



Cloud Evolution

Active Network Intelligence for dynamic, high-performing cloud-based networks

KEY BENEFITS

- Delivers equivalent performance to hardware-based deployments
- Improves TCO through optimized utilization of network resources
- Supports OpenStack for private cloud deployments
- Includes a high degree of automation for zero-day configuration
- Scales from small to large configurations to fit any network size
- Supports lifecycle operations for quick instantiation of VNFs
- Adheres to 3GPP and ETSI standards
- Supports public cloud deployments with Amazon Web Services

The biggest challenges operators face is increasing bandwidth consumption, which forces them to add capacity and resources to keep up with the market demands.

However, operators are often left with excess or outdated hardware that cannot be adapted to their new needs because of changing market dynamics. Aside from bandwidth pressures, operators are expected to run more reliable and higher speed networks, as subscribers demand better quality of experience (QoE) for their applications, while also keeping CAPEX and OPEX down.

Cloud-based deployments have the promise of achieving dynamic networks with improved profitability and service agility, while delivering a higher quality of service (QoS) to users.

The first wave of cloud has been expressed predominantly in 5G deployments, because cloud is deemed a critical component within 5G architecture as it allows edge deployment. However, since 5G and cloud carry the promise of higher bandwidth, lower latency, and a more reliable, interoperable architecture, benefiting operators, vendors, and end users, adoption is on the rise across all access types.

To ease cloud adoption, ETSI has defined a common cloud and Virtual Network Function (VNF) standard designed to facilitate operators in building and running reliable and flexible multi-vendor networks. Adhering to these standards and meeting the performance and latency goals with service-oriented solutions will be a critical success factor for network deployments in the cloud.

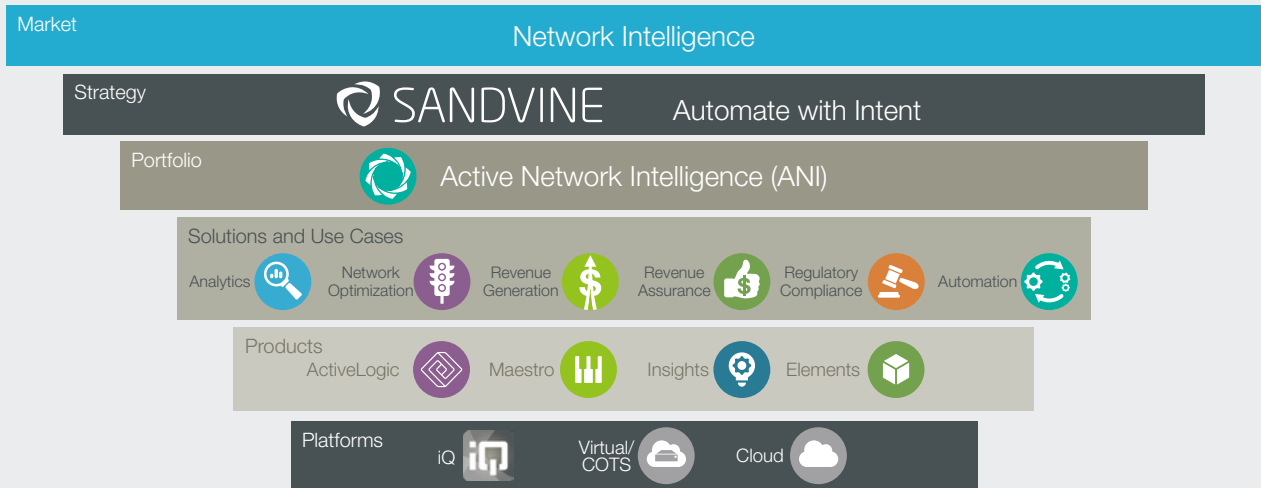
ACTIVE NETWORK INTELLIGENCE (ANI) PORTFOLIO

Sandvine's simplified and flexible architecture shown in **Figure 1** on the following page, achieves cost-effectiveness and better utilization of resources.

Specifically, this architecture enables operators to run networks more efficiently, permitting service differentiation and increasing the profit margins. This portfolio is also optimized to deliver Sandvine's ANI solutions, developed to address operators' current and future challenges without compromising on performance and functionality.

Figure 1

Active Network Intelligence Portfolio Hierarchy



ACTIVE NETWORK INTELLIGENCE IN THE CLOUD

Sandvine’s cloud-based ANI Portfolio enables operators to reap the financial benefits of cloud, without compromising on functionality or performance. It delivers uncompromised performance and resiliency for operators of any access and network type. This solution is a collection of orchestration templates, VNF, Network Services Descriptors, and VNF images developed for automated deployment and lifecycle in cloud environments.

Each component of Sandvine’s ANI Portfolio is represented by VNFs, consisting of a VNF Descriptor and VNF Image. Sandvine’s Cloud solution has been tested and validated on multiple cloud platforms, with proven high-performance in production deployments at multiple customers around the globe.

