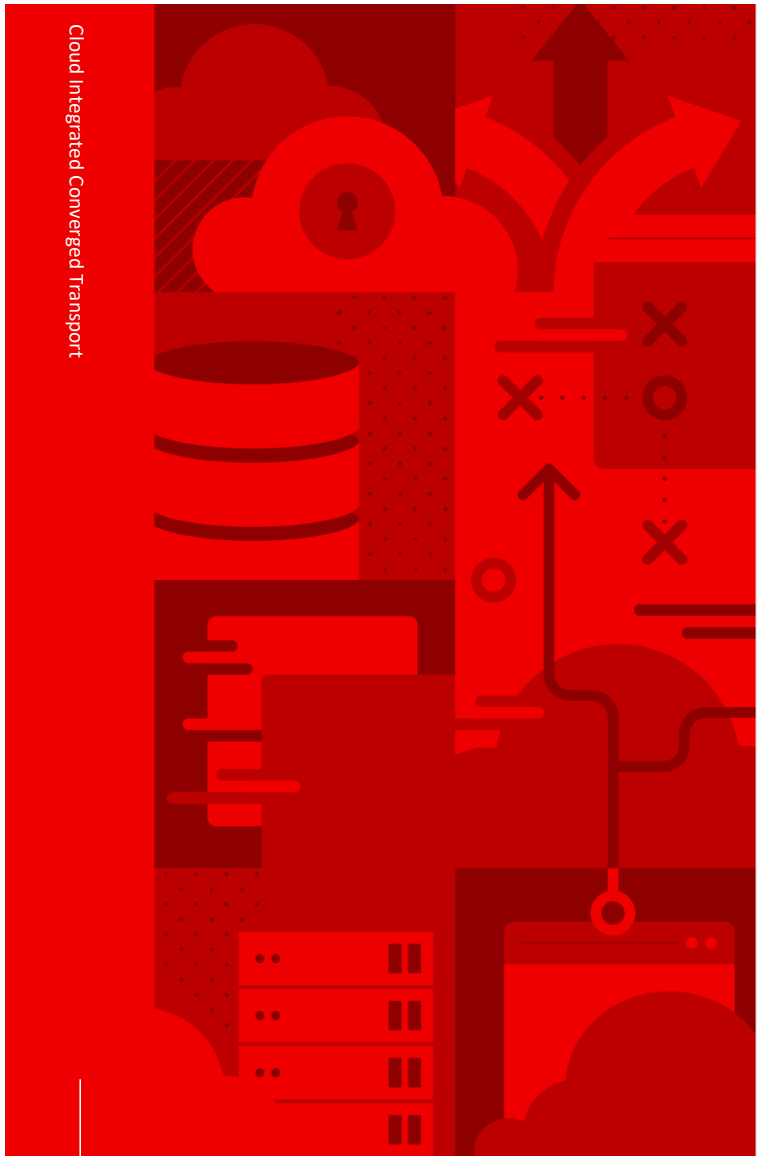

Cloud Integrated Converged Transport

Service Provider TechTalks

Aug 10, 2023

Syed Hassan, Principal Telecommunication Architect, Red Hat

Michael Marshall, Principal Networking Architect, Cisco

Kashif Islam, Principal Telecommunication Architect, Red Hat

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Agenda

- Service provider cloud drivers
- Peeling the network onion
- The role of a horizontal cloud platform
- Reimagining SP networks in the hybrid cloud era
- Cloud converged transport
- Virtual router use cases
- Summary

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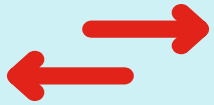
Service Provider Cloud Drivers

