INFINERA OPEN TRANSPORT SWITCH

Introduction

Infinera has always been at the forefront of innovation, with our mission to deliver efficient, high capacity bandwidth to network operators so they can create rich end-user experiences for their customers. As part of our continued innovation, Infinera has developed the Open Transport Switch (OTS) software, enabling simplified software defined networking (SDN) programmatic control of the Infinera Intelligent Transport Network.

OTS software is a crucial building block that extends the benefits of SDN to the optical transport layer. Combined with Infinera's Intelligent Transport Network, it enables network operators to realize the following key benefits:

- Operational automation
- Optimization of multi-layer networks
- Ability to deliver dynamic and innovative services
- Transformation to a DevOps model

Infinera's SDN solution, which comprises the Infinera Intelligent Transport Network and OTS software, offers network operators unmatched scalability, convergence, and automation to address the challenges of increasing bandwidth demands, network complexity, and inefficient use of resources. It allows programmatic control of the transport layer that enables network operators to stay ahead of the competition.

Why Do You Need OTS? Programmatic Control of the Underlay Network

In many solutions, SDN has been implemented via overlay networking that tunnels through devices that route and switch packets at the OSI Layer 2 (L2) and above. In this approach, L2 tunnels are created over an existing IP network, which enables a pair of end systems (physical or virtual machines) to peer with each other as if on the same L2 subnetwork. Although overlay networking enables simplicity by only requiring management of the endpoints, it has some

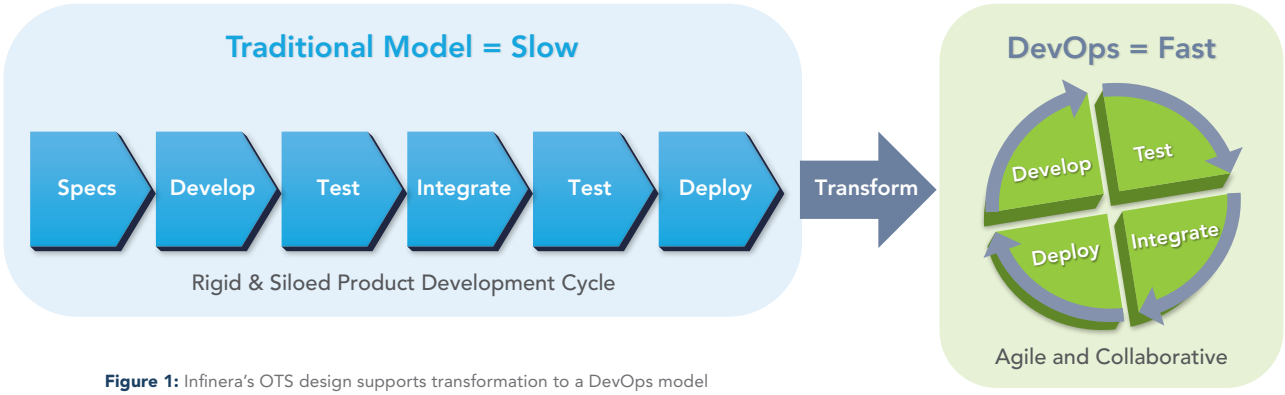

Figure 1: Infinera's OTS design supports transformation to a DevOps model

major drawbacks. Tunnels offer neither visibility nor control of the underlying physical, or underlay, network. Since overlay networking only has visibility of the endpoints of the tunnel, if there is resource contention it may lead to packet loss and protocol timeouts during peak hours of operation. While this approach may be acceptable inside a data center, it can lead to severe problems within a wide area network (WAN) where service providers need to deliver on service level agreements (SLAs). To overcome this challenge, network operators would have to over-provision their networks to accommodate peak bandwidth requirements, resulting in sub-optimal use of network resources.

Infinera's OTS software enables centralized visibility and control of the converged optical transport network underlay. An underlay approach allows service providers to leverage SDN principles to programmatically configure, provision and monitor their multi-layer networks and thus, effectively deliver on their SLAs. Furthermore, in this approach, an abstraction of the underlying transport topology is exposed to the SDN control layer, which when combined with a centralized view of the router topology forms a collapsed global view of the entire multi-layer network. This provides a programmatic way to leverage the converged optical layer to offload traffic from the higher cost router layer to automate and improve resource utilization across the entire network, significantly decreasing operational and capital costs.

