

Sandvine Long Term Evolution Architecture

Is your network ready for next-generation service delivery?

Long Term Evolution (LTE) presents both tremendous opportunities and new challenges for network operators. Increases in available bandwidth are offset by increased use of bandwidth-intensive applications which is shifting usage patterns to those more traditionally seen in wireline networks. At the same time, operators must address the challenges of unifying disparate access technologies with a common policy framework, and of meeting subscribers' expectations that the network will work consistently, without variations in latency and throughput, regardless from where they connect



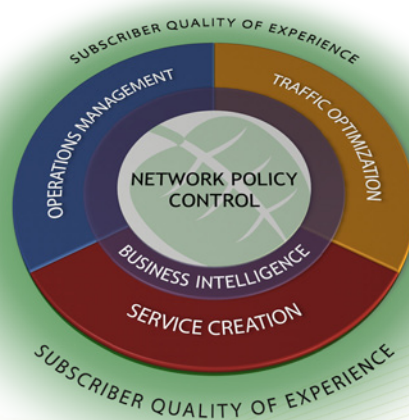
Sandvine leverages market leadership in business intelligence to present a holistic view across all media. Sandvine's network policy control solution for LTE offers operators a 3rd Generation Partnership Project Release 9 (3GPP R9) compliant solution that encompasses best-of-breed Policy Charging Enforcement Function (PCEF) and Policy and Charging Rules Function (PCRF) functionality. Subscribers can switch freely between mixed access network segments and have traffic measured, charged, and managed consistently across an operator's 4G, 3G, DSL, WiFi, and cable segments. The solution is also infrastructure-vendor agnostic, providing universal signaling for event creation and policy enforcement in mixed-vendor architectures.

The evolution of network policy control

Operators' needs are evolving faster than 3GPP standards - there is a need to deliver advanced applications with complex policy rules in a consistent manner across the network. Existing 3GPP Traffic Flow Templates do not address this need and the availability of multiple Evolved Packet Core (EPC) bearers does not offer sufficient policy granularity. Over-the-top applications require fail-safe identification and layer-7 awareness for the definition of business logic yet there are few applications, other than voice, that are capable of signalling policy requests in a Policy and Charging Control (PCC) based architecture.

Moreover, **LTE solutions must support IPv4, IPv6, and dual-stack implementations** to enable operators to transition their networks' addressing schemes seamlessly and without disruption to subscribers, while also enabling a mix of innovative IPv4 and IPv6 client devices to deliver the expected revenues that are driving the EPC revolution.

Sandvine addresses these needs with a portfolio of solutions that builds on a foundation of business intelligence to deliver usage management, location-aware traffic management, Quality of Service (QoS), and Value Added Services (VAS) enablement.



Key Benefits

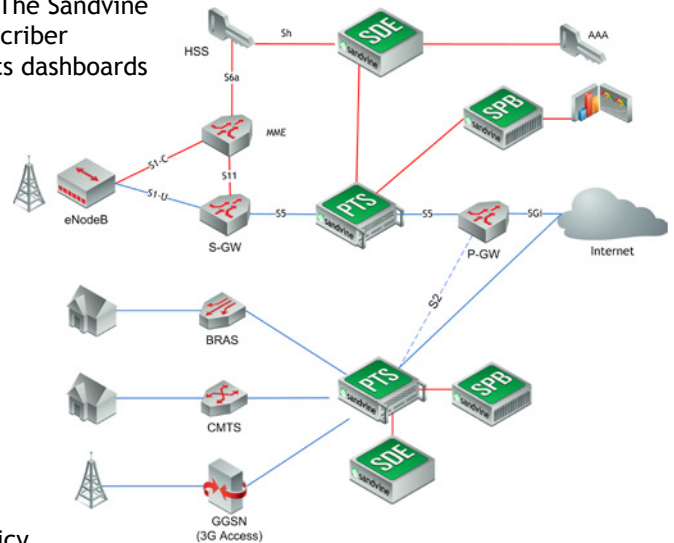
- Consistent access-independent network policy control
- Unsurpassed visibility into network usage, including per-subscriber application awareness
- Best-of-breed application signature detection
- Integration with Solution Partner Ecosystem vendors to enable new Value Added Services
- Distributed policy engine to maximize efficiency and performance
- Unified policy control in dual-source/ mixed-vendor networks
- Proven Tier 1 network scale and performance for ultra-high-bandwidth 4G networks. Zero impact to other network element functions when deployed at full scale

Hierarchical policy control to deliver optimal performance and flexibility

Sandvine's Policy Traffic Switch (PTS) platform deploys on the interface between the Serving Gateway and Packet Gateway, providing unified policy control and charging gateway functions in a consistent fashion for non-3GPP and trusted 3GPP access segments, to support gradual convergence strategies. The policy decision engine is common to both the PTS and the Sandvine Service Delivery Engine (SDE), whereby the PTS handles real-time policy decisions and enforcement, while the SDE manages network and domain wide decisions, drawing subscriber entitlement information from the Home Subscriber Server and, if required, installing policy rules on third party access gateways. The Sandvine Subscriber Policy Broker (SPB) acts as a repository for network and subscriber statistics, and generates business intelligence reports and Data Analytics dashboards to provide actionable business insights.

This hierarchical policy model enables optimal scalability and performance: a single PTS cluster provides up to 480 Gbps capacity and support for stateful management of 270 million concurrent flows, and the SDE drives policy directives on a per-subscriber, application, or session basis. This provides an optimized policy framework with distributed elements in the data path performing the bulk of policy decisions in real-time without requiring recourse to a centralized PCRF node that would need to scale to handle hundreds of millions of transactions per second.

Typically, to manage Packet Data Protocol (PDP) context QoS, PCRFs use Gx to signal a GGSN, to enforce traffic policies based on simple 5-tuple filters. Sandvine's PTS and SDE support application layer-7 awareness, allowing for much richer policy enforcement, as well as policy consolidation and provisioning of 'name-based policies'. In this way, Sandvine's distributed policy framework leverages application awareness to allow much more efficient network policy control that can be used to activate complex behaviors, workflows, and applicable protocol-based policies on the PTS or third-party platforms, with minimal signalling, and optimal scalability and performance.



Unsurpassed solution breadth

A Sandvine solution results in the delivery of desired applications, within a standards-compliant model:

- Comprehensive and granular intelligence by subscriber, application, time, location, access network, device type, realm and many other classifications.
- Proven experience in implementing fair network access, usage management, congestion relief, and traffic management.
- Interfaces for prepaid and postpaid business models via online charging and data record generation.
- Patent-pending 'traffic divert' technology to provide unique, application/subscriber/content type-aware VAS enablement

Interface Specifications

- 3GPP TS23.203 - Policy and charging control architecture
- 3GPP TS29.212 - Policy and Charging Control over Gx reference point
- 3GPP TS32.299 - Diameter Charging Applications
- 3GPP TS29.213 - Policy and Charging Control signaling flows and QoS
- 3GPP TS29.214 - Policy and Charging Control over Rx reference point
- IETF RFC2460 - IPv6 Specification
- TR 32.820 - Evolved Packet Core (EPC): Charging aspects

Solution Highlights

- Standards-compliant network policy control in a distributed, hierarchical model that optimizes performance
- 3GPP R9 compliant interfaces and full IPv6/IPv4 dual-stack support
- Proven, Tier 1 network scale and performance for ultra-high-bandwidth 4G networks
- Network policy control at an aggregate, per-session, per-flow/application, and per-subscriber granularity
- Cluster scaling to 480 Gbps for cost-effective deployment based on network growth