



Lab Testing Summary Report

August 2009

Report 090818

Product Category:

**Wireless Controller
802.11n**

Vendor Tested:



Product Tested:

**Cisco 5508
Wireless Controller**



Key findings and conclusions:

- **Security without compromises—provides integrated security services while maintaining throughput performance**
- **5508 Controller reduces roam time by 50% with security WPA2/CCKM enabled**
- **Upgrades 100 Access Points (APs) simultaneously, providing reduced download upgrades**
- **High scalability of Access Point upgrade reduces maintenance downtime**

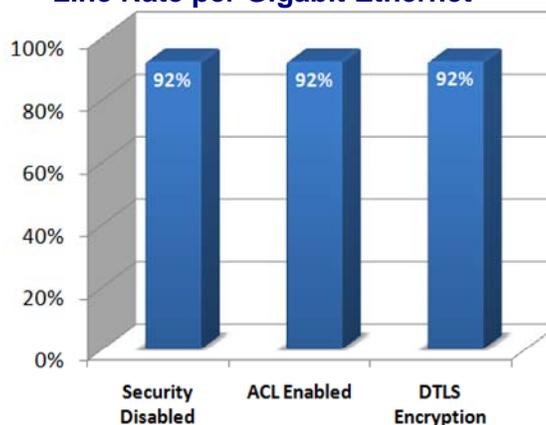
Cisco's model 5508 Wireless Controller was evaluated by Miercom under the Performance Verified test program for system throughput with and without security features enabled, roaming time and access point joins, and downloads with an emphasis on scalability. We analyzed the improvements in application throughput, demonstrated scalability and reduction in roaming and AP upload times.

The 5508 Wireless Controller is designed to offer improved system performance, both in terms of baseline throughput of UDP/TCP traffic. To achieve this level of enhanced performance, the Cisco 5508 has a dedicated multi-core control plane and a separate multi-core data plane. The resulting increase in capability meets the changing needs of target environments as implementation strategies of wireless networks evolve from being a best effort variety to one that is mission critical. Increased capacity to support more mobile clients, as well as reduced roaming time, enables an increasingly mobile workforce in areas such as healthcare and retail. Demanding applications such as video are supported, while downtime is reduced. The 5508 controller offers improvements in roaming times, even with security measures enabled.

Security without Compromises

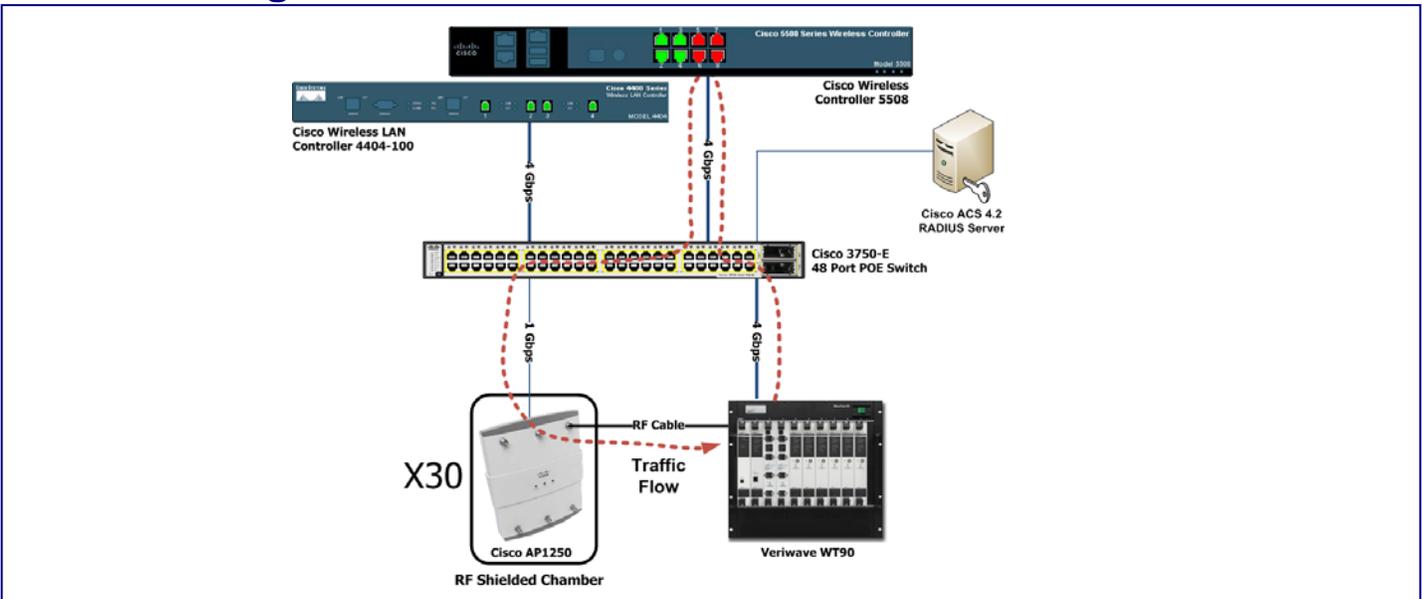
One of the Cisco 5508's most appealing qualities is its ability to provide secure wireless communications without negatively impacting performance. See [Figure 1](#) below. This is a distinct advantage (*continued on page 2*)