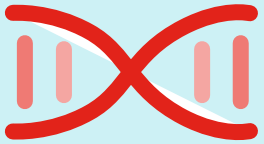
Network Transformation

NR, RAN, & Mobile Core



Changing Traffic Patterns

Open Networks

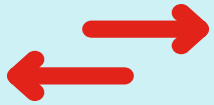


Cloud Native Application

Service Provider Cloud Drivers

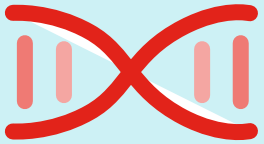
Network Transformation

NR, RAN, & Mobile Core



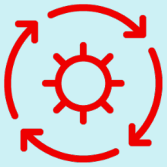
Changing Traffic Patterns

Open Networks



Cloud Native Application

Low Latency



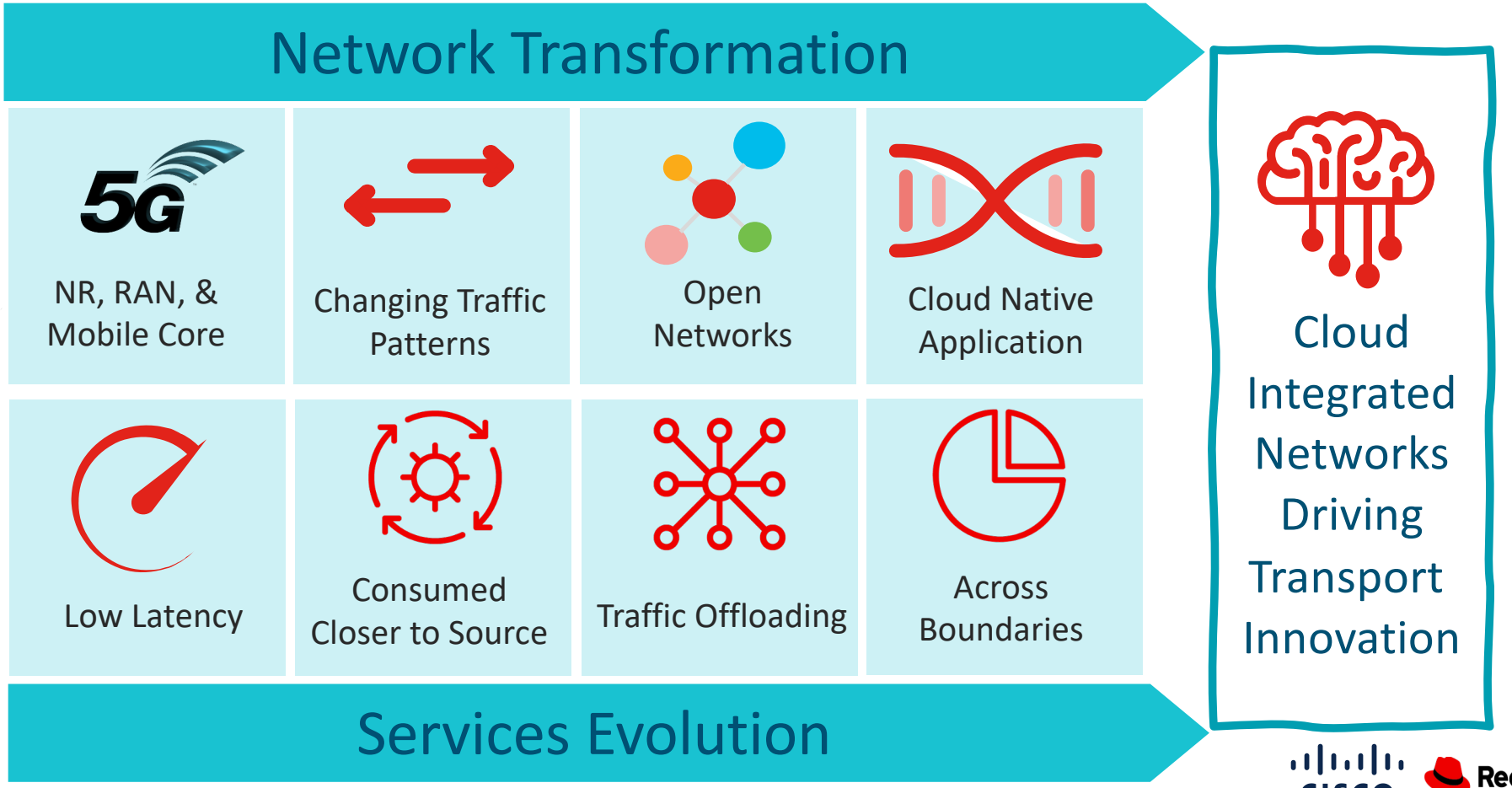
Consumed Closer to Source

Traffic Offloading

Across Boundaries

Services Evolution

Service Provider Cloud Drivers



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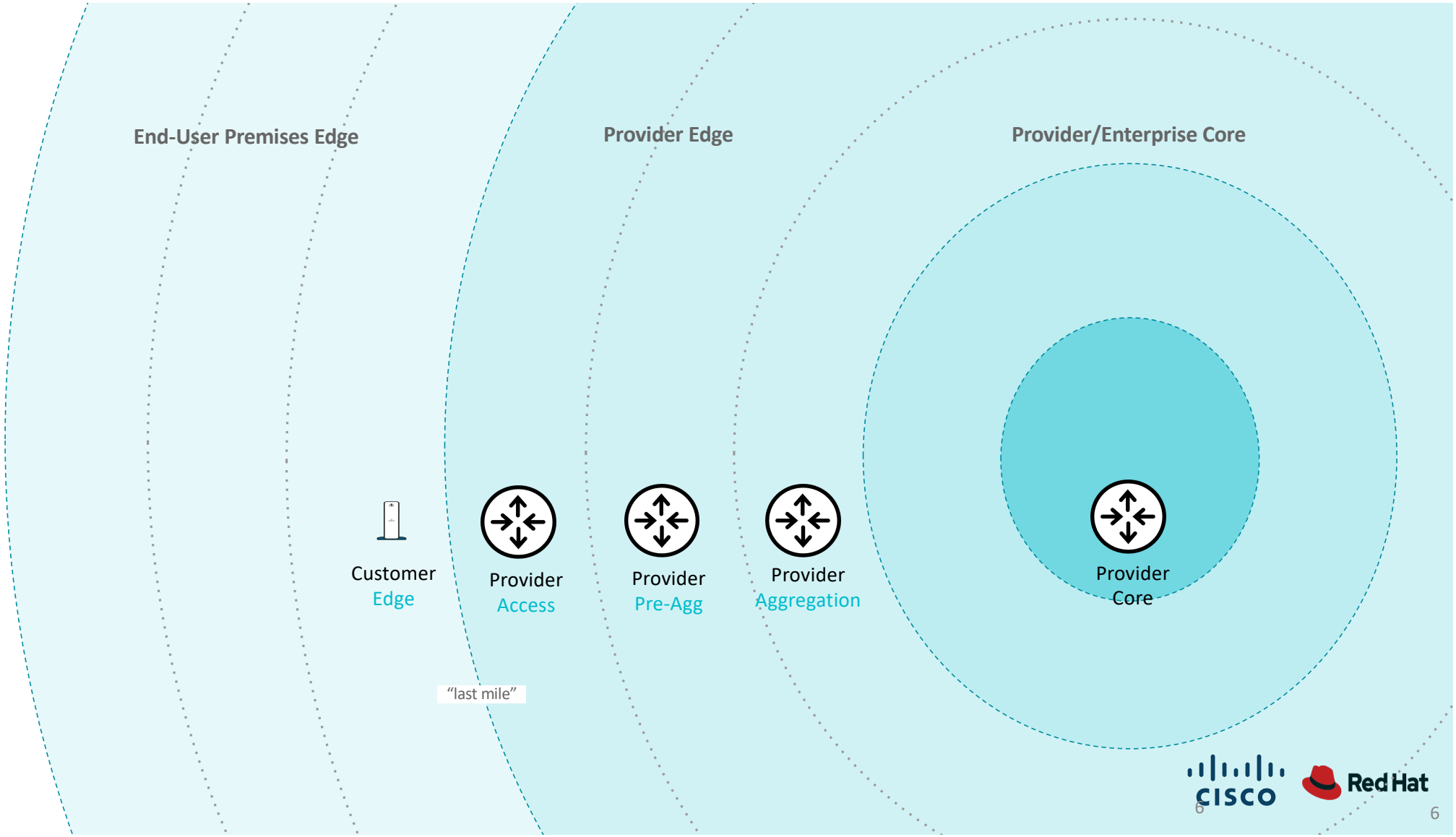
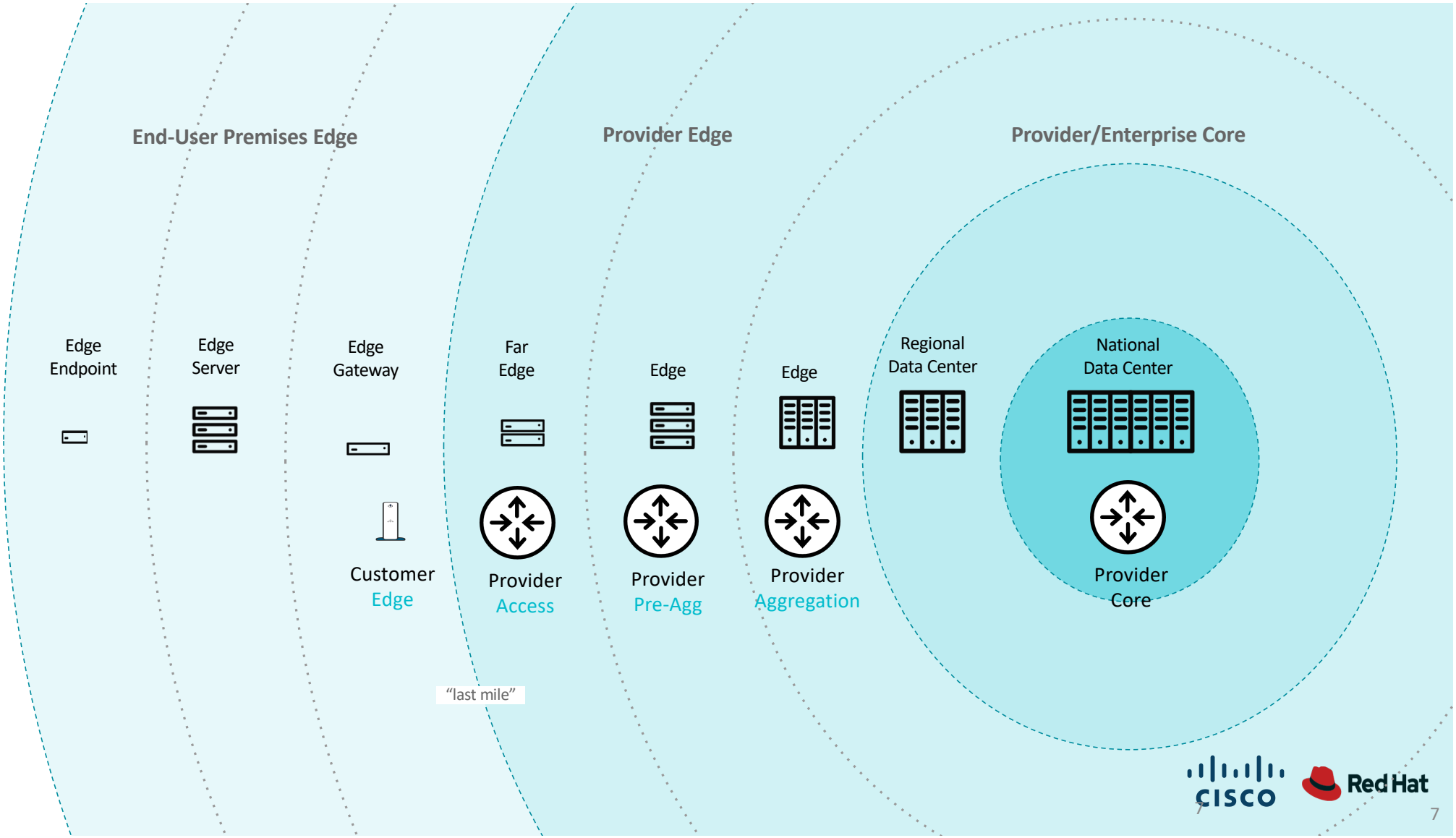
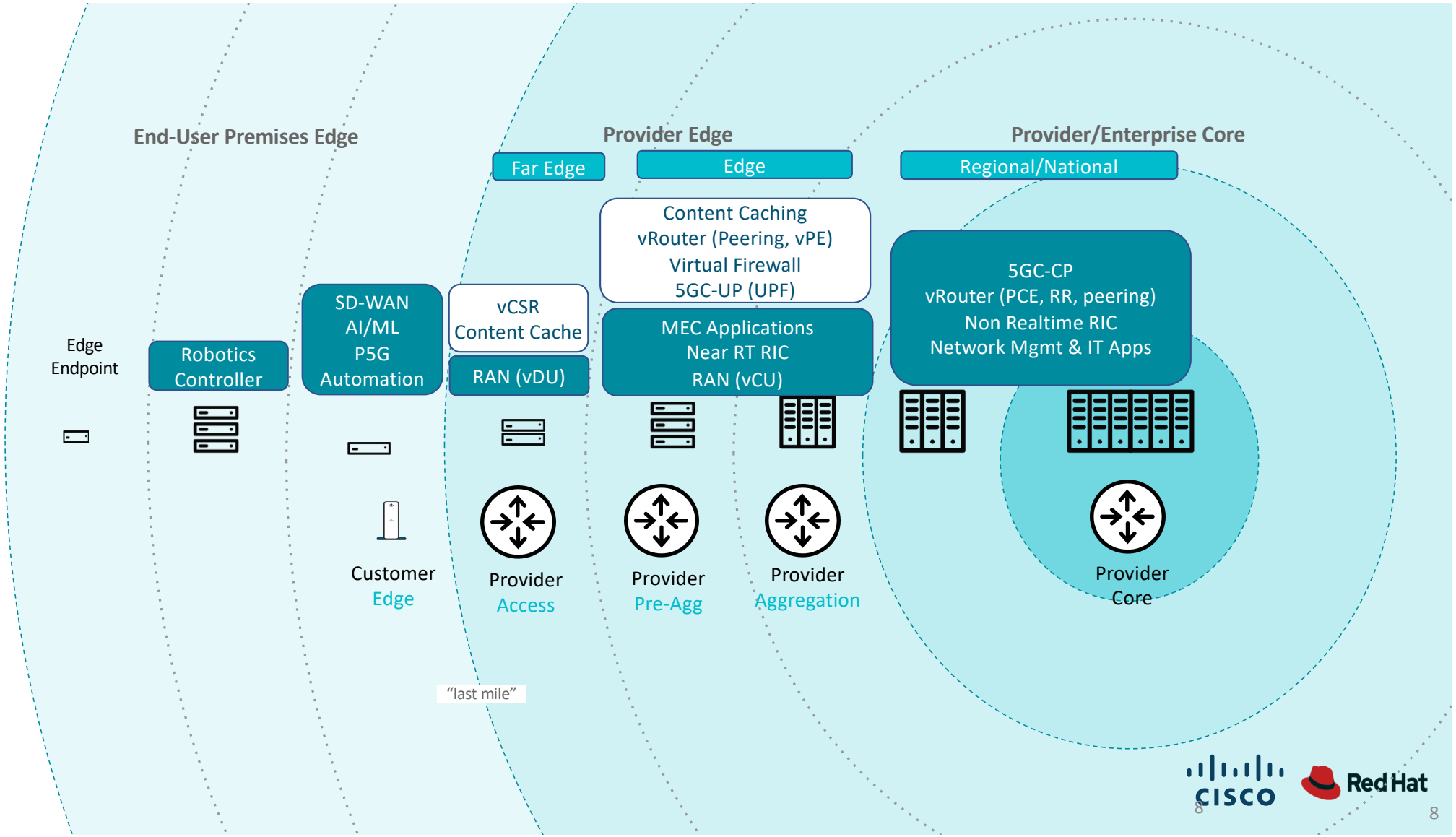

End-User Premises Edge
Provider Edge
Provider/Enterprise Core
Customer
Edge
Provider
Access
Provider
Pre-Agg
Provider
Aggregation
Provider
Core
"last mile"

6


End-User Premises Edge
Provider Edge
Provider/Enterprise Core
Edge Endpoint
Edge Server
Edge Gateway
Far Edge
Edge
Edge
Regional Data Center
National Data Center
Customer Edge
Provider Access
Provider Pre-Agg
Provider Aggregation
Provider Core
"last mile"
CISCO
Red Hat

