



An Enea White Paper

ADDING VALUE TO SD-WAN WITH DPI

By Erik Larsson, Senior Vice President of Marketing, Enea



The concept of Software-Defined Wide Area Networking (SD-WAN) has rapidly gained acceptance among enterprise users. The market is poised to expand further as demand for both licensed solutions and managed service offerings is experiencing robust growth. Recent reports⁽¹⁾ forecast that sales of SD-WAN solutions should range between \$2.2 billion and \$3.1 billion by 2022. The recent acquisition of SD-WAN specialists Viptela by Cisco and Velocloud by VMWare underline the growing importance of this market segment, which is fueled by increased demand from enterprise customers.

In this context, who is best positioned to capture this growth? Although it is hard to predict if any player (or delivery model) will dominate in the future, current market leaders have adopted a bundling strategy for value-added features, which creates SD-WAN solutions that are richer than their traditional counterparts. And this is true whether the solution is offered through traditional licensing or delivered as a managed service.

SD-WAN offers compelling value for its ability to defray MPLS costs, simplify and automate WAN operations, improve application traffic management, and dynamically deliver on the cost and efficiency benefits associated with intelligent path selection.

Rohit Mehra, Vice President, Network Infrastructure, IDC, & Brad Casemore, Research Vice President, Datacenter Networks, IDC⁽³⁾

Value-Added Features for SD-WAN

Many surveys in recent years have identified the main drivers for SD-WAN adoption. These results are from a study published by Cato Networks in March 2018⁽²⁾.

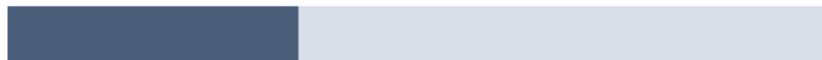
50% Simplify network or security architectures



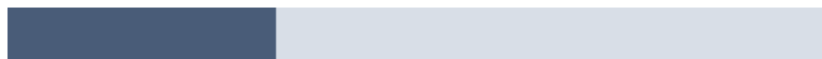
46% Provide secure Internet access from any location



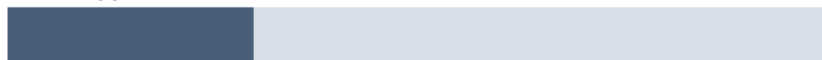
36% Integrate cloud datacenter(s) into the WAN



32% Replace MPLS with a more affordable alternative with suitable performance



31% Improve visibility into and control over mobile access to cloud applications, such as Office 365



In response, solution providers have taken advantage of Software-Defined Networking (SDN) and Network Function Virtualization (NFV) technologies to develop additional features that can easily be delivered on top of basic WAN connectivity. This has allowed them to differentiate their offerings and gain competitive advantage. Examples of these features include:

- ▶ Performance and cost-based traffic management
- ▶ Policy control and enforcement
- ▶ Security functions such as firewall and intrusion detection/prevention
- ▶ Centralized, web-based, detailed reporting
- ▶ Support for Service Function Chaining (SFC)

These features are not necessarily new, but integration into wider SD-WAN offerings has raised the bar in terms of value delivered.

The Need for Traffic Visibility

In order to support these features, SD-WAN solutions need a detailed understanding of network traffic. Thus, application-level and user-level visibility, provided by embedded Deep Packet Inspection (DPI) technology in real-time, has become a key enabler. By providing detailed information about IP flows and their content in real-time, a DPI engine, such as Enea's Qosmos ixEngine[®], creates visibility that is essential to deliver more responsive and precise SD-WAN functions.

Examples:

- ▶ Traffic can be managed between various link types or locations depending on the application performance in order to optimize user experience
- ▶ Security can be bolstered by detecting anomalous traffic or application behavior
- ▶ Reporting can be enhanced by showing performance per application, per session, per site, per link, per user, etc.
- ▶ Application-level visibility is required for SFC, which can bring significant operational benefits to enterprises and managed service providers.

Optimized for uCPE

The move towards virtualized architectures has created additional requirements. Support for uCPE is particularly important in order to cut down on total cost of ownership and potentially deliver features as Virtual Network Functions (VNFs).

Thus, any SD-WAN solution needs to work seamlessly across uCPE and dedicated hardware to cover all deployment scenarios. This means that embedded DPI engines must also support different runtime environments, including small, low-cost, access devices.

