

PROGRAMMABLE NETWORKS

Scott T. Wilkinson, PhD
Sr. Director, Portfolio Marketing
ECI

SOFTWARE DEFINED

Data Center Software Defined Networking (SDN)

- The original use for SDN
- Confined within the data center
- Rapid software-defined network flexibility

Service Provider (WAN) SDN

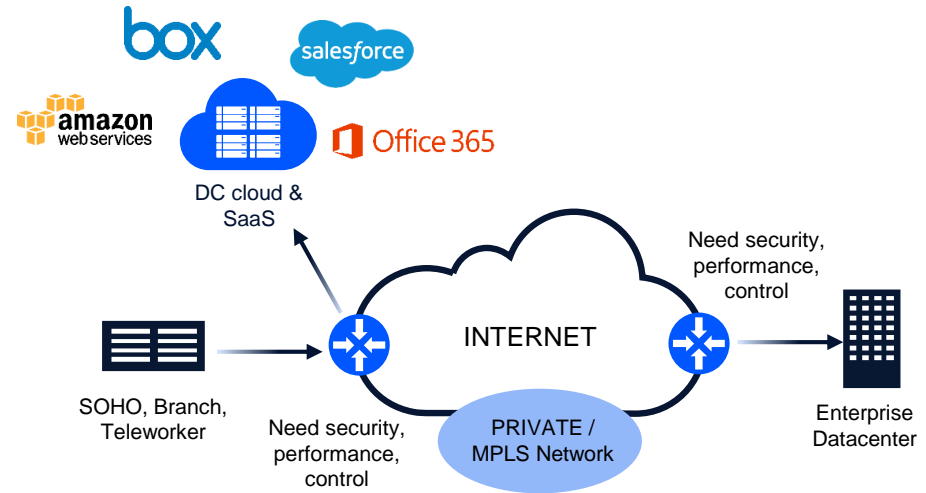
- Operating on the wider, multi-layer network
- Making the network more application aware and agile
- More complex, more technologies involved

SD-WAN for Enterprise

- Software control architecture for Enterprise / Business access
- Designed to optimize the access network across applications and providers

SD-WAN CONCEPT

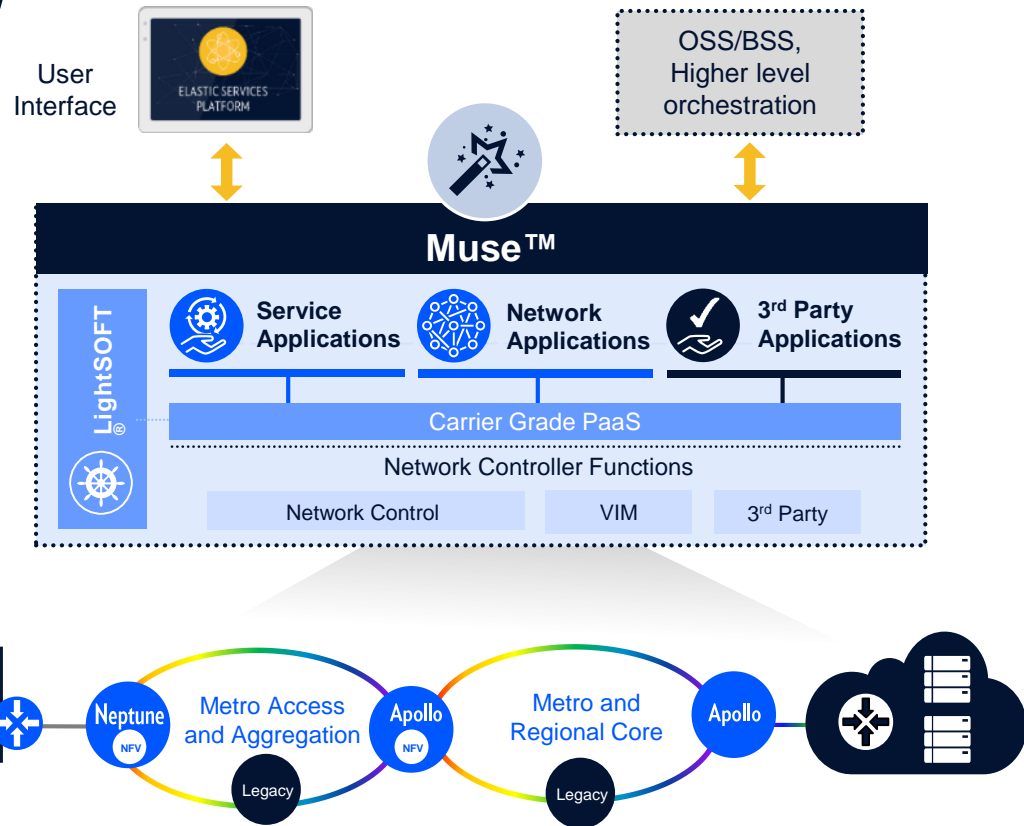
- Link aggregation across all available links
 - Expensive/assured vs inexpensive / best-effort
 - Realizing the sum total bandwidth of all
- Based on the real time characteristics of the links and real time application requirements
- Overlay network over any transport infrastructure
- Future use cases go beyond pure overlay into controlling underlay MPLS with SDN



