Alcatel-Lucent Enterprise Application Fluent Networks

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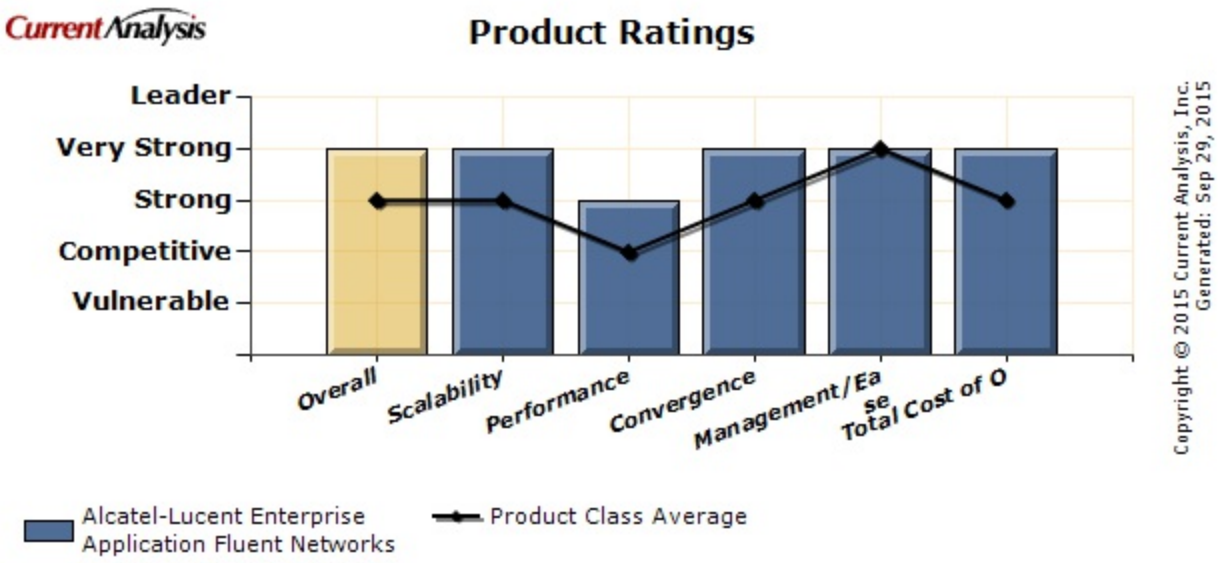
Product Assessment - Data Center Switching Infrastructure

Summary



Competitive Strengths

- Intelligent Fabric adds a number of new features that ease the networking lifecycle.
- 'Application Fluent Networking' is ALE's centerpiece for LAN-to-data center application networking.
- Integration with Citrix lets ALE deliver virtual desktops quickly and reliably.
- ALE is improving new training and mentoring, which will help its channel partners sell, implement, and support ALE's products and services.
- Alcatel-Lucent Enterprise's mesh and pod architecture is flexible and robust with plenty of scale.
- Demonstrated SPB interoperability and a RESTful interface are the foundation of Alcatel-Lucent's SDN plans.

Competitive Weaknesses

- ALE still does not have a partnership with VMware's NSX, which is table stakes in most enterprise data centers.
- While ALE is still building its channel, the company has limited support partners in certain geographies.
- ALE has limited brand awareness in North America, which is an inhibitor to growth in the region.

Current Perspective
Very Strong

ALE, marketed under the brand Alcatel-Lucent Enterprise, is very strong in the data center with both the scale and market presence to weather any storm. It continues to post gains in revenue and is seeing growth in many markets around the globe.
The 'Application Fluent Network' (AFN) is described by ALE as the embodiment of a flexible network that meets the demands of rich media applications and virtualization within the enterprise. Recent announcements from many vendors reinforce the increasing awareness

that the market is heading towards an application-aware environment, and here, ALE has a head start.

ALE's recently announced Intelligent Fabric is the company's first big networking initiative since splitting from Alcatel-Lucent and is setting its direction in next-generation networking. ALE is also targeting Intelligent Fabric at the entire enterprise network, providing an end-to-end network that has many operations automated without relying on a controller-based infrastructure, yet enabling the infrastructure to be fully orchestrated from a controller or cloud manager if required by the administrator. Intelligent Fabric fits well with ALE's technology track and is non-disruptive, unlike migrating an enterprise to a controller-based SDN. ALE is also enhancing OmniVista 2500, its network management station, with new network analytics reporting and predictive analysis.

