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The bridge to possible

AWS Deployment of XRv9K/XRd

Subtitle goes here

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BRKCLD-1005

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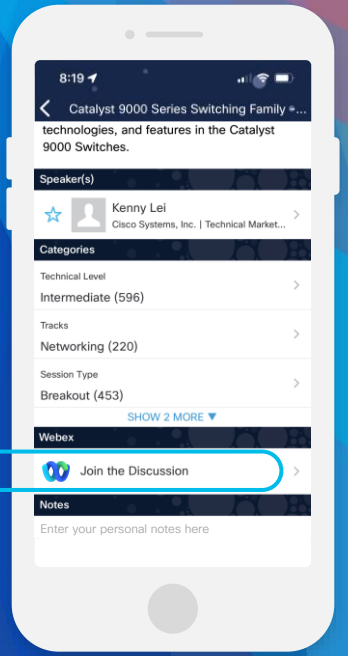
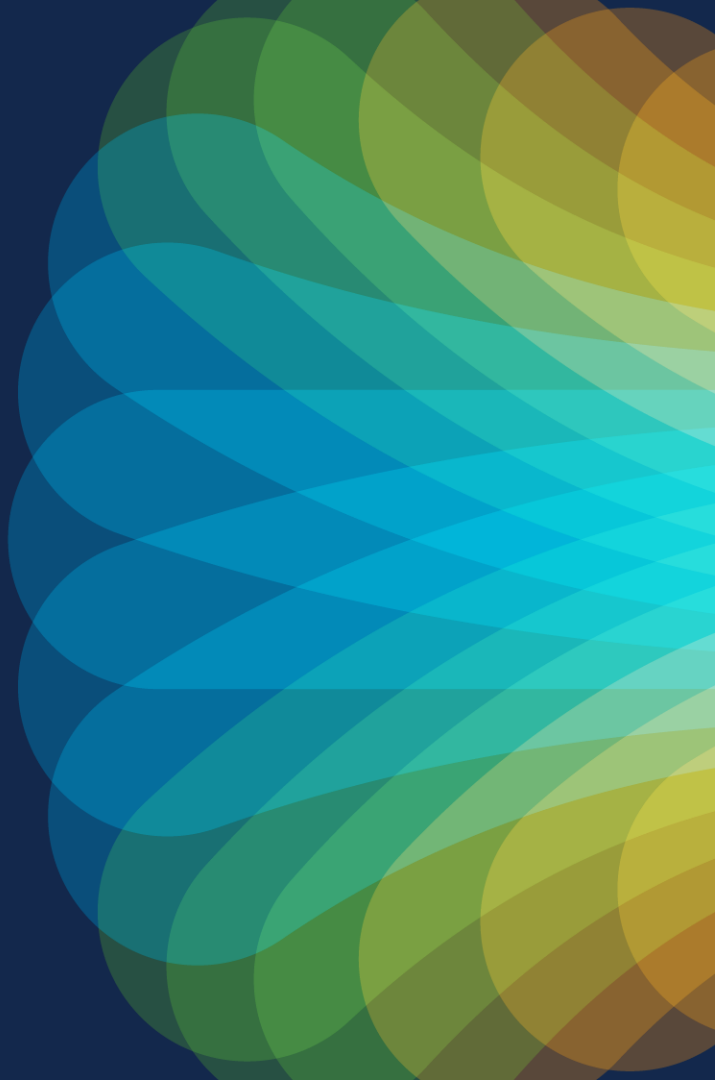


https://ciscolive.ciscoevents.com/ciscolivebot/#BRKCLD-1005

Agenda

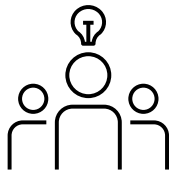
- Introduction
- XRv9K/XRd Architecture
- Deployment of XRv9K/XRd
- Deployment use cases
- Case Study
- Conclusion

Introduction



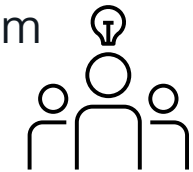
Introduction

- This session will provide an overview of how owning a network in the cloud can be advantageous to your organization. It will give an overview of the XRv9K/XRd, features that they support, how they can be deployed and how a simple network can be built in AWS.
- It also goes over some of the use cases of virtual routers and case study at one of our customers.

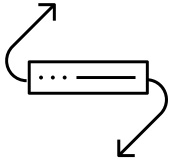


Glossary

- LXC – Linux Container
- eXR – enhanced XR
- DPDK – Data Plane Development Kit
- VPP – Vector Packet Processing
- SPP- Slow Packet Path
- SR-PCE – Segment Routing – Path Computational Elements
- GD – General Data Plane
- CNC – Crossworks Network Controller
- PIRD- Platform Independent Reference Data plane(Functional platform layer to enable the XR software packet path).
- vRouter – XRv9K/XRd (virtual router)



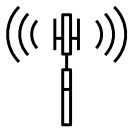
Cisco Virtual Router Use Cases



VIRTUAL ROUTE REFLECTOR / PCE

Industry Leading Scale

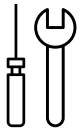
Upto 70 Mn Paths
20M Routes
100 RR Groups



VIRTUAL CELL SITE ROUTER

Lowest XR footprint

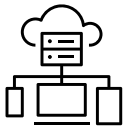
T'put: ~30 Gbps[#]
Routes: 20K
VPNv4/V6
SRv6/SR-MPLS/SR-TE
HQoS



Light weight lab simulation

CI/CD deployment

Thorough XR Coverage
Fast boot time: ~2 Min



VIRTUAL PROVIDER EDGE

Consistent architecture w/ ASR 9000

T'put: ~100Gbps
Business VPNs, M'cast, Peering

CLOUD ROUTER

Public Cloud Gateway

Routes: Upto 100K[#]
GRE Tunnels: ~400[#]
BGP Sessions: 1000[#]
SRv6[$], SR-MPLS, GRE Overlay

Why Virtual Routers in Cloud?

