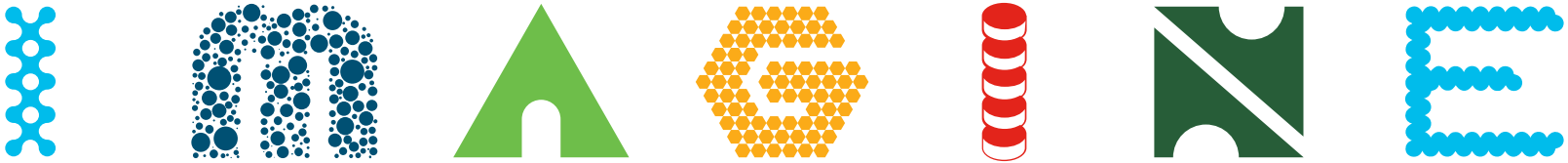


INTUITIVE

Cisco live!

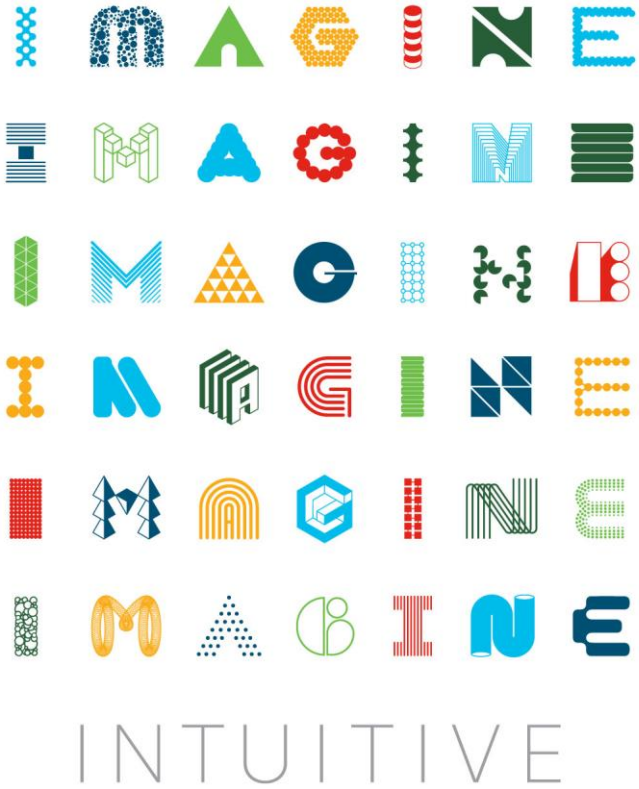
June 10-14, 2018 • Orlando, FL

#CLUS

# Testing SD-WAN for Successful Deployments

Roland Salinas, Technical Marketing Engineer

CTHCRS-2100



# Cisco Webex Teams

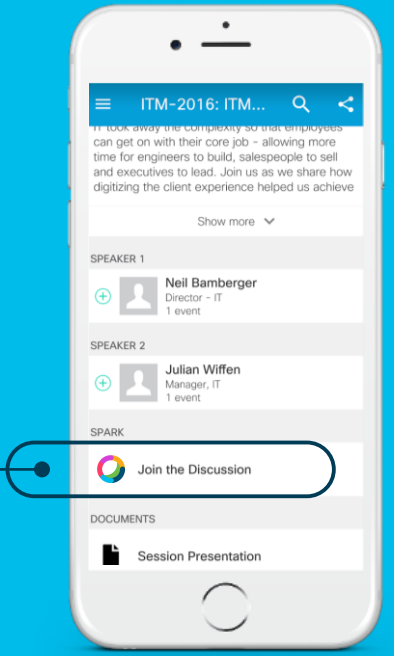
## Questions?

