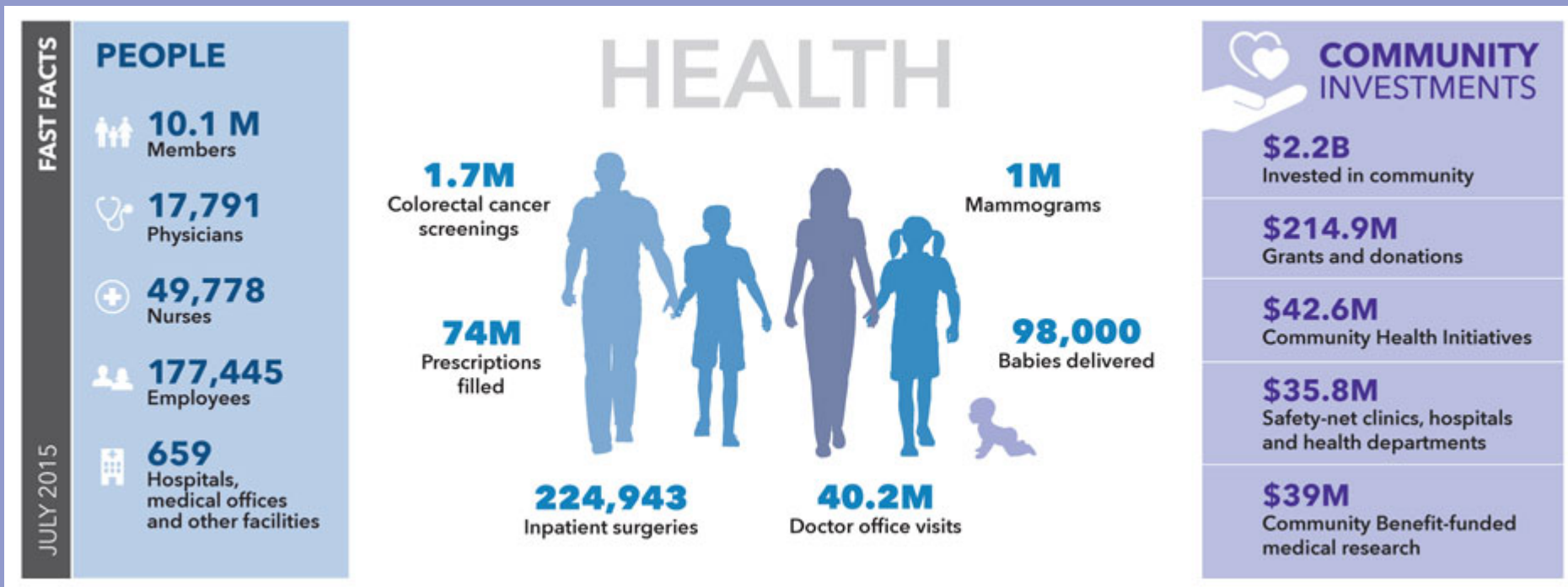




Rebuilding Kaiser Permanente's WAN for the Cloud

Kris Kline
Principal, Network Strategy
Office of the CTO

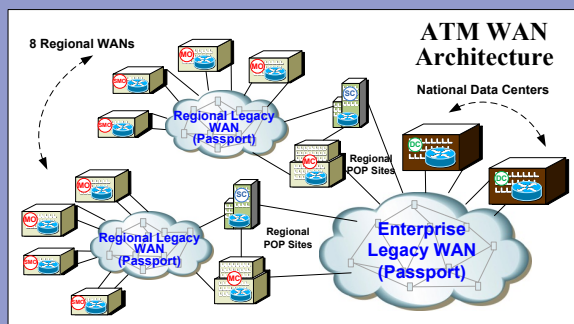
Introduction to Kaiser Permanente



- Kaiser Permanente is the US's largest nonprofit health plan
- Services provided across 7 national regions: 8 states and the District of Columbia
- Over \$62 billion in annual revenue