VRF

Repeatable and Scalable

DHCP

No cloud lock-in

Flexibility

Subnet & IP Reservation

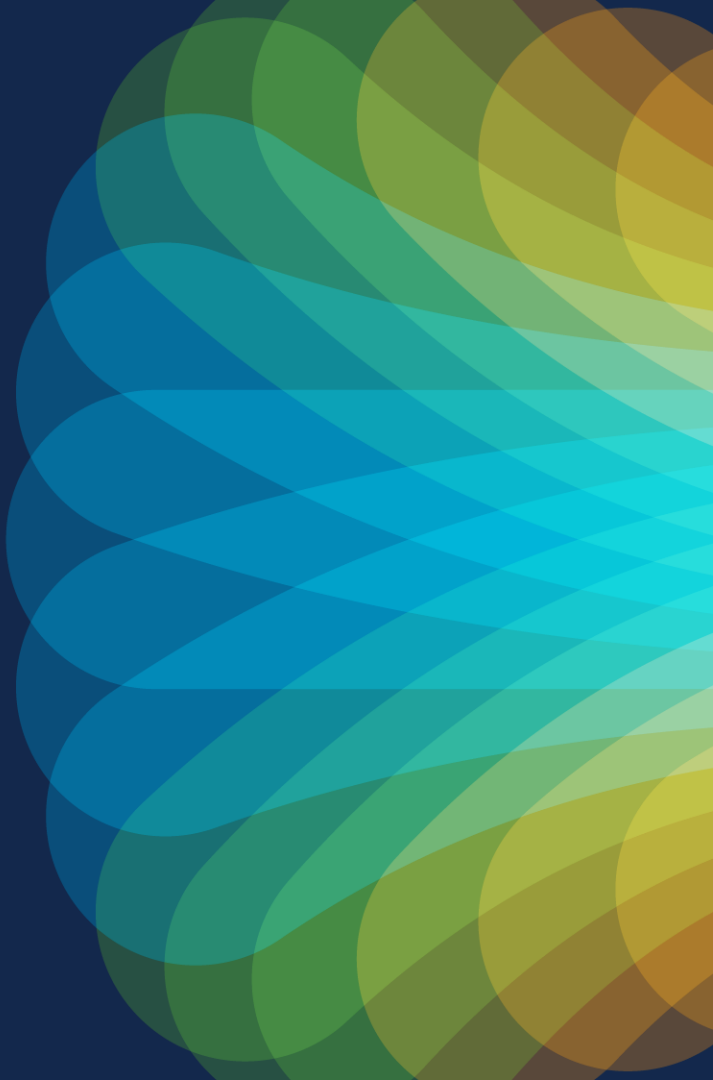
Layer 2

Anycast

QoS

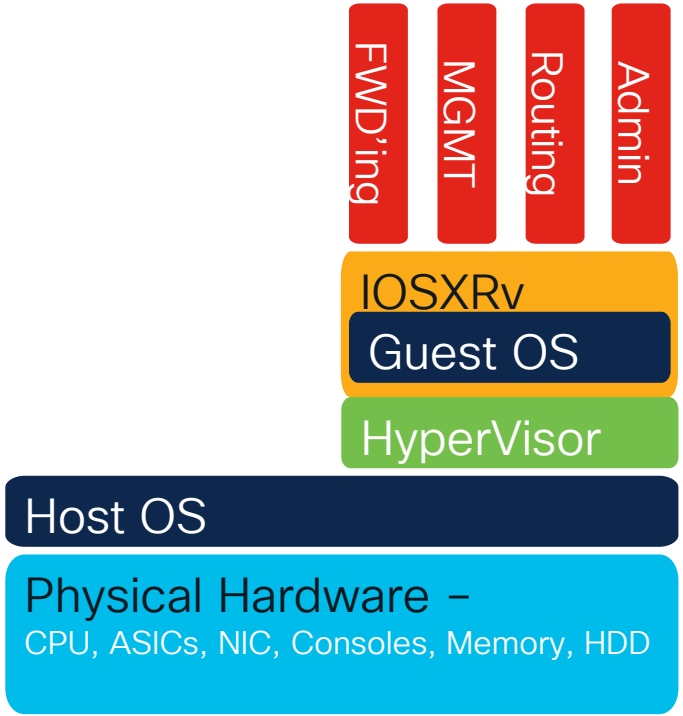
L3VPN

XRv9K & XRd Architecture



IOS XRv 9000

- IOS XR on x86 environment
- Containerized
  - LXC containers for Admin, Control and Data Planes
  - Package based software distribution
- Similar IOS XR Software feature set
- eXR based XR architecture.
- Boot Time – 20 mins on AWS, 8 mins from ISO, 4 mins from disk.
- Resource Usage: Typical 16G RAM, 4 CPUs and 64GB disk



IOS XRd

- Light foot print on x86 compute.
- Kubernetes compliant(Docker Container)
- DPDK and VPP based forwarding.
- Similar IOS XR Software feature set
- LNT based XR7 architecture (no Admin Plane)
- Boot Time : About 90 seconds
- Resource Usage : Typical 4G RAM, 2 CPUs and 7GB disk

