

What Operators Should Know About Testing Converged Data Centers

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Network management has changed with the rapid adoption of network-based services, which has placed an unprecedented strain on servers and storage, and launched a new era in data center management.

Solutions include virtualized servers, high-capacity switching frameworks, LAN and SAN convergence. However, this is not a simple plug-and-play environment. The scale and end-to-end impact of current data center evolution is putting pressure on data center equipment manufacturers and operators alike to validate the performance of supported applications and services prior to new infrastructure deployment.

Given the evolution, the new ideal test platform will provide comprehensive test capabilities for both virtual and high-density 10/40GE test ports, routing/switching technologies, and new data center bridging (DCB) and fiber channel over Ethernet (FCoE) protocols (See figure).

Virtualized Servers

Virtualization technology allows for more efficient and flexible use of data center resources, but it also increases the workload and complexity of server architecture and puts new and significant demands on both server and network resources. Operators must understand how these burdens impact the overall performance and resiliency of the server itself as well as the quality and accessibility of the application and services it delivers.

Virtualized test systems must:

- Test all aspects of the virtual switch, including functionality, conformance to standards and performance;
- Compare how different hypervisors, virtual appliances and configurations impact server performance;
- Measure intra-server and inter-server VM traffic exchange and application performance;
- Validate critical functionality including VLAN, IGMP, policy enforcement, and security;
- Assess how VM mobility impacts application reliability and performance; and
- Evaluate different server products.

High-Capacity Switching Framework

The evolution of the switching framework has been driven by server virtualization, which has much higher bandwidth requirements and introduces east-west and north-south traffic flows. There is also an increasing necessity for ultra-low latency for time-sensitive applications and for energy efficiency. The next-generation data

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center carries various technologies over a converged 10GE link and the new 10GE top of rack (ToR) and core switches must be high density, high throughput, ultra-low latency/jitter and have lower power consumption.

10GE and 40GE data center switch test systems must:

- Provide high-density 10GE and 40GE to quickly scale port counts and fully load data center switches;
- Generate both east-west and north-south traffic flows and measure whether switches can satisfy forwarding performance requirements;
- Validate ultra-low latency for time-sensitive applications;
- Support standards-based (ATIS TEER) power efficiency measurements; and
- Provide automated test suites for performance benchmarks.

LAN/SAN Consolidation

Within the data center, LAN and SAN traffic have traditionally used separate Ethernet and fibre channel networks. Cost-effective 10GE networks have provided the economic incentive to consolidate these networks using DCB and FCoE technology over converged network switches and adapters.

10GE network test systems must:

- Support high-density native fibre channel and 10GE hardware and virtual test ports in the same platform;
- Emulate DCB protocols to validate such lossless Ethernet features as priority-based flow control (PFC) and DCBX;
- Generate and measure wire-rate traffic across all ports to ensure lossless delivery of business critical storage traffic under network congestion;
- Emulate FCoE protocols to test such critical functionality as access control list (ACL) policy enforcement during FCoE initialization protocol (FIP) exchanges; and
- Quantify traffic throughput and I/O performance.

As you can see, unified, high-performance, and high-port-density test platforms must be employed to ensure that the new data center ecosystem works correctly and that applications and end users are not adversely impacted during the transition. Test platforms must provide robust yet easy-to-use 'one box' testing with detailed test plans and automated test suites.

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