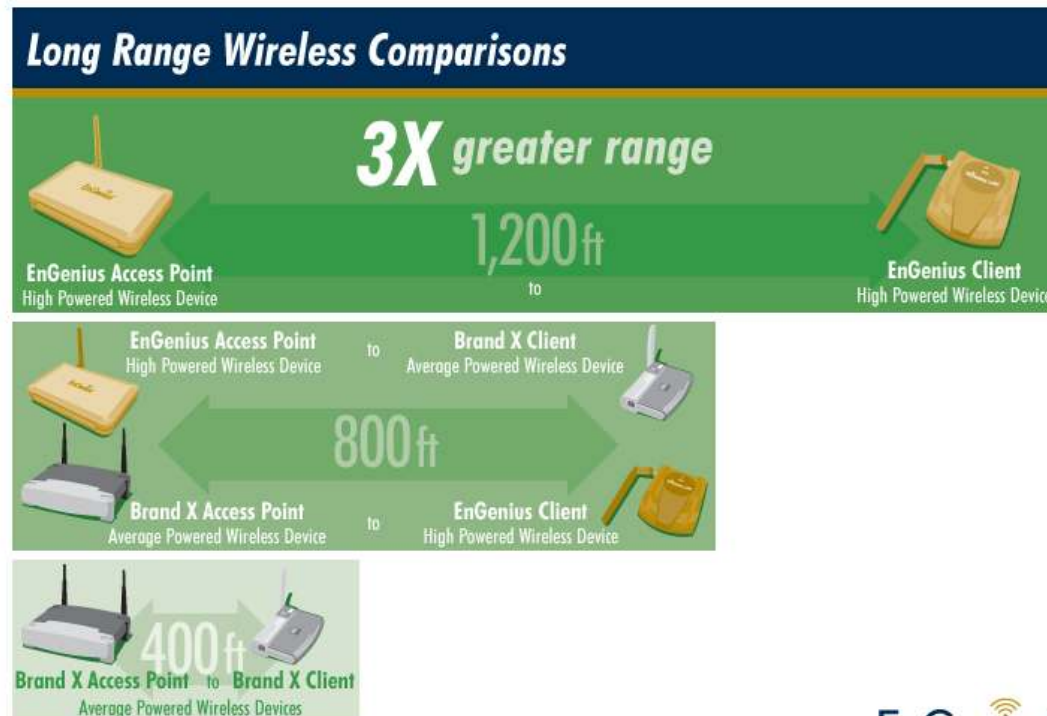
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Transmit Power

- Tx power is the amount of power a radio transmits
- Generally, the longer the distance, the more power needed
- High transmit power and receive sensitivity means less APs.



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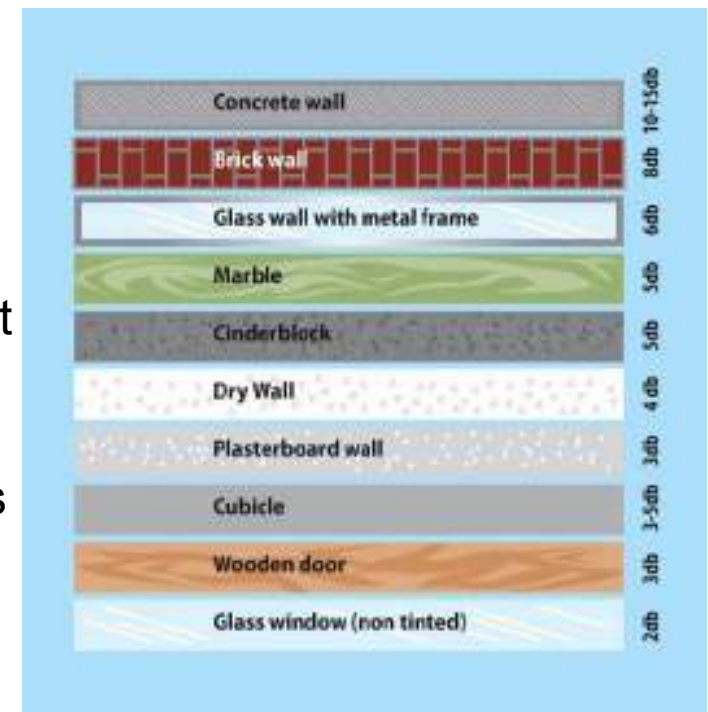
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General RF Basics

The typical leading brand AP has a Tx power of 17dBm or 50mW.