7


End-User Premises Edge
Provider Edge
Provider/Enterprise Core
Far Edge
Edge
Regional/National
Content Caching
vRouter (Peering, vPE)
Virtual Firewall
5GC-UP (UPF)
5GC-CP
vRouter (PCE, RR, peering)
Non Realtime RIC
Network Mgmt & IT Apps
Edge Endpoint
Robotics Controller
SD-WAN
AI/ML
P5G
Automation
vCSR
Content Cache
RAN (vDU)
MEC Applications
Near RT RIC
RAN (vCU)
Customer Edge
Provider Access
Provider Pre-Agg
Provider Aggregation
Provider Core
"last mile"
CISCO
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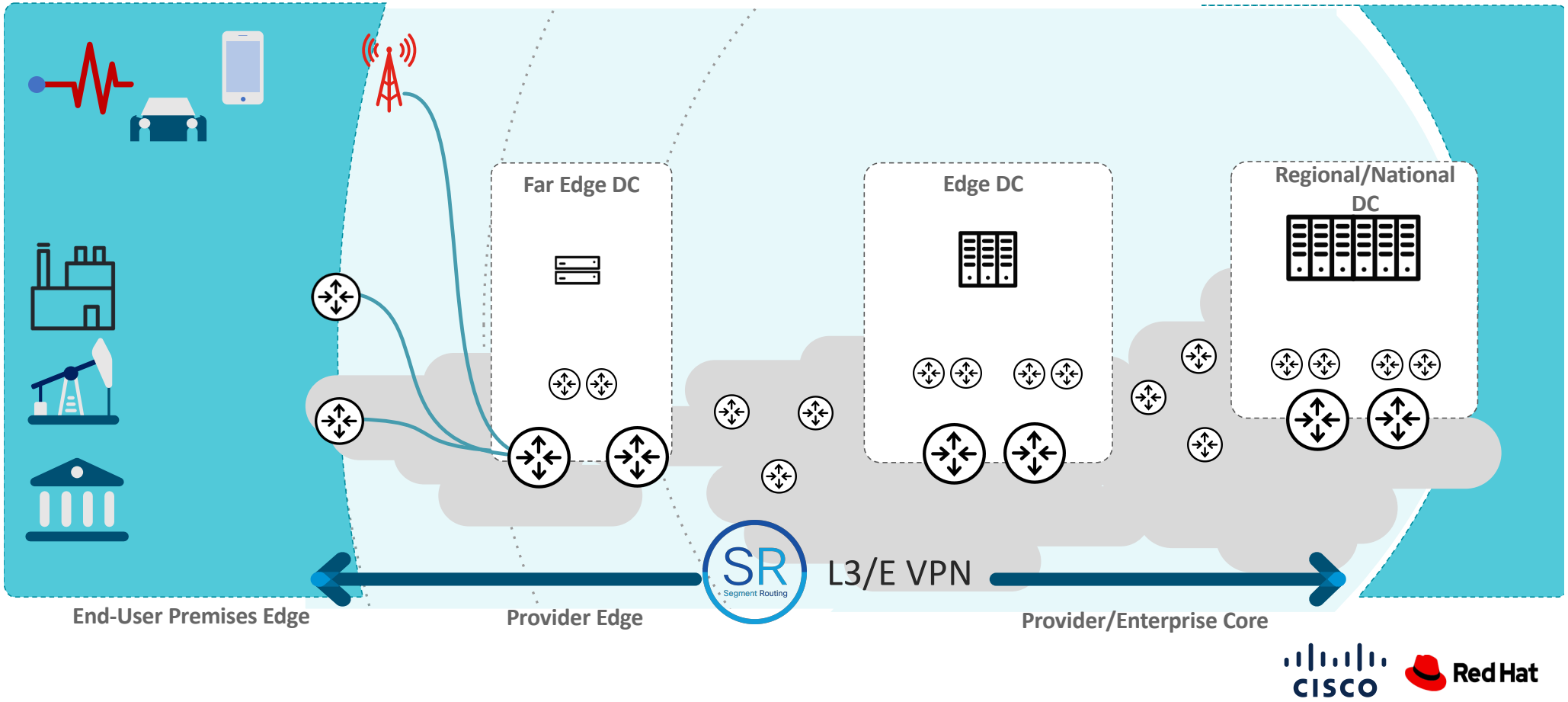
8

Evolving SP Networks



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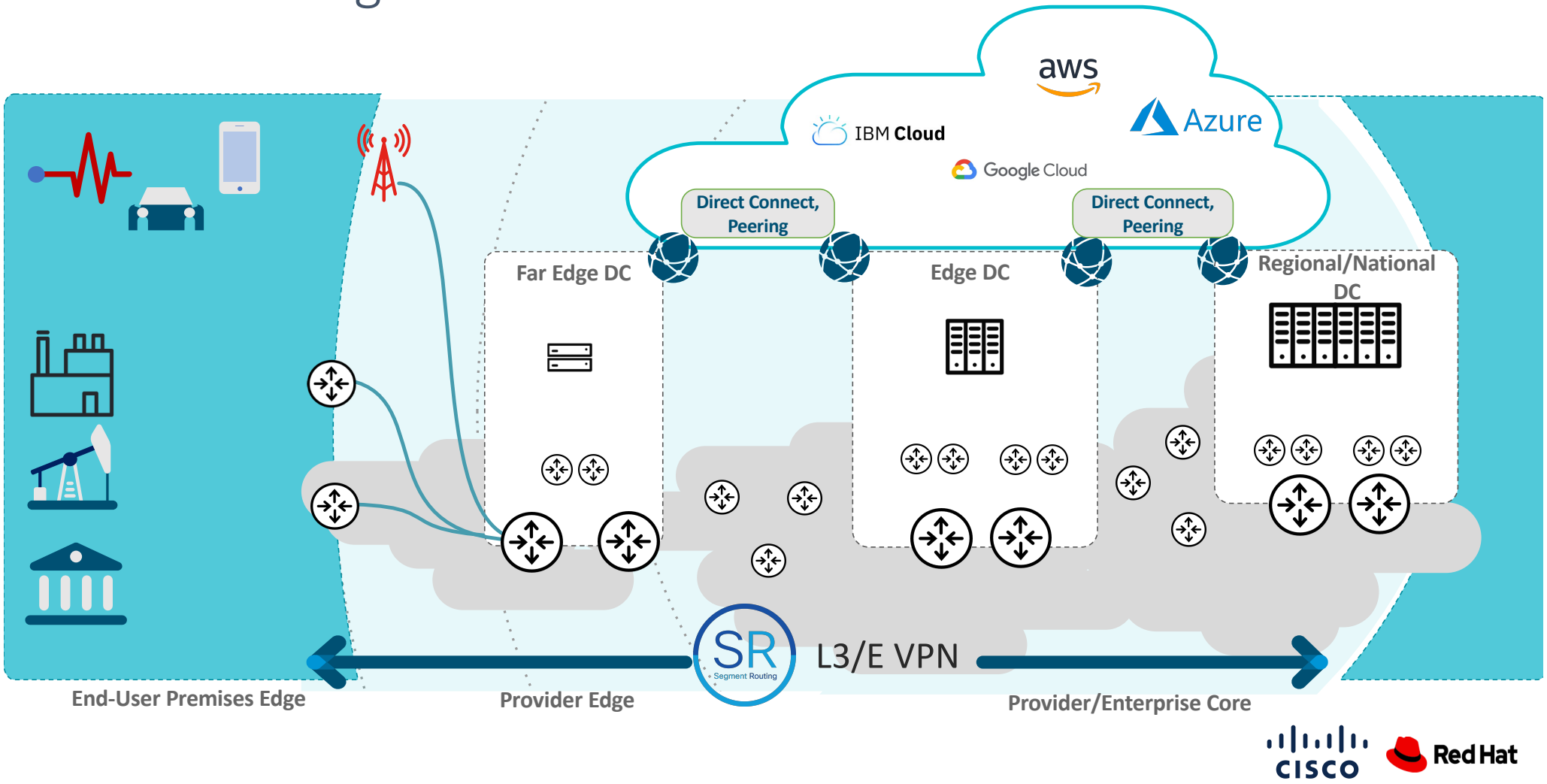
Transcending Traditional SP Network Boundaries



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So you've put general purpose compute across the SP network, great !!!

What do you need to run cloud-native applications on these devices??

A Cloud Platform for Hybrid Cloud Era

You need a Cloud Platform

- Containerization is a key aspect of cloud-native applications
- Service Providers need a horizontal Cloud Platform beyond just hypervisors
- Extends from Access, Edge, Aggregation, Core, Data Centers – and of course, the Public Cloud
- Enables a software-based disaggregated protocol stack accelerating feature velocity

What should the Cloud Platform provide?

- Consistency, Flexibility, Extensibility, Scalability, Reliability
- Ready for Cloud-Native Application workloads
- Ability to adjust performance profiles required for applications
  - RT Kernel, Huge Pages, NUMA pinning, and more
- Ability to run on variety of underlying infrastructure
  - Baremetal, Virtual Machines, On-Prem, Public Cloud
- A robust partner ecosystem !!!

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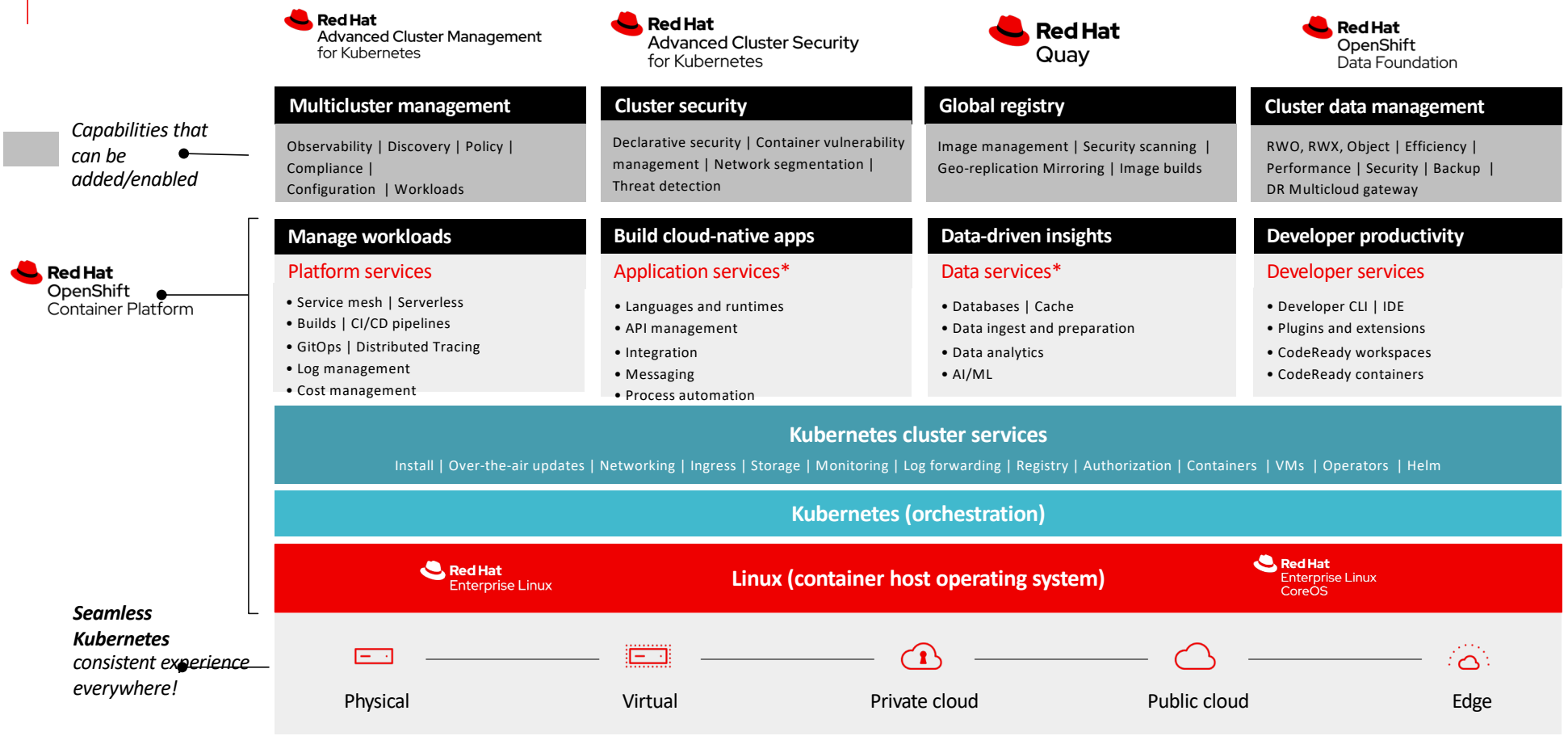
Red Hat OpenShift: Keep your options Open