IOS XRd Form Factors

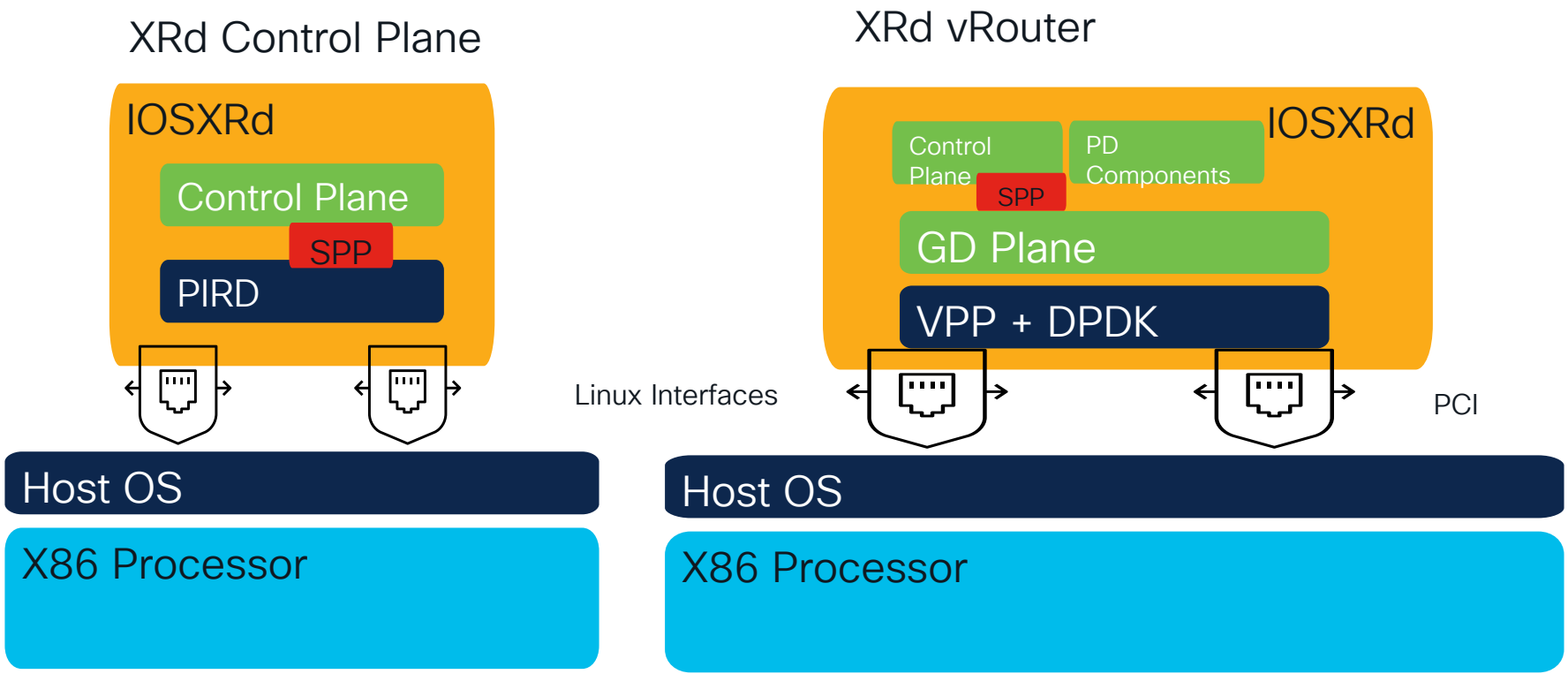
XRd Control Plane

- Control Plane only.
- Use Cases
  - vRR(virtual Route Reflector)
  - SR-PCE(Segment Routing – Path Computational Element) with Crosswork Network Controller.

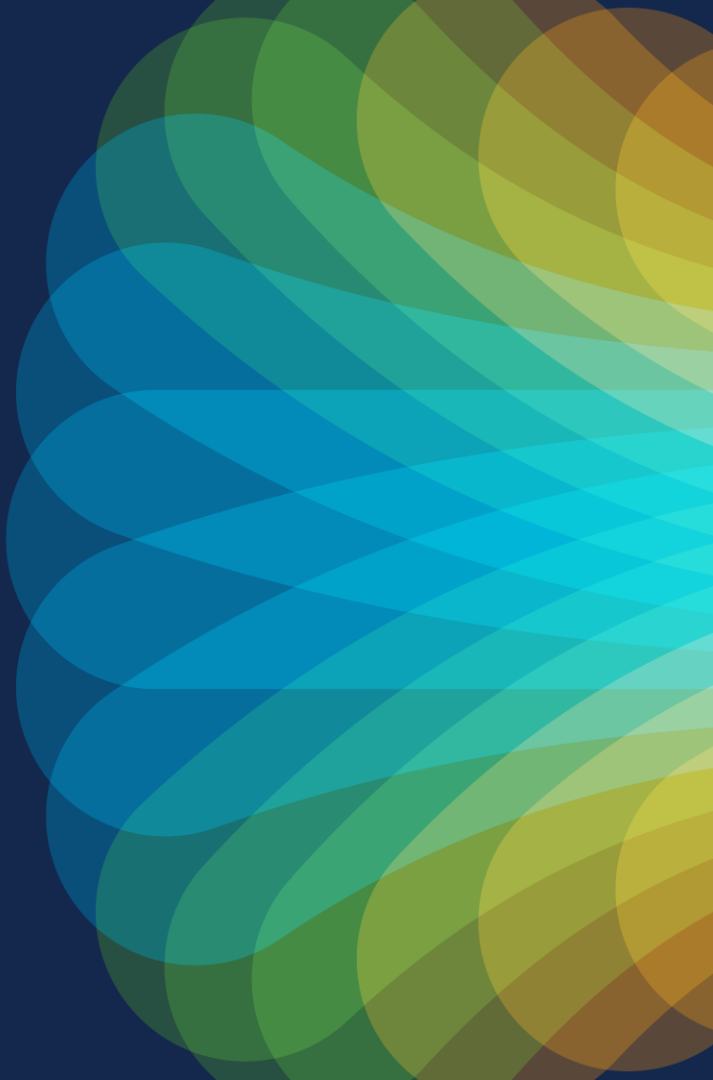
XRd vRouter

- Full featured.
- Use cases
  - vPE(virtual Provider Edge).
  - vCSR(virtual Cell Site Router).
  - Cloud Router(Public Cloud based vRouter).

IOS XRd Form Factors



Deployment of XRv9K/XRd



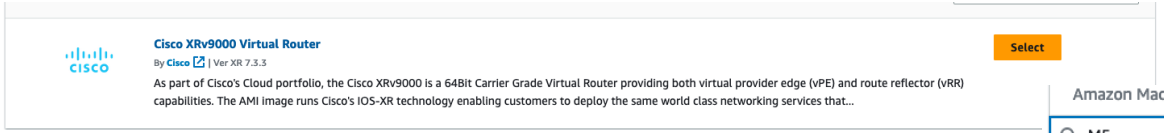
XRv9000 Specs

Instance Name	vCPUs	RAM	Network Bandwidth
M5.large	2	8 GiB	Up to 10Gbps
M5.xlarge	4	16 GiB	Up to 10Gbps
M5.2xlarge	8	32 GiB	Up to 10Gbps
M5.4xlarge	16	64 GiB	Up to 10Gbps
m5.12xlarge	48	192 GiB	10 Gbps
M5.24xlarge	96	384 GiB	25 Gbps

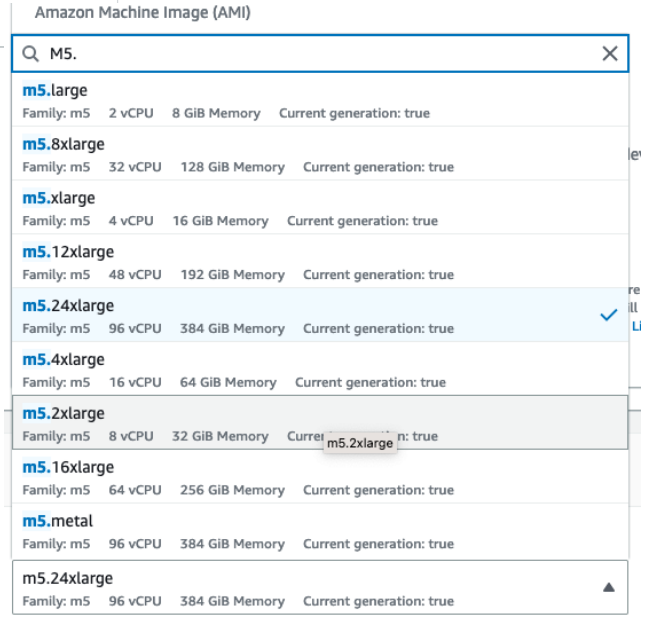
https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-eni.html

IOS XRv 9000 – Deployment Steps(AWS)

- Cisco XRv9000 Virtual Router AMI is available on AWS.



