

# Infinera Virtualized Control Plane for Automatically Switched Optical Network (vASON)

*Resilience for Hyperscale Carrier Networks - Powered by the Infinera Transcend Software Suite*

The importance of network resilience is growing substantially driven by cloud, data center, and video applications critical to the infrastructure and activities of our modern world. Even more significantly, the introduction of new network technologies such as 5G mobile continue to place increasing real-time video bandwidth demands on metro and long haul networks. This evolving technology compounds the requirement of very high service resilience in optical transport networks for service bandwidths that range from low speed up to terabit/s super-channels. In addition to finding cost-effective solutions for managing this traffic growth, network operators also need to reduce operational costs including power consumption and footprint, maximize unregenerated wavelength distances in long haul networks, extend the life of fiber assets and existing optical layer investments, and maximize network availability. To address these requirements, the Infinera vASON Control Plane uses a combination of advanced software technologies across the Infinera optical transport portfolio and incorporates an open architecture for disaggregated and multi-vendor networks.

## COMBINING THE BENEFITS OF SERVICE PROVISIONING, NETWORK SUPERVISION, AND OPTIMIZED MULTI-LAYER PATH COMPUTATION

vASON combines the provisioning of services together with various protection and restoration options, performance and alarm monitoring, and route computation with optical validation to achieve a dynamic rerouting of traffic on the lowest cost layer in case of a network failure. The vASON control plane intelligence brings further benefits to the operator. Beyond the standard functionalities of a distributed GMPLS control plane, vASON provides improved multi-layer coordination for OTN/DWDM and packet optical transport networks, better utilization of network resources, and a significant improvement in the user experience. The use of open communication protocols and APIs (e.g., ONF T-API) leads to more simplified operation, shorter time to market, and cost savings through the support of network disaggregation and multi-vendor environments even in protected networks.

## PROVIDING POWERFUL USER INTERFACE OPTIONS

vASON offers powerful and easy to operate user interfaces including the Infinera Transcend Chorus for Transport that provides a fully integrated workflow of service provisioning, alarm and performance monitoring, and management of service restoration. In addition, vASON is supported by an SDN portal interface and an open API to allow service orchestrator and external applications to control end-to-end service resilience in the network.

## BENEFITS OF INFINERA VASON CONTROL PLANE

- **Provides** multi-failure service resilience for packet optical transport networks
- **Offers** coordinated multi-layer (L0-L3) protection and restoration
- **Ensures** service resilience in open networks with disaggregated network elements
- **Supports** bandwidth control in flexi-grid optical networks
- **Features** service resilience across different vendor domains with service orchestration
- **Delivers** fast introduction of new switching functionalities through software upgrades
- **Enables** operator defined and programmable service resilience

*Infinera introduces full-featured integration of Infinera vASON across the entire optical core and metro portfolio, including the hiT 7300 Multi-Haul Transport Platform, mTera Universal Transport Platform, 7100 Nano/ USS Packet Optical Transport Platforms, and Groove G30 Network Disaggregation Platform.*