SOFTWARE DEFINED NETWORKS (SDN)

Elastic, virtualized networks realized via centralized control.

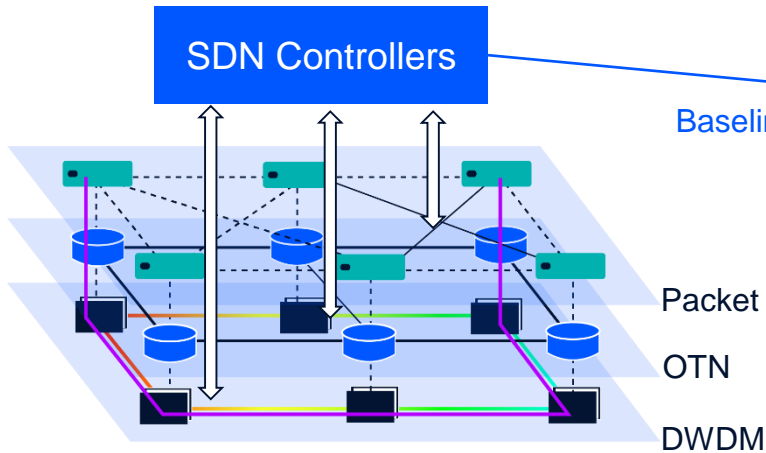
- Application-aware network control
- Automated network responses
- Network as a service integration
- Applications available today



THE EVOLUTION OF SDN

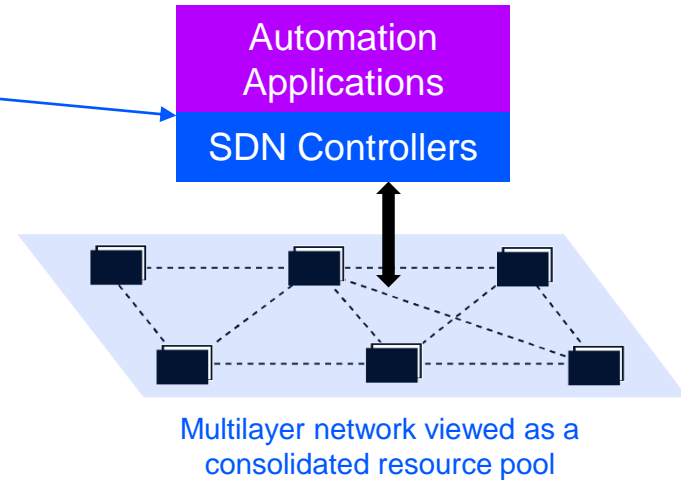
Original focus:

Moving networking intelligence from network equipment to controllers

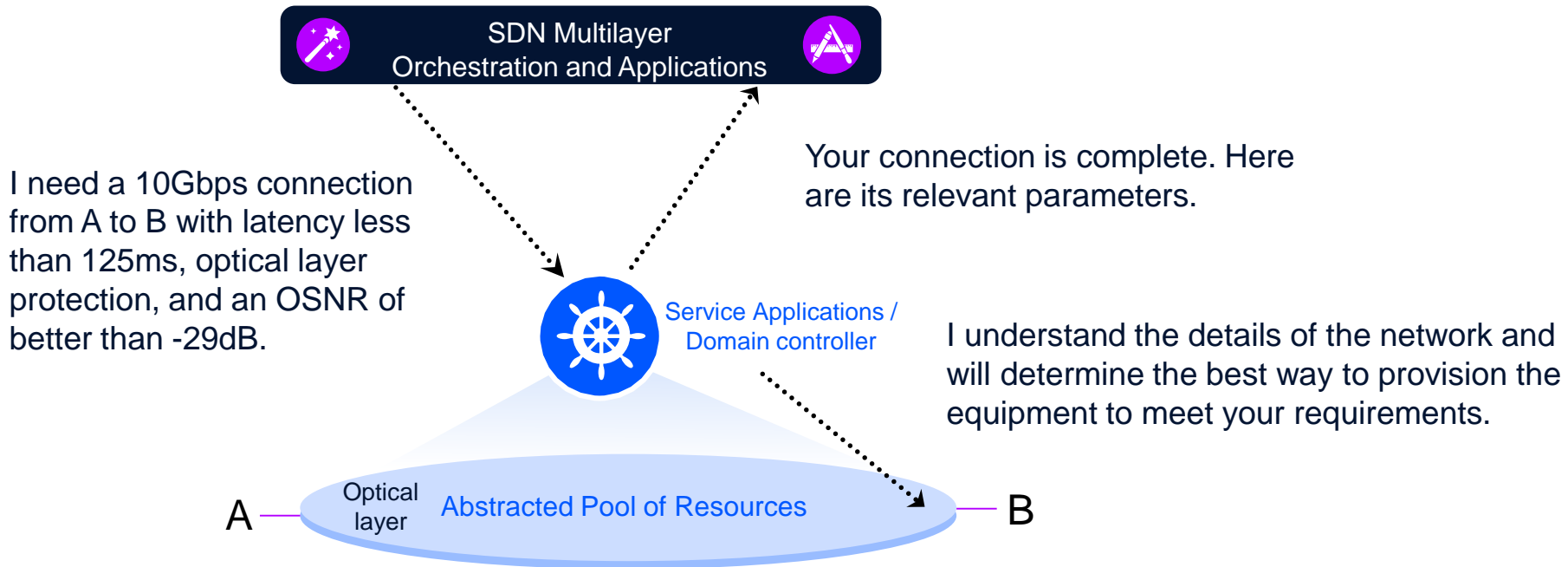


Current focus:

Automation for rapid service creation and delivery, and streamlining operations

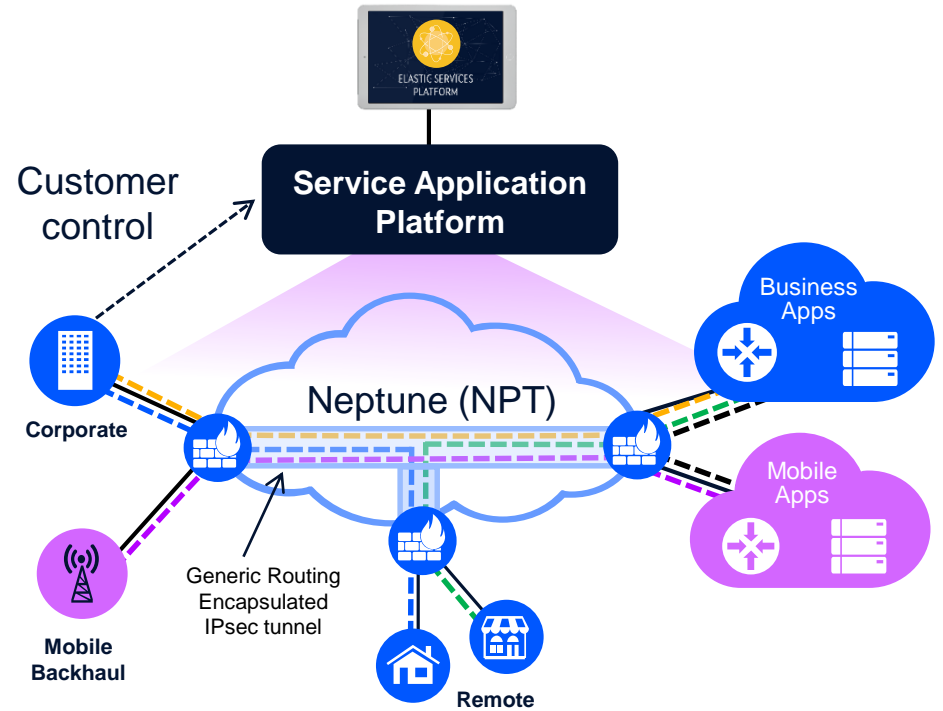


INTENT AND ABSTRACTION



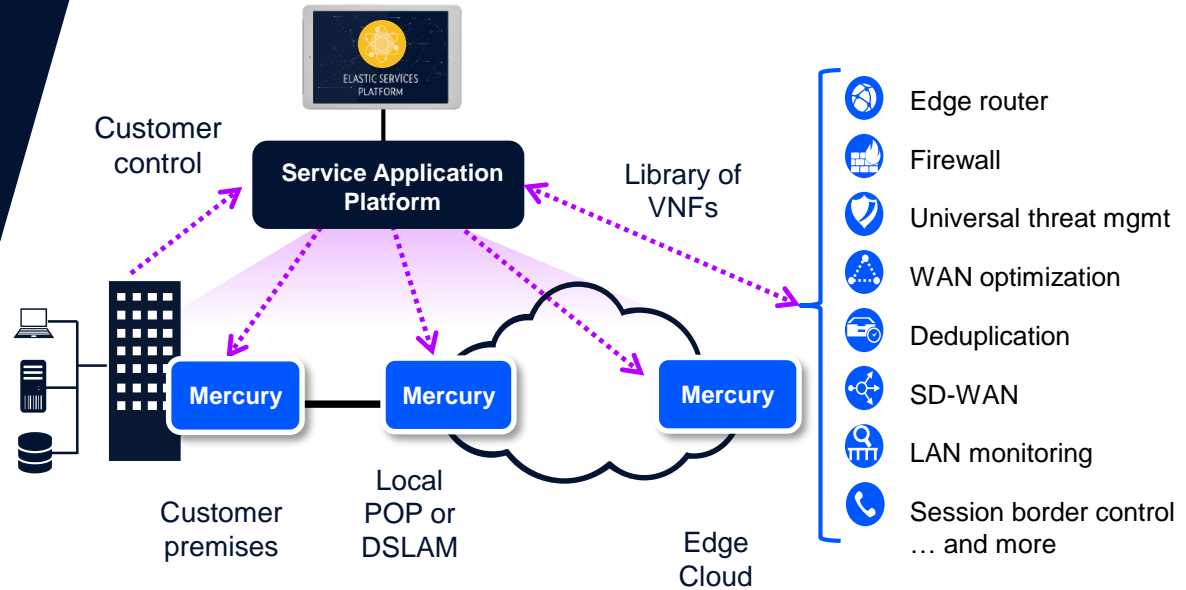
APPLICATION: DYNAMIC VPNs

- Add and remove VPNs between endpoints as needed
- Allocate bandwidth as needed
- Link to other virtualized services like security
- Customer configurable



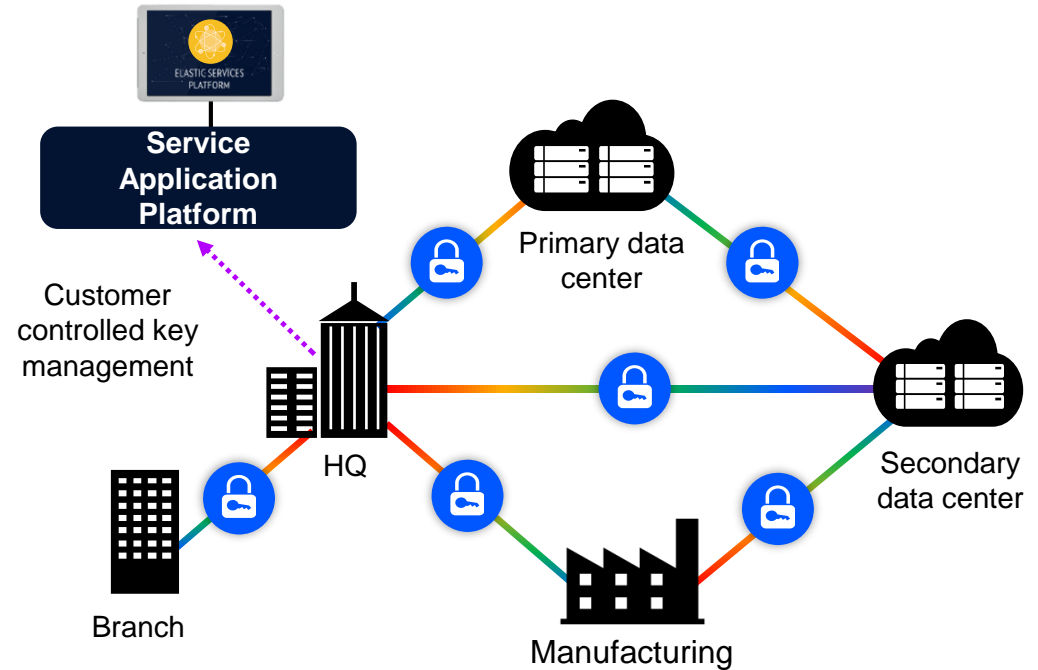
MODERNIZED BUSINESS SERVICES

- Customer configuration of end-point capabilities based on business needs
- Dynamic, zero touch service turn up
- Easy view of SLA and performance monitoring