- Select the instance type
- Provide your network settings
  - VPC
  - Subnet
  - Security Groups
- Select the number of instances
- Launch

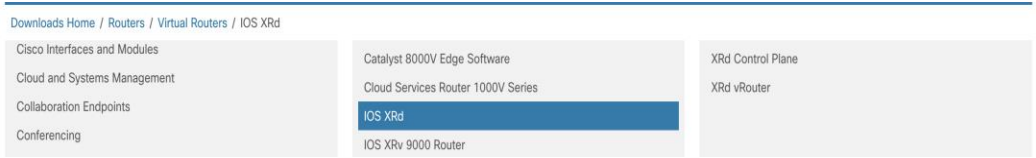


XRd Specs

Type of deployment	Requirements
XRd Control Plane	1 CPU, 2GiB
XRd Control Plane on AWS EC2	M5.2xlarge, 8GB Disk
XRd vRouter	2 CPU, 5GiB
XRd vRouter on AWS EC2	M5.24xlarge/M5n.24xlarge, 8GB Disk

IOS XRd – Deployment Steps(VM)

- Images are available on Cisco(Software Downloads)
- Host Environment (Pre-checks)
  - Docker Version 18+
  - Docker Compose
  - Linux based system (Ubuntu 20.04 or CentOS 8.2)



- Identify your variables
  - # of ports, boot config, disk usage limit, ZTP config,
- Launch XRd
  - Docker load
  - Docker run

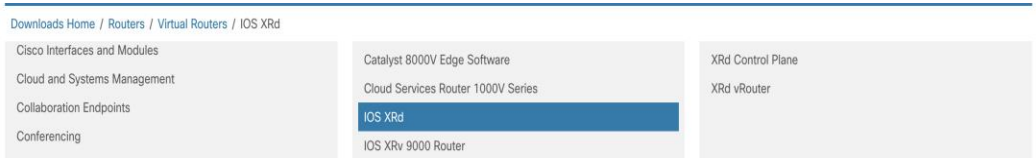
**Currently supported VMWare Tanzu and being certified with RH OCP

AWS EKS Clusters

- Kubernetes is a container orchestration tool.
- Kubernetes is an open-source system that allows organizations to deploy and manage containerized applications.
- AWS EKS clusters are managed by AWS.
  - No control-plane hassle
  - High Availability.
- XRd docker containers will be deployed and scaled using Kubernetes

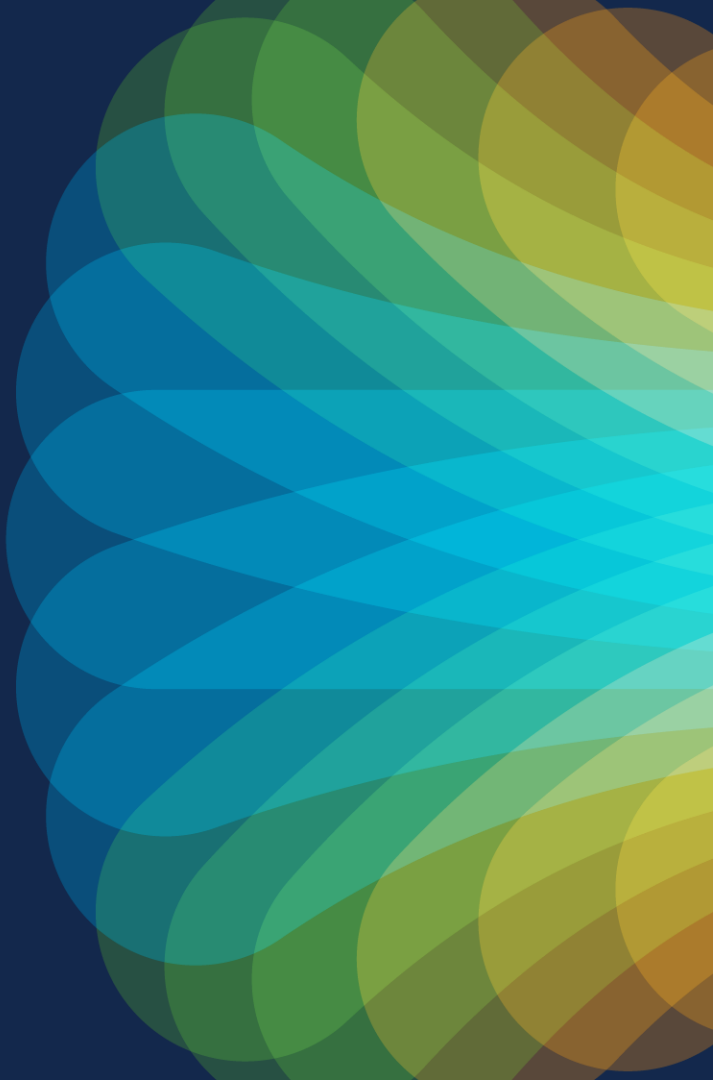
IOS XRd – Deployment Steps(AWS)

- Images are available on Cisco
- Clone XRd on AWS EKS
- Publish images to Elastic Container Registry
  - This will create a repository list on AWS console
- S3 storage bucket – for relevant resources.
- Launch from AWS console.
  - Stack details will contain VPC AZ, EC2 Key Pair, XR root user name/password.
- Navigate to instance view in AWS console to connect to XRd



https://xrdocs.io/virtual-routing/tutorials/2022-12-08-getting-started-with-xrd-on-aws/