Red Hat OpenShift: The Horizontal Cloud Platform

Single Node OpenShift (SNO)

Real Estate Optimized

Large Scale Access Deployment

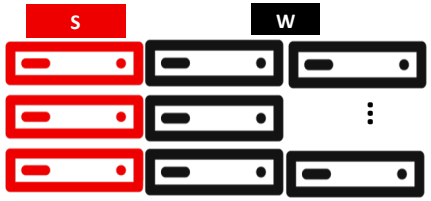
Ideal for: Cell Sites & Remote Locations

3-Node Compact Cluster

Redundancy and High Availability

Edge Optimized

Ideal for: Far Edge, Edge locations



Traditional Multi-Node Cluster

Scalable & extensible

Highly redundant

Ideal for: Edge, Regional, Central, National locations

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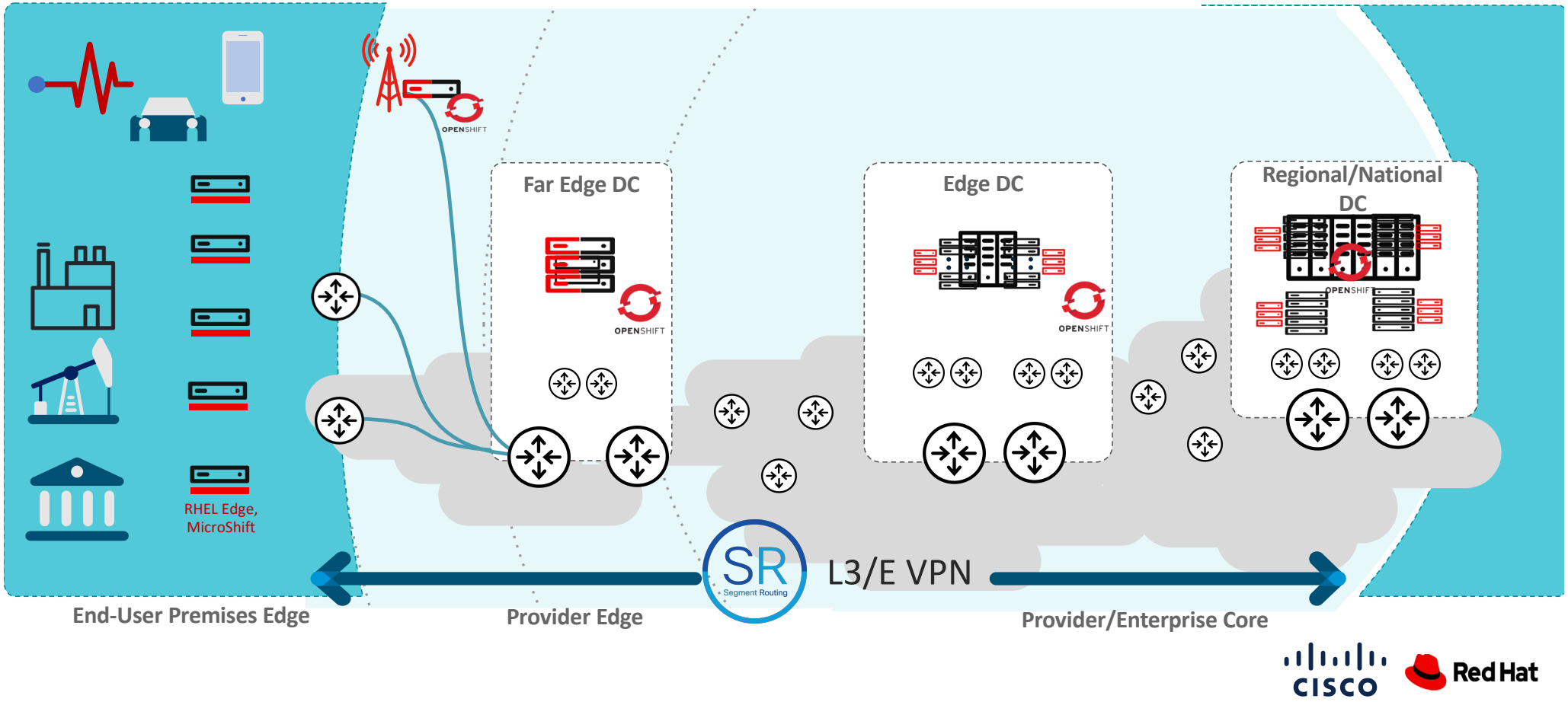
Horizontal Cloud Platform Across Privately owned SP Network



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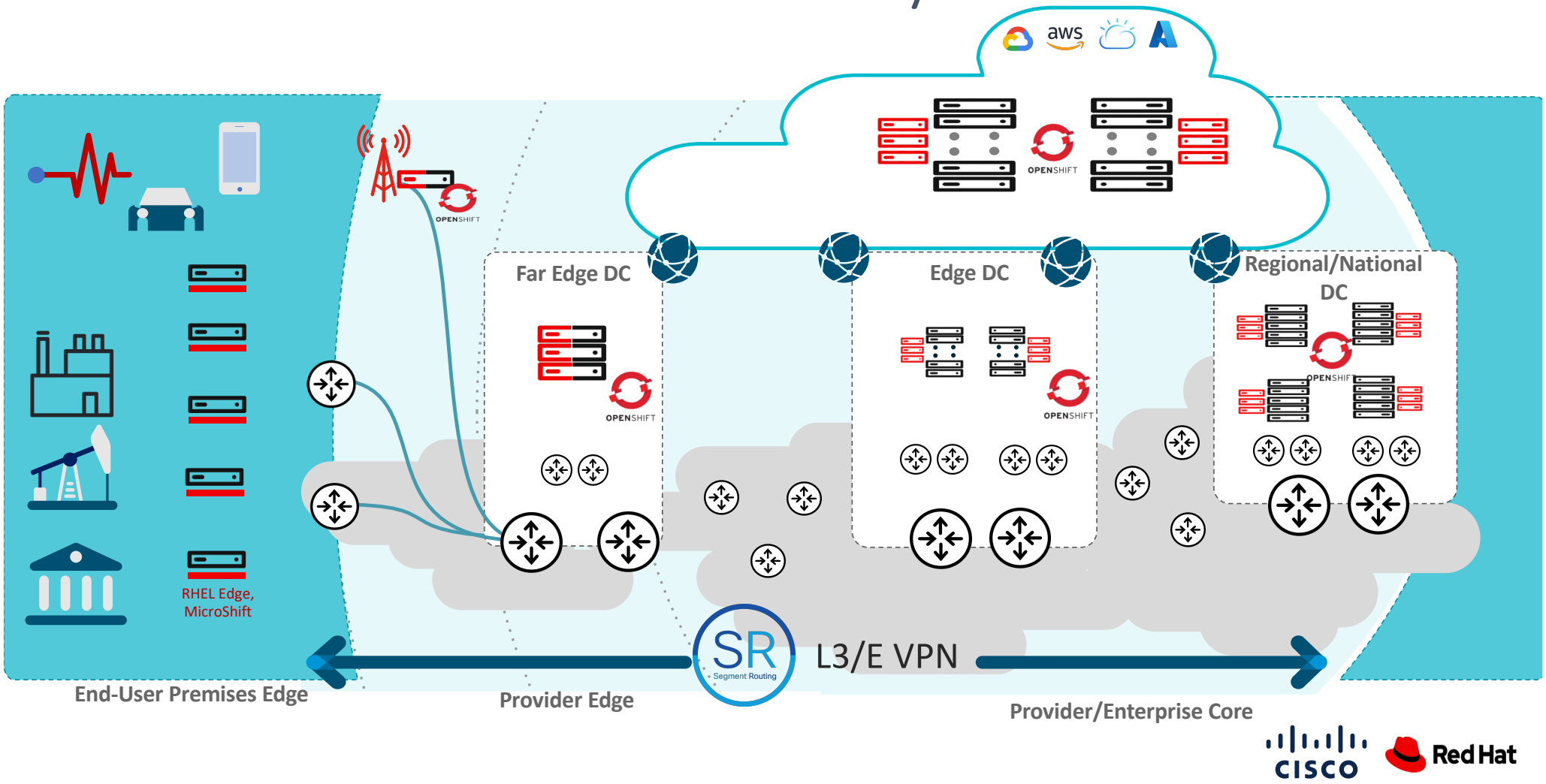
Horizontal Cloud Platform Across **Hybrid** SP Network