PRIVATE OPTICAL NETWORK WITH ENCRYPTION

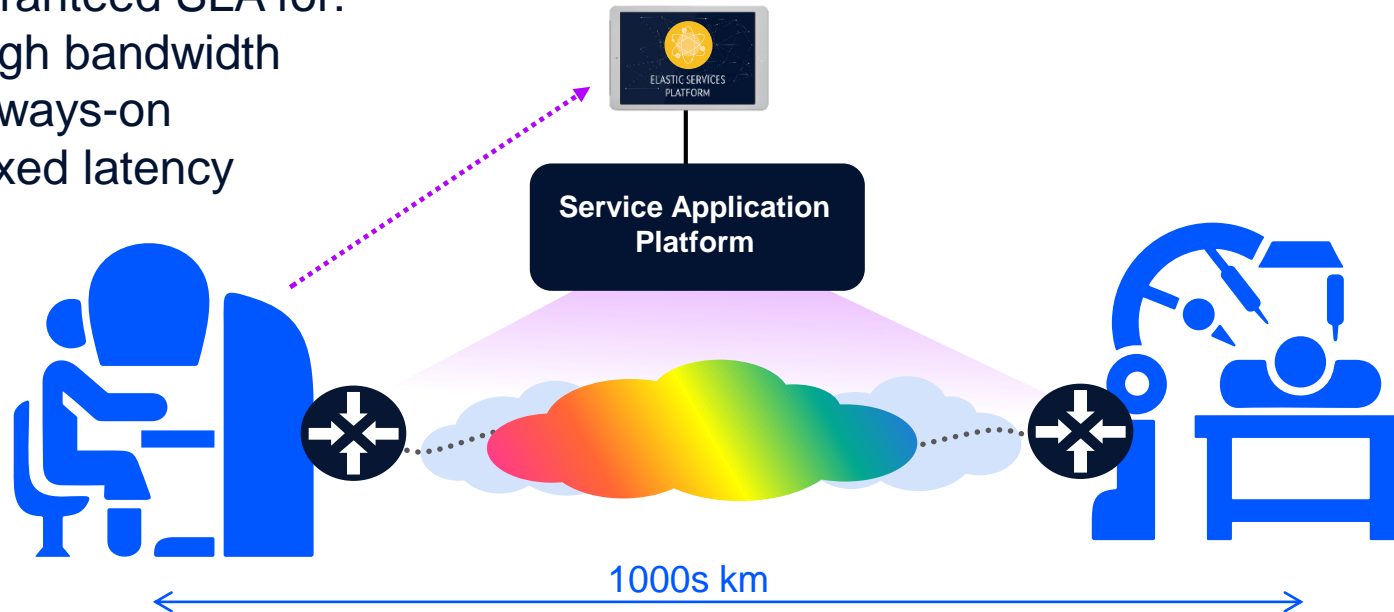
- Unlimited ultra-low latency bandwidth for all data and storage interfaces
- Economical, easy to configure and manage
- Encryption is only defense against fiber tapping



REMOTE OPERATING ROOM

Scheduled connectivity
with guaranteed SLA for:

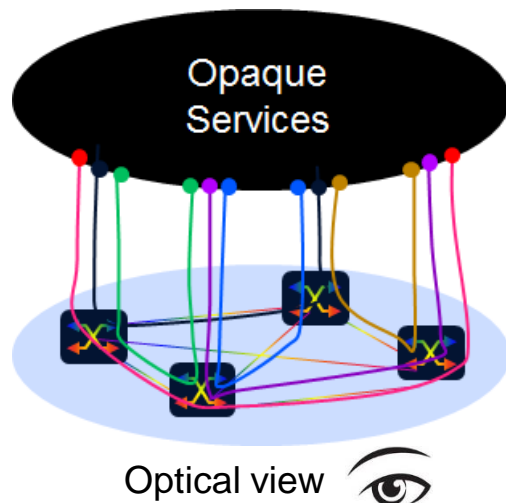
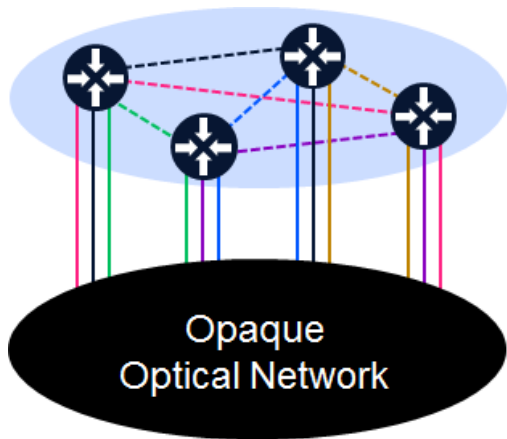
- High bandwidth
- Always-on
- Fixed latency