Deployment Use Cases



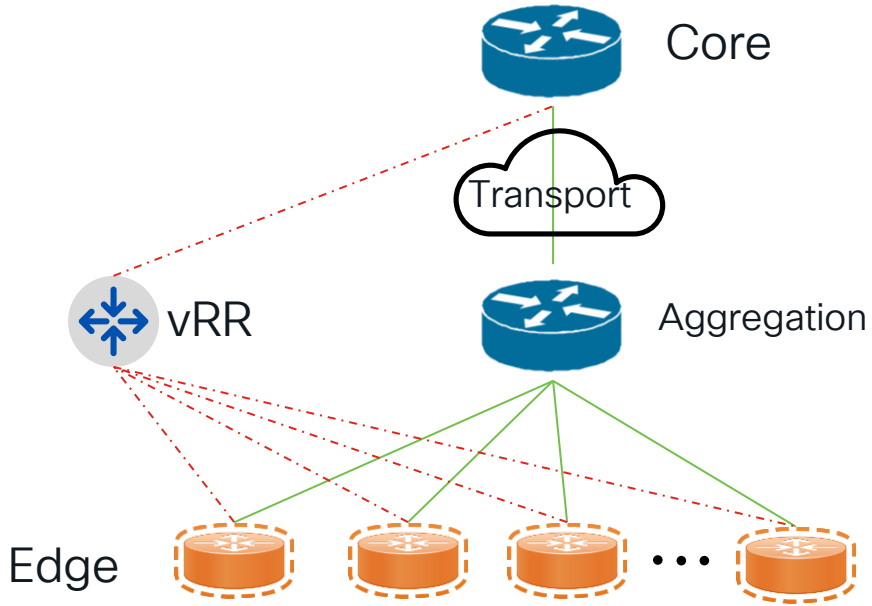
Virtual Route Reflectors (vRR)

Functionality

- Deploy per Service or Address Family
- Focal point for iBGP sessions
- Separate the Control plane and Data Plane
- vRR has capability to peer to over 3K BGP peers.
- Consumption based grow model

Key Features

- IGP & BGP Optimal RR
- IPv4, L3VPN, L2VPN-VPWS
- LAG, BFD
- VRRP, HSRP
- Telemetry



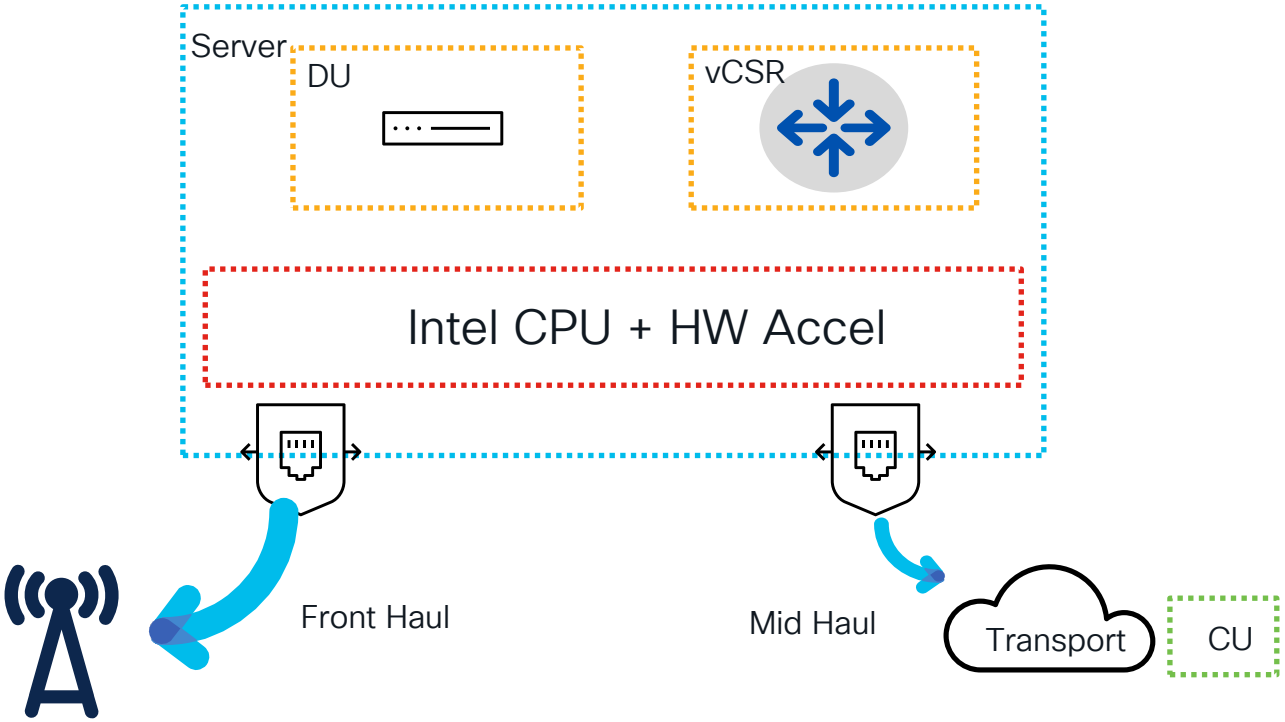
Virtual Cell Site Router(vCSR)

Functionality

- Cell Site Router
- Private 5G Deployment
- Far Edge Router

Key Features

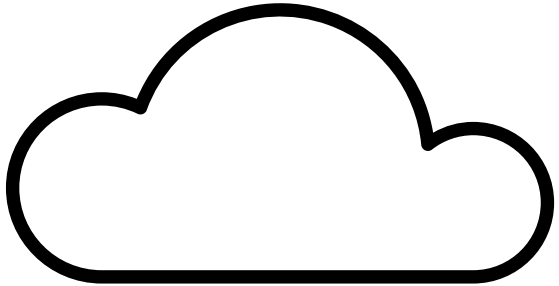
- ACL's, QoS
- DHCP, VRRP
- ECMP
- ISIS, BGP, L3VPN
- SR-MPLS
- Telemetry