Rule of thumb:

- An increase of 3dBm is double the power in mW
- An increase of 6db in an open area will double the coverage area
- An increase of 9db in a typical indoor environment will double your coverage area.
- Attenuation varies with different types of materials



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dBm to Milliwatts

dBm to Watt Conversion Table

dBm	Watts	dBm	Watts	dBm	Watts
0	1.0 mW	16	40 mW	32	1.6 W
1	1.3 mW	17	50 mW	33	2.0 W
2	1.6 mW	18	63 mW	34	2.5 W
3	2.0 mW	19	79 mW	35	3.2 W
4	2.5 mW	20	100 mW	36	4.0 W
5	3.2 mW	21	126 mW	37	5.0 W
6	4 mW	22	158 mW	38	6.3 W
7	5 mW	23	200 mW	39	8.0 W
8	6 mW	24	250 mW	40	10 W
9	8 mW	25	316 mW	41	13 W
10	10 mW	26	398 mW	42	16 W
11	13 mW	27	500 mW	43	20 W
12	16 mW	28	630 mW	44	25 W
13	20 mW	29	800 mW	45	32 W
14	25 mW	30	1.0 W	46	40 W
15	32 mW	31	1.3 W	47	50 W

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Up to 600mW Tx Power

- The typical leading brand AP has a Tx power of 17dBm or 50mW
Rule of thumb:
Outdoors - for every increase of 6 dB, the coverage distance doubles.
Indoors - for every increase of 9 dB, the coverage area doubles.
- An increase of 3dBm is double the power in mW.

Available Transmit Power
(Average):

IEEE 802.11g

28dBm @ 6~24Mbps

26dBm @ 36Mbps

24dBm @ 48Mbps

23dBm @ 54Mbps

IEEE 802.11b

28dBm @ 1~11Mbps

Receive Sensitivity (Typical):

IEEE 802.11g

-92dBm @ 6Mbps

-74dBm @ 54Mbps

IEEE 802.11b

-97dBm @ 1Mbps

-89dBm @ 11Mbps

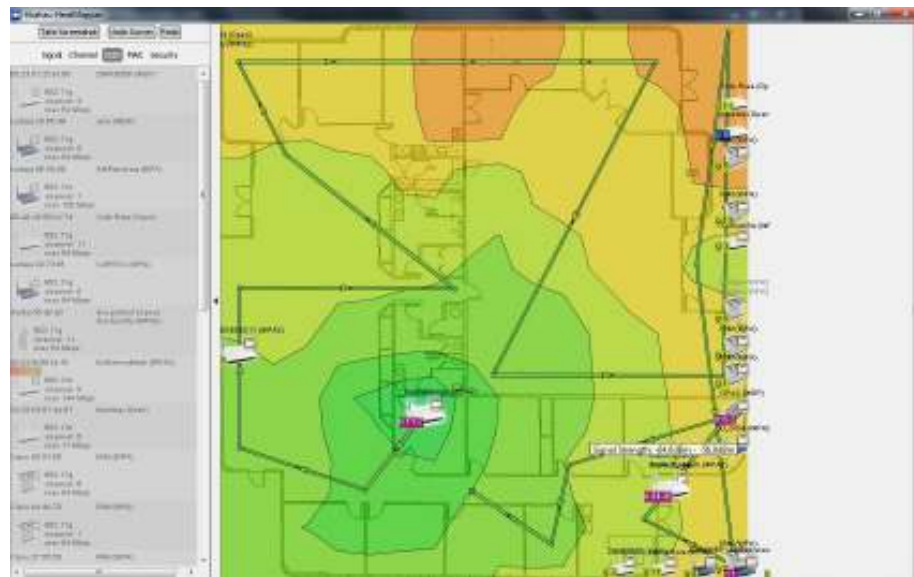
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Site Survey

