Performance and Feature Comparison of Application Delivery Appliances

Cisco ACE 4710
F5 BIG-IP 3400
F5 BIG-IP 6400
F5 BIG-IP 8800

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Businesses use competitive testing and datasheet information for the initial evaluation in the purchase criteria of IT equipment. It is standard practice for vendors to test in a fashion that demonstrates the strength of their product against the published datasheet numbers. While this information is useful, customers are now asking for additional testing that more closely mimics their deployments and the associated configurations.

Cisco engaged Miercom to test in such a manner its ACE 4710 appliance against the F5 BIG-IP 3400, 6400 and 8800 products. The goal was to determine which products provided not only the best overall raw performance, but also how the platforms performed in a variety of real-world deployment scenarios. This makes the suite of tests much more pertinent to existing and future customers of application delivery appliances.

The test plan Miercom used may be applied to any application delivery appliance. The test system configuration files are available for anyone wishing to reproduce the tests described in this report.

The test plan focused on areas usually reviewed by customers as part of a product evaluation.

Key Test Areas:

1. Baseline Layer-4 and Layer-7 Datasheet Performance
2. Real-World Layer-4 and Layer-7 Performance
3. Architecture and Feature Analysis
4. Environmental Analysis – Power Consumption and Virtualization

In both the baseline and real-world performance tests, the Cisco ACE 4710 outperformed the F5 BIG-IP 3400. In other platform comparisons, the Cisco ACE 4710 also outperformed the more expensive F5 BIG-IP 8800 and 6400, demonstrating it provides excellent value.

The Cisco ACE 4710 hardware and software platform provides the basis for a sound architecture. This platform and architecture allow it to provide true “virtualization” allowing for logical partitioning of the device, creating isolated virtual appliances with protected resources. Virtualization provides different applications or user groups with the ability to share the same appliance without the need for additional hardware purchases. This consolidation eliminates device sprawl and ultimately leads to lower power consumption and lower thermal impact in a data center environment.

The Cisco ACE 4710 is consistent with the requirements necessary for deployment into “green” data center environments. Testing results show the Cisco ACE 4710 provides the highest performance per watt consumed. When looking at a power-to-performance...
Executive Summary (continued)

Comparison, the Cisco ACE 4710 provided up to 3 times the performance while consuming less power than competing devices.

Through extensive validation testing focused on performance and real-world configurations it was determined the Cisco ACE 4710 clearly meets the specifications and will exceed the expectations of the target market for which it is designed. The Cisco ACE 4710 proved its effectiveness and resiliency and thereby earned the Miercom Performance Verified Certification.

If there are any questions or comments regarding the testing covered in this report, please feel free to contact me at rsmithers@miercom.com.

Rob Smithers
President and CEO
Miercom

Test Results Highlights:

1. Cisco ACE 4710 provides double the performance of the F5 BIG-IP 3400 in baseline L4 performance test using real-world responses (2KB to 64KB).

2. Cisco ACE 4710 delivered 38,000 L7 inspected requests per second with the most commonly used features enabled, a 2.9 times performance advantage over the F5 BIG-IP 3400, a 2.2 times advantage over the F5 BIG-IP 6400 and 1.5 times advantage over the F5 BIG-IP 8800.

3. Cisco ACE 4710 provides 70 percent better compression performance than the F5 BIG-IP 8800 and over 3 times the compression performance of the F5 BIG-IP 3400 with real-world response sizes.

4. Cisco ACE 4710 provides up to three times the performance per watt consumed compared to the F5 BIG-IP 3400.

5. Cisco ACE 4710 provides true virtualization features which reduces the number of devices deployed and reduces power consumption by 72 percent compared to the F5 BIG-IP 3400.
Testing Equipment and Lab Setup

A single environment was constructed to serve as the test bed for all tests. All devices under test (Cisco ACE 4710, F5 BIG-IP 3400, 6400 and 8800) were performance tested in this environment.

