



SNEAK PEEK

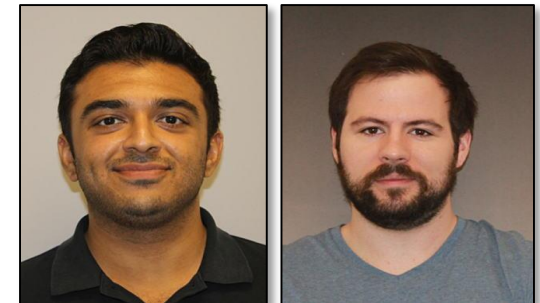
# Cisco Support Community Expert Series Webcast

## Dynamic Multi-point VPN (DMVPN)

Troubleshooting & Best Practices

Jun 7<sup>th</sup>, 2016 at 10:00 a.m. pacific  
with Hamzah Kardame and Frank Denofa

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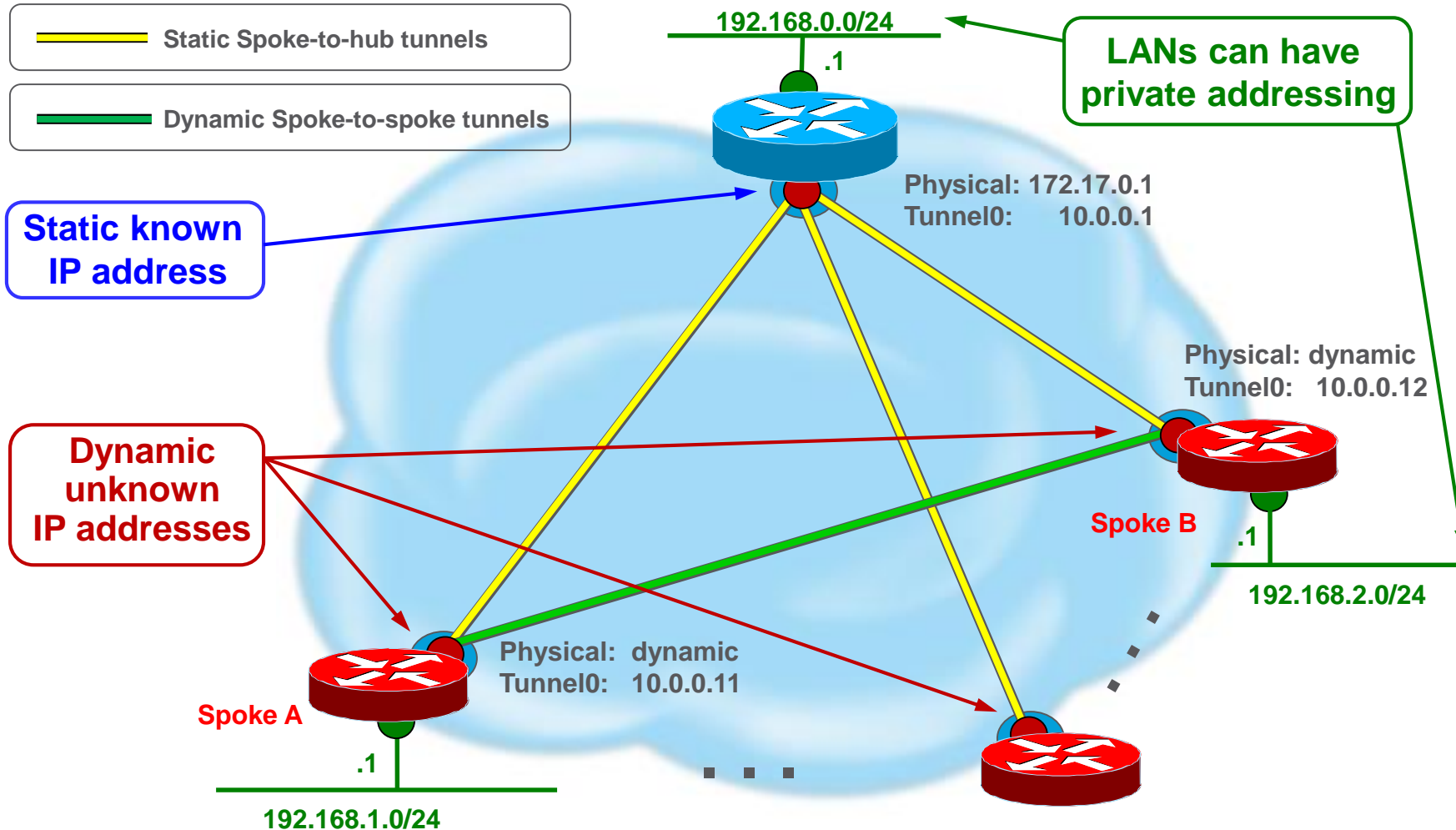
# Agenda

- DMVPN Phase 1/2/3 Overview
- Deep-Dive on Phase 3
- Step by Step Troubleshooting Approach
- DMVPN Phase-3 Operations Demo
- DMVPN Troubleshooting Demo
- Best Practices

