VALUEPOINT NETWORKS INC.

Technical Brief

Comparing high power 802.11b/g with 802.11n

Overview

802.11n offers greater throughput in close proximity applications and nominally better range than a similarly powered b/g access point. But will it overcome the range and performance of a high power b/g access point in a hotel or MTU/MDU environment? We study this question by comparing products side by side.

Analysis

The two primary claims of 802.11n are higher performance through channel bonding and greater range through MIMO. Let's look at each one of these separately.

Channel Bonding

802.11n achieves twice the throughput through bonding 2 channels together. Since there are only 3 non-overlapping channels in 802.11b/g, bonding 2 channels uses two-thirds of the available RF spectrum. In a typical MTU/MDU environment with a lot of interference, channel bonding quickly becomes a problem. In this environment 802.11n's performance ends up being similar to 802.11b/g.

802.11n attempts to solve this dilemma using the more available 5 GHz spectrum. However, 5 Ghz penetration is extremely poor and requires close proximity and line of sight. It simply does not go through walls.

The result is 802.11n simply cannot provide any better performance in a MTU/MDU environment. Its channel bonding advantage is crippled.

MIMO

Studies show MIMO found in 802.11n provides around 5-10% incremental range improvement over 802.11b/g. Yet, this assumes the same RF power output. Increasing transmit power and receive sensitivity on a single radio/antenna system will give a much more dramatic range improvement. The cost of increasing the output of an 802.11n MIMO system far outweighs the benefits, as the cost of the multiple higher power antennas alone would far outweigh the 5-10% incremental range improvement.

Comparing 530G to 802.11N "RangeBooster"

We tested a SuperAP 530G model side by side with a D-Link RangeBooster N Dual Band Router over the 2.4 Ghz spectrum. The purpose of the test was to compare performance with/ without walls between client and server, and with both 802.11n and 802.11b/g clients. In this way, we can simulate a typical MDU/MTU environment. Here are the results:

	10 ft, no walls		50 ft, thru 3 wood walls	
	N RangeBooster	530G	N RangeBooster	530G
N client	12 Mbps	12 Mbps	1.7 Mbps	*5 Mbps*
B/G client	9 Mbps	9 Mbps	0.6 Mbps	*5 Mbps*

The 530G and N RangeBooster had the same performance when clients were close-in. However, when the clients were separated by only 3 wood walls, the performance results were markedly different. In this case, the 530G had 3x and 8x higher performance connecting to N and B/G clients, respectively. Beyond 4 walls, the N RangeBooster was not able to make a connection, while the 530G still maintained good performance.

Our tests illustrate that 802.11n technology does not outweigh the benefits of high power and high receive sensitivity found in the 530G model. As expected, 802.11n performs well at close distances. However, it degrades quickly as line-of-sight obstructions are imposed.

Finally, we tested the N RangeBooster in the 5 GHz spectrum, and close-in performance was 50% better than any 2.4 GHz AP, due to the channel bonding and lower interference in this band. However, through one wood wall, it was not able to establish a connection at all, rendering this spectrum useless for an MDU/MTU application. Therefore the dual spectrum feature of 802.11n is not relevant when there are any barriers.

NOTE: the one scenario where the N RangeBooster outperformed the 530G was with 802.11n clients only, 10 ft away. The N RangeBooster had total throughput of 30 Mbps-50 Mbps depending on the spectrum, while the 530G had total throughput of 20 Mbps. 802.11n provides a superior solution when all stations are 802.11n and in close proximity.

Summary

Multi-barrier environments such as MDU/MTU require high power to provide good coverage throughout the property. 802.11n's advantages are not relevant in this environment, and it cannot match the performance of a higher powered b/g access point.

For more information about our products and solutions contact: info@valuepointnet.com
415.979.0600 Option 1