Physical Topology
The test bed was composed of a single Cisco Catalyst 6506 chassis with an installed Supervisor 720 3B (WS-SUP720-3B). The devices under test were connected to multiple Gigabit Ethernet ports (WS-X6748-GE-TX line card), or multiple 10 Gigabit Ethernet ports (WS-X6704-10GE line card) if supported. All devices except for the F5 BIG-IP 8800 were connected to the switch using Etherchannel/Trunks.

The load testing equipment consisted of three Spirent Avalanche 2700s and three Spirent Reflector 2700s. Each Spirent device connected to the switch using three independent 1Gbps interfaces, yielding a total possible throughput of 9 Gbps. All Spirent equipment was running version 7.51.43187, and used Avalanche Controller version 7.51.42389.

Equipment Used in Testing:
- Cisco ACE 4710 connected to the switch using a 4x1Gbps trunk. Version 1.7a
- F5 BIG-IP 3400 connected to the switch using a 2x1Gbps trunk. Version 9.4.4
- F5 BIG-IP 6400 connected to the switch using a 4x1Gbps trunk. Version 9.4.4
- F5 BIG-IP 8800 connected to the switch using two independent 10Gbps interfaces (trunking is not supported on the F5 BIG-IP 10Gbps interfaces). Version 9.4.4
- All devices under test were equipped with licenses permitting the maximum performance for each feature being tested. Tests were omitted in cases where licensing was not in place.
Logical Topology
The Cisco Catalyst 6500 was configured with two VLANs, 300 and 600, which will be referred to as the client and server VLANs respectively. The Spirent Avalanches were connected to the client VLAN, and the Spirent Reflectors were connected to the server VLAN. Devices under test which were connected via trunk had the trunk configured to allow both client and server VLANs. Devices under test which were NOT connected via trunk had a single interface attached to each of the VLANs, allowing for a standard routed mode configuration. Switch ports for all devices were placed in a shutdown state with the exception of the device under test. Avalanche client IP addresses reside in the same IP subnet as the virtual address configured on each device under test, thus no client side default gateway was necessary. The Avalanche server IP addresses used a default gateway pointing to the device under test (self-ip on the F5 BIG-IPs or VLAN interface on Cisco ACE 4710).

Load Generator Configuration
Default values were used in all possible fields for the Spirent test configuration. Minor modifications were made to ensure all requests were closed properly (FIN instead of RST), and to shorten the idle timeout allowing for quicker detection of failures. Load was applied in a stepped profile, and the last step containing zero failed connections was recorded as the test datum. Each step spanned at least 2 times the duration of the idle timeout, ensuring any errors were reported before moving to the next load step.

Test Descriptions
Performance tests measured the maximum CPS (connections per second) and throughput (mbps) of the device under test using a specific configuration. Measuring the maximum CPS provided an indication of how rapidly each device could establish and respond to new connections. Measuring the maximum throughput provided an indication of how much data could pass through each device per second. The list to the left outlines what features were enabled in each test case.

• Baseline Layer-4 and Layer-7 Datasheet Performance
  Layer-4 SLB (Server Load Balancing)
  – Layer-4 virtual server
  Note: To ensure best performance on the F5 BIG-IP devices, a FastL4 policy was used per the recommendation of F5 documentation, whereas on the Cisco ACE 4710 this is transparent and requires no special configuration.

  Layer-7 SLB
  – Layer-7 virtual server performing URL matching
  Note: To ensure best performance on the F5 BIG-IP devices, a FastHTTP policy was used per the recommendation of F5 documentation, whereas on the Cisco ACE 4710 this is transparent and requires no special configuration.