MULTILAYER OPTIMIZATION

Current approach – Extra links are required to deal with multiple failures

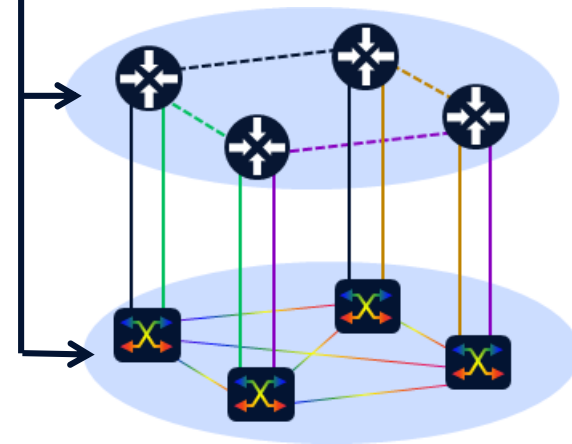
 Router view



Service Application Platform

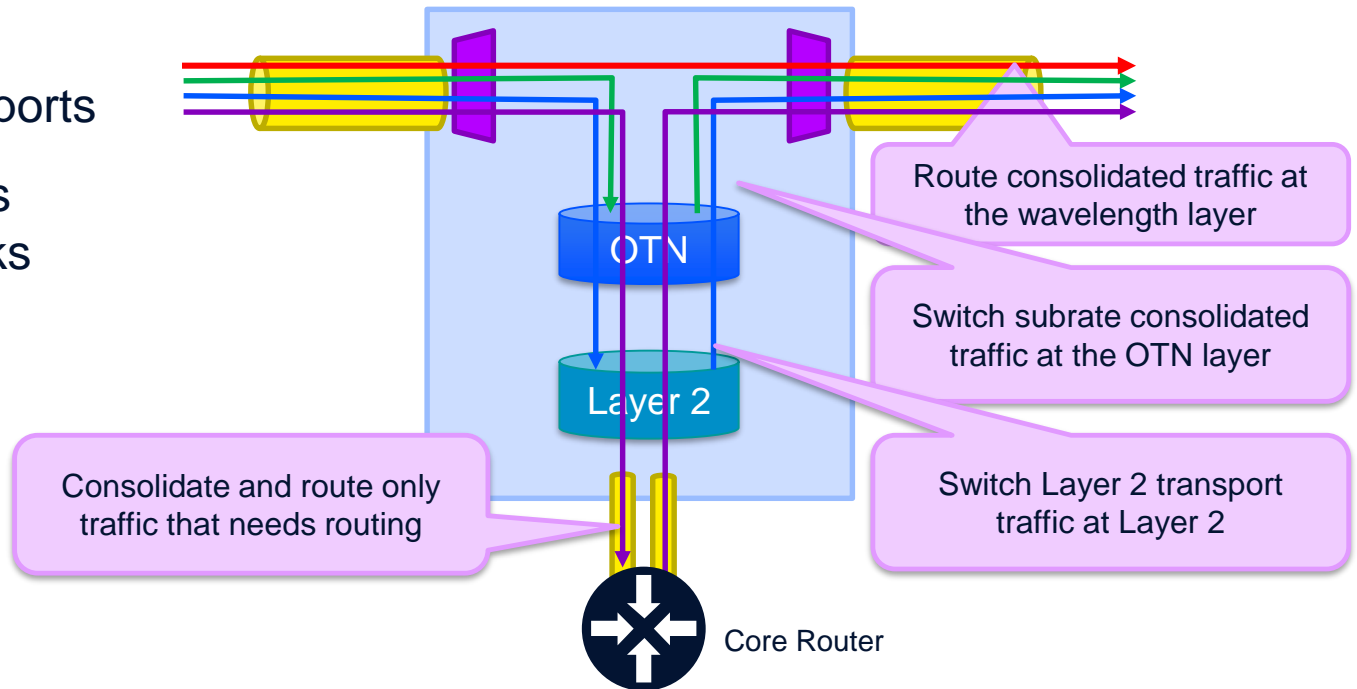