Within the OmniSwitch portfolio, the OmniSwitch 10K provides dense chassis switch capabilities, acting as either aggregation or core device, while the OmniSwitch 6900-Q32 provides dense, wire-speed 10/40 GbE aggregation and the new OS6900-X72 offers high-density 10 and 40GbE top-of-rack connectivity. These, in addition to the OmniSwitch 6850E and the new OmniSwitch 6860/OmniSwitch 6860E Gigabit switch offering, provide customers with a variety of high-performance access and interconnect solutions. The OmniSwitch portfolio offers inner tunnel VXLAN visibility and differentiated services for inner traffic control. New members of the OS6900 family offer VXLAN L2 VTEP support. ALE has demonstrated field trial interoperability with VMWare NSX 6.1.4 and VMWare vSphere 6.0 with common business partners.

Architecturally, ALE proposes a mesh and pod concept, whereby up to 480 access ports are woven together for a 1:1 performance ratio with sub 1-usec latency, and pods can be interconnected or linked up to an aggregation/core layer, enabling scale from hundreds to up to well over 10,000 access ports with just two core switches.

At the core of the AFN concept, as applied to data center switching, is a predefined application behavior profile, which ALE dubs 'virtual network profile' (vNP). The vNP is in turn associated with an application and has appointed metrics, QoS configurations, access control policies, and other parameters that dictate network behavior to optimize the environment for a given traffic and security need, whether media, big data, or other. With the recent software update, vNP also includes the ability to detect VMs in VXLAN environments, providing consistent visibility and QoS/security controls across both the virtual and physical networks.

With Intelligent Fabric, the network operation will experience far fewer manual configuration changes, and as data center environments continue to increase in complexity exponentially, many enterprise data center architects are seeking ways to simplify their administration tasks. This technology is also used to respond to changes in the application environment, automatically reconfiguring the network when the virtualization platform moves a virtual machine from one physical location to another within – or even between – data centers, automating what all too often is a manual process for the network administrators. With the recent software update, all of these capabilities extend to the VXLAN virtualized network environments.

Strengths and Weaknesses

Strengths

• Intelligent Fabric automates network deployment and real-time operations by simplifying the networking lifecycle from initial deployment through capacity planning for both the data center and the campus LAN. Intelligent Fabric is initially a firmware upgrade on the OmniSwitch 10K and 6900 product lines with plans to move downstream in the future.

• ALE has approached the data center with technology and a message centered on Application Fluent Networking that addresses one of the greatest challenges IT faces in the data center, which is managing the application experience versus the devices and individual elements. This focus is the foundation for the architecture and key to ALE's entire offering from data center to campus. The approach, operationally, is fully automated and triggered by users, applications, and virtual machine movement. The fully integrated OpenFlow 1.0/1.3 agent allows integration and operational control by standard-based SDN controllers.

• ALE's virtualization partnership with Citrix enables customers to deploy a tightly integrated ALE Intelligent Fabric into an existing Citrix solution quickly, or to plan a new project around Citrix technology. This speeds time to deployment and offers customers a strong L2-L7 solution for desktop virtualization, a Citrix strength. As VDI continues to gain traction in the market, this solution's value will only increase and pay dividends for Citrix, ALE, and ultimately customers that deploy the joint offering. ALE is also integrated with XenServer for quick network response when virtual machines are moved, added, or deleted, which simplifies network operations.

• ALE's global reach and scale provide customers with reasonable channel and support accessibility, regardless of the country in which they are located. Though strongest in

Europe, ALE has heavily invested in growing its channel and support network in the Americas and Asia. China Huaxin having a majority stake in ALE may open doors in China which would be otherwise closed to foreign technology companies. ALE is enhancing its data center channel with new training, on-site mentoring, and integration workshops aimed at educating the channel of the company's products and capabilities.

• The pod and mesh architecture proposed by ALE is both simple to deploy and highly scalable. It is ALE's name for a leaf-spine architecture, and with the throughput and features provided on the OmniSwitch 6900 and OmniSwitch 10K, it scales up to 28,800 access ports with just two core switches. For many data centers, this is a sufficient number of access ports to accommodate growth for the life of the data center. The 40GbE availability demonstrates ALE's commitment to delivering high-performance networks for modern data centers, while the OmniVista 2500 controller, along with a highly programmable and scriptable CLI and RESTful interface, simplifies the integration with OpenStack orchestration.

• Full interoperability with existing infrastructures enables deployment and transition to the mesh/pod architecture without requiring a wholesale replacement, thus preserving investment and easing customers into a full fabric architecture gracefully. ALE, Avaya, HP, and Spirent demonstrated shortest path bridging interoperability, further cementing ALE's commitment to standards-based networking.