• Real-World Layer-4 and Layer-7 Performance
  Layer-4 SLB
  – Layer-4 virtual server
  – Session persistence (sticky)
  Layer-7 SLB
  – Layer-7 virtual server performing URL matching
  – Session persistence (sticky)
  Note: Enabling sticky on the F5 BIG-IP devices forces the administrator to change from FastHTTP to HTTP profile, whereas on the Cisco ACE 4710 there is no such limitation.

continued on page 5
Layer-7 SLB with SSL Offload
- Layer-7 virtual server performing URL matching
- Session persistence (sticky)
- SSL termination using default settings
- Least connections load balancing algorithm
- HTTP health probes to real servers

Layer-7 SLB with HTTP Compression Offload
- Layer-7 virtual server performing URL matching
- Session persistence (sticky)
- HTTP compression using default settings
*Note: Minimum content-length was lowered on the F5 BIG-IP devices to prevent small responses from bypassing compression.*
- Least connections load balancing algorithm
- HTTP health probes to real servers

Functional tests were performed in a demonstrative manner. Each feature was configured and its functionality verified as follows:

• Virtualization
  - Multiple virtual contexts were created on the Cisco ACE 4710. It was demonstrated that each context could be assigned its own pool of reserved resources, participated in its own network topology and provided its own management interface.
  
  *Note: F5 doesn’t support virtualization on any of its platforms.*

• Role Based Access Control (RBAC)
  - Multiple domains were created, each with a different subset of objects. It was demonstrated that each user account is limited to modifying only the objects which are referenced by its configured domain.
  - Multiple roles were attached to various user accounts. It was demonstrated that each user is only able to perform the actions listed in its configured role.
  - A custom role was defined on Cisco ACE 4710 to demonstrate the flexibility available for controlling user’s permitted actions.
  
  *Note: F5 doesn’t support custom role definitions.*

• Pay As You Grow Licensing
  - Various licenses were added and removed from the Cisco ACE 4710 to demonstrate its ability to rate limit features such as SSL connections per second, throughput and compression throughput, based on which license is installed.
  
  *Note: F5 doesn’t support pay-as-you-grow licensing.*

• Environmental Analysis
  - Each device was connected to branch power via a current meter. A reading was taken from each device during a “full load” performance test.
The Cisco ACE 4710 is an application delivery appliance that provides features including intelligent Server Load Balancing (SLB), SSL encryption offloading, HTTP compression offloading and network security. It is packaged as a slim appliance that consumes minimal power and occupies a single 1U space in datacenter facilities. Miercom conducted a wide range of tests against the Cisco ACE 4710, as well as the F5 BIG-IP 3400, 6400, and 8800 products.

**Key Test Areas:**

1. **Baseline Layer-4 and Layer-7 Datasheet Performance**
2. **Real-World Layer-4 and Layer-7 Performance**
3. **Architecture and Feature Analysis**
4. **Environmental Analysis – Power Consumption, and Virtualization**

**Baseline Performance**

Application delivery devices are able to provide a maximum level of performance in a few basic configurations. These configurations represent the fundamental types of load balancing and generally are performance tested for use in datasheets. The following tests measure the performance of each device in these “best case” configurations. Any additional configuration options should impose a reduction in performance on any of the devices being tested.
Testing with 128 byte responses showed both devices performed comparably and handled approximately 110,000 connections per second. In real-world scenarios, it is extremely rare to find servers returning responses as small as 128 bytes; typical responses from HTTP servers range from 2 kilobytes to 64 kilobytes. In each of the test cases that reflect real-world response sizes (2KB, 8KB, 64KB), the Cisco ACE 4710 clearly outperformed the F5 BIG-IP 3400 providing over double the performance. The Cisco ACE 4710 was able to deliver nearly its full rated throughput of 2Gbps when handling large responses (64KB or 512KB). The F5 3400 is limited to a maximum of 1Gbps and was only able to handle a maximum of 885 Mbps. In order for the F5 BIG-IP 3400 to achieve even the measured performance, it must be manually configured with a FastL4 profile or performance will be severely degraded. As stated by F5, the FastL4 profile has several feature limitations including not supporting HTTP/TCP optimizations, OneConnect, or HTTP compression. The Cisco ACE 4710 does not require any special configuration to achieve these performance results.
Much like the Layer-4 test, the F5 BIG-IP 3400 performed very well when handling small 128 byte responses. When faced with response sizes more typical of real-world traffic, the Cisco ACE 4710 provided up to double the CPS and throughput capability as compared to the F5 BIG-IP 3400. The Cisco ACE 4710 was able to deliver nearly its full rated throughput of 2Gbps when handling large responses (64KB or 512KB). The F5 3400 was limited to a maximum of 1Gbps and was only able to handle a maximum of 800Mbps. In order for the F5 BIG-IP 3400 to achieve even the measured performance, it must be manually configured with a FastHTTP profile or performance will be severely degraded. The F5’s FastHTTP profile imposes many limitations, including not supporting session persistence, HTTP compression or TCP/HTTP optimization. It also only offers limited iRules support. The Cisco ACE 4710 does not require any special configuration to achieve these performance results.
Performance Test Results (continued)