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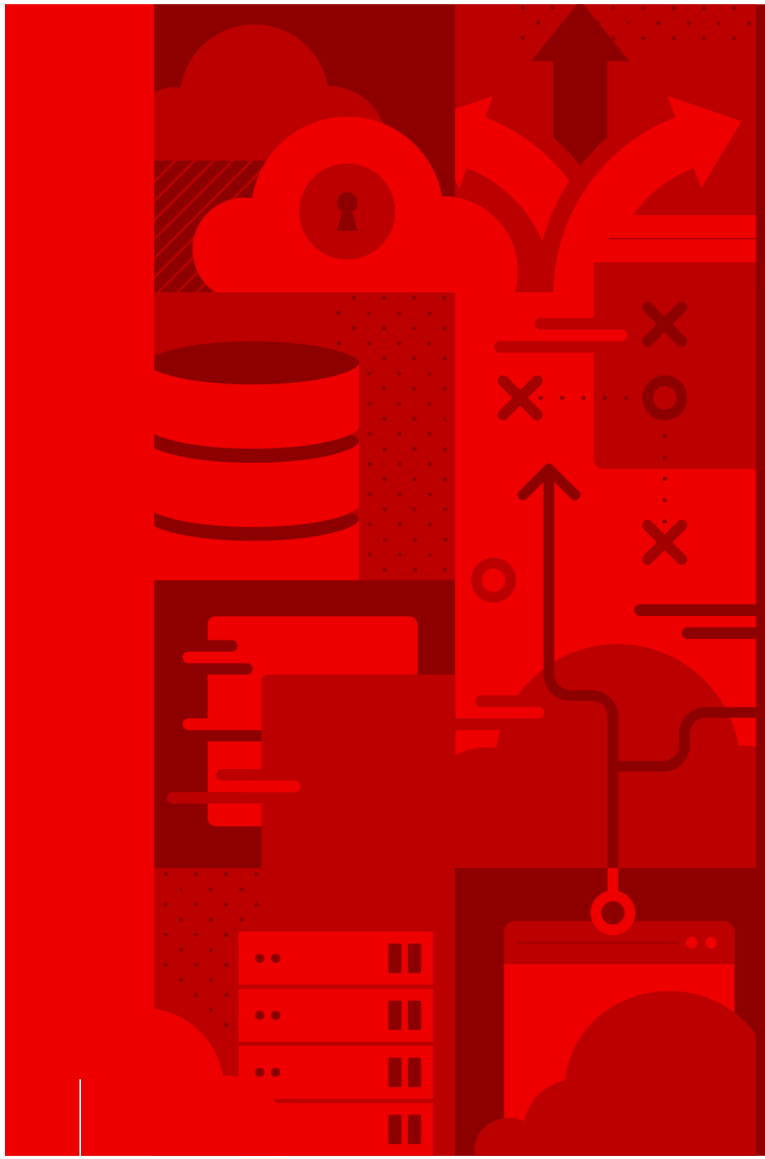

Reimagining SP Networks in Hybrid Cloud Era

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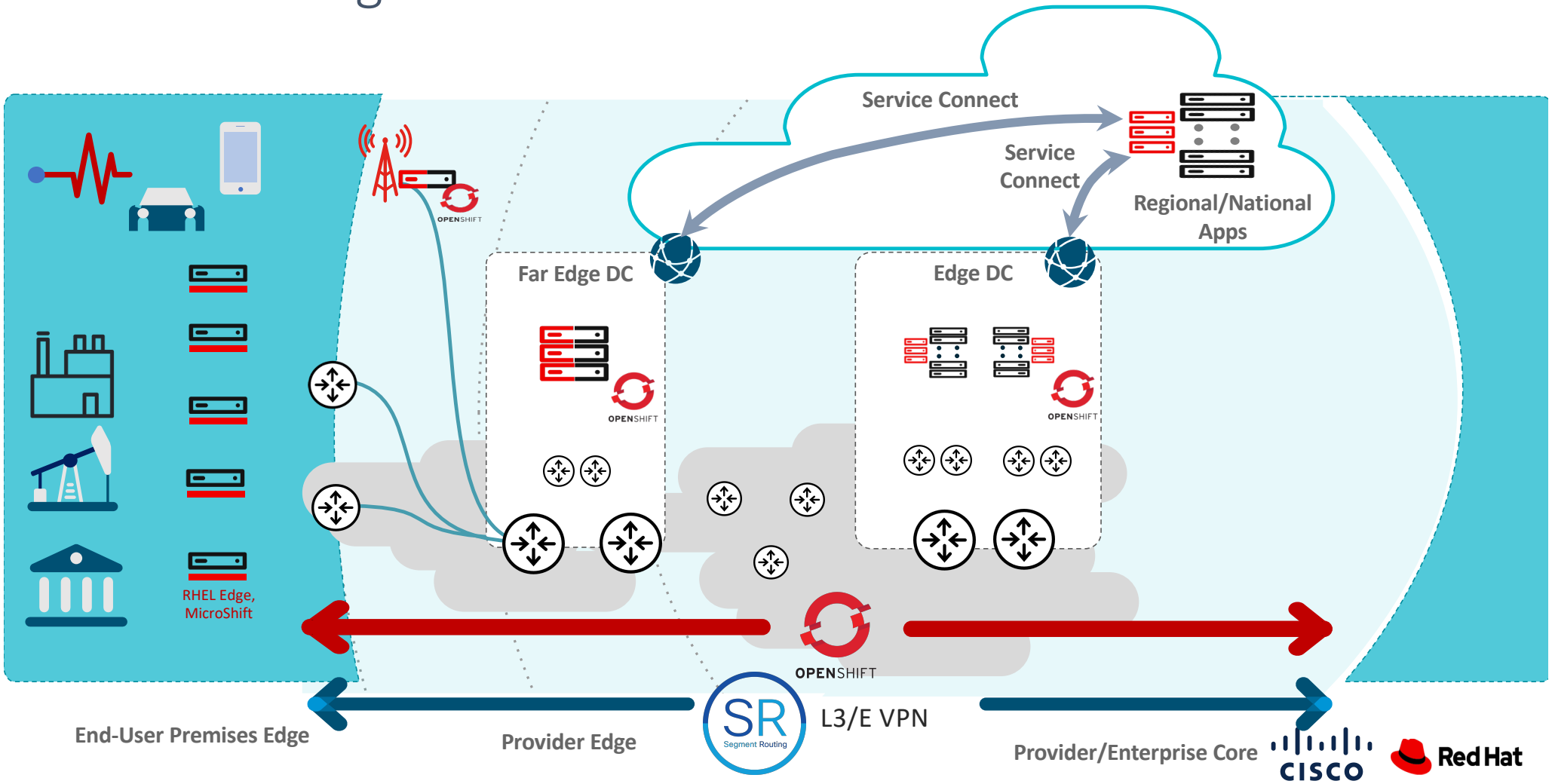
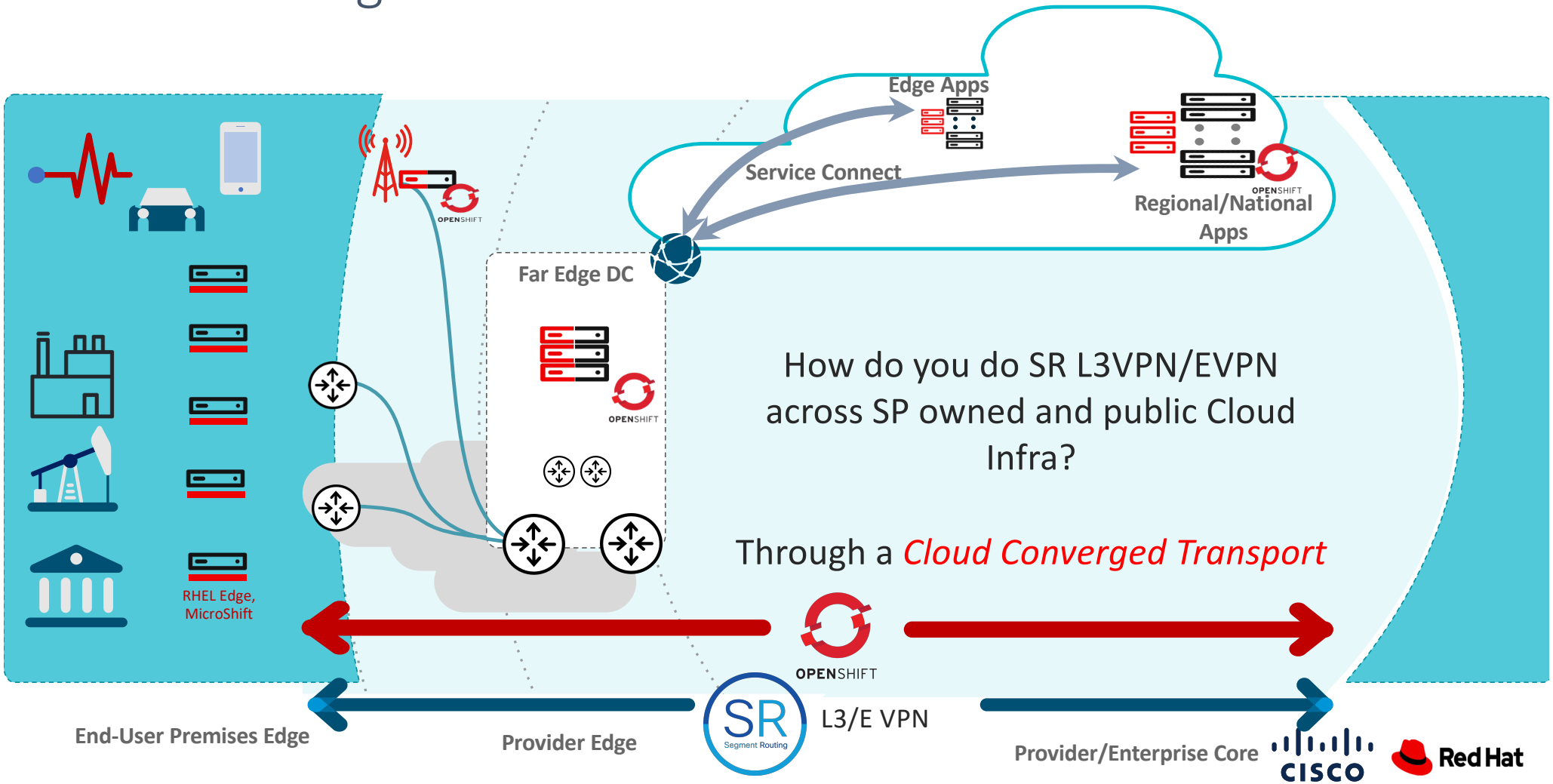
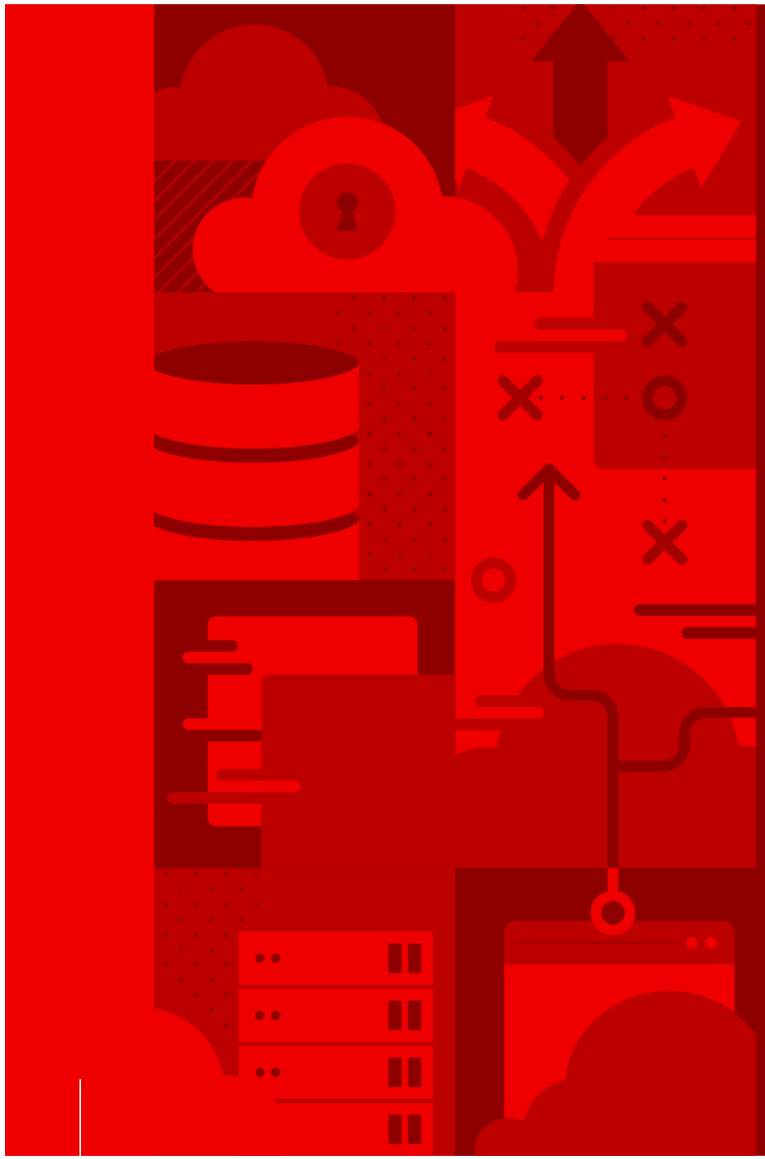
Transcending Traditional SP Network Boundaries