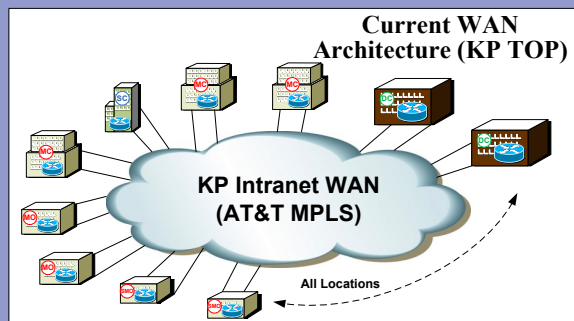
Kaiser Permanente WAN “Eras”

WAN 1.0 (ATM / Frame Relay)



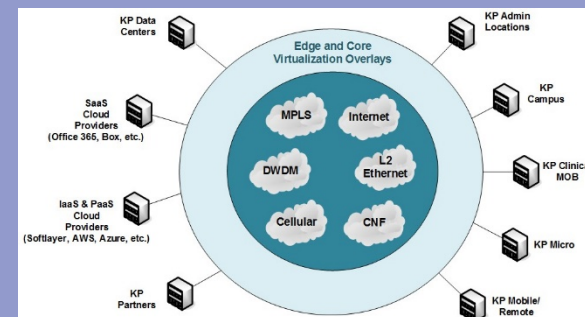
- 1995 – 2007
- 1Mb – 155Mb
- Hub / Spoke

WAN 2.0 (MPLS)



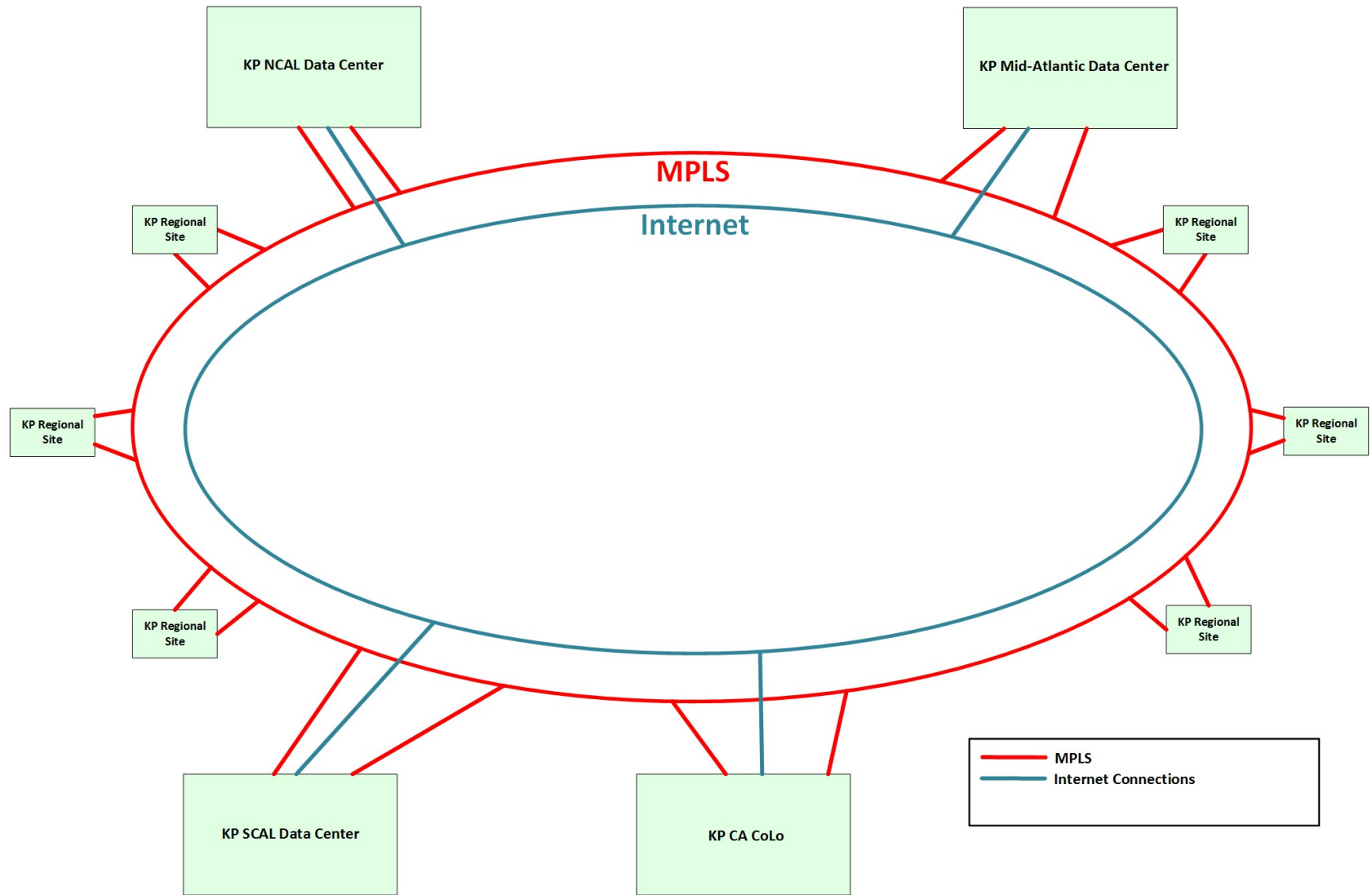
- 2007 – 2015
- 1Mb – 10Gb
- Full MPLS Mesh
- Single Vendor