Real-World Layer-4 and Layer-7 Performance

Businesses which use application delivery devices generally require a few common features to be included in the device configuration. Typically these are needed to prevent application users from being prematurely disconnected, sent to the wrong server, or to enable more intelligence for use with the load balancing decision. The following tests measure the performance of each device when configured with these real-world features. It is the performance measured in these tests that should be used when determining a true price vs performance figure, not the baseline performance figures usually shown on data sheets.

Real-World Layer-4 SLB

Throughout all tests across all response sizes, the Cisco ACE 4710 consistently outperformed by large margins the F5 BIG-IP 3400. All tests using a real-world response size demonstrated that the ACE provided more than double the CPS performance of the F5 BIG-IP 3400. The Cisco ACE 4710 was able to deliver nearly its full rated throughput of 2 Gbps when handling large responses (64KB or 512KB). The F5 3400 is limited to a maximum of 1Gbps and was only able to handle a maximum of 830Mbps. In order for the F5 BIG-IP 3400 to achieve even the measured performance, it must be manually configured with a FastL4 profile or performance will be severely degraded. The Cisco ACE 4710 does not require any special configuration to achieve these performance results.
The Cisco ACE 4710 consistently outperformed all of the F5 BIG-IP devices including the highest performance model, the BIG-IP 8800. When testing with a typical 2KB response, the Cisco ACE 4710 provided 2.9 times the performance of the F5 BIG-IP 3400, 2.2 times the performance of the F5 BIG-IP 6400 and 1.5 times the performance of the F5 BIG-IP 8800. The Cisco ACE 4710 was able to deliver nearly its full rated throughput of 2 Gbps when handling large responses (64KB or 512KB). The F5 3400 is limited to a maximum of 1Gbps and was only able to handle a maximum of 890 Mbps. Additionally the F5 BIG-IP 6400 and 8800 devices were only able to handle 1700Mbps and 1415Mbps respectively. Enabling persistence on the F5 BIG-IP devices in conjunction with Layer-7 functionality requires the user to manually change the profile to the standard profile. The Cisco ACE 4710 does not require any special configuration to achieve these performance results.
The Cisco ACE 4710 demonstrated that, in nearly all tested response sizes, it outperformed the F5 BIG-IP 3400. As response sizes increased, the Cisco ACE 4710 was able to handle 930 Mbps, whereas the F5 BIG-IP was only able to handle 650 Mbps.
The Cisco ACE 4710 consistently outperformed all of the F5 BIG-IP devices including the highest performance model, the BIG-IP 8800. None of the F5 BIG-IP devices were able to handle more than 650 Mbps without dropping connections. The Cisco ACE 4710 compressed the full 1024 Mbps of traffic for which it is licensed. Additionally the Cisco ACE 4710 continued to service requests above the 1024 Mbps compression license, returning them uncompressed and allowing total throughput to reach the 2 Gbps licensed limit. When analyzing only the compressed responses, the Cisco ACE 4710 provided up to 3.5 times the performance of the F5 BIG-IP 3400, and up to 1.7 times the performance of the F5 BIG-IP 8800. By allowing “overflow” connections to be serviced as uncompressed, the Cisco ACE 4710 was able to service more than three times the total throughput and CPS as compared to the F5 BIG-IP 8800.
The performance measurements in the previous tests are a good indicator of the capacity or load that can be applied to each device in different scenarios. While this is very important, attention must also be paid to the hardware and software architecture of each device. The architecture can provide useful features, as well as impose unwanted limitations. To a potential customer of application delivery devices, these features can often be equally as important as performance. The following tests investigate the architecture of both the Cisco ACE and the F5 BIG-IP platforms, focusing on a few key areas as noted.