Use Cisco Webex Teams (formerly Cisco Spark) to chat with the speaker after the session

## How

1. Find this session in the Cisco Events App
2. Click “Join the Discussion”
3. Install Webex Teams or go directly to the team space
4. Enter messages/questions in the team space

## Webex Teams will be moderated by the speaker until June 18, 2018.




cs.co/ciscolivebot#CTHCRS-2100


Planning + Execution = Success

# Agenda 2

Planning

- PoC or Pilot
  - DC Connectivity
  - Remote site topologies
  - IaaS topologies
  - Migration strategy

Know your test objectives

- High Availability
- Interoperability
- Performance
- Scalability

Execution

- Schedules
- Results
- Tools

# POC or Pilot

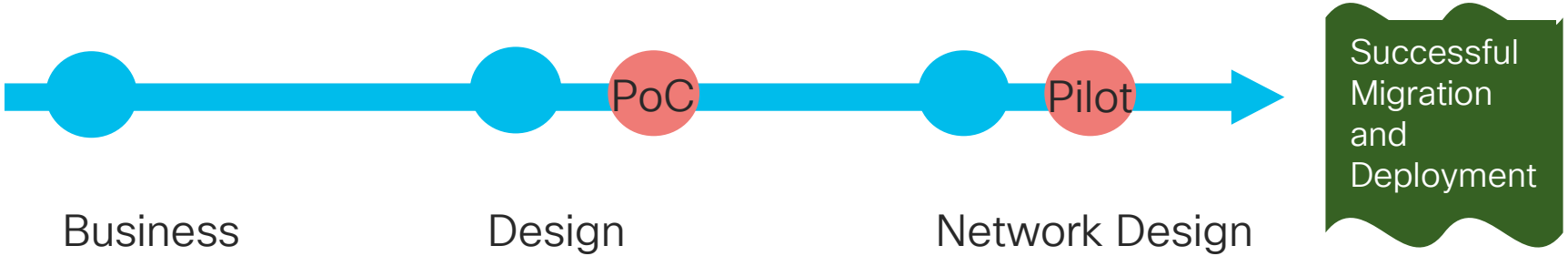
## Proof of Concept

- Validate a product or system which has not been proven before
- Isolated setup
- Initial validation that the product or solution can meet your requirements
- Typically done during sales process or early design phase

## Pilot

- Validate a product or system in your full production or in a controlled production environment
- Incorporate components which cannot be simulated
- Full feature set or partial feature set
- Typically done in design phase to validate functionality and allow for final changes