WAN 3.0 (Hybrid WAN)



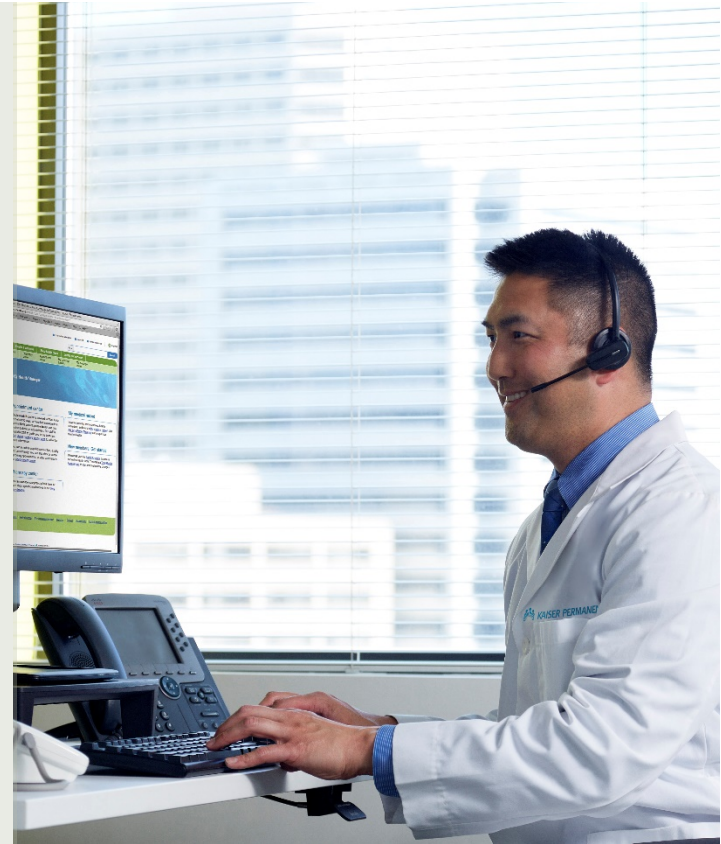
- 2015 – and beyond
- 1Mb – 100Gb
- SD-WAN Enabled
- Multi-Vendor
- Multi-connection types
- Integrates Carrier Neutral Facilities (CNF) & Cloud

Previous WAN Architecture



Business Drivers for New WAN Approach

- Increased criticality of the network
- Membership growth & Acquisitions
- New methods of care delivery
- Highly regulated industry – PHI, PCI, HIPAA
- Strategic move to external cloud services
- Forecast network growth – 20% to 40% YoY
- 30%-60% of KP WAN traffic is Internet bound



