Policy Enforcement in SDN and NFV-based Telco Infrastructure

Telco infrastructure based on the principles of software-defined networking (SDN) and network functions virtualization (NFV) will give operators increased flexibility in how and where network functions are deployed. One example is deep packet inspection (DPI), which can be integrated in a virtual switch to enable high-performance and cost-effective traffic shaping.

Challenge: Network operators require the ability to implement and enforce service-level agreements (SLAs) with priority given to time-sensitive traffic, like voice and video, or subscribers of preferred service plans.

Solution: Qosmos* DPI technology and traffic shaping functions can be added to a virtual switch, allowing a policy and charging rules function (PCRF) to set policy based on a flow's application ID and metadata data (e.g., jitter). The hypervisor-hosted solution runs on an Intel® Xeon® processor-based platform and bypasses Linux kernel performance bottlenecks via the Intel® Data Plane Development Kit (Intel® DPDK), which accelerates I/O for guest virtual applications and virtual switch communication. The policy enforcement OEM application is pre-integrated into the standard hypervisor and provides external interfaces to the policy and rules function.

Implementation: When flows come into the virtual switch, Qosmos DPI technology analyzes them, and the service platform uses the results for matching them with the PCRF-configured flow table, as shown in Figure 1. Next, the software-based traffic shaping function receives the flow and fetches the DPI information from the flow table. Based on the policy set by the PCRF, the traffic shaping function (using the token bucket algorithm in the Intel DPDK 1.4 release) may perform one of several functions, including:

- Transmit the flow as soon as possible, if high priority
- Queue the flow if a higher priority flow needs to be transmitted
- Drop packets if the network is congested
- Tag the flow to provide information to a downstream function
- Add packets, like tokens, used to monitor the latency of a flow

Example: On a congested network, the DPI engine informs the traffic shaping function that a YouTube* flow has a high level of jitter, prompting the flow to be prioritized over email and instant messaging flows, which are subsequently queued. The policy enforcement function makes use of the outputs from the Qosmos DPI engine to enforce SLAs set by external logic (e.g., PCRF, OSS) for the different flow types.

Benefits: Traffic shaping can be used to create multiple tiers of service, enabling service providers to generate more revenue from subscribers willing to pay for guaranteed quality of service. In fact, any subscriber consuming time-sensitive services may experience a noticeable performance improvement. In addition to the centralized benefits that networks based on SDN/NFV provide, this hypervisor-hosted solution consolidates networking functions in a small form factor, helping network operators maximize their return on investment (ROI) and lower operating expenses (OpEx).

For more information about Qosmos DPI technology, visit www.qosmos.com.

For more information about Intel solutions for communications infrastructure, visit www.intel.com/go/commsinfrastructure.

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FEATURES
- Cost-Effective Solution
- Standard Open vSwitch* Support
- High-Performance Software DPI
- Native Policy Enforcement
- Hypervisor Hosted