# Timeline to develop your design and test topologies




## Business Requirements

- Applications
- Users
- Hours of operation
- Regulatory
- Tools

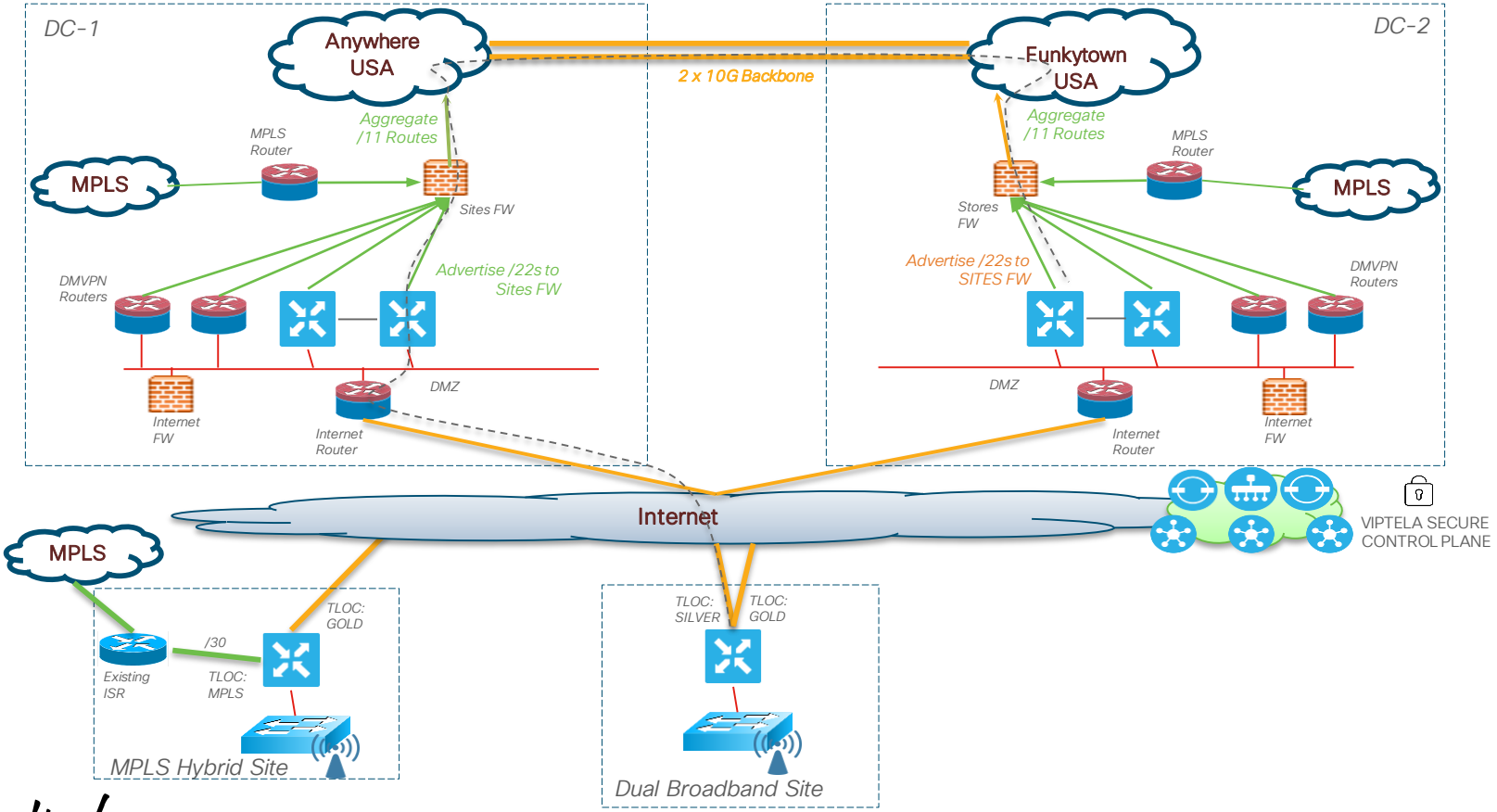
## Design Requirements

- High Availability
- Performance
- Capacity
- Security
- Interoperability
- Costs