WAN Architecture – Two Strategies

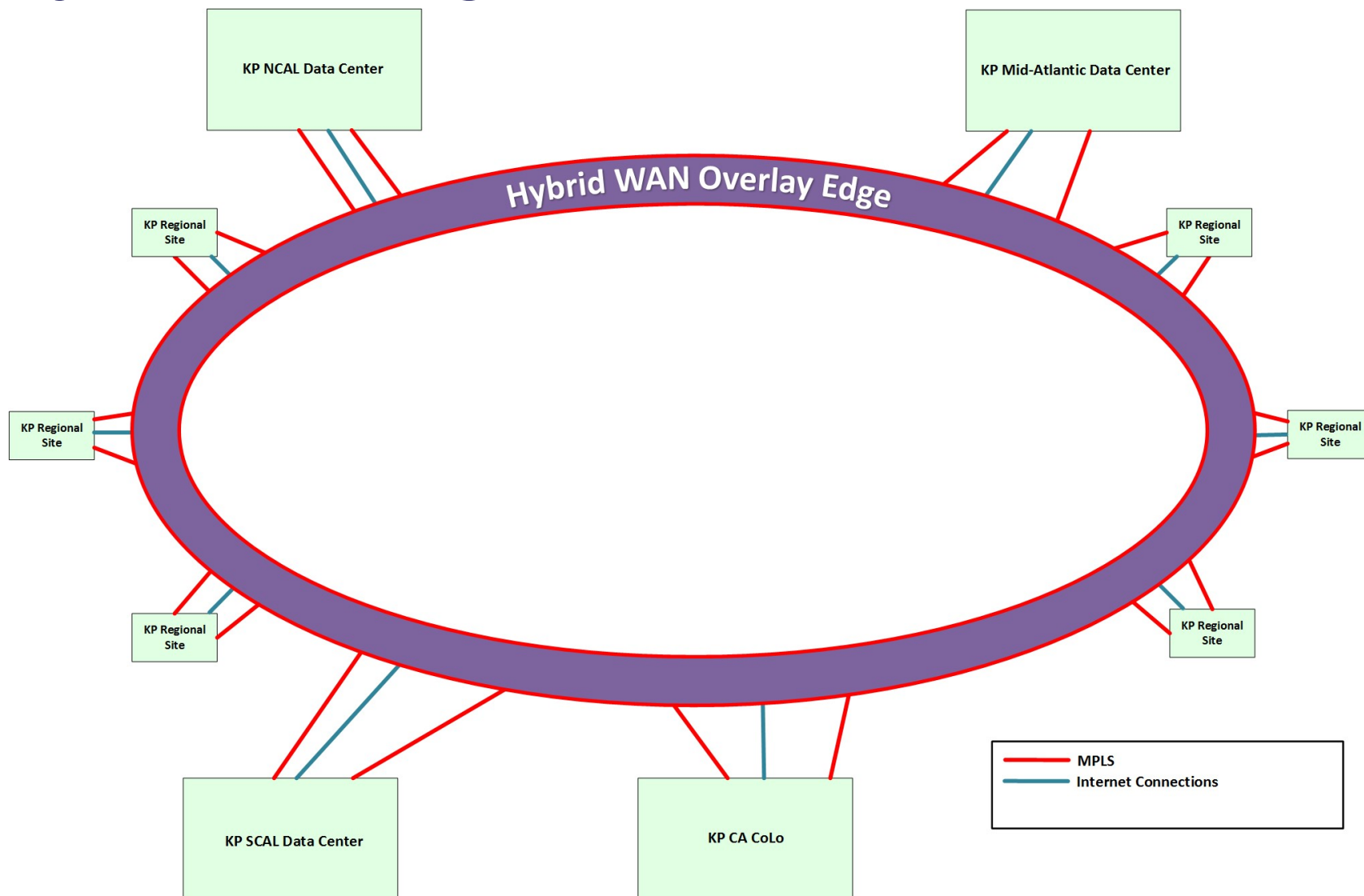
Hybrid WAN Edge

- Grow bandwidth with Internet connections at edge
- Increase utilization on dual MPLS links
- Enables application profiling, prioritization, and transport selection
- Sets foundation for the future – direct internet access to surf, guest, and public cloud

