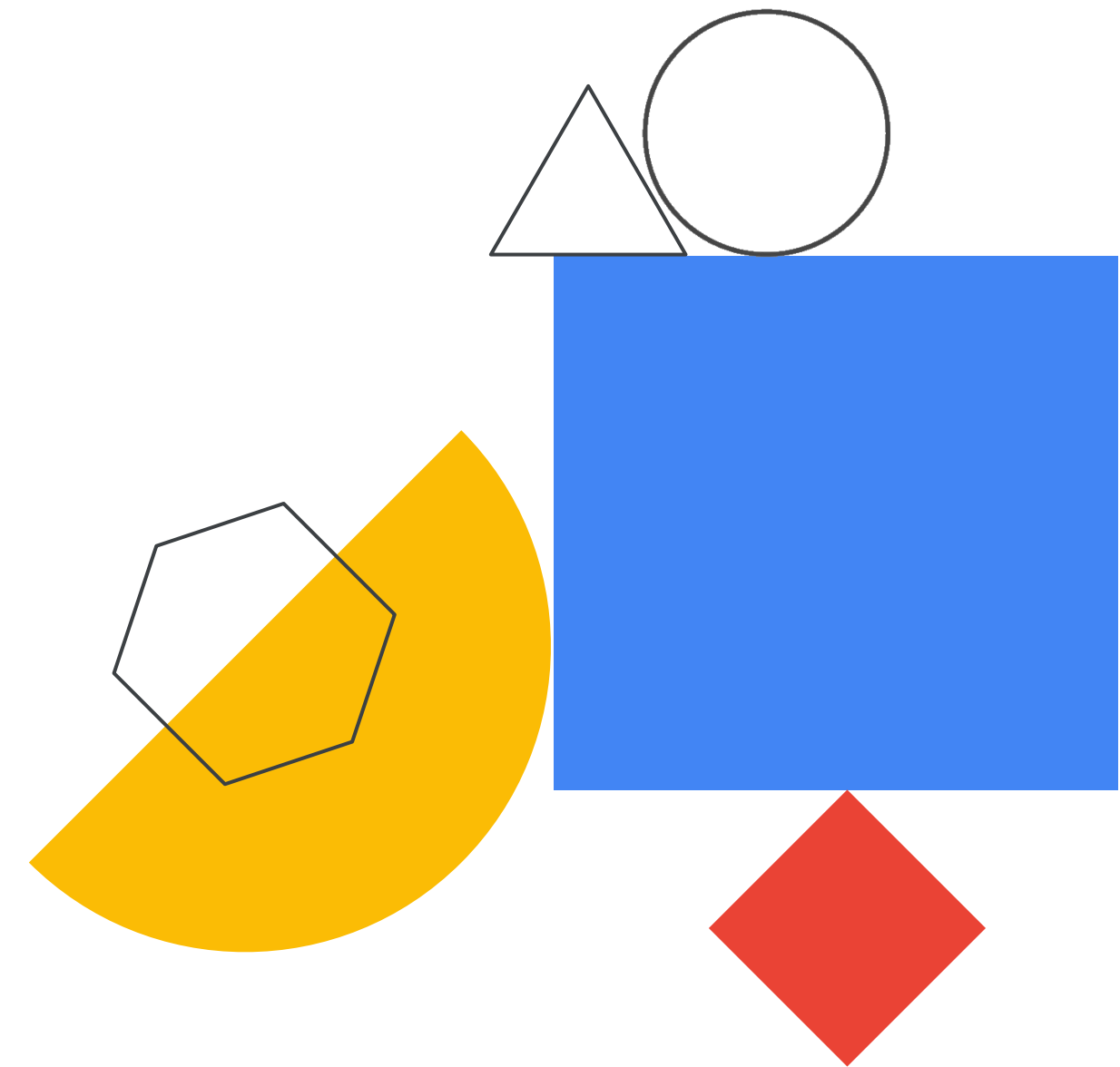


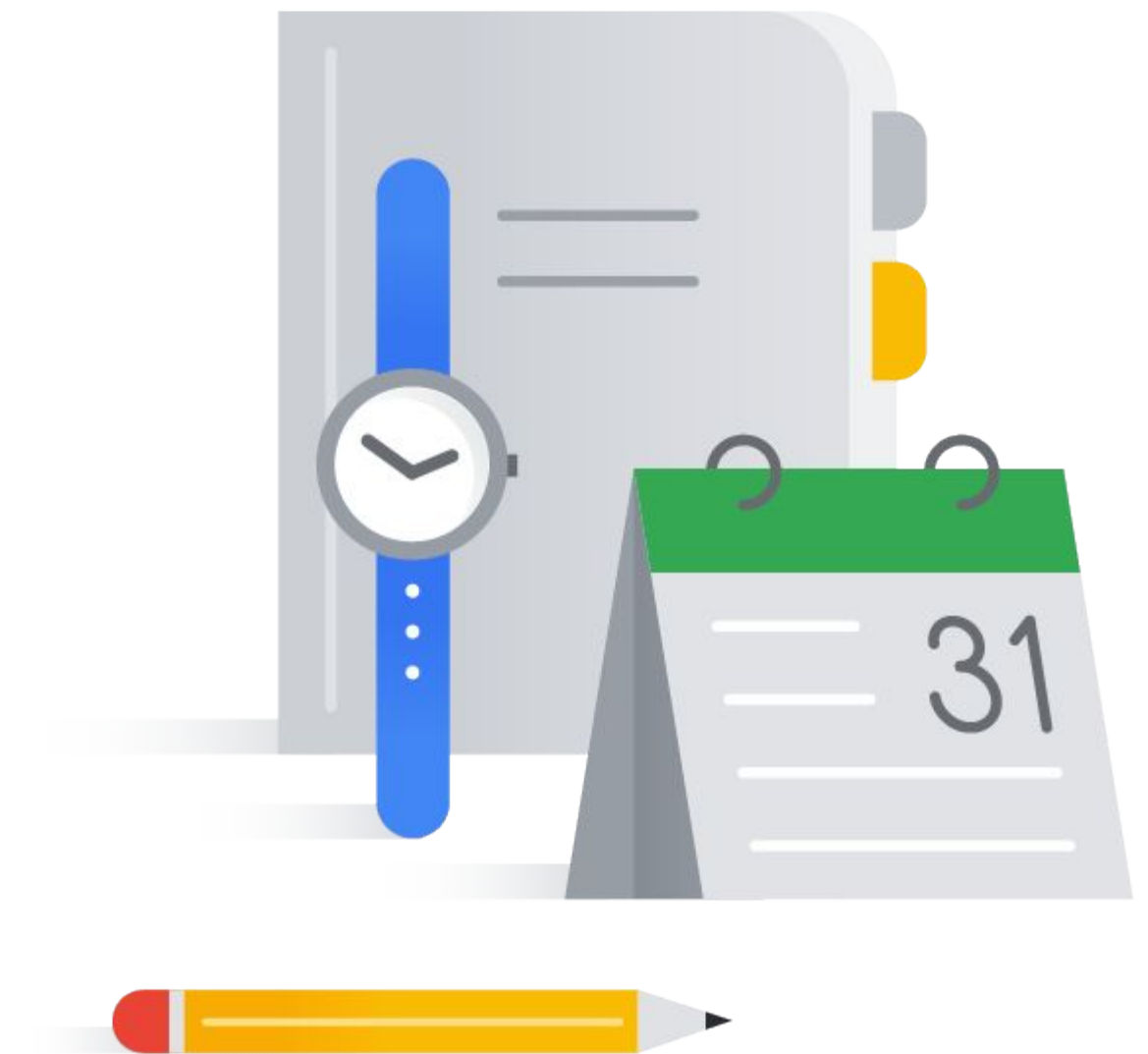


# Interconnecting Networks



# Agenda

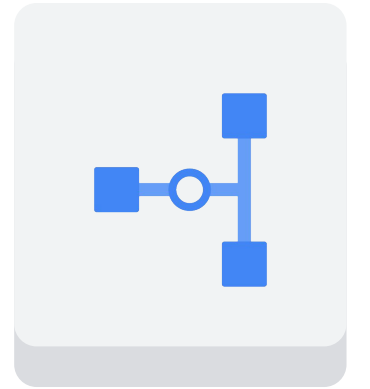
- 01 Cloud VPN  
Lab: Configuring Google Cloud HA VPN
- 02 Cloud Interconnect and Peering
- 03 Sharing VPC Networks