**Virtualization**

Traditionally, server load balancers were physical devices and were either shared or dedicated to IT groups based on organizational structure or application service-level requirements. Using multiple physical devices creates deployment and operational inefficiencies, including under-utilized physical resources, device sprawl due to applications requiring dedicated devices, increased power and cooling requirements in the datacenter and increased acquisition and operational costs resulting from the purchase and maintenance of multiple devices.

To address these challenges, the physical server load balancer or application delivery device needs to be virtualized into multiple logical devices, each with its own isolated resource pool. The Cisco ACE 4710 virtualizes a physical device into a maximum of twenty virtual devices known as contexts. Tests showed that each virtual device provided the same capabilities of the parent physical device, and the resources of each virtual device were completely isolated from each other.

**ACE 4710 Virtualization Capabilities:**

- Each ACE virtual device contains its own management interface, resources, configuration file, disk space, role based access controls (RBAC), routing tables and load balancing policies.
- The ACE’s resources or performance can be allocated and limited with fine granularity to each of the virtual devices. All resources can be allocated to a virtual device based on a percentage of the ACE’s total capacity, or selective resources such as bandwidth, connections per second, NAT entries and memory. This flexibility allows resources to be shifted with fine granularity to the virtual devices (and its applications or departments) that need them the most. This results in the highest performance while maximizing resource utilization of the physical ACE device.
- Each ACE virtual device has access only to the VLANs assigned to it and any routing between virtual devices can only be done through an external routing device. These limitations ensure that each virtual device participates in its own network topology and that the virtual devices do not interfere with each other.
- The ACE places each virtual device’s configuration into its own discrete directory structure. Each virtual device only has access to its own directory structure, ensuring that configuration changes cannot affect other virtual devices.

In contrast, the F5 BIG-IP physical devices cannot be virtualized into multiple logical devices. The F5 BIG-IP’s resources or performance cannot be allocated based on criticality of the application, and it maintains a single configuration file and routing table per device.

*Note: Testing clearly showed that the F5 BIG-IP’s “Administrative partition” feature does not provide device virtualization; it simply controls access to the device.*
Role Based Access Control (RBAC)

In most customer environments, application delivery devices are managed by multiple functional groups (network administrator, application administrator, system administrator, security administrator, etc.). These functional groups negotiate workflow, coordinating amongst themselves to make configuration changes on a traditional application delivery device. To simplify the workflow, RBAC allows device administrators to assign roles to users based on their functions, providing only the necessary actions (such as create, modify, etc).