# DMVPN Components

- ❑ Next Hop Resolution Protocol (NHRP)
  - Creates a distributed (NHRP) mapping database of all the spoke's tunnel to real (public interface) addresses
- ❑ Multipoint GRE Tunnel Interface (mGRE)
  - Single GRE interface to support multiple GRE/IPsec tunnels
  - Simplifies size and complexity of configuration
- ❑ IPsec tunnel protection
  - Dynamically creates and applies encryption policies
- ❑ Routing
  - Dynamic advertisement of branch networks; almost all routing protocols are supported

# DMVPN Example



# Phase 1

- Hub and spoke functionality
- p-pGRE interface on spokes, mGRE on hubs
- Spokes don't need full routing table – can summarize on hubs

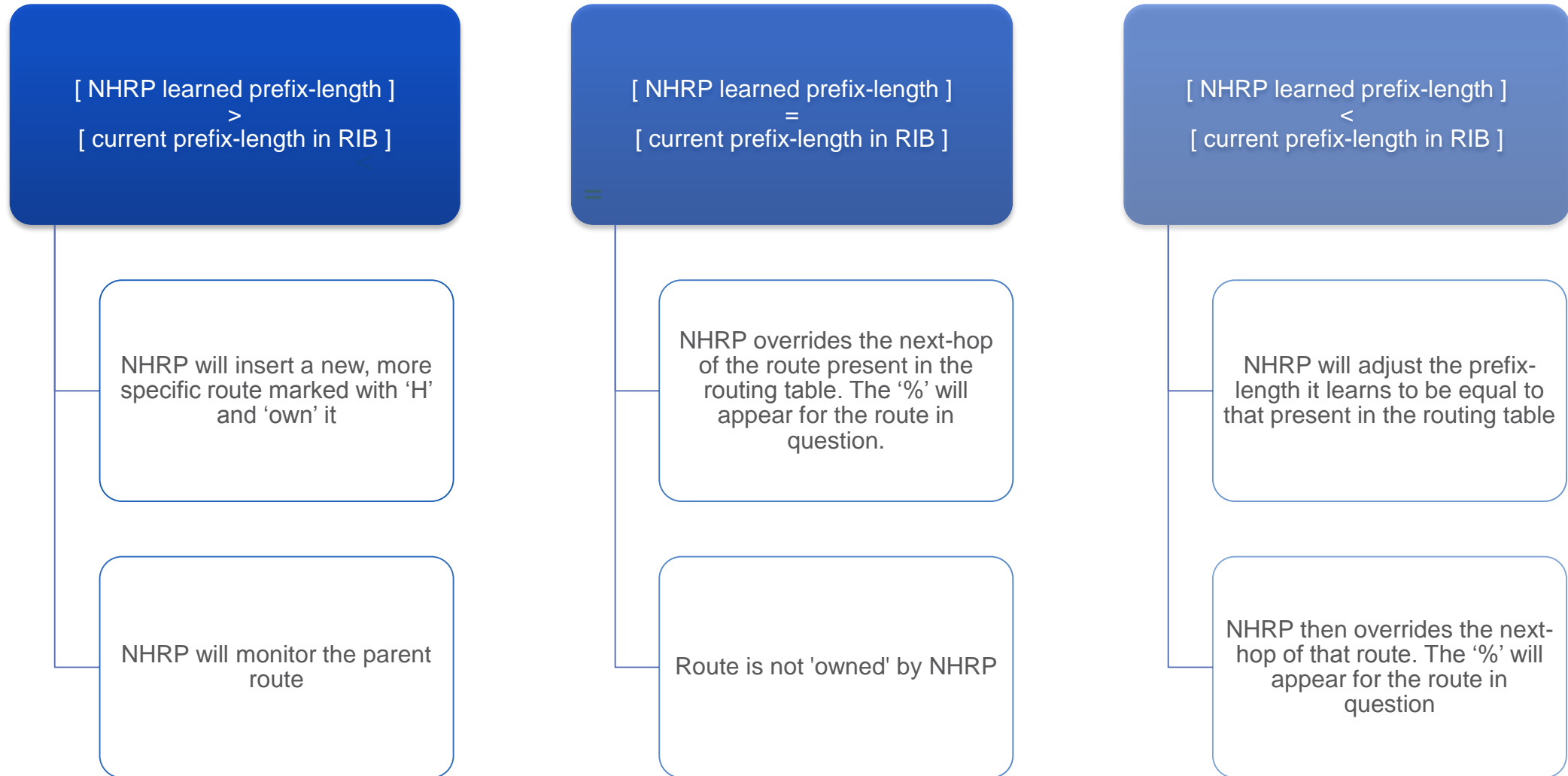
# Phase 2

- Spoke to spoke functionality
- mGRE interface on spokes
- Direct spoke to spoke data traffic reduces load on hubs
- Spoke must have full routing table – no summarization
- Spoke-spoke tunnel triggered by spoke itself