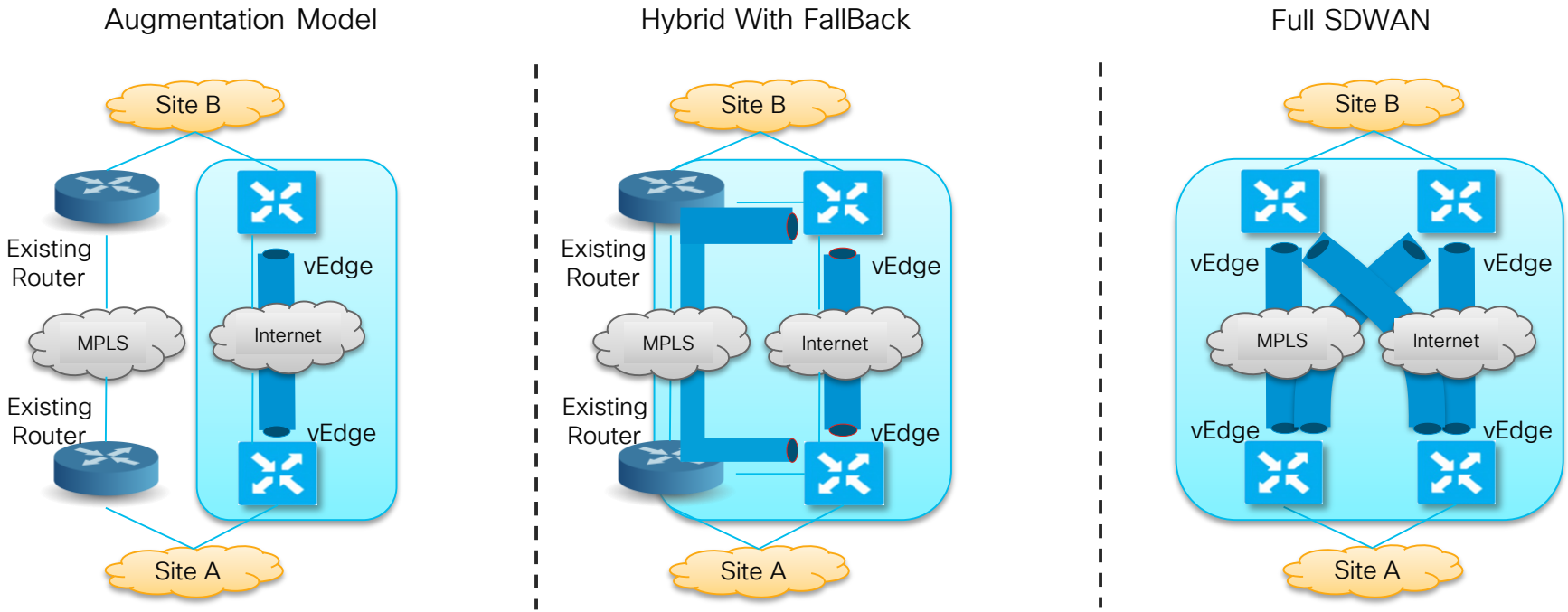
## Network Design

- High level design
- Site topologies
  - Data center
  - Remote site types
    - Type A
    - Type B

# High level design with Data Centers



# Site Designs



# Important test cases for SD-WAN

## Based on you business requirements

- Interoperability at Layer 3
  - BGP, OSPF, Route redistribution, Loop avoidance
- Overlay implementation
- Site deployment
- High Availability
  - Transport convergence, brownout detection, device failure, site failure, controller failure
- User interface experience
- Application experience
  - Application recognition, queuing, shaping, marking, load balancing
  - IaaS / SaaS
  - Traffic Engineering
- Capacity and Scale
  - Site to DC, Site to Site
- Service Chaining

# Create your test cases based on your objectives

**Intelligent Path Control**

Site 1 Active-Active data paths with policy

Site 1 fail directly connected link on MPLS path

Site 1 restore directly connected link on MPLS path

DC 1 fail directly connected link on MPLS path

DC 1 restore directly connected link on MPLS path

Site 1 fail intermediate link on MPLS path

Site 1 restore intermediate link on MPLS path

Site 1 to DC 1 MPLS path brownout delay detection and convergence

Site 2 to DC 1 MPLS path brownout delay detection and convergence

Site 1 to DC 1 MPLS path brownout jitter detection and convergence

Site 2 to DC 1 MPLS path brownout jitter detection and convergence

Site 1 to DC 1 MPLS path brownout frame loss detection and convergence

Site 2 to DC 1 MPLS path brownout frame loss detection and convergence

Key Objectives

- High Availability
- Interoperability
- Performance
- Scalability

# Defining your test cases

- Define your objective
- Define the setup
- Eliminate variables
- Define the procedure
- Define the pass/fail criteria
- Define the result format

| | |
|---|---|
| **Title** | Site 1 fail directly connected link on MPLS path |
| **ID** | |
| **Description** | Verify the NUT can recover from a link failure on the MPLS path at the link connected to Site 1. This will test the Site 1 device's ability to detect and signal a link up/down and for the system perform the appropriate convergence according to user defined policy |
| **Test Type / Objective** | High Availability |
| **Test Setup** | Hybrid WAN |
| **Procedure** | 1. Configure traffic policies such that business critical apps and real time voice traffic is using the MPLS path and all other traffic is forwarded via the Internet path<br>2. Generate mix of enterprise traffic including the prescribed MPLS and Internet path traffic using application profile LargeSite.<br>Generate at least one bi-directional test stream that will match business critical policy and will be forwarded on MPLS transport. Use a consistent frame size of 256 bytes and inter-frame gap of 100,000 frames per second. This stream will be used to measure convergence.<br>3. Verify the prescribed traffic is forwarded according to the policies defined<br>4. Start test traffic and allow the test traffic to run for at least 30 seconds<br>5. Remove the link/cable directly attached to the WAN router device at Site 1 connected to the MPLS cloud<br>6. Allow test traffic to run for an additional 1 min after removing the link. Then stop traffic<br>7. Using the traffic generator, measure the frame loss associated with test stream described in step 3. Each lost frame represents 1/100,000 seconds of convergence.<br>8. Measure the total frame loss in both upstream and downstream directions. Allow the test traffic to run at least 1 min past the link fail event to ensure no additional frame loss occurs after the link removal/addition |
| **Pass/Fail Criteria** | Record convergence time in both upstream and downstream directions<br>Verify traffic is prioritized on the surviving link per the predefined policies |