Optimized multilayer view requires fewer links



SDN FOR INTELLIGENT ROUTER BYPASS

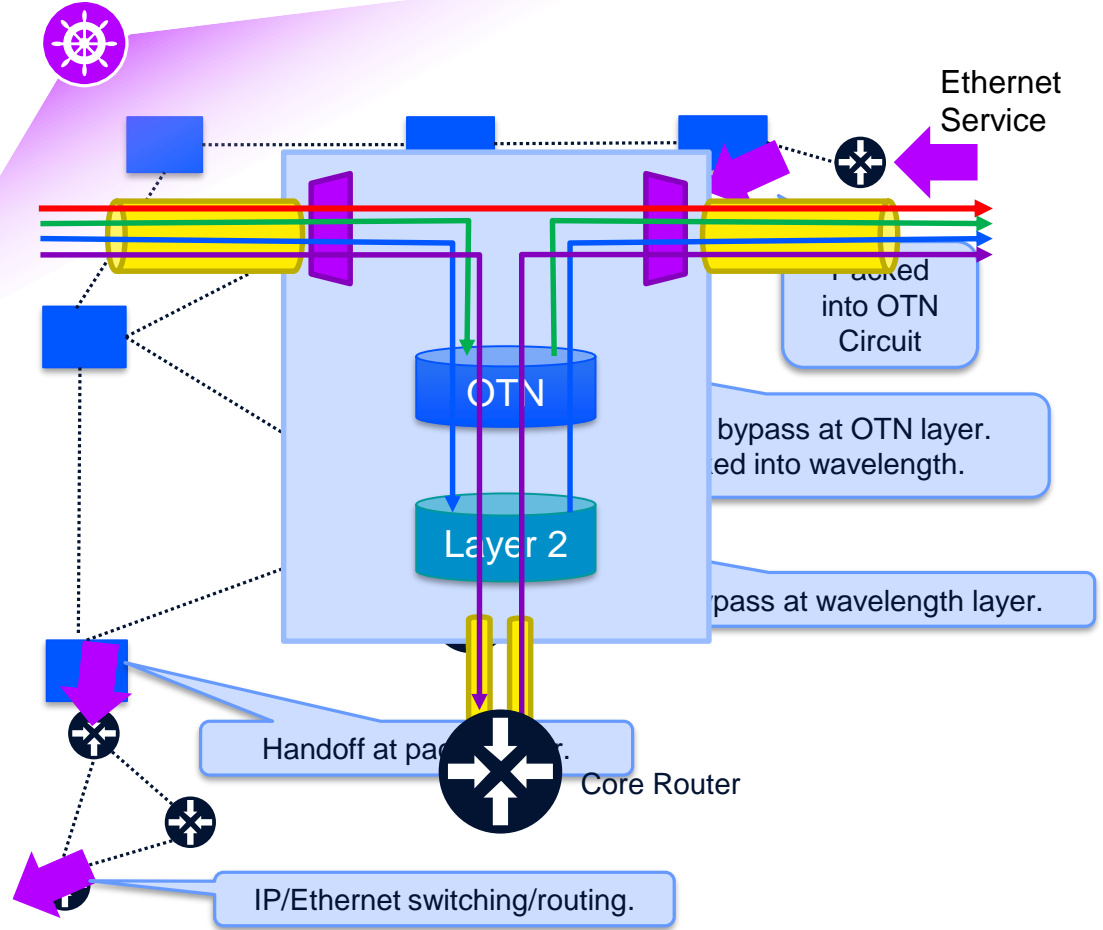
- Minimize use of expensive router ports
- Coordinate across multilayer networks