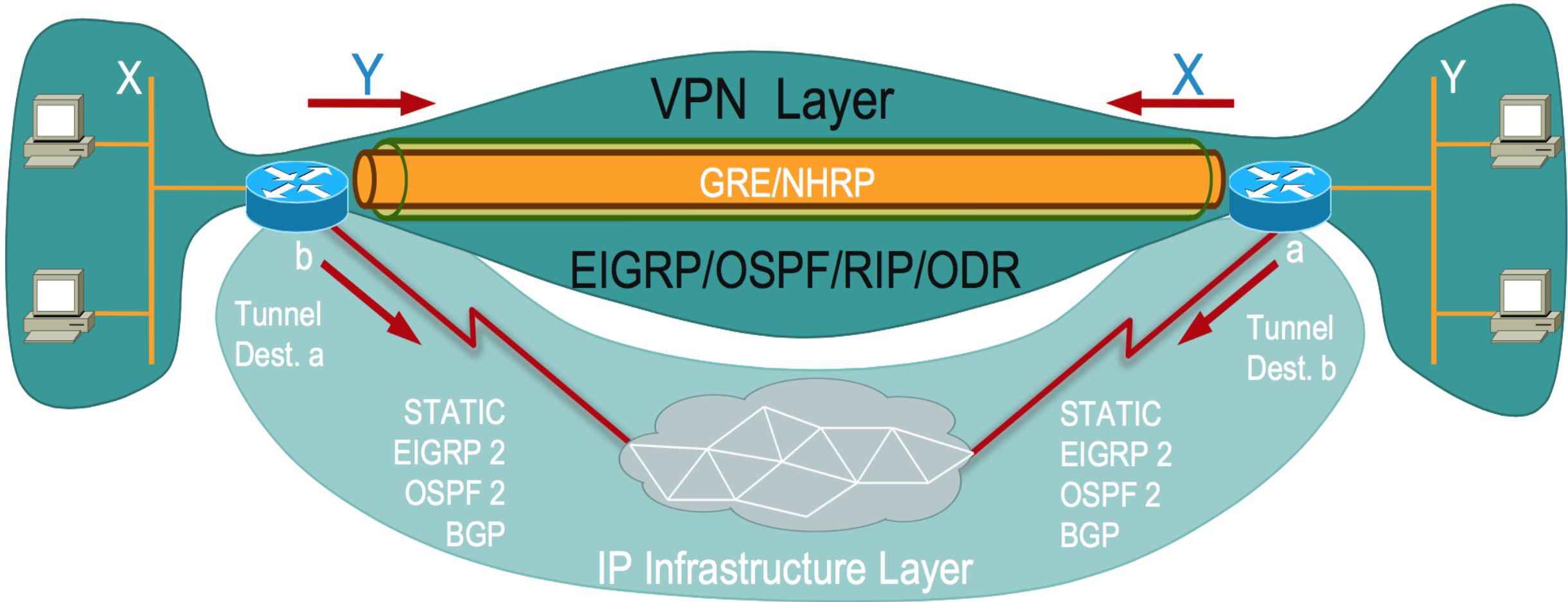
# Phase 3

- Spoke to spoke functionality
- Spokes don't need full routing table – can summarize
- Spoke-spoke tunnel triggered by hubs
- NHRP routes/next-hops in RIB

# DMVPN Phase 3 – Deep Dive



# DMVPN Layers



# Layered Troubleshooting Methodology

Is connectivity present between the two routers NBMA IP addresses over **UDP 500, UDP 4500, ESP/IP Proto 50** bi-directionally?

- Ping | Traceroute
- Netflow/FNF | EPC | ACL hitcounts

Is the **VPN tunnel UP** and stable?  
Do the **encrypt and decrypt counters increment** for the given IPsec SA, at both routers?

- show dmvpn | show crypto isakmp sa detail | show crypto ikev2 sa | show crypto session detail
- Do pings between the tunnel interface IP addresses work?
- show crypto ipsec sa peer x.x.x.x
- debug dmvpn all crypto\*

**Hub-Spoke** : Does the NHRP entry at the hub for the given spoke's tunnel IP, show as **'registered'**?  
**Spoke-Spoke** : Does each spoke have a **'dynamic'** NHRP entry present for the other, or, does it show as **'incomplete'**?

- show ip nhrp detail | show ip nhrp traffic | show ip nhrp nhs
- debug dmvpn all nhrp\*

Is the **routing protocol neighborhood UP** and stable?  
Are routes being learned at both routers, over the Tunnel interface?

- show ip route [eigrp | ospf | rip]
- show ip [eigrp | ospf] neighbor
- show ip nhrp multicast
- ping [ 224.0.0.10 (eigrp) | 224.0.0.5 (ospf) | 224.0.0.9 (rip) ]



**Hope you enjoyed this little peek into the webcast.**  
Remember it was just a peek. Jun 7<sup>th</sup>, you get a chance to see the whole thing.



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At the webcast you will be able to learn so much more and get a chance to submit questions for the expert to answer during the broadcast.  
We'll see you there!