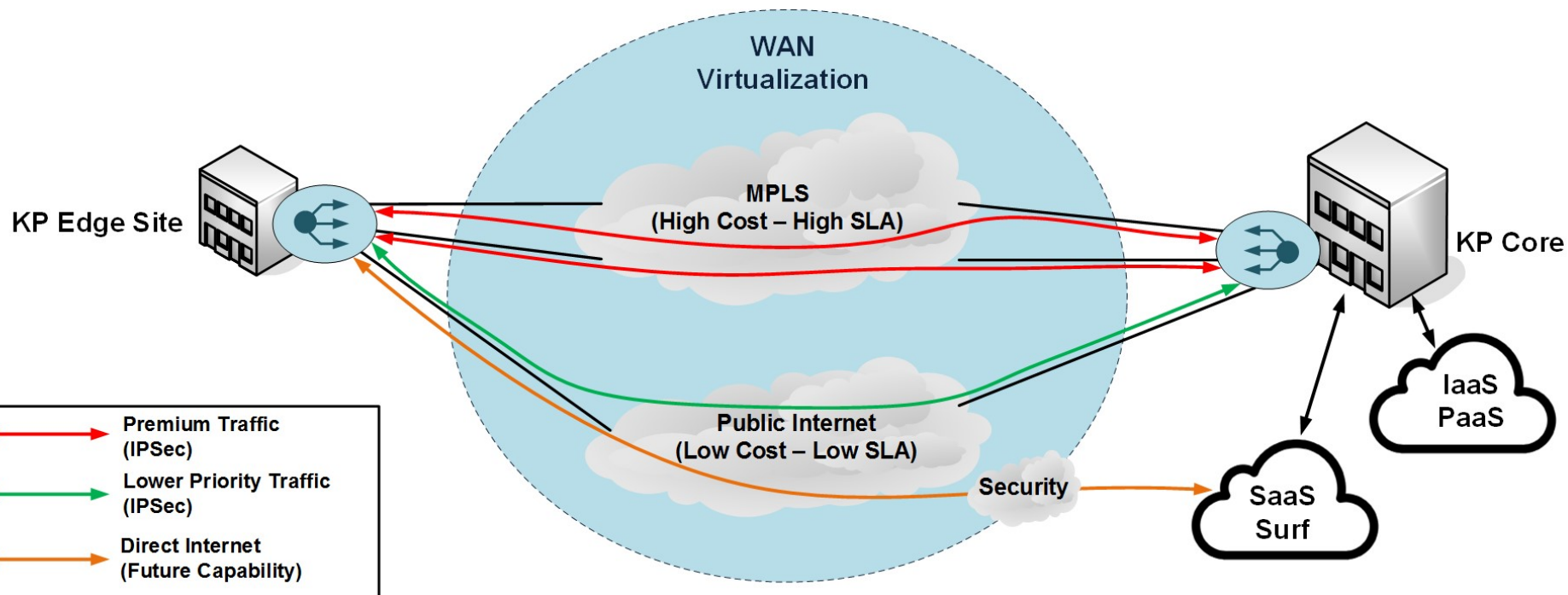
Carrier Neutral Facility (CNF) Core

- Leverage CNF for carrier flexibility, availability, and competitiveness
- Enable high-speed Layer-2 DCI between DCs and CNFs
- Deploy private MPLS and VRFs for powerful network underlay and traffic segmentation
- Enable future core overlay capabilities (NSX / VXLAN)