Figure 1: Cisco Model 5508 Wireless Controller - Percentage of Line Rate per Gigabit Ethernet



Model 5508 Controller achieved 92% line rate throughput, without security enabled. When security is enabled, the 5508 maintained 92% line rate throughput. The 8% difference is for CAPWAP header processing overhead.

Test Bed Diagram



How We Did It

The Cisco Wireless Controller model 5508 was tested for line rate throughput performance with integrated security enabled. We validated improved roaming time and observed reduced packet loss during roaming. Network downtime was monitored for Cisco Access Point joins with code download and upgrades.

Veriwave's Wave Test 90 load generator was used to generate 802.11n line speed traffic and stateful 802.11n clients. The test bed used FPGA based hardware and the WaveQoE Real World Deployment Test suite to evaluate real world metrics including packet loss, latency, jitter, VoIP R-Values/MoS, Video MDI scores and roaming delays.

The Veriwave load generator was connected via RF cables to 30 Cisco 1250 Access Points, which were isolated in RF shielded chambers to eliminate the interference from other AP's in the laboratory. Cumulative UDP throughputs were measured for different frame sizes to validate line rate system throughput. To analyze impact of integrated security services on performance and throughput, tests were performed with guest ACL (Access Lists) enabled and DTLS (Datagram Transport Layer Security) encryption turned on. Roaming stress tests were performed to determine the ability of the controller to handle mobile clients with minimum roaming delays and packet loss. Roaming times were recorded for open non-secure clients and secure clients using CCKM (Cisco Centralized Key Management).

Upgrade and join time for 100 APs was determined for the controller. A mixture of Cisco Aironet 1130, 1140 and 1250 APs were used for testing. We measured the time from the moment the APs started downloading code from the controller, to the point where all APs were successfully upgraded and ready to support wireless clients.

(continued from page 1) which also eliminates the performance vs. security decision for IT managers, as they can now provide both. If you enable the security, it will not degrade network performance.

System throughput tests were conducted with varied security settings to validate performance improvements on the 5508. The test bed was configured with one client per radio, and the Veriwave WaveTest 90 was used to send downstream UDP traffic in frame sizes ranging from 512 bytes to 1518 bytes. Throughput with clear text (no security) with ACL enabled, and with DTLS encryption, but with ACLs disabled, was measured and recorded.

From this data we were able to determine an average throughput, and the percentage of line rate per GigE port. The 5508 Controller was remarkably consistent across the board, delivering a clear text performance of 92% of line rate. The advantages built in to the 5508 become more dramatic when security measures are enabled. Guest ACL was enabled, and the throughput test was run again. The 5508 shrugged off the additional workload however, and continued to deliver 92% line rate performance. Finally, Datagram Transport Layer Security encryption was enabled on the 5508, and the performance tests run again. Once again, the 5508 delivered a solid 92% average of line rate traffic. In this test, the 5508

clearly demonstrated its ability to provide enterprise class security without compromising performance.

Testing was conducted to determine client roaming time. Baseline roaming time was measured, and then security measures were enabled to evaluate their impact, as shown on Figure 2. We were impressed to see that the 5508 had an average baseline roaming time of 11ms. When WPA2/CCKM security measures were enabled, average roaming times improved to 9ms, cutting roaming time by almost a third. This is coupled with a corresponding reduction in packet loss during the roam process. These results demonstrate that business critical security can be implemented without a tradeoff in roaming performance, improving the user experience for mobile connected clients, and providing peace of mind for network managers.