# Cloud VPN

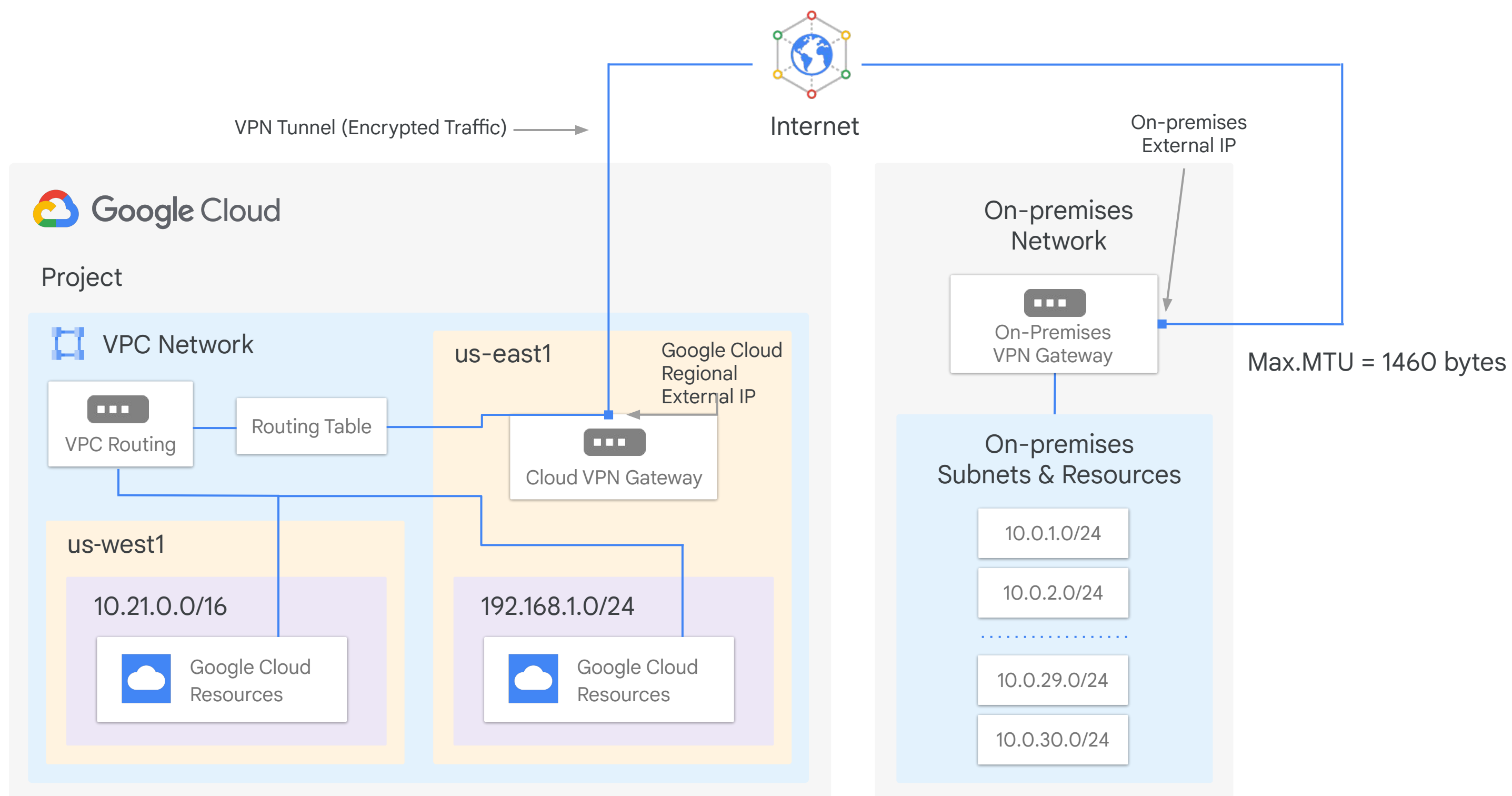
# Classic VPN securely connects your on-premises network to your Google Cloud VPC network



Cloud VPN

- Useful for low-volume data connections
- 99.9% SLA
- Supports:
  - Site-to-site VPN
  - Static routes
  - Dynamic routes (Cloud Router)
  - IKEv1 and IKEv2 ciphers