- Spectrum analyzers can determine the presence of RF interference
- Identify possible dead spots
- Identify optimum installation locations for access points preferably with a spectrum analyzer.
- A common practice is to make sure clients have an RSSI of -60dBm in required coverage areas.



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General Indoor Applications

- Hotspots
 - Multiple APs
 - Multiple SSIDs with VLANs
 - VPN Tunnel
 - Home Solutions

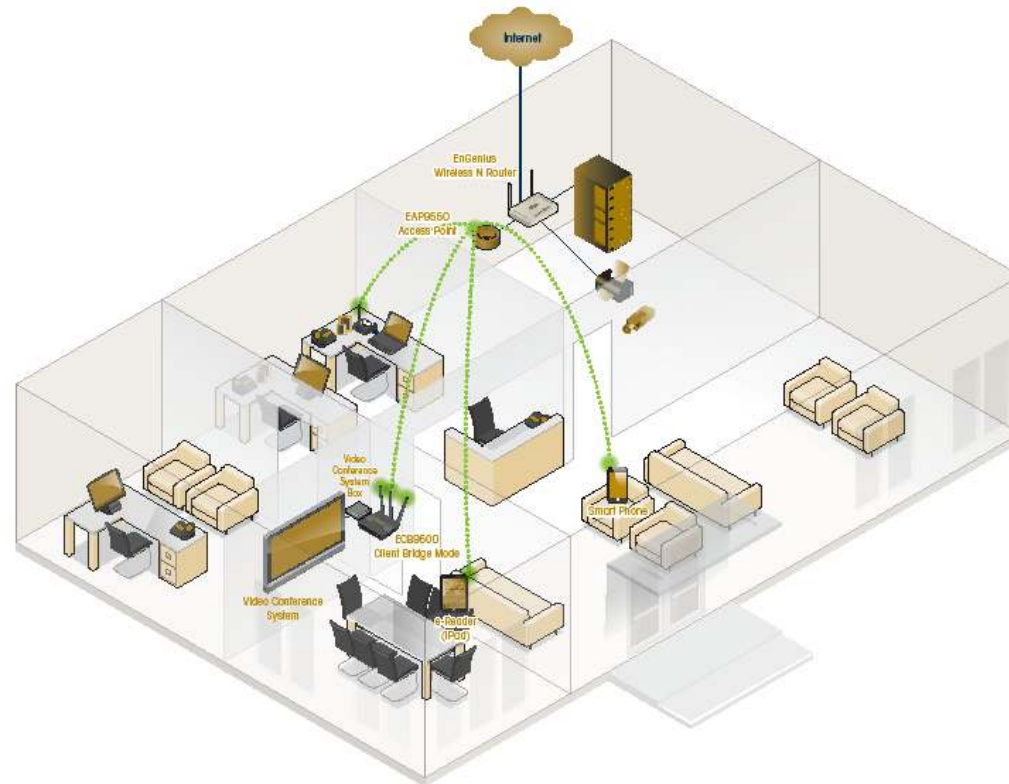
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Hotspot

- Access Points can be added to an existing network to provide wireless connectivity to different network resources for laptops and handheld devices