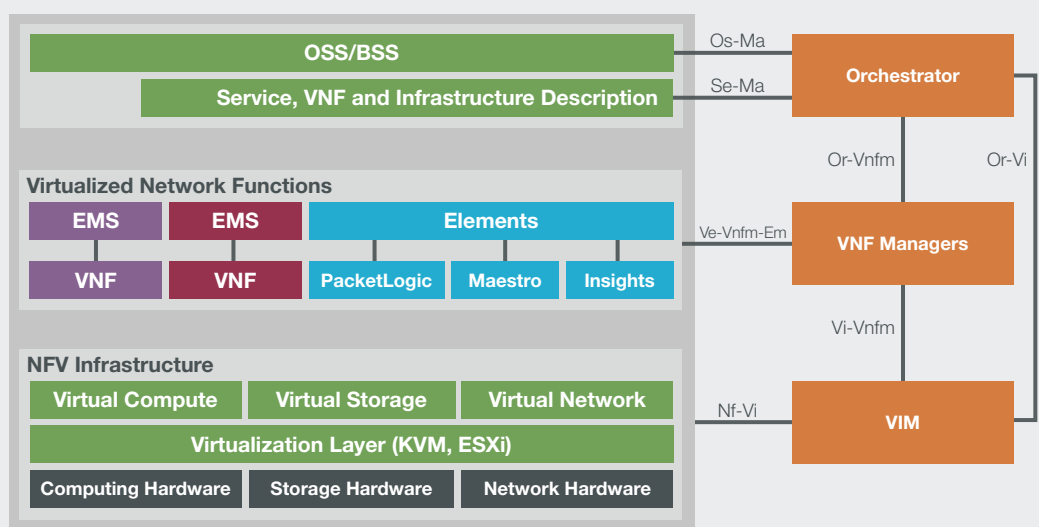
SANDVINE VIRTUAL NETWORK FUNCTIONS

Sandvine’s Cloud solution for ANI consists of these products in VNF format:

- **ActiveLogic VNF:** Hyperscale performance data plane, machine learning-powered advanced traffic classification – ready for any access or network
- **Maestro Policy Engine VNF:** Contextually aware control plane with flexible policy and charging control enabling application-based charging
- **Insights Data Storage VNF:** Analytics backend, high-performance database
- **Deep Insights VNF:** Analytics frontend, ANI Portal, and use case visualizations
- **Elements VNF:** Operation and maintenance of ANI Portfolio

Figure 2

Sandvine’s Cloud architecture is created in order to fit into solutions that are based on an architecture that complies or resembles the NFV architecture defined by ETSI.



Sandvine VNFs support various lifecycle operations, including VNF/NS (Network Service) instantiation, termination, and automation of zero-day configuration. Exact lifecycle scenarios depend on NFV Orchestrator capabilities.

Sandvine's Cloud solution can be deployed in telco (private) cloud networks with OpenStack, and public cloud through Amazon Web Services, to better utilize network resources and improve total cost of ownership (TCO). This solution undergoes interoperability testing and onboarding to Virtual Infrastructure Manager (VIM) and NFV orchestration solutions on a regular basis. Sandvine releases cloud orchestration packages for every validated NFV orchestration solution. Cloud orchestration packages consist of VNF and NS Descriptors and meta-information needed for deployment of the Sandvine solution.

Sandvine VNFs can be deployed in the latest OpenStack environments supplied by major NFV/VIM vendors.

SANDVINE VNFS PERFORMANCE INFORMATION

Sandvine ANI VNFs are highly optimized for cloud deployments. The table below summarizes performance test results for a typical, large deployment in private cloud OpenStack.

	ActiveLogic VNF	Maestro Policy Engine VNF
vCPUs	46 vCPU	16 vCPU
RAM	178 Gb	64 Gb
Storage	80 Gb	200 Gb
Hypervisor Type and Version	QEMU/KVM version 2.11	
Hardware Type	Dell R740 with Intel(R) Xeon(R) Platinum CPU	
OpenStack EPA Settings	HugePages, CPU pinning and SRIOV interfaces	
Total Throughput	Up to 90 Gbps	
Concurrent Active Connections	Up to 2,500,000 concurrent active connections	
Provisioned Subscribers	Up to 20,000,000 total subscribers	

ABOUT SANDVINE

Sandvine helps organizations run world-class networks with Active Network Intelligence, leveraging machine learning analytics and closed-loop automation to identify and adapt to network behavior in real-time. With Sandvine, organizations have the power of a highly automated platform from a single vendor that delivers a deep understanding of their network data to drive faster, better decisions. For more information, visit sandvine.com or follow Sandvine on Twitter at [@Sandvine](https://twitter.com/Sandvine).



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