



Traffic Steering Engine

Deploy service function chains in a straightforward, standards-compliant manner.

The Traffic Steering Engine (TSE) delivers carrier-grade horizontal scale and reliability in a completely virtualized solution, so it's aligned with CSPs' network functions virtualization (NFV) strategies; plus, the TSE is subscriber-aware, so it's the perfect enabler of today's subscriber-centric network services.

Service Function Support

The Traffic Steering Engine supports steering traffic to:

- Service functions provided by Sandvine (e.g., TCP acceleration, policy control, DDoS scrubbers, etc.)
- Any third-party service function that's compliant with the IETF Service Function Chaining (SFC) standard

Asymmetry Support

Unlike data center networks, CSP networks have routing asymmetry (as a means of ensuring resilience and redundancy). The Traffic Steering Engine can be deployed in networks with any degree of asymmetry, while still guaranteeing service function instance affinity (a necessity for high-performance service functions).

Horizontal Scalability

The Traffic Steering Engine delivers the cost-effective horizontal scalability that CSP networks need, but which is lacking in alternatives repurposed from other markets/applications:

- Each instance intersects up to 240 Gbps of full duplex data plane traffic, while concurrently steering that 240 Gbps of traffic to service function chains
- Multi-instance deployments scale linearly to infinity
- The redundancy model is a cost-effective N:N+1

Subscriber Awareness

In today's subscriber-centric world, many service functions need to be applied to only a subset of a network's subscribers; the Traffic Steering Engine's subscriber awareness ensures the traffic from only the appropriate subscribers is sent through the appropriate service function chain, ensuring an efficient, high-performance deployment.

Tunnels and Encapsulation Support

Most CSP networks include tunneled/encapsulated traffic. Typically, the service functions themselves only apply to the traffic within the tunnel/encapsulation; however, most service functions lack the ability to peer inside the tunnel/encapsulation. The Traffic Steering Engine provides the solution: parsing the tunnel/encapsulation headers before steering traffic to the service function chain, and then reapplying the tunnel/encapsulation headers before returning the data traffic to the network.

Straightforward Deployment and Operation

Deployment and operation is straightforward, because the Traffic Steering Engine:

- Auto-discovers new service function instances as they scale in and out, and steers traffic accordingly (e.g., load-balances, preserves service function instance affinity)
- Includes a health-check for service functions and service function instances, so it doesn't attempt to steer traffic to a service or instance that's unavailable
- Is configured through Sandvine's Control Center graphical user interface
- Provides detailed operational metrics

Virtualization

The Traffic Steering Engine is completely virtualized.

Standards Compliance

The Traffic Steering Engine fulfills the proposed Service Function Forwarder (SFF) role of the IETF Service Function Chaining standard, and the proposed Traffic Steering Support Function (TSSF) from the ETSI/3GPP standards.

FEATURES AND SPECIFICATIONS

The Traffic Steering Engine includes all the features you need to succeed with your service function strategy.

Traffic Steering

Engineered to be compliant with:

- IETF SFC Architecture: uses the Network Service Header (NSH) protocol and acts as a Service Function Forwarder
- ETSI/3GPP: acts as a Traffic Steering Support Function

Steers data traffic to the appropriate service function chain based upon a wide range of criteria: IP/Port, Layer 4 protocol (TCP/UDP), Tunnel ID, Subscriber Attribute, VLAN, MPLS Tag, MAC, DSCP mark.

Traffic Mirroring

Can be configured to mirror traffic to a specified destination.

Subscriber Awareness

Completely subscriber aware: each flow is associated with a subscriber (i.e., account identifier), and each subscriber is associated with a set of attributes (e.g., IMEI, CM-MAC, service plan, entitlements, etc.). Attributes are defined by the CSP, and can include practically anything; steering can be based upon any attribute.

Tunnels and Encapsulation

Parses tunnel/encapsulation headers prior to steering traffic to a service function chain, and reapplies the headers prior to returning the traffic to the network.

Supports the following tunnels/encapsulation: IPIP, GTPU, L2TP, GRE, MPLS, VLAN, QinQ, CAPWAP, DSLite/MAP, EoL2TP, EoMPLS, UDPGeneric, PPPoE, IPv6 Transition (Teredo, 6rd, 6over4, 6to4).

Load Balancing

Balances load across instances within a single service function, while maintaining instance affinity. The load balancing algorithm can be based on a wide range of factors: Subscriber IP, Internet IP, Port, Subscriber identity, Subscriber attribute (e.g., IMEI, CM-MAC, service plan/tier, etc.), VLAN, MPLS tag, L4 protocol (i.e., TCP/UDP), MAC address.

Auto Discovery

Automatically detects when service function instances scale in and out, whether elastically or manually, and accounts for those instances within the load balancing algorithm.