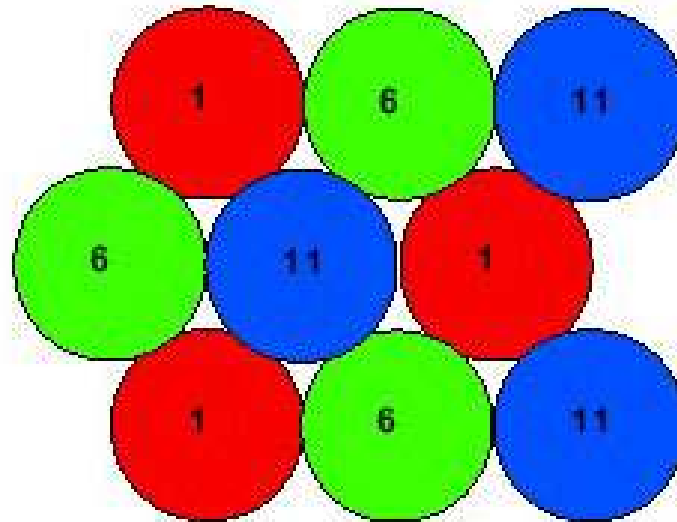


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Multiple APs

- In a multiple AP environment, RF interference can be a factor.
- FCC allows for only 3 non-overlapping channels between channels 1-11 (2.412 – 2.4.62).
- Channels are 22MHz wide but only separated by 5MHz



Multiple SSIDs with 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

SSID	Security	VID	Enable	Edit
EnGenius1	Open System/No Encryption	100	<input checked="" type="checkbox"/>	Edit
EnGenius2	Open System/No Encryption	2	<input type="checkbox"/>	Edit
EnGenius3	Open System/No Encryption	3	<input type="checkbox"/>	Edit
EnGenius4	Open System/No Encryption	4	<input type="checkbox"/>	Edit

EnGenius1
Guest Internet Access

EnGenius2
Staff Network

EnGenius3
IT Dept



EnGenius4
Security



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ECB-3500

- 802.11  2.4GHz
- 600mW RF output
- Dual diversity antenna
- 802.3af PoE compatible 
- Multiple SSID (AP mode)
- Supports VLAN tagging
- WMM QoS
- 7 operation modes



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ECB-9500

- 802.11b/g/n
- 300 Mbps wireless data rate
- Discreet enclosure design
- 4dBi internal antenna
- 802.3af **PoE** compatible
- Multiple SSID (AP mode)
- Supports VLAN tagging
- WMM QoS



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EAP100

- 802.11 ^{2.4GHz} **bg n**
- 150Mbps wireless throughput
- High Power : 26dBm
- 10/100 Ethernet
- Integrated 5dBi Antenna
- Wall Mount/ Ceiling Mount
- 802.3af PoE
- Multiple SSID with VLAN
- SNMP Monitoring



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EAP300

- 802.11 ^{2.4GHz} **bg n**
- 300 Mbps wireless throughput
- High Power : 29dBm
- 10/100 Ethernet
- Integrated 5dBi Antenna
- Wall Mount/ Ceiling Mount
- 802.3af PoE
- Multiple SSID with VLAN
- SNMP Monitoring



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EAP350

- 802.11 ^{2.4GHz} **bgn**
- 300 Mbps wireless throughput
- High Power : 29dBm
- Gigabit Ethernet
- Integrated 5dBi Antenna
- Wall Mount/ Ceiling Mount
- 802.3af PoE
- Multiple SSID with VLAN
- SNMP Monitoring