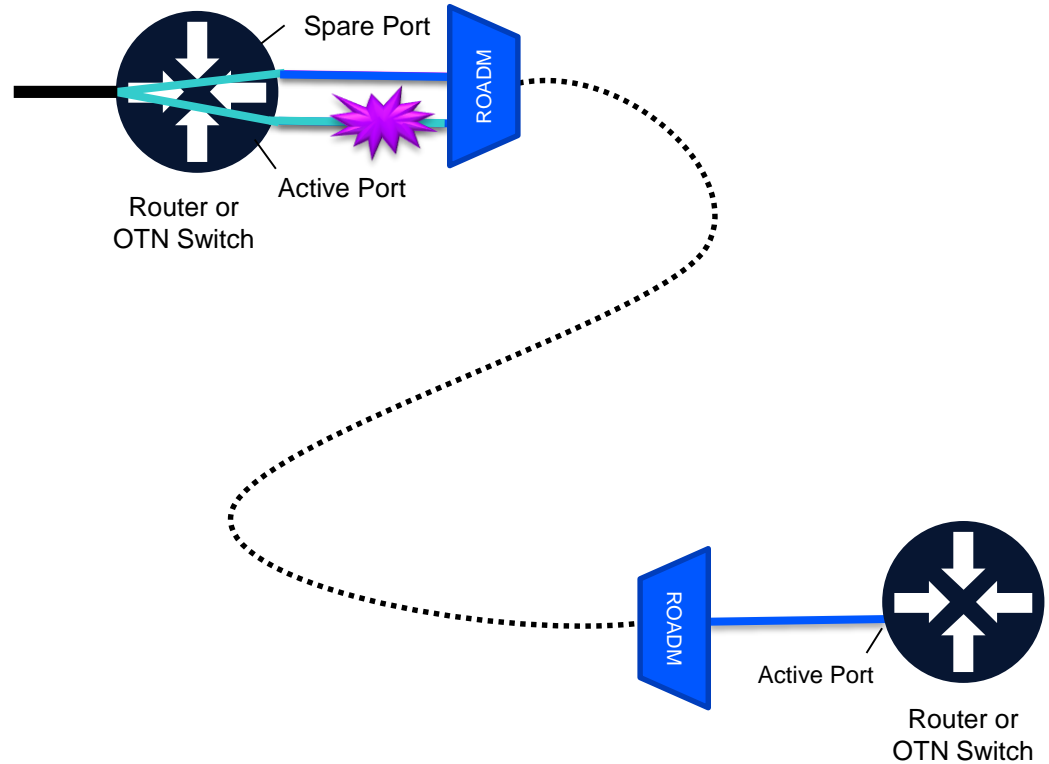
SDN FOR INTELLIGENT ROUTER BYPASS

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Multilayer SDN/NFV Controller



INTELLIGENT NETWORK RESTORATION

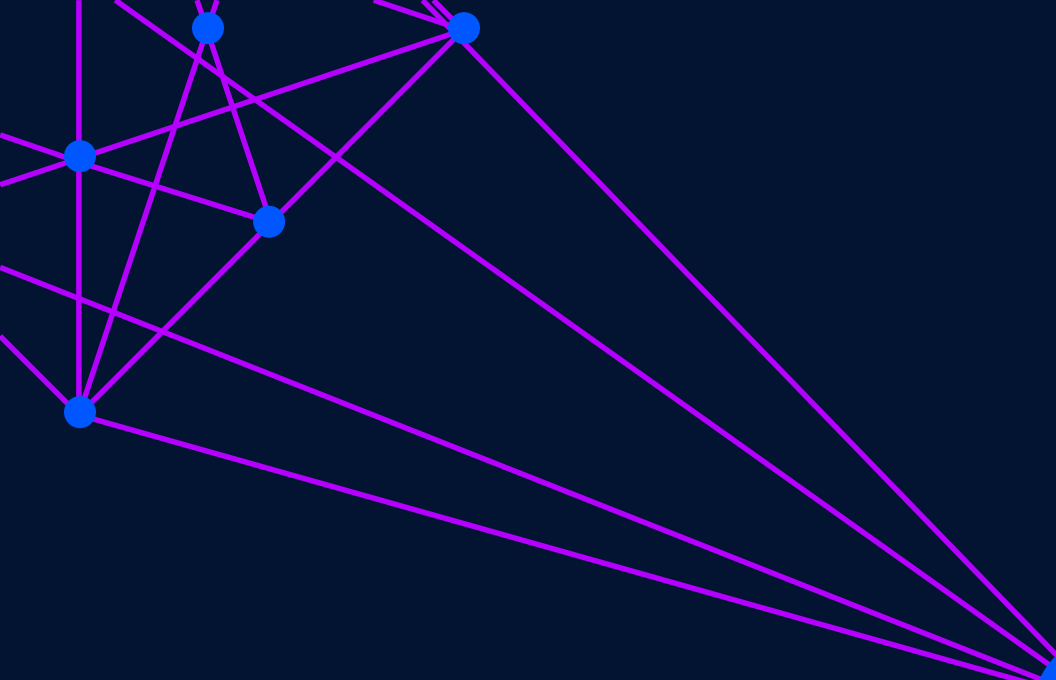


CONCLUSIONS

SDN is real, the applications are exciting, and the technology is evolving quickly

It is important to build networks today that are ready for the SDN future





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THANK YOU!