Weaknesses

• ALE still does not have a partnership with VMware's NSX, which is table stakes in most enterprise data centers. While passive VM detection will work in many situations, ALE's VM detection will not see the payload if the traffic between the hypervisors is encrypted. While ALE's VxLAN can be used for inter-data center connections, the product currently does not perform any special processing such as MAC learning or broadcast and multicast control, which can negatively impact LAN functions over the WAN.

• As with most modern network virtualization architectures, ALE's solution depends on an edge-to-edge data center capable of vNP application and control for a fully automated zero-touch operation. In ALE's installed base accounts, this will not present as much of an issue, as the AFN solution works on most of the OmniSwitch families. However, in mixed vendor environments, the value for automation and control would be inhibited or severely limited to the network segments where ALE equipment is not utilized.

• ALE has invested significantly in its support and channel networks; however, the number of support partners still pales compared to some competition. These solutions are nearly certain to require some assistance at some point and having rapid access to competent support personnel is critical. After all, the data center is the most sensitive and important element within IT today.

• ALE still suffers from brand visibility and awareness in the enterprise beyond the core optical and carrier strengths of its former majority owner, Alcatel-Lucent.

Point and Counterpoint

Point

• If ALE's products are so hot, why is it that they are not popular in the North American market? Is it that ALE is a Chinese company headquartered in France and pays more attention to the needs of European and Asian customers?

Counterpoint

• ALE has continued to make strides in penetrating and raising awareness in North America. ALE is a truly global company with many markets to serve and an important one is North America. In the last 12 months, ALE has won dozens of regionally and globally recognized brands and logos, all of which indicate that ALE can certainly win the technology side of the business based on merit and value. ALE continues to show positive growth in campus and data center networking in nearly all markets and segments. With significant resources invested in a revamped and focused channel program, ALE continues to sign on many new partners and thus sees increased funnel activity throughout the region.

Point

• ALE does not have a software-defined networking strategy and cannot support the programmability requirements needed for private clouds or their dynamic nature.

Counterpoint

• AOS, the operating system running on the OmniSwitch, currently offers a full set of RESTful APIs, an OpenFlow agent with support for up to four logical switches for device

partitioning, OpenStack support, OVSDB support, embedded Python3 support, and CLI scripting for programmability by internal logic or external orchestration from systems such as cloud platforms and hypervisor management systems. In addition, AOS embeds functionality that detects, classifies, and prioritizes applications automatically, reducing operational overhead. The benefits are available in ALE's mesh and pod architecture. It also has proven interoperability with other networking vendors and SDN orchestrators such as NEC ProgrammableFlow Controller.

Buying/Selecting Criteria

Scalability

Very Strong

• The new OmniSwitch 6900-Q32 doubles the capacity to 32x40G Ethernet ports or up to 104x10G Ethernet ports using a 4:1 QSFP+ breakout cable and sub one-microsecond of latency port to port. When the 6900-Q32 is used in ALE's pod architecture, a total of 480 ports can be managed in a single pod.

• The new OmniSwitch OS6900-X72 delivers up to 72x10GbE in a configuration of 48 SFP+ ports plus six QSFP+ ports. The QSFP+ ports can be split using a 4:1 QSFP+ breakout cable or transceiver. The switch port-to-port latency is sub-microsecond. When the OS6900-X72 is used in ALE's pod architecture, a total of 288 ports can be managed in a single pod.

• With delivery of the 40G technology modules and 100G options slated for release, the mesh architecture is now enabling multiple pods to connect at extremely high data rates and provides the scale to address all but the 'hyper' class data center architectures, which are a unique breed.

• With 10GbE, 40GbE, and 100GbE options in the product family, ALE has taken care to provide investment protection and scalable capacity for the platforms.

• With Intelligent Fabric/vNP, enterprise IT administrators possess the ability to save significantly on management cycles by enabling the network to optimize itself, autonomously, based on application auto-discovery and application profiling. As configuration deployment requires less labor cycles, fewer administration hours are spent maintaining the network; therefore, the same number of headcount can manage the same network size. This technology also plays in with VXLAN environments, providing management ease through consistent treatment of applications across virtual and physical environments.

Performance

Strong

• The OmniSwitch 6860/OmniSwitch 6860E/OmniSwitch 6900 and OmniSwitch 10K all perform at line rate when populated. This simplifies deployment and architectural consideration and offers headroom to grow as the data center needs expand.