Transcending Traditional SP Network Boundaries





Cloud Converged Transport

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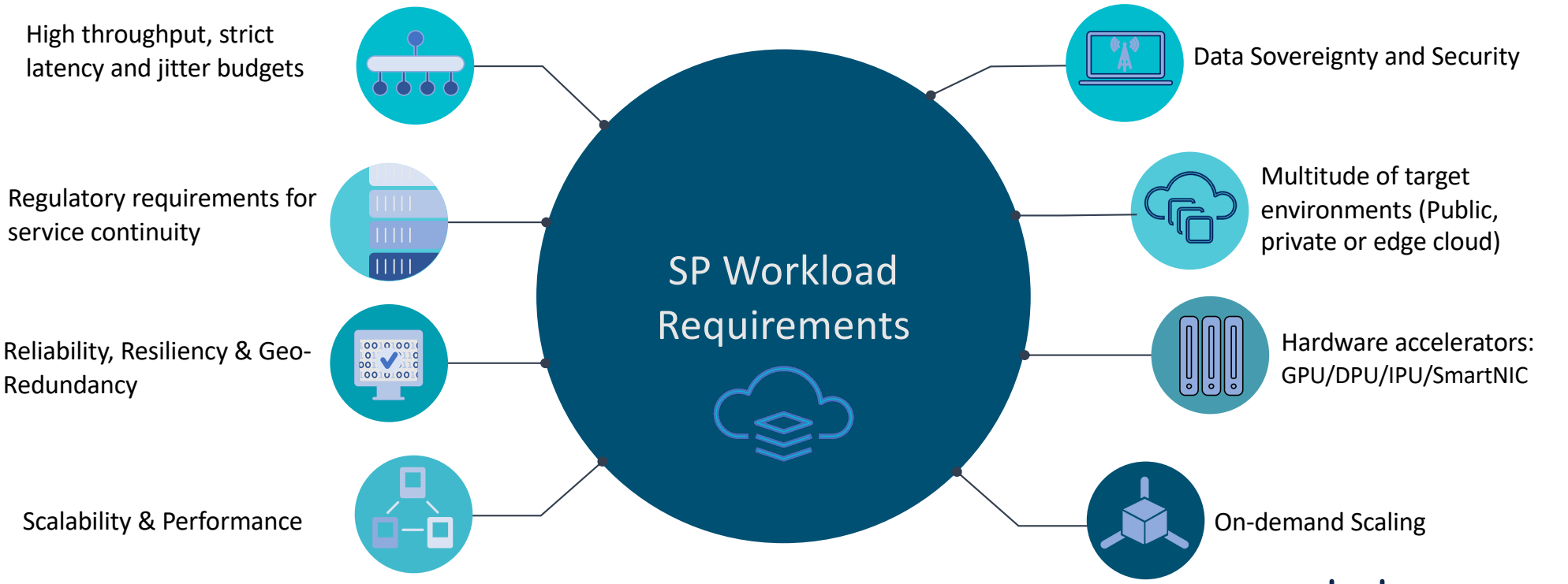
SP Workloads differ from Enterprise/IT Applications



SP Workloads are everywhere!!! – Private and Public Clouds

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Cloud-Ready Converged Transport

Ubiquitous Reachability Enabler

Converged Infrastructure

- ✓ Wireless (eMBB, mMTC, URLLC), wireline, IP+Optical
- ✓ Decomposition & virtualization
- ✓ Rich connectivity
- ✓ ORAN/vRAN

Programmable Transport and Services

- ✓ Segment Routing (SR): Unified Service Aware Forwarding
- ✓ BGP VPN
- ✓ Network Slicing

Cloud-Ready

- ✓ Agnostic to workload location
- ✓ SP workload in Public/Private Cloud, co-location or on-premises
- ✓ Cisco vRouter with the same look-and-feel & flexibility as on-premises
- ✓ Addresses all SP workload and network requirements
- ✓ Flexible service placement
- ✓ Scale-out

Simplified Operational Model

- ✓ Automation & Orchestration
- ✓ Service Assurance & Observability
- ✓ Reliance and Security

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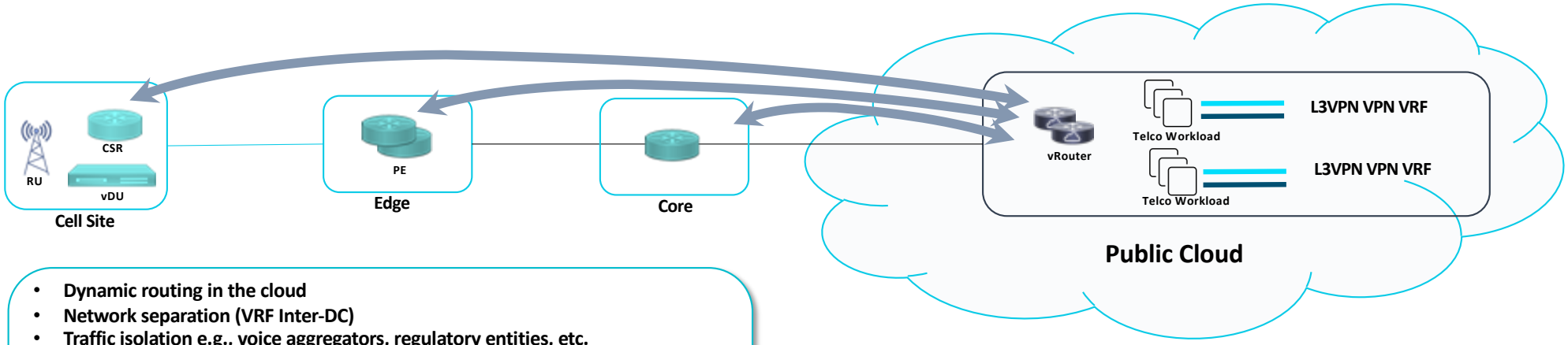
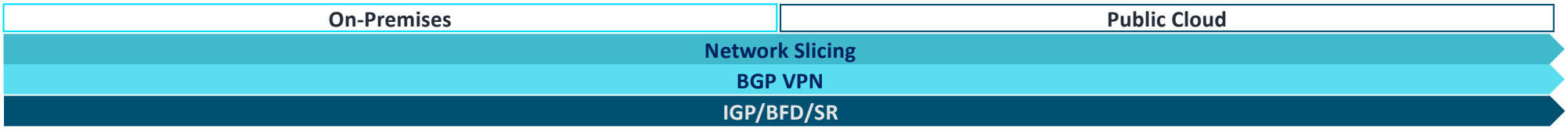
SP Workload Network Requirements for Hybrid Cloud



- Dynamic routing in the cloud
- Network separation (VRF Inter-DC)
- Traffic isolation e.g., voice aggregators, regulatory entities, etc.
- High Availability, routing it to the standby network function in case of failure
- Geo-Redundancy to enable service continuity during outage
- Link/Network error detection
- Routing features at scale
- Unified forwarding and service plane
- Standard routing technologies
- no cloud lock-in