OTS: Purpose Built from the Ground Up

OTS is a lightweight Web 2.0-enabled software platform that runs on a Linux server and enables a high degree of abstraction and virtualization of the underlying Intelligent Transport Network. The high degree of abstraction, which effectively eliminates a rigid relationship between bandwidth services and physical network components, is appropriately exposed to the SDN control layer through modern Web 2.0 APIs. This facilitates a move away from legacy SNMP-based

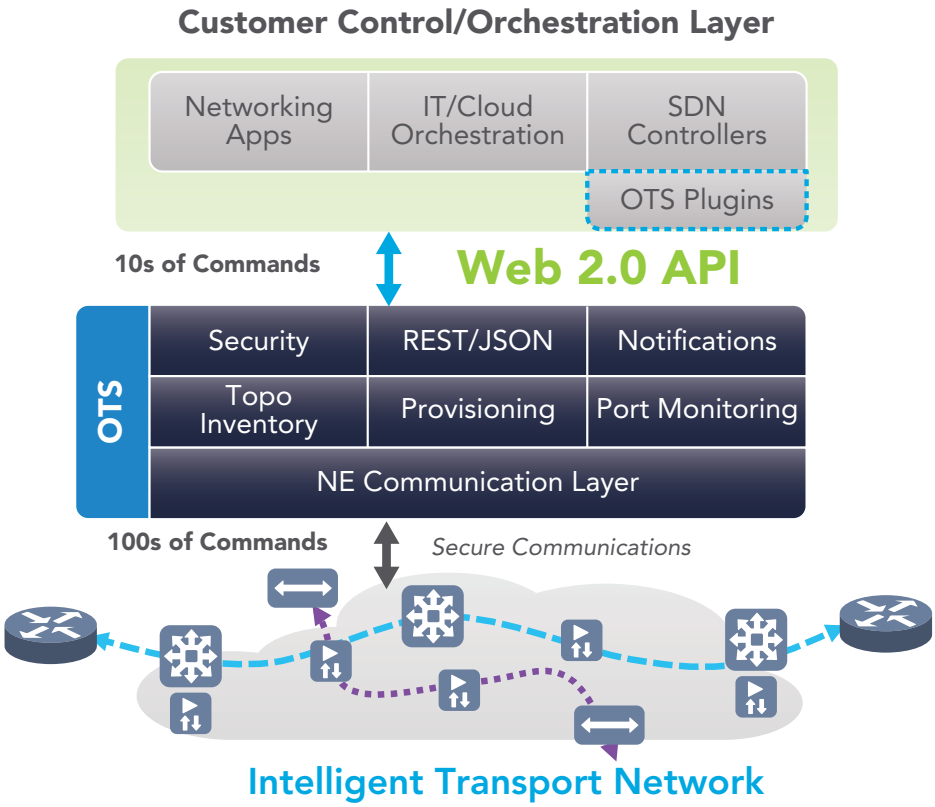

Figure 2: Open Transport Switch software architecture

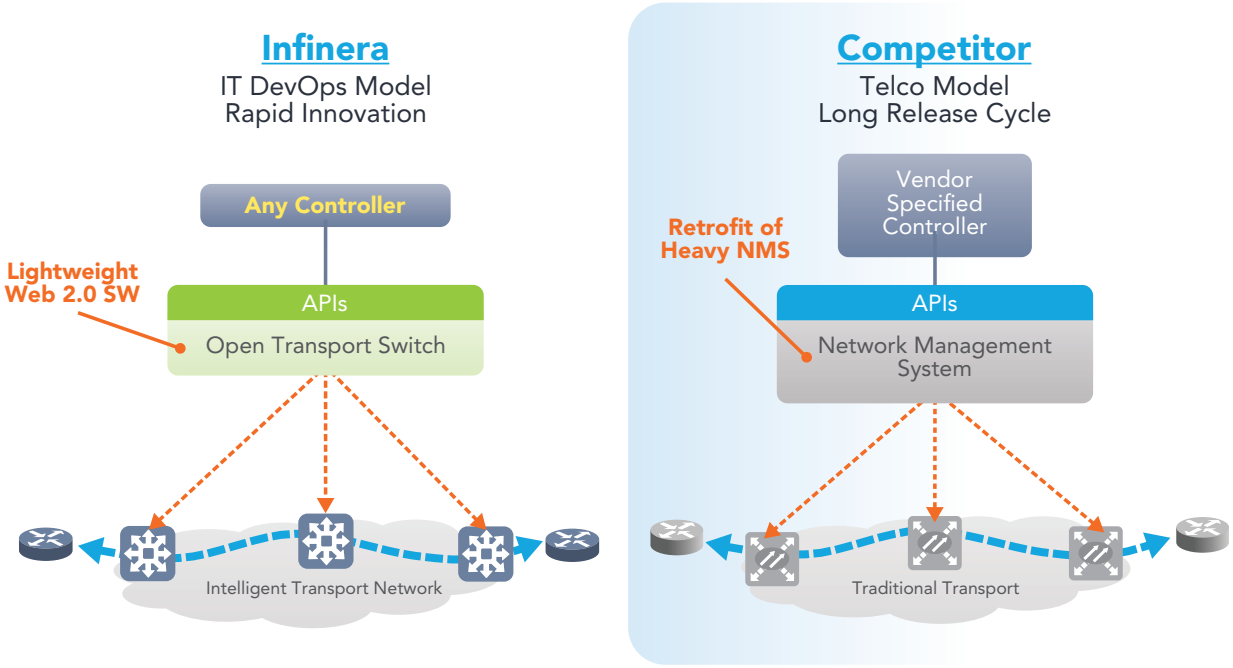

Figure 3: OTS software is designed with an IT mindset

management to an abstracted and simplified programming model to enable service providers to develop applications that rapidly deliver innovative services capable of meeting with SLAs while using their network resources very efficiently.