• The pod and mesh architecture is the result of an aggregate of 40G links both between OmniSwitch 6900s and the OmniSwitch 10K which results in an interconnect mesh that scales with the solution to over 20,000 ports.

Convergence

Very Strong

• ALE has added VXLAN gateway and VXLAN overlay support and integrated it within its AFN framework to provide true visibility, security, and QoS for applications in the virtualized network, ensuring appropriate performance of applications no matter where they are residing in the data center. However, ALE lacks certification with VMware's NSX, which can impact its ability to sell to VMware customers.

• ALE supports DCB and FCoE abilities on the OmniSwitch 6900. In addition, the OmniSwitch 10K also possesses support for these convergence standards and ALE has demonstrated shortest path bridging interoperability with other vendors, allowing customers to deploy a mixed environment if desired.

• ALE has added native FC attachment to the OmniSwitch 6900 as promised, with a

module offering 12 universal ports that can support 1 and 10G Ethernet as well as 2/4/8G Fibre Channel. In addition, the OmniSwitch 6900 supports NPIV FCoE to FC forwarding, FIP snooping, and FCoE – all underpinned with DCB support for lossless operation.

• With its flexible queue capability and control, storage applications that employ iSCSI or AoE can be assigned a vNP, which can provide high-priority service levels to the traffic running over any of the OS devices within the data center.

Management and Ease of Use

Very Strong

• ALE has enhanced the OmniVista 2500 management software, adding predictive network analytics and key performance indicator reporting. Network analytics provides visibility both on a micro level and on a macro level of users, applications, and switch usage for proactive management of the network. The predictive analytics monitors traffic loads and predicts future capacity requirements, helping IT better plan for network upgrades or implement traffic management measures. It also provides an avenue for partners to offer additional services for consulting.

• 'Application fluency,' the concept of application awareness and network automation, is one that more vendors are embracing, if under different marketing names. In order to address the scale needs sought by carriers and public cloud providers, in addition to the largest enterprises, the only method to manage an environment with tens of thousands of access ports is through some software autonomy.

• ALE has introduced its Intelligent Fabric plug-n-play features which allow a network administrator to deploy the solution without requiring any configuration. This feature provides the capability to discover and configure LACP, SPB, and MVRP at first-time boot-up or at runtime and provides for self-attachment of devices, access switches, servers, and applications to the network.

• The vNP technology employed by ALE provides scale and ease of use, though its greatest benefit may be in the ability to roll out a service level agreement (SLA) policy rapidly, with confidence that all devices are properly configured. In addition, the vNP capability reduces configuration errors by eliminating tedious QoS and policy administration, which at the level provided by ALE would have been done in both ACLs and within the QoS control.

• The Intelligent Fabric can detect when a new VM is enabled by passively analyzing the LAN or VxLAN traffic and applying the appropriate virtual network profiles (VNP) defining quality of service and access controls. Virtual machine discovery occurs independently of the hypervisor and hypervisor management system.

• The RESTful APIs, python library, and CLI scripting make ALE's OmniSwitch fully programmable, supporting third-party control by external management and orchestration platforms. These features are well documented and well suited to dynamic, virtualized data centers. ALE has also introduced application fingerprinting, which allows the classification of applications based on REGEX signatures and provides the capability to discover and treat the applications at run time based on well-known signatures beyond traditional L2-L4 classification. It has also introduced deep packet inspection (DPI) technology in its OmniSwitch 6860 platform to provide full L2-L7 application classification.

Total Cost of Ownership

Very Strong

• ALE has always priced its switching technology aggressively in the market and offered flexible feature licensing to enable customers to deploy the device today and utilize a feature or capability later as business needs dictate.

• Labor savings and OpEx implications with the Intelligent Fabric/vNP technology could prove to be significant over time. However, the impact of these savings may be reduced by the fact that few, if any, customers adjust their QoS after initial deployment, instead defining two or four queues and simply assigning applications based to one of these. The other operational benefit of vNP technology is the automatic network reconfiguration when a virtual machine is moved from one hypervisor to another, which is a common integration feature.

• One other hidden cost that may become quite significant as enterprises move to embrace more public cloud applications is the ability to mesh together services versus having a simple VPN or alternative connection. With that in mind, new or additional protocols may influence architectures and service choices to a degree. Shortest path bridging, one of the

evolving alternatives to spanning tree (used to address the multi-link use limitation from which spanning tree suffers), provides good compatibility with many carrier systems and is a good option to implement on many existing systems which support the IS-IS protocol.