BGP/MP-BGP, Anycast, L3VPN, BFD & QOS



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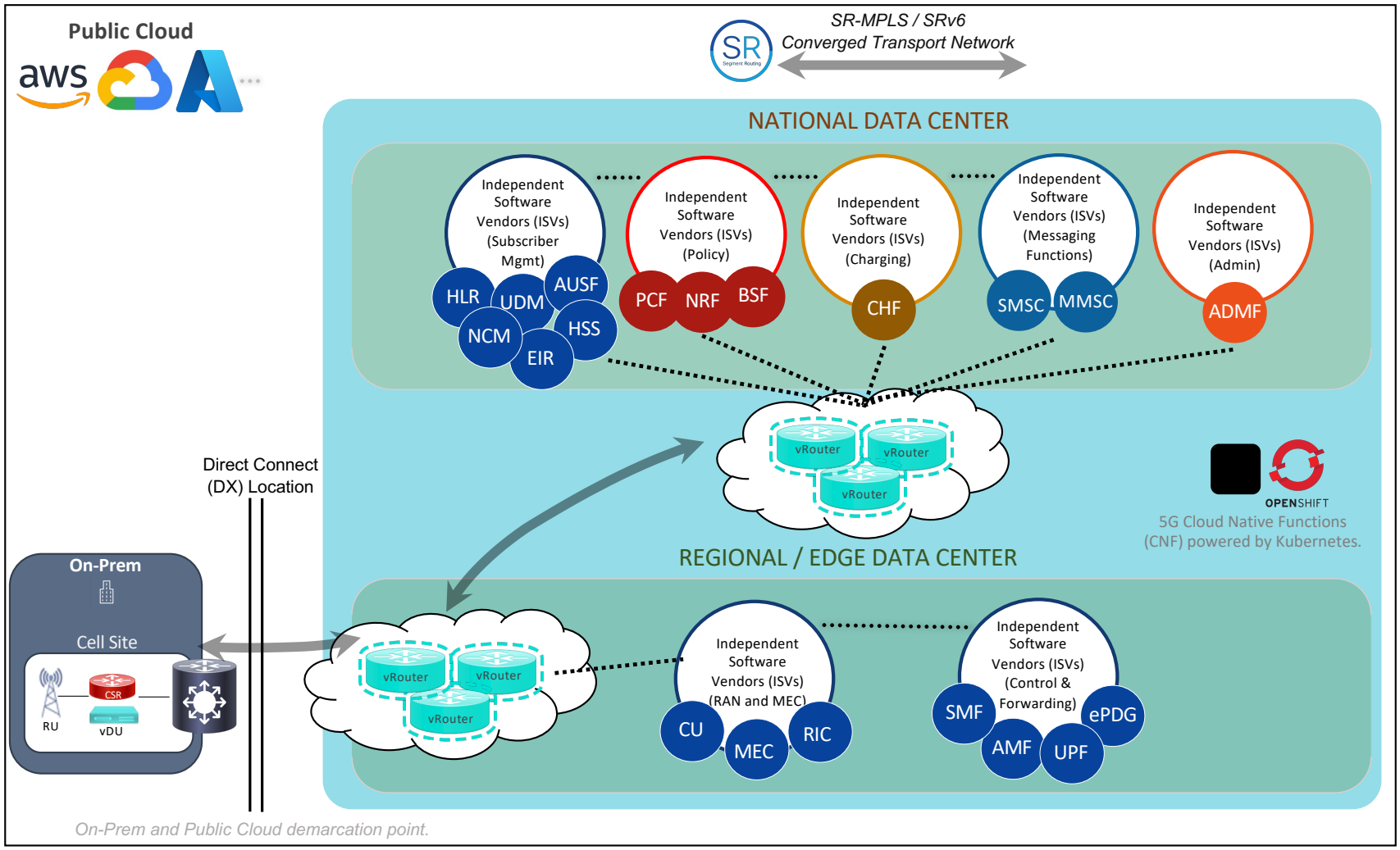
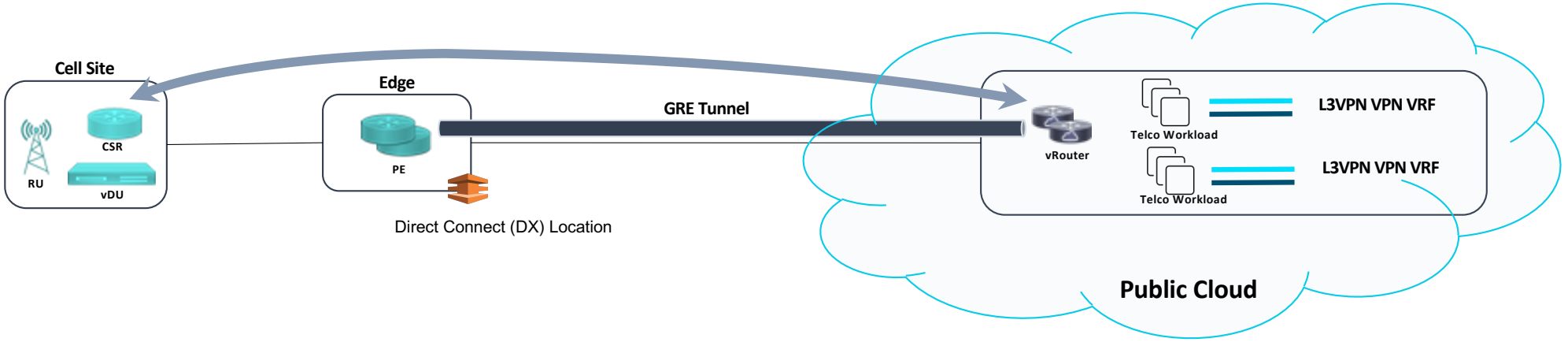
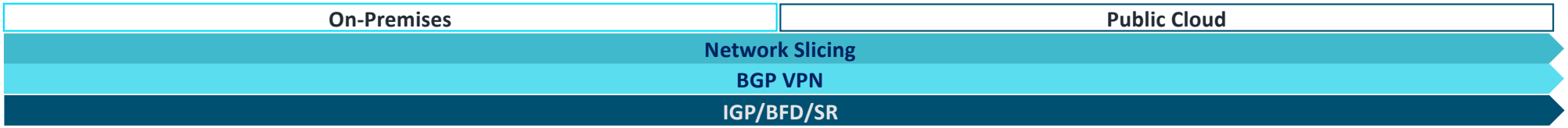
SP Workload Network Requirements for Hybrid Cloud

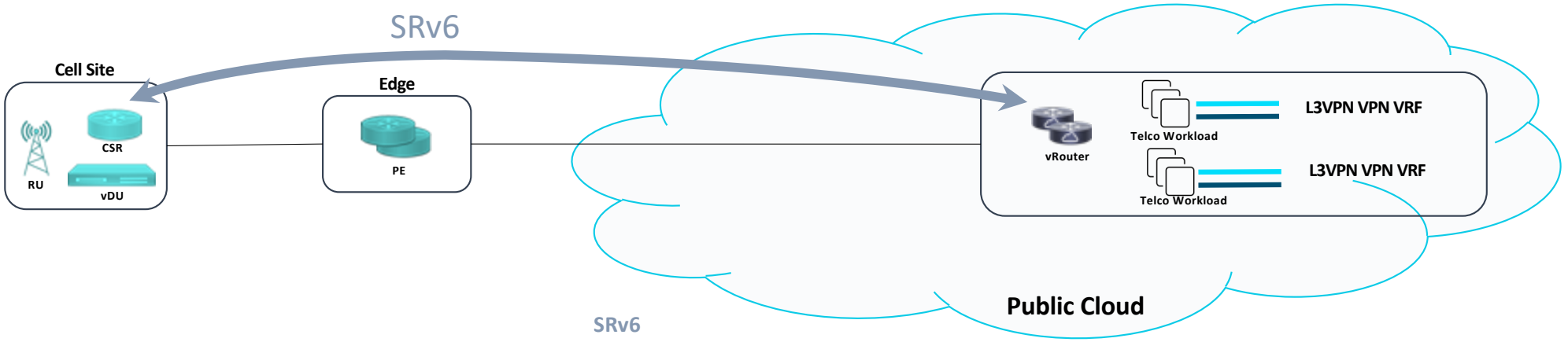


5G Cloud-Ready Converged Transport Architecture



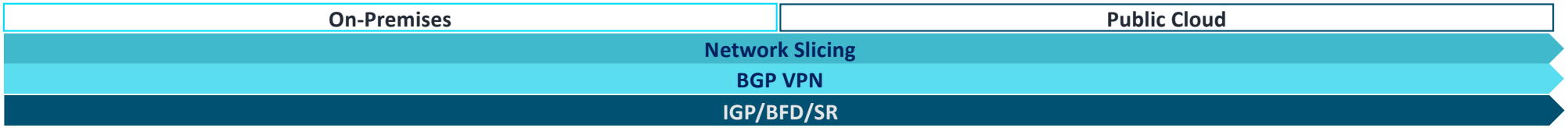


5G Cloud-Ready Transport Architecture Evolution



SRv6

- SRv6 enable scalable hybrid & multi-cloud
- IPv6 with flexible address allocation & flow label support are required from hyperscalers