The open and modular software architecture of OTS allows it to easily integrate into a customer's application, SDN controller or orchestration software layer through standard and secure WEB 2.0 APIs.

This flexibility is in contrast to the requirements by other vendors to deploy their SDN controller or network management software. Its lightweight software design offers high levels of agility, which assists in rapid feature innovation as opposed to other solutions that sit on top of a heavyweight element or network management system. OTS's lightweight approach paves the way for service providers to transform to a DevOps model of software development and beat their competition with rapid service deployment.

Hybrid Control Mode

OTS software is also designed to help facilitate the introduction of Transport SDN into the network independent of a network operator's production services using Hybrid Control Mode. In this mode, the OTS is deployed in a network to manage SDN-enabled on-demand optical transport bandwidth services alongside the existing production services, which are managed by Infinera's network management software, Digital Network Administrator (DNA). This allows service providers to introduce SDN-enabled services into their network without disturbing revenues from the existing services. Thus, both SDN

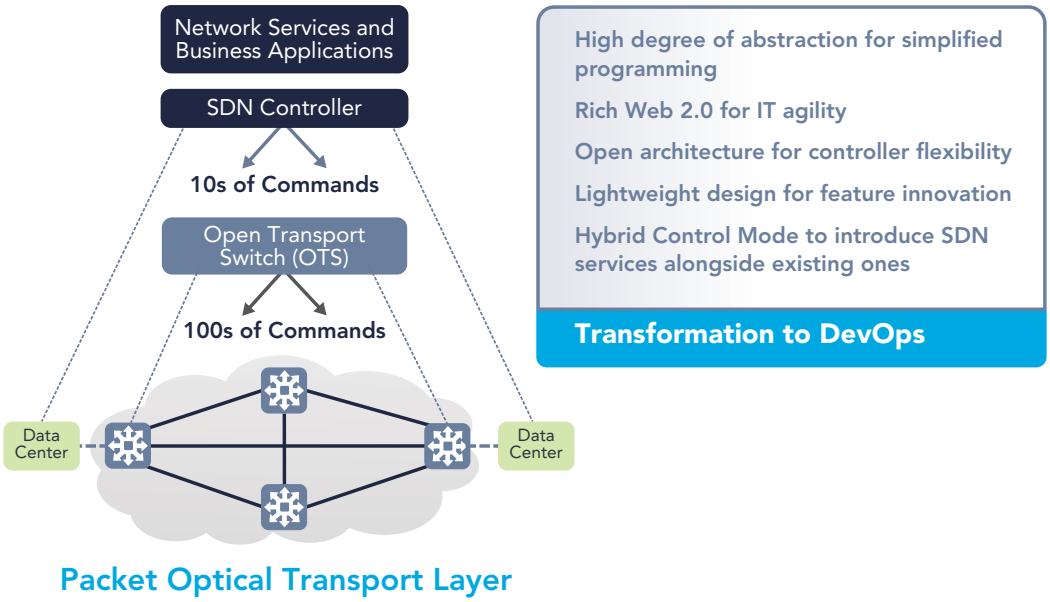

Figure 4: OTS software abstracts the Intelligent Transport Network and provides Web 2.0 APIs for SDN programmatic control

and traditional services can be managed seamlessly while sharing the same underlying Intelligent Transport Network.

Summary

Infinera's Open Transport Switch software provides programmatic control of a highly scalable and software controllable transport solution—The Intelligent Transport Network. With OTS software, service providers can leverage the transport layer to deliver new innovative services, to optimize the overall network for lower capex and to automate operations for lower opex delivery by transforming to a DevOps model of software development and service creation and deployment.

About Infinera

Infinera builds the world's most innovative solutions to help its customers win, and it does that by delivering on its founding vision of "An Infinite Pool of Intelligent Bandwidth." Our SDN solution, comprising the Infinera Open Transport Switch software and the Intelligent Transport Network, facilitates true automation and programmability of the converged optical layer, thus offering customers a simplified programmable bandwidth service model. For more information about Infinera's SDN solutions and to realize the benefits of SDN in your network today please visit www.infinera.com/go/sdn or contact your Infinera account manager.

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