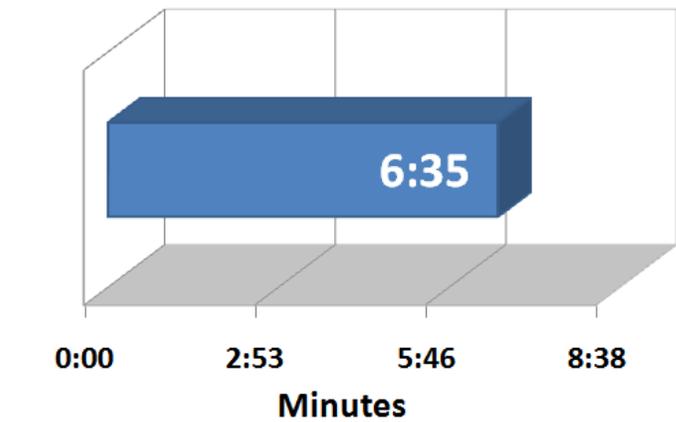
Improved Operational Efficiency

A necessary chore in any network is maintenance. In a 24/7 business environment, the uptime of communications is critical. Reducing the duration of maintenance windows required for upgrades, not only enhances the availability of the system, but, since most maintenance is performed during off-peak hours, reduces overtime costs for IT departments.

Testing was conducted using 100 Cisco access points

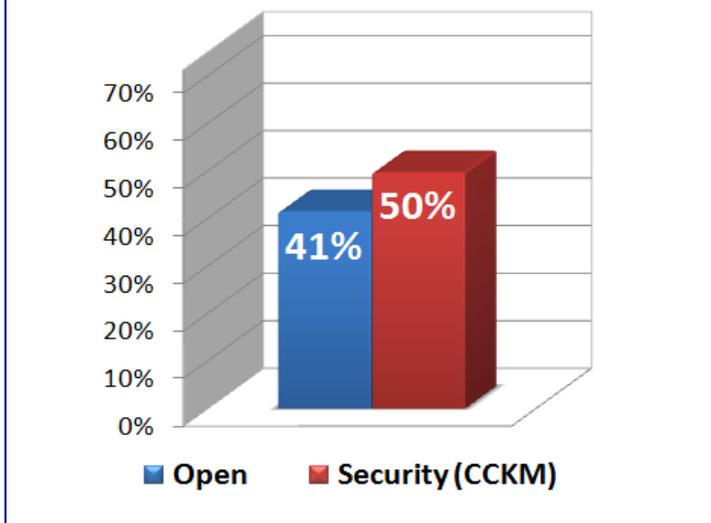
comprising a mix of Aironet 1140, 1130, and 1242 models. An upgrade process was initiated whereby the APs were joined to the network, and downloaded a new firmware image. We measured from the point when the Access Points started downloading the new code, to the point where they had upgraded successfully, and returned to an operational status. The total time during which the APs were unavailable was recorded. See Figure 3 below.

Figure 3: Upgrade Time for 100 Access Points



The chart above shows the 5508 controller during an upgrade process. We measured the time from when the Access Points started to download code from the controller, to the point where Access Points were successfully upgraded, and ready to support wireless clients.

Figure 2: Wireless Controller Roaming Performance Improvement



Percent Reduction in Roam Time - 5508 controller demonstrated marked improvements in roaming times for secure as well as non-secure connections. Cisco's 5508 controller dramatically reduces roam time, even with security measures enabled.

The capacity of the 5508 was able to upgrade all 100 APs connected to it in 6 minutes and 35 seconds. Performing on a scalable network, the Cisco 5508 wireless controller supports large scale, high capacity AP upgrades, promoting High Availability and reduces downtime.

Bottom Line

The 5500 Series is the next generation of Cisco's wireless controller product line. This upgraded architecture provides improved throughput, security without compromise, High Availability and scalability, as enterprises move their mission critical communication networks to a mobile platform. The improved scalability operational benefit reduces maintenance costs. Security measures do not degrade performance throughput, and help to make the Cisco 5508 Controller a smart choice.

Miercom Performance Verified

Based on Miercom's observation of the performance during testing, the Cisco 5508 Wireless Controller has earned the Performance Verified award.

The 5508 Controller demonstrated its ability to deliver high throughput performance and low roaming times, even with full security measures employed. Uptime and reduced maintenance window, regardless of scale, enhances its usability in business critical environments.



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