Both the Cisco ACE 4710 and F5 BIG-IP platforms support RBAC, and testing was conducted on each. Several users were created using the pre-defined roles on both the Cisco ACE 4710 and F5 BIG-IP platforms, and commands were issued to verify the user’s access was limited to the scope defined by their assigned role. Tests showed that the Cisco ACE 4710 provides customizable and granular role-based access control (RBAC) in addition to eight pre-defined roles. The eight well defined roles on the Cisco ACE 4710 such as slb-admin, server-admin, network-admin and security-admin, eliminates complex coordination among various IT groups for configuration changes. It was also demonstrated that custom roles can be created on the Cisco ACE 4710 to adapt to different organizational structures. Both pre-defined and custom roles can be configured within each Cisco ACE 4710 virtual device. In contrast, testing showed that the F5 BIG-IP platform supports seven pre-defined roles, and these roles have many overlapping functions. In addition, the F5 BIG-IP platform doesn’t provide the ability to define custom roles when the pre-defined roles are not suitable for an organization.

Hierarchical Management Domains

In addition to RBAC, customers require more granular access, restricting functional groups within IT to make changes only to specific portions of the configuration. This is necessary when multiple applications are hosted on the same physical device or the Cisco ACE 4710 virtual device. To meet this specific requirement, the Cisco ACE 4710 provides “Hierarchical Management Domains” and the F5 BIG-IP provides an “Administrative Partition” feature. Tests showed that each platform’s feature provides the ability to group user-defined objects such as real servers, VIPs and server farms into a Cisco ACE 4710 domain or F5 BIG-IP partition. The domain or partition is then assigned to users who manage the device. In addition, the role assigned to a user determines the operations permitted on the objects grouped into the domain or partition. The Cisco ACE 4710’s hierarchical management domain feature, can allow a configurable object (real server, probe, VIP, etc) to be a member of multiple domains.

Note: The F5 BIG-IP’s administrative partition feature does not provide device virtualization, and is not comparable to the virtual context functionality provided by the Cisco ACE 4710.

Pay as You Grow

Traditional application delivery devices forced business organizations to perform a forklift upgrade when additional performance was needed. Because of this, businesses usually made huge initial investments to obtain a minimum of 50 percent extra capacity to accommodate growth. It was demonstrated on the Cisco ACE 4710 that customers can initially buy a 1 Gbps throughput license to meet their current requirements, and by purchasing an additional license the throughput can be raised to 2 Gbps as needed. The Pay as You Grow licensing on the Cisco ACE 4710 gives customers flexibility and avoids the need for an upgrade. In contrast, all F5 BIG-IP platforms support fixed capacity with no ability to upgrade throughput or other performance metrics through software licenses.
Environmental Analysis

Power Consumption and Cooling Requirements

The Cisco ACE 4710 appliance is designed with low power consumption in mind. An external power management device was used to measure the actual power consumption for the Cisco ACE 4710 and the F5 BIG-IP devices while idle and then again during a loaded condition.

The results showed that Cisco ACE 4710’s maximum allocated power under load was only 123 Watts, 85 percent of the 145 Watts consumed by the F5 BIG-IP 3400. Additionally, these measurements were run against the F5 BIG-IP 6400 and 8800 and in these comparisons the efficiency differences were more astounding. The F5 BIG-IP 6400 was measured at 273 Watts and the F5 BIG-IP 8800 at 504 Watts. This equates to the Cisco ACE 4710 consuming 45 percent of the power compared to a F5 BIG-IP 6400 and 24 percent of the power compared to a F5 BIG-IP 8800. This translates to an estimated 645 BTUs for the Cisco ACE 4710 appliance compared to 760 BTUs for the F5 BIG-IP 3400, 1430 BTUs for the F5 BIG-IP 6400 and 2640 BTUs for the F5 BIG-IP 8800.

The power savings are further magnified when throughput or customer isolation requirements increase. For example, when three customers or applications require their own isolated application delivery devices, three physical F5 BIG-IPs would be required while a single Cisco ACE 4710 would be virtualized into three virtual devices. This results in power consumption of 435 Watts by the F5 BIG-IP 3400s, 819 Watts by the BIG-IP 6400s, or 1,512 Watts by the BIG-IP 8800s. In comparison, the power consumption of the Cisco ACE 4710 remains constant at 123 Watts due to its virtualization feature.