*Enough detail so that someone else could recreate this test and achieve the same result!*

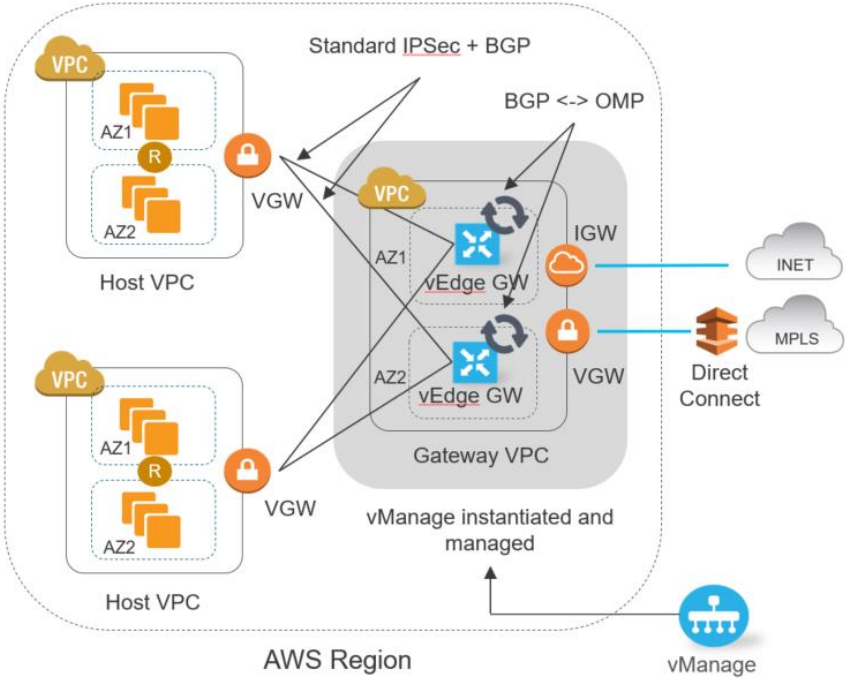
# Transport Convergence Test Case
## *Procedure Example*

1. Configure traffic policies such that business critical apps and real time voice traffic is using the MPLS path and all other traffic is forwarded via the Internet path
2. Generate mix of enterprise traffic including the prescribed MPLS and Internet path traffic using application profile Large Site.

   Generate at least one bi-directional test stream that will match business critical policy and will be forwarded on MPLS transport. Use a consistent frame size of 256 bytes and inter-frame gap of 100,000 frames per second. This stream will be used to measure convergence.
3. Verify the prescribed traffic is forwarded according to the policies defined
4. Start test traffic and allow the test traffic to run for at least 30 seconds
5. Remove the link/cable directly attached to the WAN router device at Site 1 connected to the MPLS cloud
6. Allow test traffic to run for an additional 1 min after removing the link. Then stop traffic
7. Using the traffic generator, measure the frame loss associated with test stream described in step 3. Each lost frame represents 1/100,000 seconds of convergence.
8. Measure the total frame loss in both upstream and downstream directions. Allow the test traffic to run at least 1 min past the link fail event to ensure no additional frame loss occurs after the link removal/addition

# IaaS deployments

- Variability is expected, can be minimized
  - Use Cluster Placement Groups in AWS for performance related testing
- Allocate test resources with higher compute & I/O resources than your Device Under Test
- If possible, perform comparison testing with the same environment, don't shutdown then restart the environment



# Test Case Execution

Keep a testing diary

Save logs, screen shots, desktop recordings, result files…

Organize your result files in a directory structure that corresponds to your test plan

Someone else may come looking for these results….