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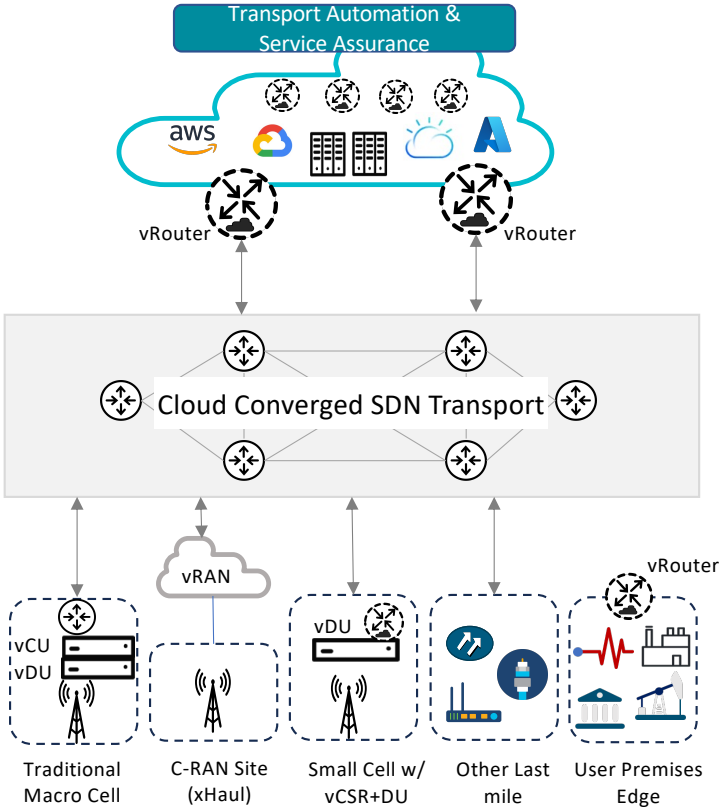
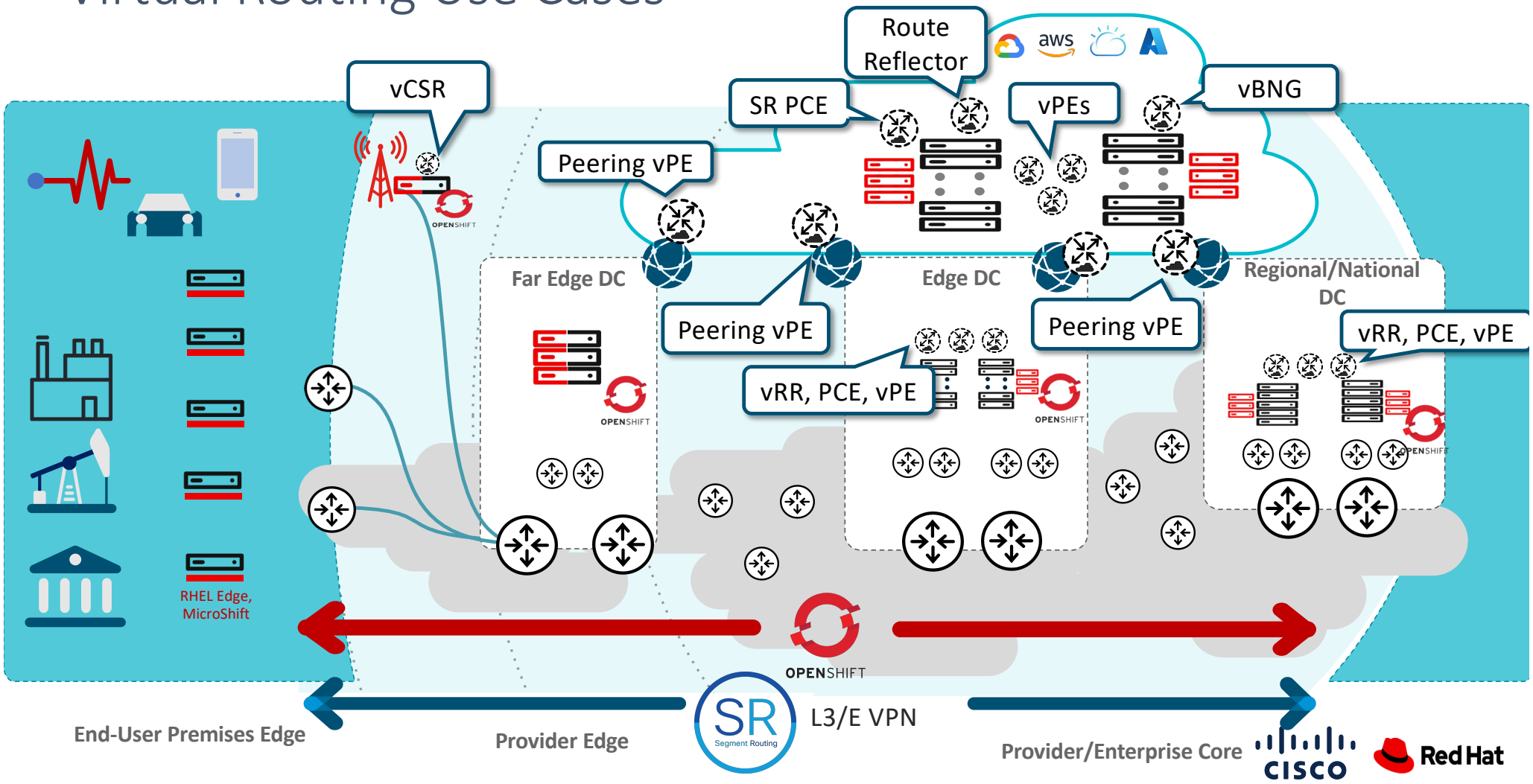
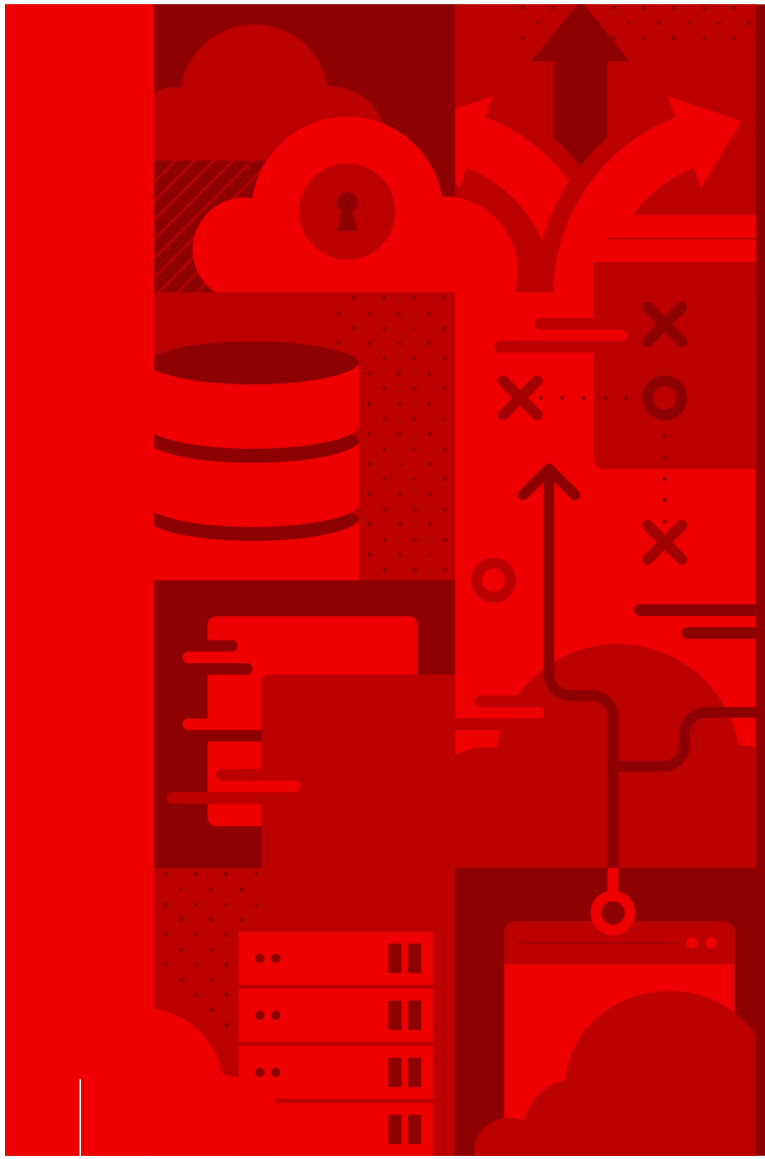
Cloud Ready Converged Transport

- Cloud Ready vRouters
  - XRv9K as VNF
  - XRd as a CNF [NEW]
- XRd validated on Red Hat OpenShift and now part of Red Hat Catalog
  - XRd Product Info:
    - https://www.cisco.com/c/en/us/products/routers/ios-xrd/index.html
  - XRd in Red Hat Catalog:
    - https://catalog.redhat.com/software/search?target_platforms=Red%20Hat%20OpenShift&q=XRd&p=1
  - How to run XRd on OpenShift:
    - https://cloudify.network/nw_xrd_cp.html



Virtual Routing Use Cases





Final Thoughts

Summary

- Service Provider Networks are increasingly moving to the public cloud
- Public cloud can augment, or entirely replace, certain Service Provider network domains (such as Region/National DC, edge DC, etc)
- Cloud Native applications over general purpose compute spans the entire SP network, including public cloud
- Horizontal Cloud Platform across the entire network enables uniform experience
- Moving to public cloud does **NOT** elimate the need for networking, rather amplifies it
- Cloud Converegnd Network provides connectivity across private and public SP infrastructure
- Virtualized routers play a big role
- Cisco XRd (containerized router) is validated on Red Hat OpenShift and can be used in public and private
- Virtuaul, or rather Containerized routers used in public cloud as well as private infrastructure as vCSR, vPE, PCE, vRR, CN-BNG and others

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In a Nut Shell …

Horizontal Telco Cloud Platform

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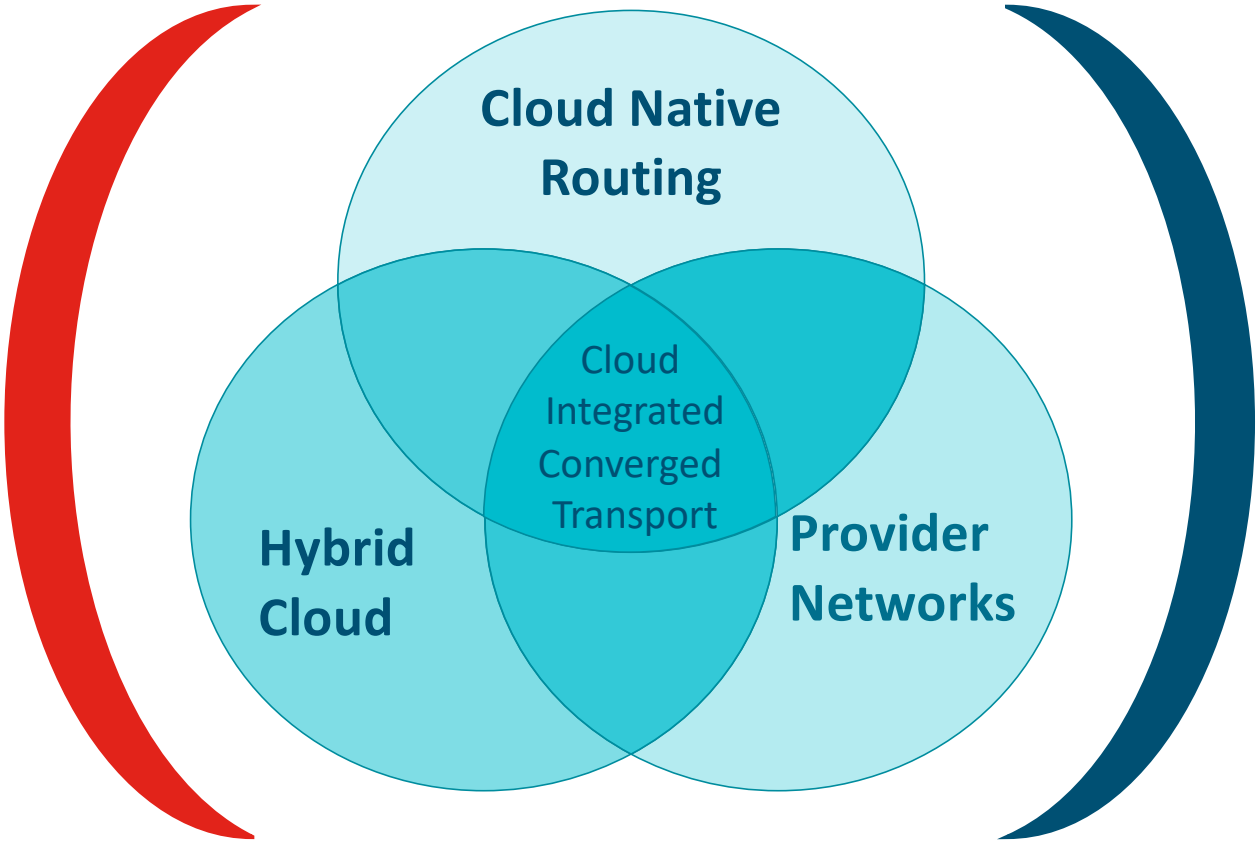

Converged Transport Network

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Interested in Converged Transport and Cloud?

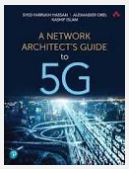
Red Hat Content Catalog: at Red Hat
https://catalog.redhat.com/software/search?target_platforms=Red%20Hat%20OpenShift

Red Hat OpenShift for Cloud RAN
https://www.redhat.com/architect/openshift-cloud-ran
https://www.redhat.com/architect/cloud-ran-deployment-models

Cisco Converged Transport
https://www.cisco.com/c/en/us/solutions/service-provider/converged-sdn-transport.html

Cisco XRd vRouter Overview
https://www.cisco.com/c/en/us/products/routers/ios-xrd/index.html

Running Cisco XRd on Red Hat OpenShift
https://cloudify.network/nw_xrd_cp.html



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