Similarly, to achieve power consumption and heat dissipation for a more “Real-World” scenario with approximately 2Gbps throughput and devices configured in a persistent Layer-7 configuration, three F5 BIG-IP 3400s, or two F5 BIG-IP 6400s, or two F5 BIG-IP 8800s would be required, while a single Cisco ACE 4710 would provide equivalent performance.

The heat dissipation shown above in BTUs is a projected estimate based on a calculated value (3.41 x power consumed.)
In reviewing the test results, it became evident the Devices Under Test (DUTs) behaved similarly in that they were transitioning from a performance capacity limitation by the CPU (CPS limitation) to a network interface limitation (Mbps limitation) when the response sizes increased. This is a concern for the F5 BIG-IP 8800, which due to a design flaw or software bug cannot utilize all four of its processors with persistence enabled. Additionally, the F5 BIG-IP architecture is such that each of the CPUs on the F5 BIG-IP 8800 is allocated 2Gbps of network capacity, resulting in a maximum aggregate throughput of 2Gbps when persistence is enabled and the resulting loss of CPU occurs.

Furthermore, instances of instability upon overload were observed on the F5 BIG-IP 8800. While conducting our tests at high traffic volumes and under certain conditions, we could force the device to restart all of its TMM processes. We found this anomaly to be reproducible, and it caused complete loss of functionality until the device automatically recovered.

Miercom attempted to notify the vendor of this instability. Although this failure could be reproduced, Miercom’s policy is to not make public the mechanism that can cause a product to fail. We are prepared to discuss this anomaly only with individuals who need access to this information.

As an operational consideration, configuring the F5 BIG-IP products for the various tests requires that specific attention be paid to the profiles being selected. The use of the performance profiles restricted the features available for use and also affected the level of performance. Without being properly educated, it is easy to select a sub-optimal profile which will either hinder performance or prevent the use of desired features. In comparison, the Cisco ACE 4710 automatically tailors its performance to be optimally based on the configured options. There is no need to “shift-gears” to ensure optimal performance as the configuration is changed.

Miercom attests that the Cisco ACE 4710 provides superior performance to the F5 BIG-IP 3400 and in many cases outperforms the F5 BIG-IP 6400 and 8800. Testing was conducted to reflect configurations found in real-world deployments, and the Cisco ACE 4710 demonstrated better performance than the F5 BIG-IP 3400 in configurations using Layer-4, Layer-7, SSL, HTTP compression and Session Persistence.

The Cisco ACE 4710 also has the ability to reduce the power and cooling required in a datacenter by providing the highest performance per watt and true device virtualization. This allows consolidation onto fewer devices while providing better performance.

The Cisco ACE 4710 also provides the ability to scale performance as customer needs increase through upgradable licenses. In addition to performance and datacenter efficiency, the Cisco ACE 4710 platform streamlines IT workflow by providing innovative and unique capabilities such as custom role based access control and device virtualization. Best in class performance, a rich feature set and green datacenter ability earned the Cisco ACE 4710 the Miercom Performance Verified Certification.
With hundreds of its product-comparison analyses published over the years in such leading network trade periodicals as Business Communications Review, Network World and VoIP Magazine, Miercom’s reputation as the leading, independent product test center is unquestioned. Founded in 1988, the company has pioneered the comparative assessment of networking hardware and software, having developed methodologies for testing products from enterprise class VoIP gateways and IP PBXs to carrier grade switching equipment and gateway products. Miercom’s private test services include competitive product analyses, as well as individual product evaluations. Miercom features comprehensive certification and test programs for Interoperability (SIP, H323, IPV6, etc.), Security, Reliability and environmental friendliness: Certified Interoperable™, Certified Reliable™ Certified Secure™ and our newest certification, Certified Green™. Products may also be evaluated under the NetWORKS As Advertised™ program in which networking-related products must endure a comprehensive, independent assessment of the products’ usability and performance.