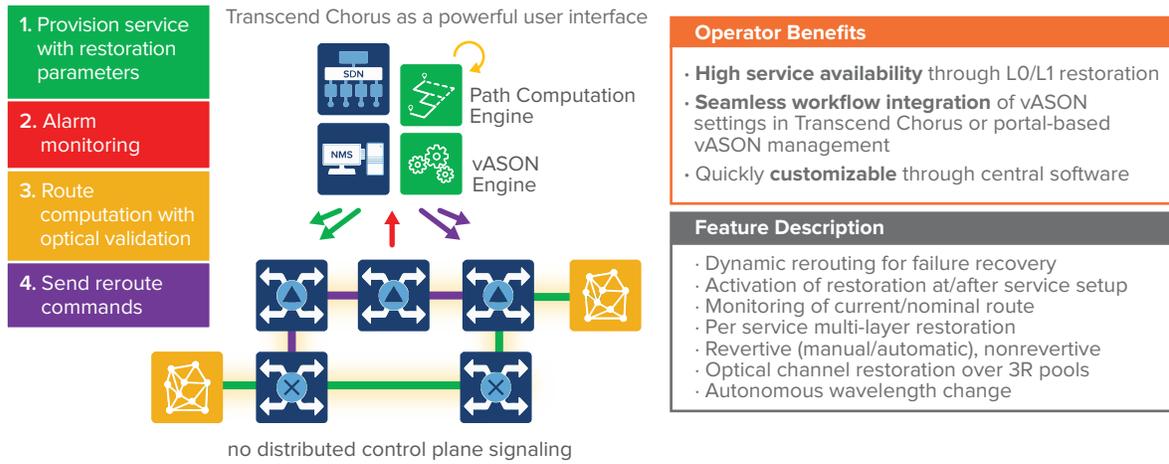


Figure 1: Basic Concept and Functions of the Infinera vASON Control Plane

## ENABLING EASY MIGRATION FROM ASON/GMPLS TO vASON

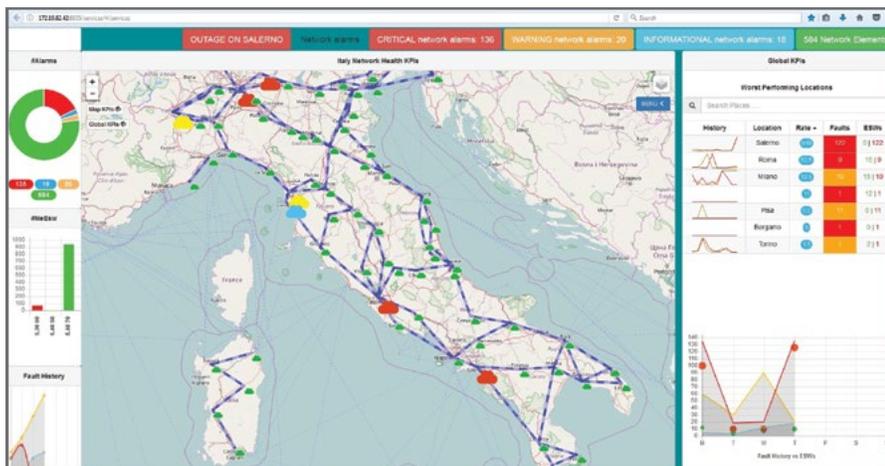
In order to take advantage of the vASON benefits, existing networks that use ASON/GMPLS control plane must be seamlessly migrated to vASON control plane. Infinera offers an automated in-service migration that avoids any traffic interruption. Through this process, the restoration control function is transferred from the GMPLS control plane to the vASON control plane. The restoration profile can be changed during the migration.

## ENSURING MINIMAL SERVICE RECOVERY TIME AND MAXIMUM END-TO-END SERVICE PROTECTION WITH MULTI-FAILURE RESILIENCE

vASON provides high resilience for both wavelength and OTN switched multi-service networks by combining network restoration with fast traffic protection switching of the network elements, such as Line Side, Client Side, SNC, OMS, or OTS protection. Taking advantage of these rapid protection mechanisms, the vASON engine minimizes service recovery times and protects end-to-end services against multiple failures. Moreover, the vASON control plane enables cost-efficient service resilience in IP-Optical networks by combining fast protection of IP/MPLS L3 router services with optical restoration and multi-layer path diversity.

## INTERWORKING WITH INFINERA AWARE TECHNOLOGY FOR THE OPTIMAL USER EXPERIENCE AND NETWORK RESOURCE UTILIZATION

Infinera Aware Technology checks and validates routes in real time by measuring optical impairments. The Aware Technology determines a residual margin of a defined route taking into account OSNR, transponder parameters, and link penalties. Based on this information, the vASON control plane determines if a selected path meets the KPIs of the underlying service level agreement and can be used for restoration. This approach will optimize both the user experience and the usage of network resources.



**Today**

- Outages
- Traffic densities
- SLA monitoring
- Network rollout/status
- Software versions
- Risk analysis

**Infinera Aware Technology Add-on**

- Online view of margin per lambda
- Pre-emptive maintenance indication
- Tap unused network resources

Figure 2: Network Health Check Based on Infinera Aware Technology

## FEATURING VERSATILE RESTORATION MANAGEMENT

The operator must be able to select the preferred protection and restoration parameters in order to ensure optimized restoration behavior in the network. vASON control plane empowers the operator by providing a wide variety of configuration options, such as priorities per service/ per connection, routing constraints, and detailed behavior for resilience control functions (e.g., revertive switching).

