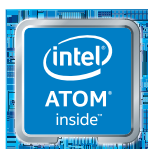# 128 Technology,* Lanner,* and Intel Deliver Next-Gen SD-WAN

Branch office communication networks are changing to deliver cloud services for workers. Communications service providers can meet these needs with SD-WAN services powered by Session Smart Routing technology from 128 Technology running on Intel® processor-based white box servers from Lanner.

Overview

Software defined wide area network (SD-WAN) systems are increasingly being used to build all-encompassing branch office WAN devices that are able to meet legacy WAN needs and provide access to cloud-based services via the Internet. One method of doing this is to run this software on virtualized, low-cost white box servers. The goal is to create a universal customer premises equipment (uCPE) device supporting all of the services needed by the branch, such as firewalls, load balancers, WAN optimizers, VPN gateways, and others, as virtual network functions (VNFs).

However, accommodating all of this functionality places huge compute demand on the server with each service function requiring its own cores and memory. The performance on these servers can easily be maxed out, limiting the ability of the communication service provider (CommSP) to introduce new services or modify existing services and/or service functions.

To adjust, CommSPs must add separate fixed-function appliances —"middle-boxes"— and develop complex service chaining among different devices to direct data flows. The complexity of this process leads to errors and higher costs. The processing overhead needed to support all of these service functions requires more powerful white box servers, resulting in a uCPE that is not cost-effective for many branch office locations.
128 Technology* has developed smart routing technology that integrates core networking services in a single VNF that can be run on a cost-effective white box server. The company has teamed with Lanner* to deliver an SD-WAN uCPE-based on Lanner's white box servers powered by Intel® processors.

Challenge

As cloud services grew in popularity, branch offices added Internet networking equipment alongside their legacy WAN access systems to provide responsive cloud service for workers. Since the legacy WAN equipment was already installed, the initial response was to add fixed-function appliances (middleboxes) for each new service and to create composite functions using service chaining of those appliances. But middleboxes come with high infrastructure and management costs because they are fixed-function appliances that utilize complex and specialized processors. Middleboxes also introduce management complexity in terms of variations in management tools across devices and vendors, and the need to consider policy interactions between these appliances.

Service function chaining of virtual middleboxes results in some minor cost savings, but places higher demands on the uCPE or complex chains in the cloud. Many of these problems can be resolved by providing integrated middlebox functions natively in the router.

Solution

The 128T Networking Platform from 128 Technology utilizes the company's Session Smart routing software technology in order to obviate the need for multiple common middlebox functions when building application-friendly branch office networks. The Session Smart routing architecture is composed of three technologies:

- **Session-Aware Data Plane:** Transforms a stateless layer 2 or layer 3 network data plane into a fully session-aware, in-band signaling data plane. This allows computation and enforcement of deterministic end-to-end route vectors that can also serve multi-tenant applications.

- **Services Control Plane:** For control, the 128T features a Services Information Base (SIB) that combines dynamic service policies and IP routing tables. This control plane is distributed among multiple platforms and features multi-tenant service enablement.

- **Open, Service-Centric Automation and Analytics:** Applications, orchestration, and automation tools are enabled by RESTful and Netconf APIs, which provide the capability to integrate other networking applications.

Because the software is not based on tunneling mechanisms, the user scaling benefits are significant. It removes overhead processing, eliminating issues with fragmentation and performance. Integrated functions like L2-L4 firewall, load balancing, session migration, session duplication, application identification, and other functions can be deployed in a small hardware footprint, allowing the use of low-cost white box servers as uCPE and the ability to chain special service functions within the CPE when needed.