Hybrid WAN Edge Architecture



KP Hybrid WAN Edge Detail



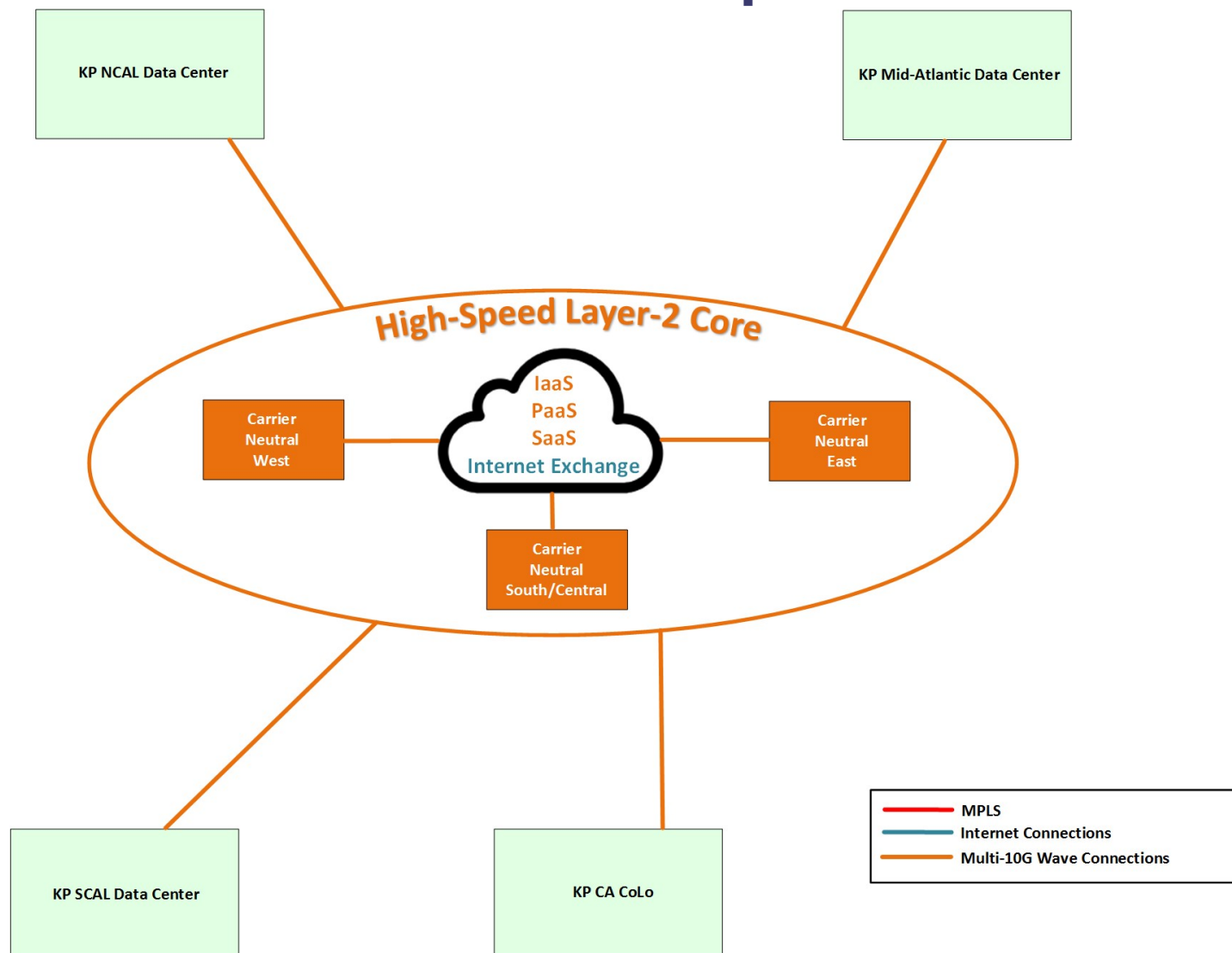
- Secure transport over both MPLS and Internet to Core
- Traffic separation of Internal, Internet, Guest, & Wi-Fi Calling
- Retaining Dual MPLS ; Adding Internet as tertiary connection
- Dynamic Multi-Path capability via centralized application policy