Encryption: Not an Issue

An increasing proportion of flows on IP networks, especially Internet traffic, is now encrypted. By definition, a DPI engine is not able to read a packet payload which is encrypted. Enea has overcome this by using advanced techniques like statistical flow analysis, session prediction, peer matching and certificate inspection, enabling Qosmos ixEngine to identify the application behind most encrypted flows.

Using such techniques, the following encrypted flows can be classified:

- ▶ HTTPS/SSL encrypted flows
- ▶ Encrypted P2P protocols like BitTorrent
- ▶ Applications that use their own encryption protocol like Skype. Qosmos can also identify services like VoIP and chat within Skype by using statistical recognition.
- ▶ IPSec tunnels
- ▶ Session prediction based on DNS cache

Classification of these flows mean that value-added SD-WAN features such as traffic optimization, policy enforcement, and user experience are largely unaffected by encryption.

The next phase of SD-WAN will be based on a universal CPE (uCPE) approach (...) this business model works, is buyable, and provides the most value.

Ali Longwell, Associate Editor with SDxCentral, ⁽⁴⁾

Classifying Traffic Encrypted with SSL/TLS

100%
ACCURATE







Method 

Read (unencrypted) name of service in SSL/TLS certificate or in Server Name Indication (SNI)

Classifying Encrypted P2P Traffic

90%
of P2P sessions IDENTIFIED






Method 

- In a P2P session, the initialization phase is not encrypted
- During this phase, classify as P2P all traffic from the IP addresses of known peers

Classifying Skype

90-95%
ACCURATE



Method 

- Search for known binary patterns in traffic flows
- This pattern is usually found in the first 2 or 3 packets

```
01101110110001010000
11101100010100000001
01100011111011011101
111101101101100010
1111011011011000100
10110111011000101000
```

Build vs. Buy

One of the top questions facing developers of SD-WAN solutions is whether to build a proprietary DPI engine or to buy one from a specialist? The answer is all about opportunity cost; opportunity cost of dedicating resources to build a DPI engine but more importantly to maintain its accuracy as time goes by. Applications and protocols constantly evolve and in the end the number of hours required to maintain a fresh DPI solution far exceeds those required to build it in the first place.

By outsourcing their DPI needs, development teams are able to concentrate all resources on their own area of expertise, at the same time allowing their solutions to benefit from the most advanced DPI technologies and a comprehensive, constantly up-to-date, protocol library. By integrating DPI as a technology component (DPI engine), they accelerate time-to-market while reducing development and maintenance costs, enabling them to manage overall operational expenditures more effectively.

What to Look For in a DPI Engine?

When evaluating third-party DPI engines, developers of SD-WAN solutions should focus on the following characteristics:

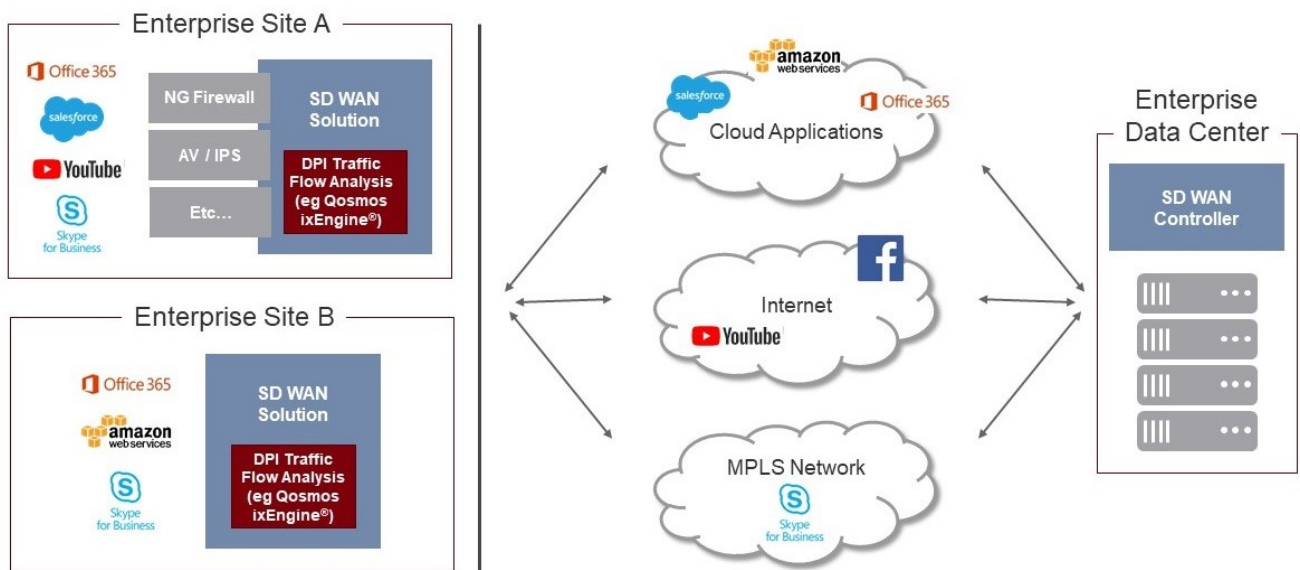
- ▶ Number of protocols and applications that can be identified
- ▶ Ability to integrate custom signatures
- ▶ Extraction of application metadata and number of metadata available
- ▶ Ability to analyze traffic in real-time at any connection speed
- ▶ Ability to classify and keep track of all network flows by application and user
- ▶ Provide volume, delay and jitter per application, user and network link
- ▶ Support for SDN/NFV environments by using a flow-based approach to cover traffic going across both physical and logical interfaces
- ▶ Support for a wide range of run-time environments, from uCPE to appliances
- ▶ Availability of actionable security information in real-time (e.g. automatic identification of fake or corrupted files)
- ▶ Availability of computed statistics in real-time (e.g. MOS for VoIP)

Why Enea Qosmos Technology?

Enea's Qosmos Division is totally focused on DPI technology, continuously monitoring protocols, reverse engineering new protocols and regularly delivering updates to ensure the highest possible traffic visibility for our customers' solutions. It's a meticulous task requiring specific expertise and substantial resources. Qosmos products are used by development teams at equipment manufacturers, solution vendors, and systems integrators, who

integrate the DPI capabilities as a technology component. Qosmos also provides a full range of tools, enabling customers to tailor the DPI functions to their needs and, if required, to develop specific signatures themselves.

Enea’s Qosmos ixEngine can be used in all environments: physical, virtualized and in SDN architectures. It is easily integrated into uCPE solutions by supporting DPDK and OVS for fast data capture and uses standard variables such as ConnTrack App ID and NSH to enable real-time service control. Designed with developers in mind, Qosmos’ software libraries are easy to embed into third party products and solutions.



Qosmos ixEngine provides application-level visibility to improve SD-WAN routing and security functions

References:

- (1) "SD-WAN Sales Will Hit \$2.2B by 2022, Dell'Oro Group Says," article by Sue Marek, VP of Content and Editor-in-Chief, SDxCentral, <https://www.sdxcentral.com/articles/news/sd-wan-sales-will-hit-2-2b-by-2022-delloro-group-says/2018/08/>
- (2) Results of a study by Cato Networks released in March 2018: <https://www.channelpartneronline.com/2018/03/21/cato-study-carriers-sd-wan-maintains-their-hold-on-customer-mpls/>
- (3) From "IDC: SD-WAN growth is exploding for at least the next 5 years" by Brandon Butler, Senior Editor, Network World, <https://www.networkworld.com/article/3048174/wide-area-networking/idc-sd-wan-market-to-hit-6b-by-2020.html>
- (4) From "SD-WAN's Future Will Rest on the Universal CPE" by Ali Longwell, Associate Editor with SDxCentral, <https://www.sdxcentral.com/articles/news/sd-wans-future-will-rest-on-the-universal-cpe/2018/09/>

About the Author

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About Enea

Enea develops the software foundation for the connected society, supplying solutions for mobile traffic optimization, subscriber data management, network virtualization, traffic classification, embedded operating systems, and professional services. More than 3 billion people around the globe rely on our technologies in their daily lives. Enea's leading DPI-based IP traffic classification and network intelligence software is embedded by vendors and integrators into their products sold to telcos, cloud service providers and enterprises. For more information on Enea's Qosmos Probe or Qosmos DPI technology: www.qosmos.com.



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