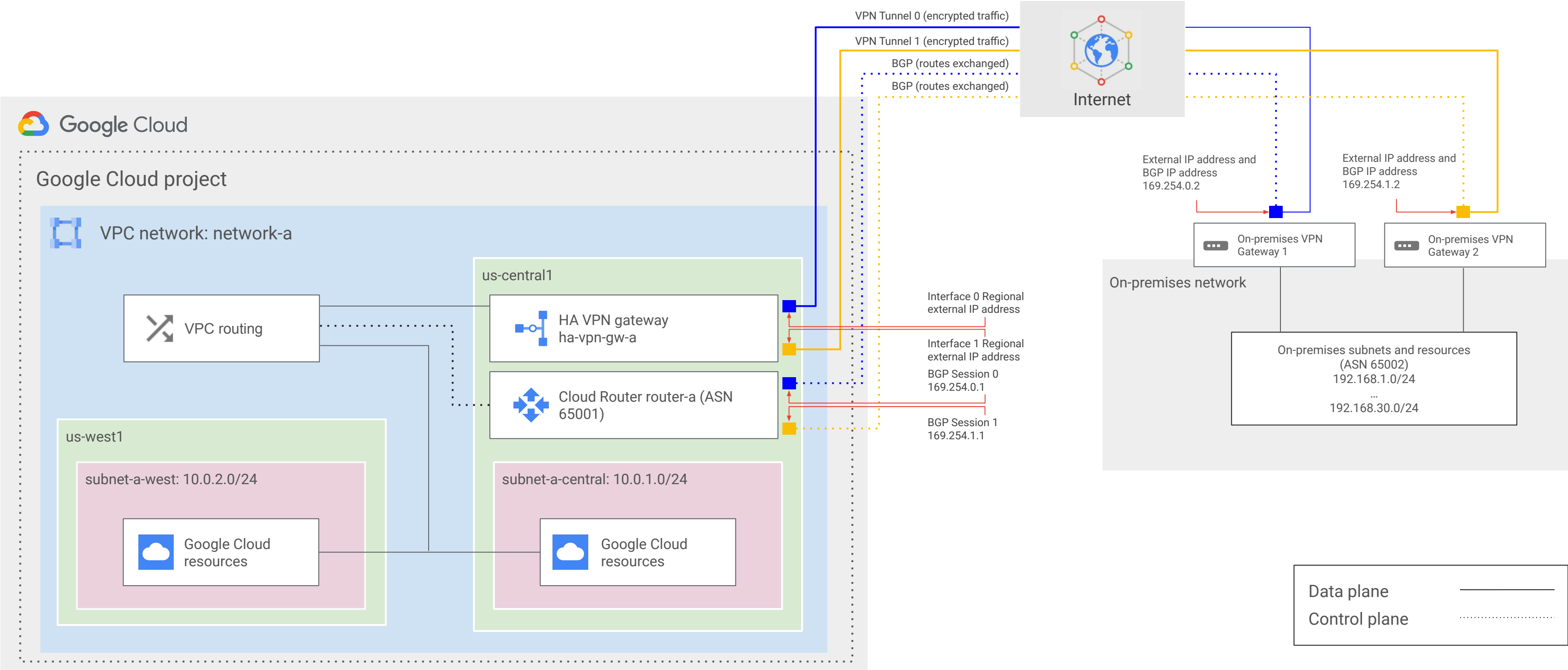
# Classic VPN topology



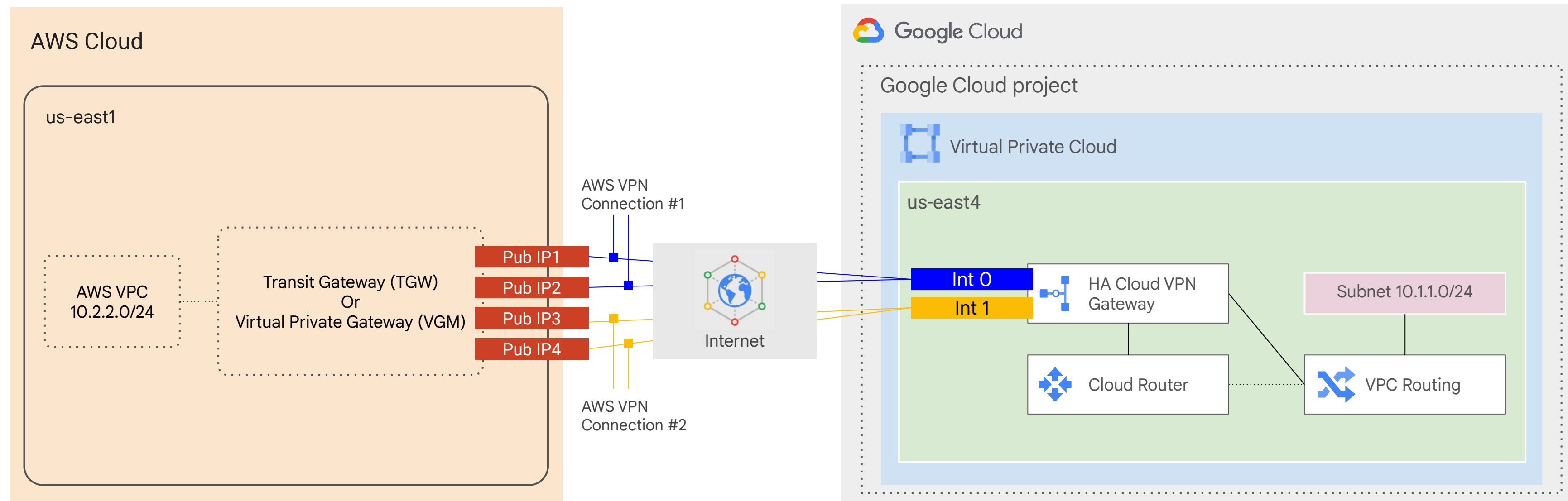
# HA VPN overview

- Provides 99.99% service availability.
- Google Cloud automatically chooses two external IP addresses.
  - Supports multiple tunnels
  - VPN tunnels connected to HA VPN gateways must use dynamic (BGP) routing