## OFFERING PROGRAMMABLE MULTI-LAYER AND MULTI-DOMAIN RESILIENCE

vASON provides a comprehensive set of interfaces for management and control through the Infinera Transcend Software Suite including the NMS, SDN controllers, and orchestrators. The toolkit enables the user to implement highest resilience, efficiency, and transparency into the network. Multi-layer and multi-domain orchestration allow for application-defined restoration behavior and vendor-agnostic network resilience.

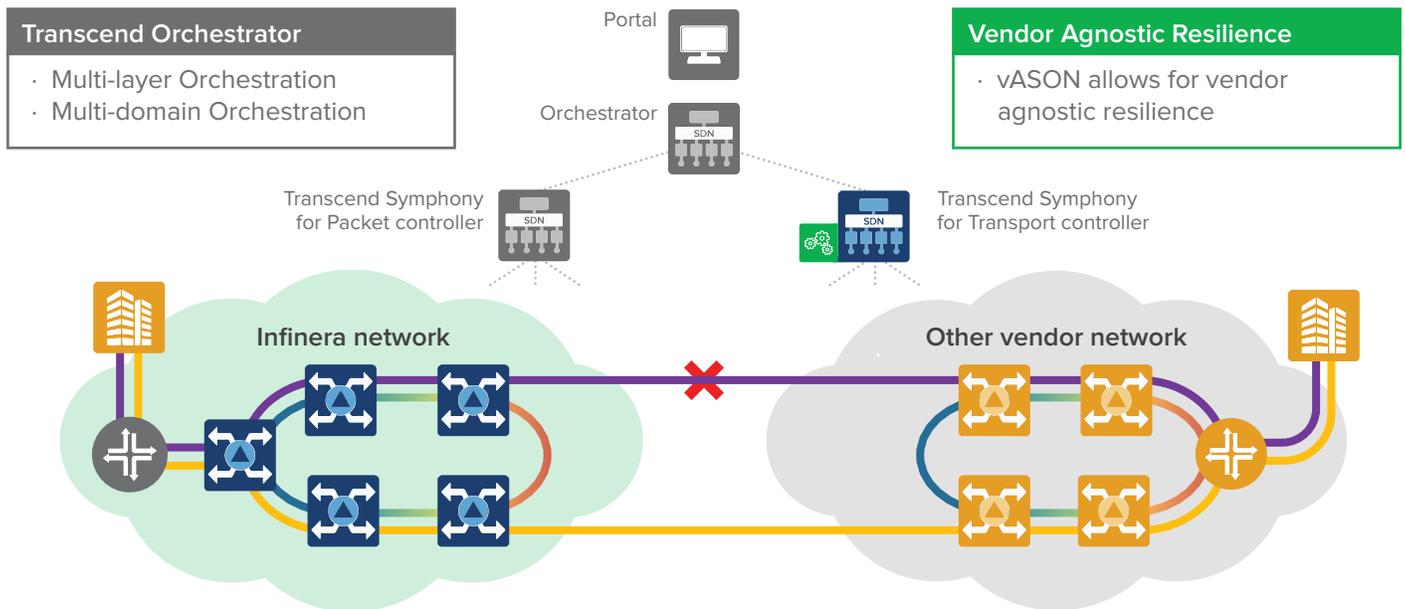


Figure 3: vASON Multi-layer and Multi-domain Resilience

## SUMMARY

By enabling operators to achieve the highest network resilience, Infinera vASON technology offers significant advantages over distributed control planes. vASON can be introduced and changed quickly as a central software instance while supporting all existing network structures. Furthermore, vASON addresses the most critical needs in GMPLS networks by supporting specialized, disaggregated network elements and enabling multi-vendor resilience. The coordination of network resilience functionality across the transport and Ethernet/IP layer is critical to ensuring the optimal network response to potential failures. Infinera vASON delivers the advanced network resilience and integrated control features that operators need to effectively and cost efficiently manage their existing networks as well as their future disaggregated network architectures.

## KEY FEATURES

- Consistent to standard GMPLS/ASON control plane functionalities
- Fast multi-failure protection with restoration in multi-transport networks
- Fast multi-failure protection and restoration in IP-Optical networks
- Integration into established service provisioning workflows
- Programmable restoration behavior
- Seamless support of new transmission technologies
- Online route validation with real-time optical impairment check