Virtual Router(vRouter) in cloud

aws Underlay vmware

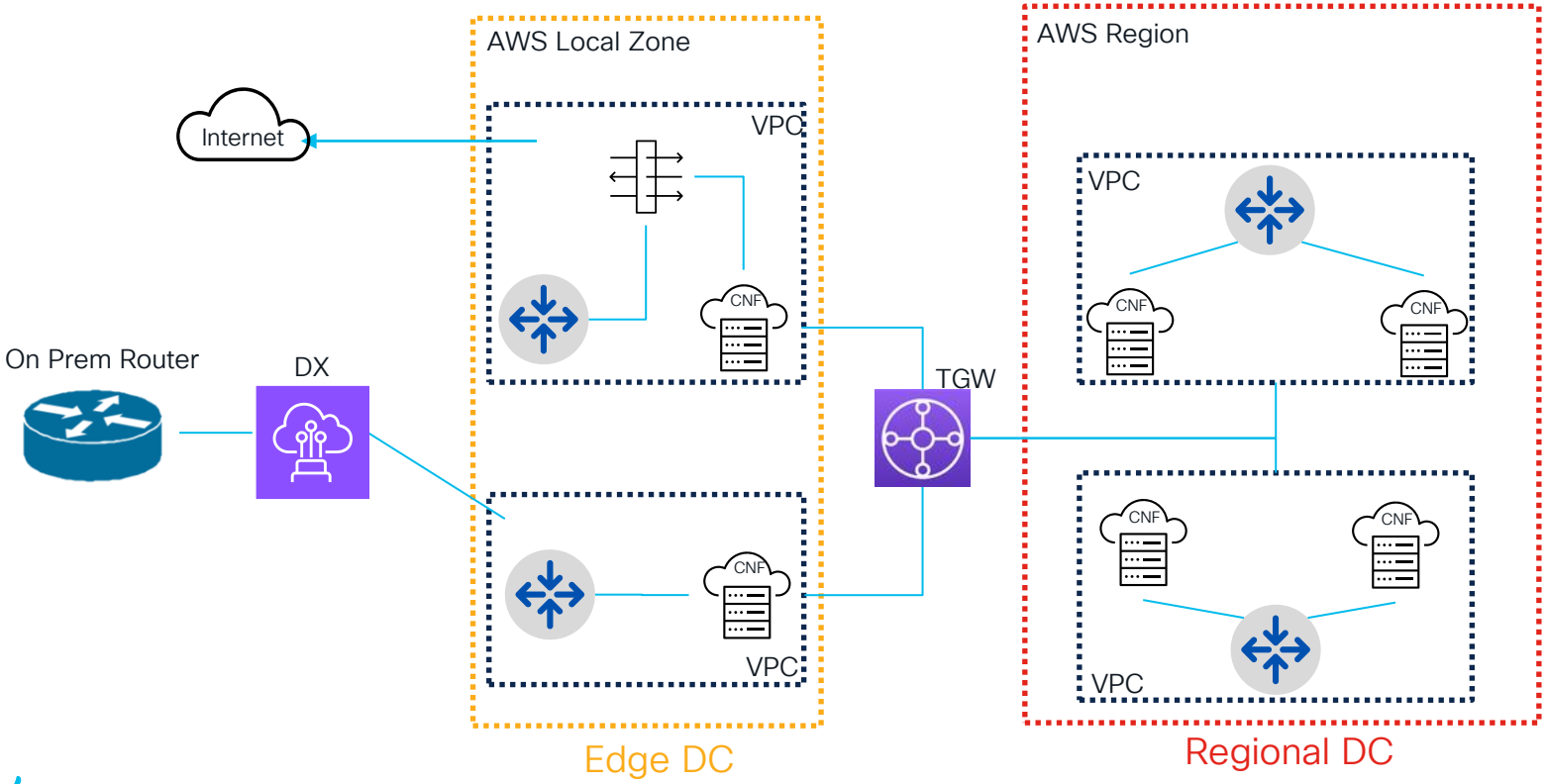
- TGW
- LGW
- IGW
- DX Gateway



cisco Overlay

- SR-MPLS
- L3VPN
- BGP
- IS-IS

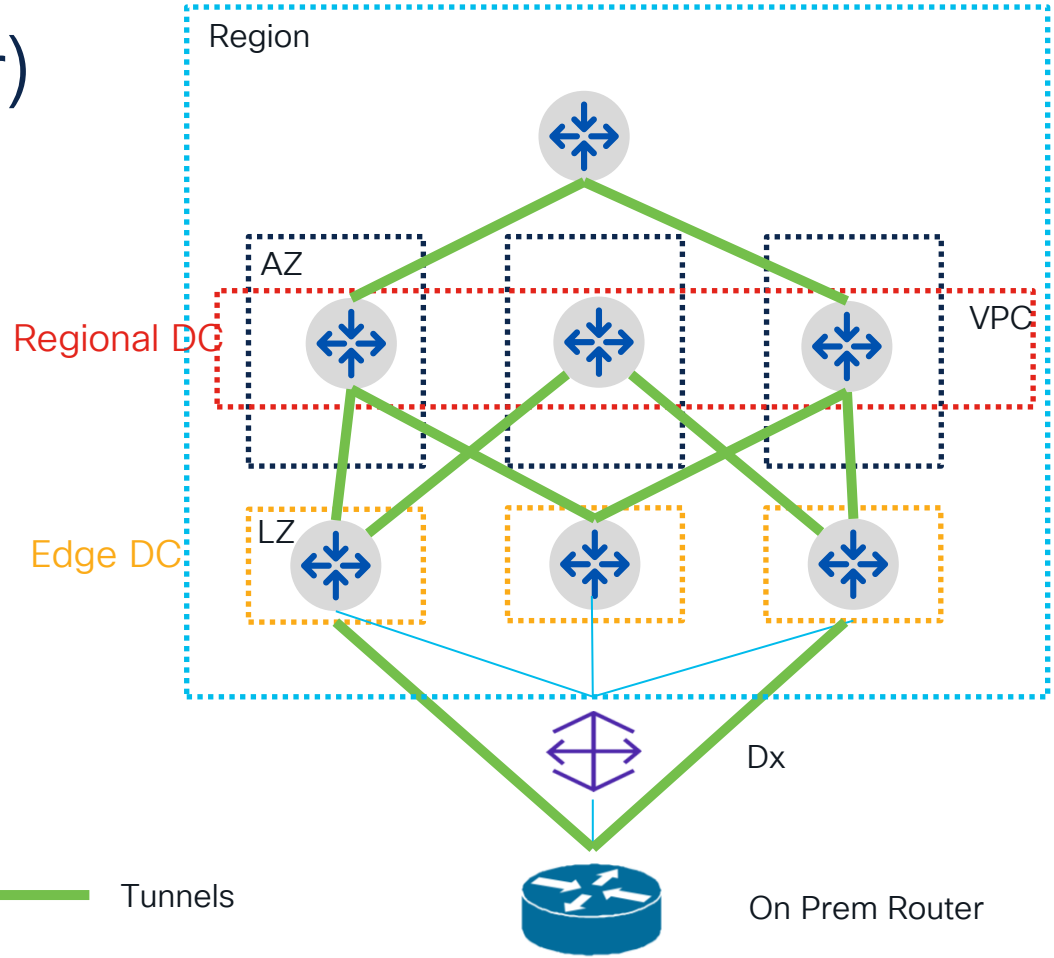
Virtual Router(vRouter)



Virtual Router(vRouter)