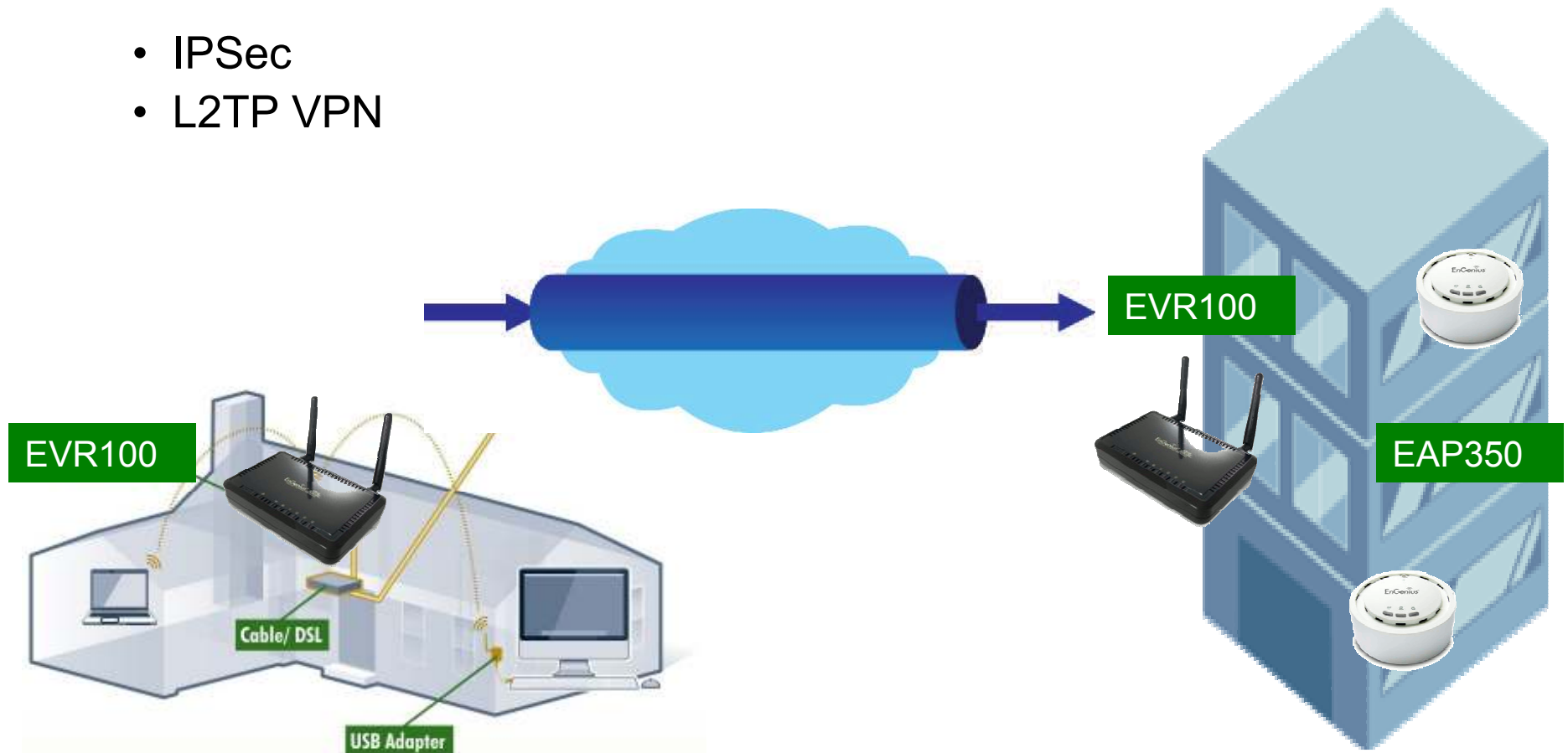
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VPN tunnel

- IPSec
- L2TP VPN



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EVR100 VPN Router

- 802.11 ^{2.4GHz} **bg n**
- 300 Mbps wireless throughput
- Gigabit Ethernet
- IPSec and L2TP VPN