Failure Detection

Auto-detection of failure of a service function and of a service function instance within an SFC.

Hybrid SFC Mode

Supports service function chains that include service functions acting as SFFs.

Redundancy/High-Availability

N:N+1 redundancy model to ensure high-availability in a cost-effective manner.

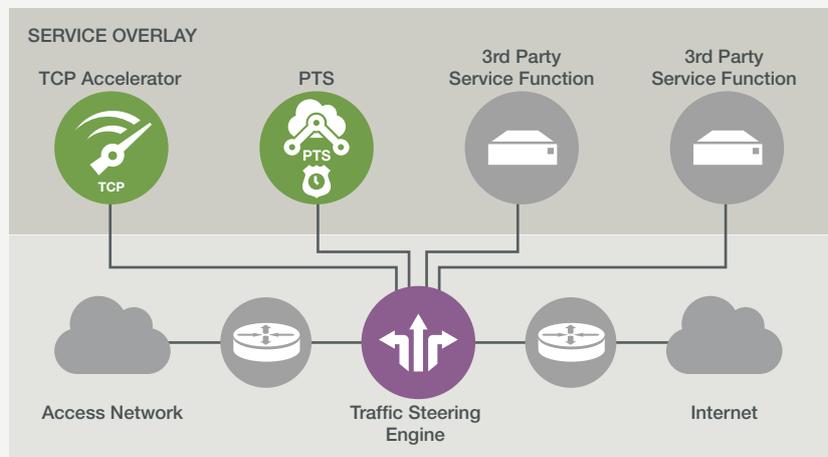
Configuration

Operators configure the Traffic Steering Engine and define service chains using Sandvine's Control Center graphical user interface.

Additionally, Control Center lets operators view traffic in real-time and examine the Traffic Steering Engine's operational metrics.

Figure 1

DEPLOYING THE TRAFFIC STEERING ENGINE



The Traffic Steering Engine is deployed in the network's data plane, where it intersects the network's traffic.

In practice, the Traffic Steering Engine's tunnel/encapsulation support means that it can be installed almost anywhere in the network, which unlocks a number of very interesting deployment scenarios.

For instance, a CSP could install Traffic Steering Engine deployments throughout the network, near the subscriber edge, and configure each deployment to collectively (and selectively) steer traffic to a central deployment of the Sandvine Policy Traffic Switch (PTS) Virtual Series (i.e., for policy control use cases to be applied).

PERFORMANCE AND DIMENSIONING

Built on the Linux operating system (RHEL or CentOS), and combined with Intel's virtual computing technologies (DPDK), the Traffic Steering Engine delivers efficient, cost-effective performance and horizontal scale.

Specification	Performance
Intersection Capacity	Each instance of the Traffic Steering Engine intersects up to 240 Gbps of full duplex data plane traffic, while concurrently steering that 240 Gbps of traffic to service function chains. Traffic Steering Engine instances can be linearly combined to infinite horizontal scale, using an efficient, cost-effective N:N+1 redundancy model.
Traffic Steering Capacity	

The Traffic Steering Engine supports 1 GE, 10 GE, 40 GE, and 100 GE network interface cards (NICs), and the following virtualization technologies.

Specification	Descriptions
Hypervisors*	QEMU (KVM), ESX (VMware)
Cloud Platforms	OpenStack
Operating Systems	Red Hat Enterprise Linux, CentOS

*The Traffic Steering Engine is qualified and tested on these hypervisors; while it is expected to work on others, it has not been explicitly tested to do so.

CONFIGURING THE TRAFFIC STEERING ENGINE, WITH CONTROL CENTER

Simplify Operations without Sacrificing Functionality

Control Center is Sandvine's unified policy control and element management graphical user interface, and provides a single mechanism for monitoring operational information, editing network policies, configuring elements, and deploying network policy control solutions, in addition to managing your Traffic Steering Engine deployments.

Control Center simplifies deployment and operation of the Traffic Steering Engine with features including:

- **Operational Insight:** Monitor the health and status of your entire Sandvine deployment, including the Traffic Steering Engine, in a central location.
- **Real-Time Visibility:** Control Center gives you one central location to manage and view your entire Sandvine deployment. Using Control Center's real-time graphing feature, you can examine traffic flowing through the Traffic Steering Engine in real-time, in aggregate and on a per-instance basis.
- **Easy Service Chain Creation:** Use the built-in solution wizard to create and define new service function chains.
- **Painless Software Updates:** Control Center simplifies pushing software updates to all Traffic Steering Engine instances.
- **Subscriber Mapping Configuration:** A tool to setup and configure subscriber awareness in your network. Simply choose from the options based on your network architecture.

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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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