

Autonomous Vehicle pioneer Zenuity accelerates its network with Arista to deliver multi-petabyte workflows for AI and deep learning innovation

Highlights

Challenge

Zenuity needed to upgrade its legacy three-layer network to a more advanced leaf and spine architecture to improve performance and enable automation capabilities to support multi-petabyte AI driven workloads.

Solutions

- Arista 7500 series universal deep buffers switches for high performance, low latency and scale
- Arista Software Driven Cloud Networking delivering standard based SDN innovation
- Arista EOS to implement standards based and API driven automation capabilities

Results

- Improved performance, lower latency and better reliability at scale
- Standards driven and open API to enable extensive automation to improve operational agility
- Seamless migration processes with proven roadmap to meet future growth requirements

To better handle huge volumes of data powering projects with the field of artificial intelligence and autonomous vehicles, Zenuity decided to upgrade from its legacy three tier network to Arista spine and leaf architecture that has delivered new levels of performance, automation and scale.



Z E N U I T Y

Make it real.

Project Background

The automotive industry is driving towards a future of autonomous vehicles that offers benefits including less accidents, greater fuel efficiency, decreased pollution, and more freedom for car operators. Zenuity, a Sweden-based company with offices in Europe, China and the United States, is tackling one of the greatest challenges facing the automotive industry by developing a software strategy that places the company's expertise in artificial intelligence (AI) and deep learning at the center.

At the core of successfully developing autonomous vehicles (AV) is the software running on powerful AI car computers that will be entrusted with making crucial, real-time decisions. Deep learning is enabling these AV systems to feed these systems needed to build advanced automate driving software, Zenuity collects, stores and processes vast amounts of data.

Some of it comes from a fleet of test vehicles that are equipped with state-of-the-art lidar technologies, sensor, radar and computer vision systems that gather hundreds of terabytes a day that needs to be stored and processed in HPC data centres. Data is also generated by re-simulations and shared between automotive partners across the world to help the company to build and test new features with robust performance.

This data needs to flow around different parts of the organisation for processing but the legacy network infrastructure within its main Swedish campus feeding two additional datacentres was proving problematic.

Challenge

"Our legacy network architecture could not guarantee us the reliability and throughput we needed," explains Joel Bergman, network architect at Zenuity, "In an environment where you are potentially pushing tens of petabytes across the network each day, delays result in loss of productivity and our workloads are growing by double digits each quarter."

The legacy network used a traditional three tier approach along with limited automation capability. "We are an agile company," says Bergman, "and alongside improving network performance, we have a strategic aim to allow our developer teams to provision more network capabilities themselves so they are not waiting on the network ops to make moves, adds or changes – with the overall aim to deliver a shorter time to market for our products."



In late 2018, Bergman and his team began evaluating several options with three clear goals. The first was a move towards a spine and leaf architecture that would deliver the peak throughput it needed. Another goal was to enable enhanced automation capabilities that could be integrated within an open, standards-based framework. Along with a credible roadmap to move from 100 Gbps to 400 Gbps over the next few years.

“We examined a number of network vendors and technologies in depth,” says Bergman, “Across all our criteria, Arista was the solution that genuinely made us excited – in many ways, it was the solution we wished other leading vendors could be.”

Solution

As an always-on environment, Zenuity planned a multi-stage migration to ensure no disruption to the production network. The heart of new network powering its deep learning efforts are Arista 7500 Series Universal deep buffer switches that utilises a virtual output queue architecture to provide deterministic low latency with no head of line blocking. Latency is predictable as packet sizes increase from a low of 3.5usec (port to port) for 64 bytes to under 9usec for jumbo frames which makes it ideal for handling the mixed workloads of the Zenuity environment.

Each Arista 7508R switch has up to 288 x 100G interfaces that fully configured, delivers up to 36Tbps switching capacity with a flexible arrangement of 10/40/100GbE interfaces.

The connected datacentres use Arista 7260CX3-64 as spine switches offering a 2RU system with 64 100G QSFP ports to deliver wire speed performance with an overall throughput of up to 12.8 Tbps. Leaf elements are handled by a mixture of Arista 7280 and 7050 series switches.

All the Arista switches across the Zenuity data centre infrastructure use Arista EOS, an inherently open and programmable network operating system built on a standard Linux distribution. This capability allows Zenuity to integrate with the broad ecosystem of Linux-based DevOps tools and includes API's to use well-known methods such as JSON/RP and protocols like Extensible Messaging and Presence Protocol (XMPP) plus the ability to natively support common scripting languages such as Python.



Benefits

“The reliability and performance of moving over to an Arista spine and leaf architecture has been outstanding,” says Bergman, “We believe we could not have created the production network that we have built to meet such a demanding workload with any other vendor solution.”

The production network has delivered 100% stability since launch and unpredictable network performance issues have been eliminated. “We are also about 90% of the way to delivering on our vision to move to a more NetOps way of working,” says Bergman, “We already have much of the automation in place for the network team and we are now implementing tools to help automate key network requirements for our software developers.”

Even over the duration of the project, Zenuity’s network requirements have grown by 30% and Bergman is now preparing for an initial move to Arista 400 Gbps networking solution to handle some of the most intensive deep learning workloads.

“We have been blown away by the responsiveness of Arista,” adds Bergman, “They understand our vision and have been with us every step of the way during this project. The strength of the relationship and the trust we have built means that we now have a partner for the next stage of our journey.”



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