Lanner Hardware Powered by Intel Processors:
128 Technologies has teamed up with Lanner to develop a uCPE that combines its software running on Lanner white box servers. Several of Lanner's servers powered by Intel Atom® C3000 processors and Intel Atom C2000 processors can be utilized for this uCPE application. The most flexible system is the Lanner NCA-2510, a virtualization-optimized 1RU-high server that utilizes Intel Atom C3000 processors and is available with between 4 and 16 cores and up to 32 GB of memory. The NCA-2510 supports up to four 10 GbE small form-factor pluggable (SFP+) optical connections in addition to a four-port Intel® Ethernet Server Adapter I350 Gigabit Ethernet controller. The NCA-2510 leverages other Intel technologies including single root input/output virtualization (SR-IOV), Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI), and Intel® QuickAssist Technology (Intel® QAT). Combined, these technologies give the device the features and throughput for vCPE, uCPE, SD-WAN, and software-defined security applications.

Figure 1. Front view of Lanner NCA-2510

The server configurations engineered by Lanner can support the resource-demanding management and orchestration framework needed for virtualization. These configurations include Open vSwitch* and the Data Plane Development Kit (DPDK); these two technologies accelerate packet processing and throughput to support multiple virtual machines and virtual network functions (VNFs) running—and contending for resources—on the same hardware.

Memory allocation per VNF is an important consideration for uCPE applications, as many VNFs are trying to squeeze every sector of the platform plus some additional headroom that might be needed in the future. This can become a costly bottleneck for future growth. In addition to the server's 32 GB of memory, the combined uCPE solution leverages 128 Technology's session-oriented, state-based architecture. This software design enables intelligent session distribution algorithms that require less overhead processing and memory allocation.

The servers come with optional support for LTE and Wi-Fi to offer CommSPs a valuable network option for self-configuration from the network.

Deployments: The combination of 128T Session Smart technology with innovative hardware from Lanner powered by Intel has been deployed in various secure interconnect and SD-WAN scenarios:

- A Tier 1 US CommSP utilizes the solution to provide a branch office network to a retail chain with more than 4,000 stores nationwide. The CommSP chose the solution because it can switch from an active connection to a backup connection without the need for a pre-established backup tunnel without a service disruption.

- A building materials manufacturer built its WAN using the technology and was able to realize outstanding application response with no need to add costly new network services. This was due to 128 Technology's innovative Smart Session Routing, which freed up bandwidth for users.

- A cloud-based communications provider deployed the solution in order to extend security and service level agreements (SLAs) to hundreds of hospitals. The solution enabled the service provider to have complete visibility and provide performance guarantees in case of any failures along the path.

Conclusion

The dynamic networking requirements of today's branch office WANs is increasing the need for specialized networking functionality. The challenges of developing an SD-WAN solution that balances legacy WAN services with Internet routing, firewalls, load balancers, WAN optimizers, VPN gateways, and other functions has led many service providers and enterprises to service chain these functions—either as discrete appliances or as virtual appliances. A more cost-effective and easy-to-manage alternative is to combine Session Smart Routing from 128 Technology with the power of Intel CPUs and Lanner's innovative hardware design. The result is a true uCPE that provides all necessary networking functions in a cost-effective white box server that still has the capacity to allow CommSPs to deploy other service-provisioning VNFs.

About 128 Technology

For businesses held back by the complexity of their networks, 128 Technology routing software simplifies everything with its revolutionary Session Smart Technology. For more information, visit www.128technology.com.

About Lanner

Lanner Electronics Inc. (TAIEX 6245) is a worldwide hardware provider in design, engineering, and manufacturing services for advanced network appliances and rugged industrial computers. Lanner provides reliable and customizable computing platforms with high quality and performance. Today, Lanner has a large and dynamic workforce of over 900 well-experienced employees worldwide with the headquarter in Taipei, Taiwan, and subsidiaries in the US, Canada, and China.

About Intel® Network Builders

Intel® Network Builders is an ecosystem of independent software vendors (ISVs), operating system vendors (OSVs), original equipment manufacturers (OEMs), telecom equipment manufacturers (TEMs), system integrators (SIs), enterprises, and service providers coming together to accelerate the adoption of network functions virtualization (NFV)-based and software-defined networking (SDN)-based solutions in telecom networks and in public, private, and hybrid clouds.

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