Run multiple iterations

Ad-hoc testing is ok…

- Have a purpose
- Its your time

# Tools – Use the best tool you can afford

- Traffic generators
  - Local or remote
  - IXIA, Spirent, IXIA/BreakingPoint, Avalanche, Chariot
  - Seagull, Iperf, TREX others
- WAN bridges
- Netflow applications
- Packet captures

- Rent / Own
- Automate if needed

# Planning

# +

# Execution

# =

# Success

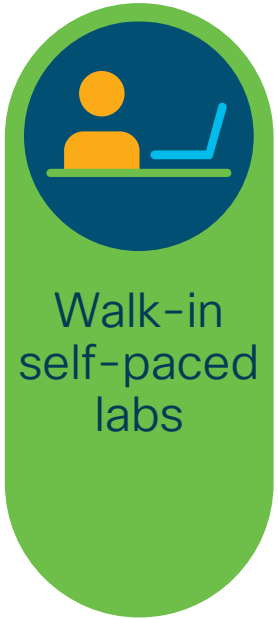
# Complete your online session evaluation

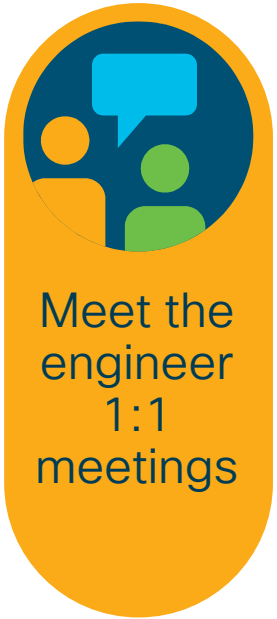
Give us your feedback to be entered into a Daily Survey Drawing.

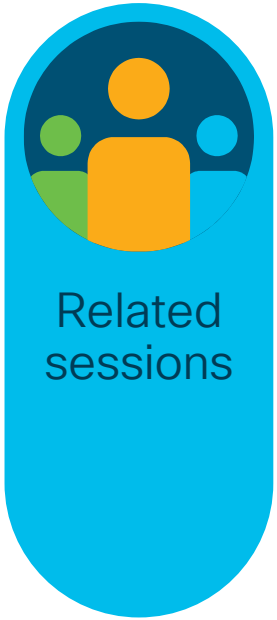
Complete your session surveys through the Cisco Live mobile app or on www.CiscoLive.com/us.

Don't forget: Cisco Live sessions will be available for viewing on demand after the event at www.CiscoLive.com/Online.

# Continue your education

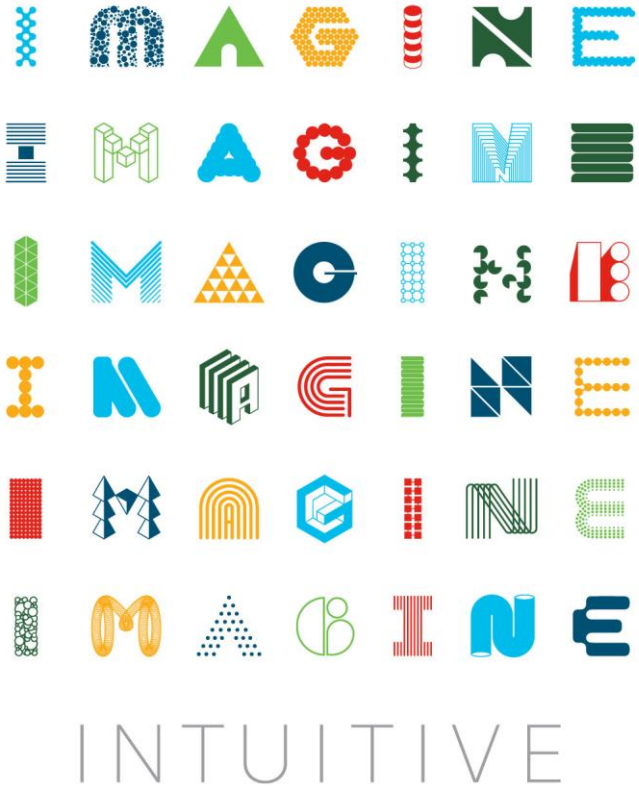



# Related Sessions

- BRKRST-2092 Introduction to Next-GEN SD-WAN
- BRKRST-2095 SD-WAN Routing Migrations
- BRKCRS-2111 Migration to Next-Gen Cisco SD-WAN
- BRKCRS-2112 Serviceability for Next Generation SD-WAN
- TECCRS 2014 SD-WAN Technical Deep Dive

# Thank you



INTUITIVE