• The pod/mesh architecture significantly reduces the footprint (e.g., number of devices, etc.) to support the data center networking requirements. TCO models show significant savings over competitor implementations – sometimes up to 70% or more. ALE's flexible networking architecture supports a variety of topologies such as spine and leaf, rings and subtending rings, partial mesh and full mesh.

• ALE products have been certified as Citrix Ready for several Citrix products. This aids in the ease of deployment for virtual desktops and increased application visibility and performance by utilizing Citrix NetScaler. ALE's network management platform has also been integrated with Citrix XenServer to provide network automation as it relates to virtual machine provisioning and mobility.

Metrics

Metrics

Switch Models	OmniSwitch 10K: up to 64 40GigE ports or 256 ports 10GbE non-blocking, full IPv4, IPv6 support; future 100GigE modules. OmniSwitch 6900: SFP+-based models with 20- or 40-port models with one or two expansion bays (up to 32 or 64 ports wire-speed 10GbE SFP+, respectively), QSFP+-based models with 32-ports of 40GbE or 104 ports of 10GbE. In X20- or X40-port models with one or two expansion bays (up to 32 or 64 10G ports, respectively), full IPv4, IPv6 support, and a set of expansion modules available for all base models, including up to a three-port 40GigE module release, an eight-port 10Gbase-T module, up to a 12-port 10GbE SFP+ module, and up to a 12-port universal module supporting 1/10GbE together with a 2/4/8 Gbps native FC interface. In T20- or T40-port models with one or two expansion bays (up to 28 or 56 10GBase-T ports, respectively), full IPv4, IPv6 support, and a set of expansion modules available for all base models, including up to a three-port 40GigE module release, an eight-port 10Gbase-T module, up to a 12-port 10GbE SFP+ module, and up to a 12-port universal module supporting 1/10GbE together with a 2/4/8 Gbps native FC interface. OmniSwitch 6860(E) 24 or 48-port 10/100/1000 models with up to 4x10GbE (SFP+) uplinks, full IPv4, and IPv6 support. OmniSwitch 6850E: 24 or 48-port 10/100/1000 models with up to 4x10GbE (SFP+) uplinks, full IPv4, and IPv6 support.
Fabric Scale with 2 link layers	Pod: Six OmniSwitch 6900s all directly connected (concurrent) to each other resulting in 480 10GigE server ports and in addition six 40GigE links available for interconnecting pods to each other or for connecting to core switches. Multiple pods (480 ports) can be interconnected to form Alcatel-Lucent's mesh for a two-layer environment providing up to 28,800 server ports using two core switches at 1:1.8. The pod is an array of any model of OS6900, providing flexibility to match the specific needs of the customer.
Storage Convergence	FCoE support in OmniSwitch 6900 family; Native FC support with N-port Interface Virtualization (NPIV) gateway functionality, FC-BB5 and FC-BB6 standards compliant, Enhanced Transmission Selection (802.1Qaz), Priority Flow Control (802.1Qbb), Quantized Congestion Notification (802.1Qau)
Failover Mechanisms	OmniSwitch 10K hardware: PSUs, fabric, fans, and management; OmniSwitch 10K software; OmniSwitch 6900 hardware: PSUs and fans
Active Multi-link technology (spanning	MC-LAG, SPB, virtual chassis

tree solution)	
Management	CLI/web-based management; OmniVista 2500 GUI for network & configuration management; OmniVista 2500 Virtual Machine Management; OpenStack plug-in; 5620 Service Aware Manager (SAM) for end-to-end management and monitoring for multi-site DC, cloud, etc. for deployments in conjunction with Alcatel-Lucent's IP service routers and optical networking equipment
Distribution location / Multi-site capabilities	Data center interconnection using Alcatel-Lucent's IP services routers and optical networking equipment; SPB-M interoperability

System / Software Resilience

"Hot" System Patching	OmniSwitch 10K provides for hitless software upgrades when appropriately configured (2x management/fabric). OmniSwitch 6900 provides hitless software upgrades with staggered reboot when configured in a virtual chassis configuration.

Performance

Box / Fabric Latency (if stated)	Pod: 480 1:1 10GbE ports, sub 1us latency any point to any point; Mesh: with two core switches 28,800 10GbE access ports, sub 4us aggregate latency any point to any point

This report is tagged to the following vendor(s):

Alcatel-Lucent Enterprise

This report is tagged to the following content areas:

Service: Enterprise IT and Services , Business Technology and Software
Market: Cloud Technology and Services , Data Center Technology

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