Key Features for vRouter

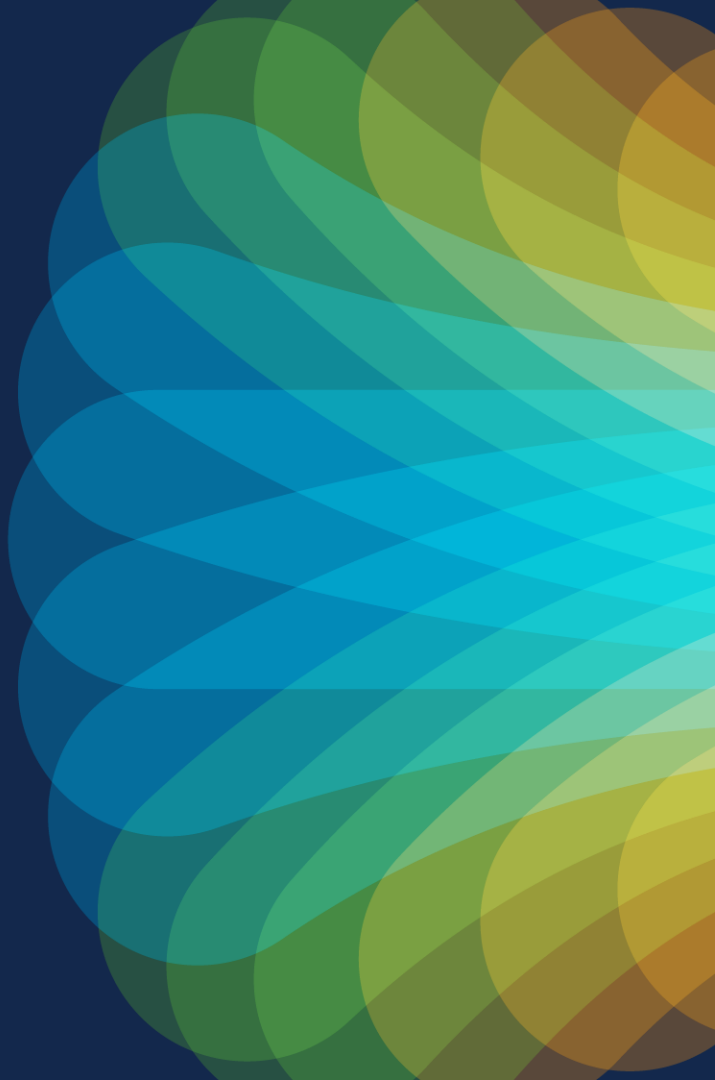
- ACL's, QoS for GRE Tunnels
- GRE Tunnels
- BGP VPNs(v4/v6)
- ISIS
- PBR
- SR-MPLS
- VRF
- Telemetry
- BFD



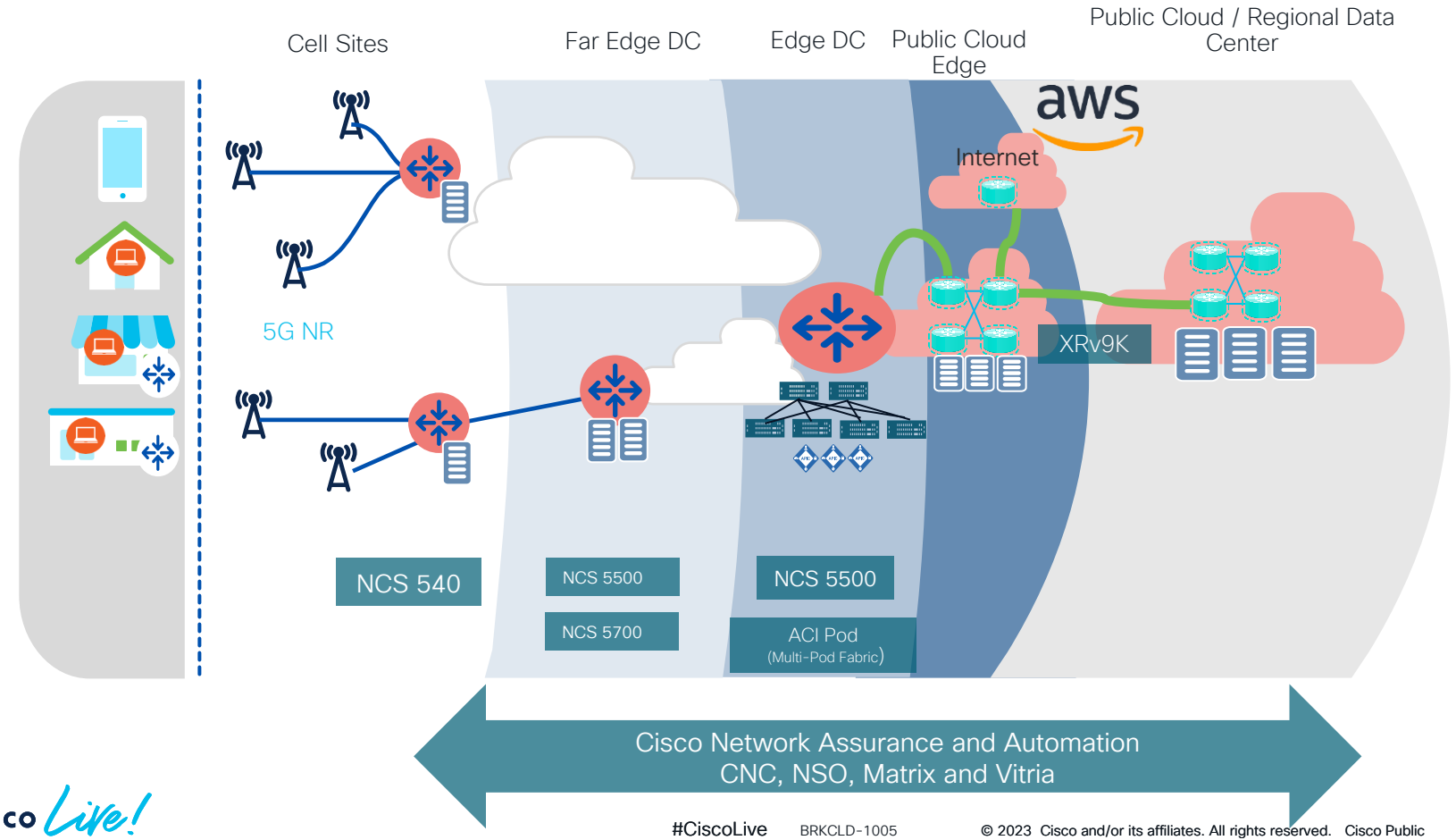
Building the network in AWS (Cloud)

- Traditional approach is building a Data Centers connected by IP backbone
- VPC's can be your Data Centers.
- Underlay network is AWS native network hosting transit gateway, local gateway, security groups, ENI etc..
  - Management traffic.
- Overlay network is built using GRE tunnels on the XRv9k/XRd, with BGP and MPLS.
- Workload Distribution
  - A single VPC across multiple AZs can host your web, enterprise, big data, IoT and common services type of applications.
  - A single VPC inside an LZ can host applications that are latency-sensitive, edge computing, disaster recovery.