Core WAN Architecture Drivers

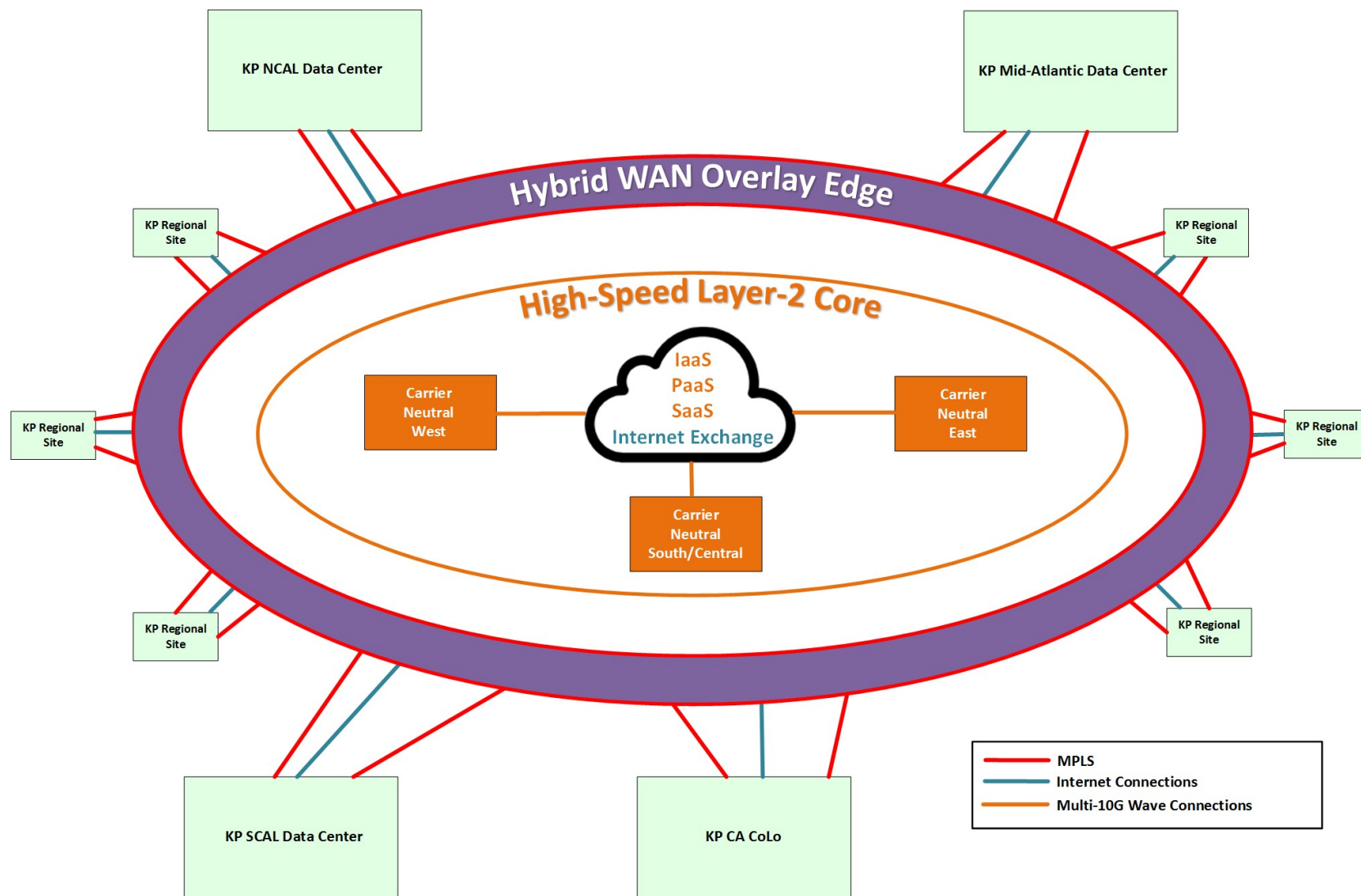
- **Cost Effective** – Leverage Layer-2 Waves from multiple carriers – Connections start at 2x10G
- **Maturity** – Edge SD-WAN solutions not ready for core bandwidth and throughput
- **Flexibility** – Enables various overlay and traffic separation technologies in core
- **Capability** – Delivers bandwidth and performance for KP migration from internal DCs to IaaS/PaaS



Core WAN Architecture Concept



Combined Edge and Core WAN Architecture



Lessons Learned

- Security
 - New interfaces to cloud providers drive new security flows and hardware placement
 - Define which security stack applies to each different cloud type
- Application team excitement for cloud
 - Drive for real requirements and scope
- CNF selection and placement
 - Understand each cloud vendor's cloud connection points and interface method



Thank You