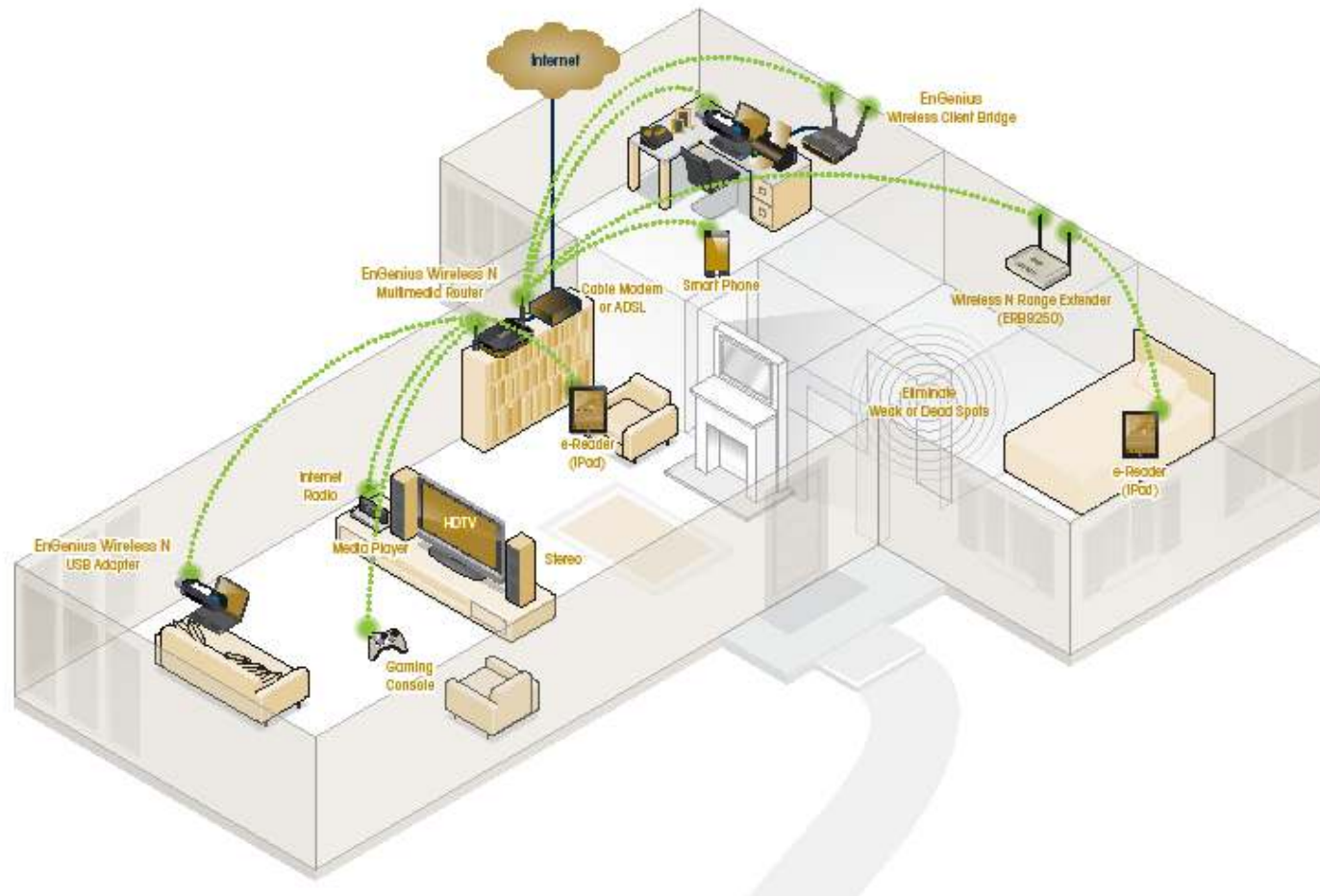


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Home Solutions



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ESR1221N and ESR1221N2



- ESR1221N - 150Mbps wireless
- ESR1221N2 - 300Mbps wireless
- WPA easy setup
- WEP/WPA/WPA2 encryption
- 4 port 10/100 LAN

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ERB-9250 Range Extender

- 300Mbps Wireless
- Easy setup wizard
- WPS support
- Extend the range of existing wifi network
- 10/100 LAN Port



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EUB9603H

- 802.11 ^{2.4GHz} **bgn**
- 150Mbps
- USB 2.0
- 600mW Tx power
- 5dBi removable antenna
- Windows XP/Vista/7 and Intel Mac OS 10.4-10.6 driver support



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Questions

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