REPORT REPRINT

Arista speeds up its big switches, says it's ready to take on Internet-scale routing

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Even as Arista gets big, it isn't showing any signs of slowing down. It recently announced a refresh of its high-end 7500 chassis switch family and introduced full routing capability for most cloud applications, enabling customers to use the 7500 instead of traditional 'Internet routers.'

Arista announced a refresh of its high-end 7500 chassis switch family (the 7500R) and the introduction of what it says is full routing capability for most cloud applications, enabling its cloud customers to use the 7500 rather than more expensive, larger and more power hungry traditional 'Internet routers.' Switches and routers both perform very-high-speed packet forwarding using specialized ASICs. Internet routing differs from datacenter or enterprise network routing in the size of the forwarding table required; the ASICs used in the switches that perform intra-datacenter interconnection in modern datacenters typically can't hold enough packet-forwarding rules to do Internet-scale routing.

THE 451 TAKE

Arista continues to demonstrate how switches built with merchant silicon can be competitive in the marketplace, now adding Internet routing to its product portfolio. Although Arista is approaching $1bn in annual revenue, it has continued a product cadence that quickly leverages a new generation of switch chips, and continues to leverage its EOS software investments and assets. Being able to do full Internet-scale routing on a power-efficient and port-dense chassis switch (compared to a fuller-featured traditional Internet router) will add important use cases and expand available markets for Arista.

PRODUCTS

The announcement included a new version of the 7500 chassis switch family (the 7500R) and new software routing functionality – FlexRoute. The 7500 is a family of chassis switches that use a variety of line cards that differ in port and interface specifics that are then integrated to into a larger switch. The family includes chassis that support four-, eight- or 12-line cards. Arista says the largest switch has total forwarding capacity of roughly 115Tbps and is capable of forwarding more than 90 billion packets per second. It has introduced three new line cards, each capable of supporting 10/25/50/40 and 100GbE ports in a variety of physical configurations. The 7500R can also use the earlier E series of line cards at their full capability, demonstrating, Arista says, its commitment to customer investment protection. Compared to existing Internet routers, Arista says the 7500R uses significantly less power and has greater port capacity and density. The 7500R is available in NEBS-compliant configurations to facilitate telco use.

The 7500R is based on the most recent Broadcom packet-forwarding chips from the Dune acquisition (the 'Jericho' chipset). The Jericho chips are designed for this kind of very-high-capacity switch. Most top-of-rack switches are based on Broadcom's Tomahawk chips.

Arista highlights how it has used a combination of Jericho features and EOS software to deliver high switch throughput. This includes an internal 'cell' architecture whereby larger packets are broken down into data 'cells,' and the cells that collectively constitute the packet are forwarded individually through the fabric, assuring more deterministic forwarding behavior and shorter latency. Like all switches, the 7500R capacity is limited by the output capacity of each link. The Arista design strives to assure that congestion on an output port will not introduce congestion on other ports (a 'non-blocking' design). To achieve this, the Arista 7500 Series designs have always incorporated large internal packet buffers on each line card. The 7500R features 'virtual' packet buffering, meaning that these packet buffers can be allocated dynamically based on incoming traffic (rather than being pre-allocated).

INTERNET-SCALE ROUTING

The other big component of this announcement is full Internet routing. This, in turn, is based on specific use of Jericho chip features, new software functionality Arista calls the FlexRoute engine, and an evolved datacenter networking architecture where the layer of Internet routers is replaced with a functionally equivalent layer of high-performance switches – the 'routing spine.'

Switches and routers both function by forwarding packets toward their ultimate destination, picking among the various paths available. Packet forwarding is implemented in specialized ASICs that parse various packet header data (e.g., the IP address of the destination) and then look for rules that apply in high-speed associative memory to determine the forwarding action to be taken. Datacenter switches already do routing (sometimes called L3 switching). Doing routing at Internet scale requires larger hardware rule tables than for routing within a datacenter or corporate network. In the past, Internet-scale routers used specialized, proprietary forwarding ASICs that consumed considerably more power than the merchant chips used in less complex networks, and often included features of value to a network service provider but not of value in cloud networking.

Arista says that it is able to include four times as many routes in the Jericho hardware as other vendors have to date because of its innovative programming of the hardware rather than using Jericho with the standard libraries provided by Broadcom.

Arista also described new routing software it has developed (FlexRoute) that leverages the data sharing between the Arista switches in a network (and other additions) that have been added to Arista's EOS software platform NetDB. Arista says that FlexRoute responds to routing changes significantly faster than competitive routers.

MARKETING

Arista has identified a number of use cases for the 7500R as an Internet-scale router that are relevant to the cloud datacenter markets that it already serves. These applications are based on the use of a new routing 'spine' layer that incorporates and coordinates the routing of multiple switches (typical for availability). Arista also says that the programmability of its switches make them attractive in modern datacenter network architectures where, among other changes, comprehensive optical network subsystems are being replaced by an integration of simpler optical transmission subsystems (or even electrical/optical transceivers directly connected to the switch) with Ethernet switches, and the collection of elements are managed as a whole, for example by an OpenDaylight-based controller.

The specific use cases Arista identified are Internet peering, and what Arista describes as an evolution to a content-driven Internet; the construction of inter-datacenter WANs that interconnect a set of datacenters that serve the same application; and within service providers' networks as they are transformed to use software-agile network functions virtualization.

COMPETITION

Arista identifies Cisco as its primary competitor and regularly shows Arista's growth coming with the parallel decline of Cisco switching share. Arista also competes with the other contenders for the switching market but is clearly the leader of that pack, exhibiting 40% YoY growth in a market that is at best growing very slowly. The 7500R is comparable in performance to the high-end switches from the incumbent vendors.

Arista also competes with commodity switches and homegrown networking software in the cloud market. Although the biggest cloud providers are on paths to develop and supply much of their own switches and networking software internally, Arista suggests that they are still significant customers for network 'edge' applications such as routing that leverage the programmability and capacity of the Arista switches.

SWOT ANALYSIS

STRENGTHS

Arista is clearly the poster child of the switch industry, having successfully built and taken public what is now nearly a $1bn, profitable and growing company. Arista believes its strongest differentiation is its software architecture and applications, but the 7500 family clearly shows its competence as a designer of high-end switch hardware as well.

WEAKNESSES

Arista is dead center in Cisco's competitive crosshairs; historically, Cisco has been a formidable opponent.

OPPORTUNITIES

IT broadly is rapidly transforming with the evolution to mobile applications and cloud computing. From its beginning, Arista has successfully exploited the emerging cloud network marketing opportunity, which continues to be a bright spot in the networking business.

THREATS

Cisco is aggressively pursuing Arista in the courts and has attained a determination by an administrative law judge of the US International Trade Commission that, if it stands, would be a significant business problem for Arista. Cisco also has IP suits in the courts. Arista, like all vendors, is threatened by the competence of its customers and their ability to design and supply their own equipment (servers and switches), including software should they so choose.