Case Study at Dish



Case Study



Case Study

dish

Challenges	Solutions	Results
• Forwarding Performance • High Availability • Software Upgrades and SMU Installations • Learning curve	• Using Automation to automate scaling of tunnels and routers. • Cisco BPA(Business Process Automation) and AWS API	• Low Latency for 5G subscribers • Ability to consolidate various vendors in the cloud data center. • First cloud based 5G service provider.

Conclusion

- Approach it as a server that can do routing.
- Focus on instance sizing as part of the pre-deployment.
- Lightweight and cloud focused.
- Well known Control Plane.
- If deployed in cloud, we need to be creative in differentiating traffic that goes underlay and overlay.

Call to Action

- Try it out in a lab or cloud environments
- Provide us your use-cases

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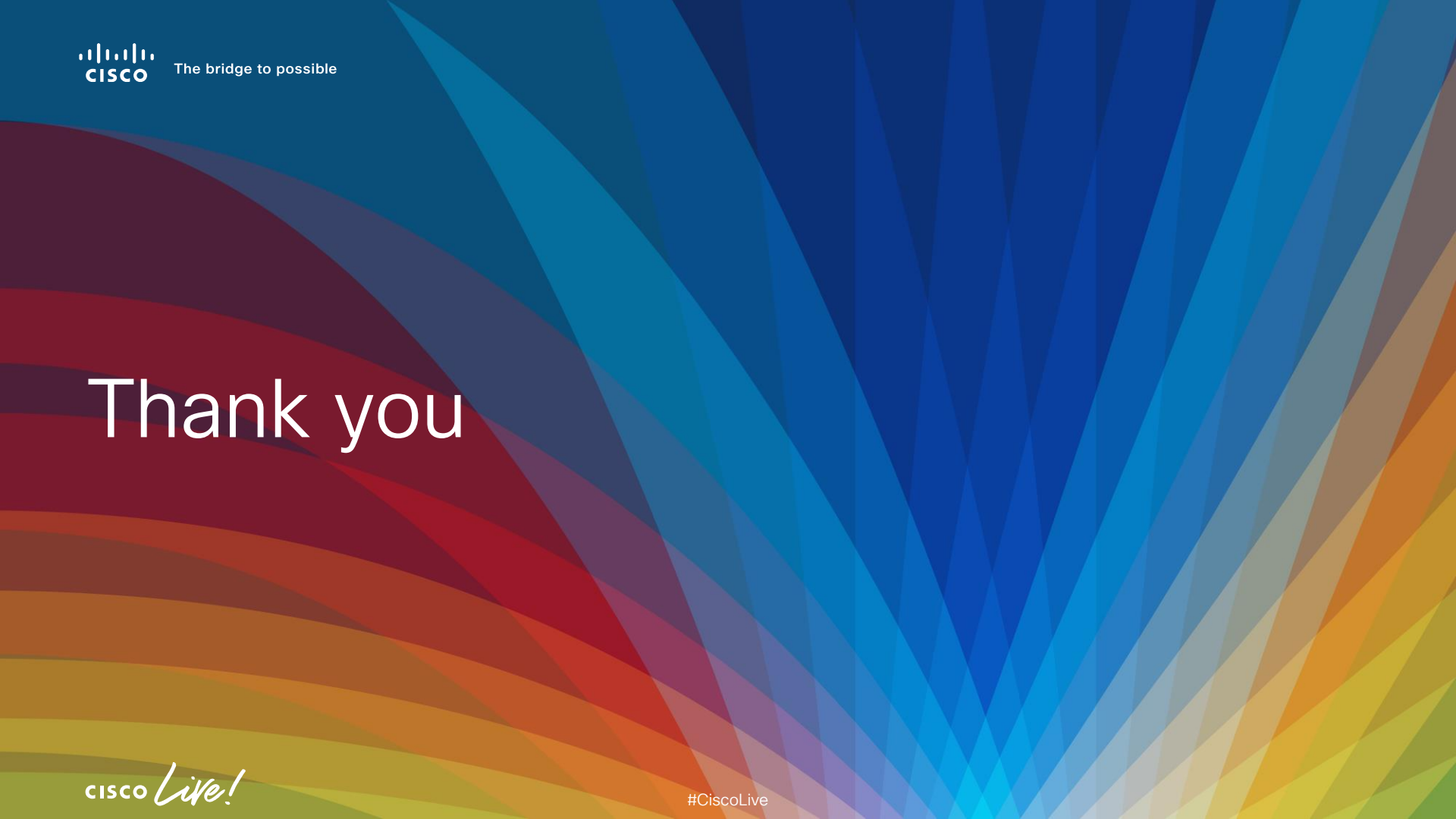
- Dish Wireless, World's first 5G network with hybrid cloud – IBOSPG-2006
- Book your one-on-one Meet the Engineer meeting
- Visit the On-Demand Library for more sessions at www.CiscoLive.com/on-demand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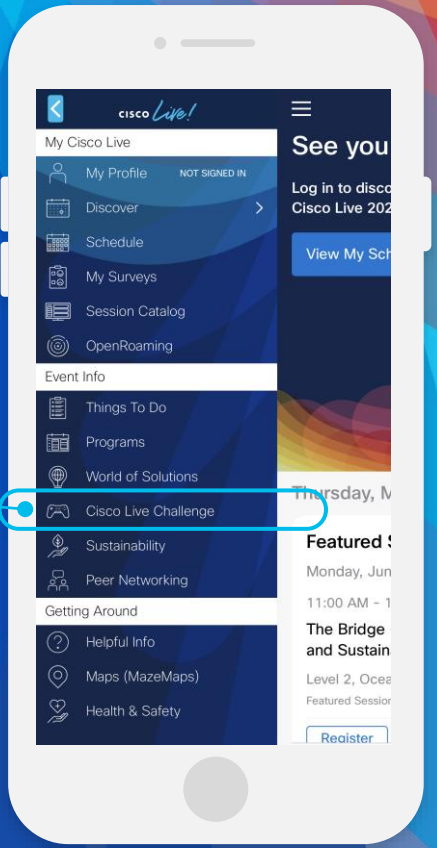

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