- Supports site-to-site VPN for different topologies/configuration scenarios:
  - An HA VPN gateway to peer VPN devices
  - An HA VPN gateway to an Amazon Web Services (AWS) virtual private gateway
  - Two HA VPN gateways connected to each other

# HA VPN to peer VPN gateway topology

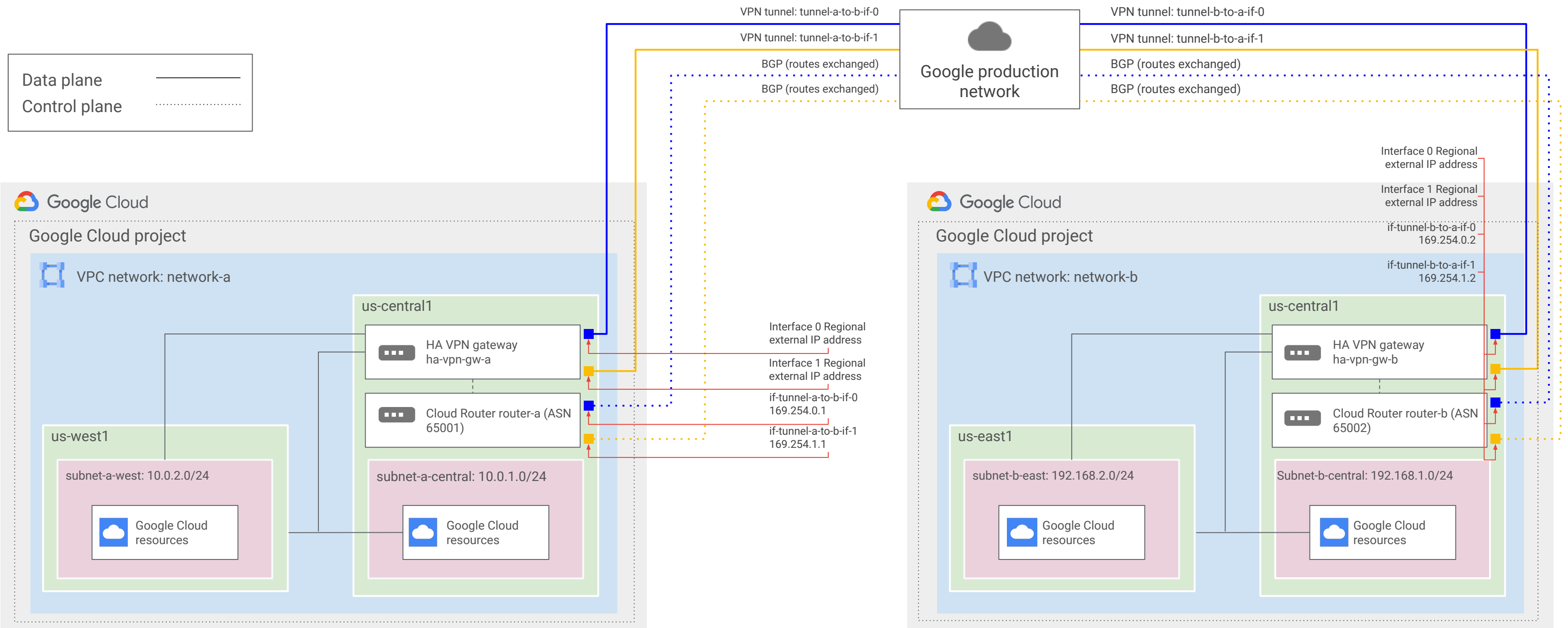


# HA VPN to AWS peer gateway topology

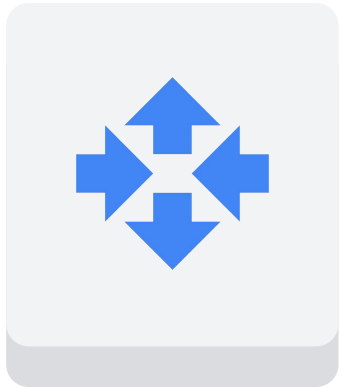




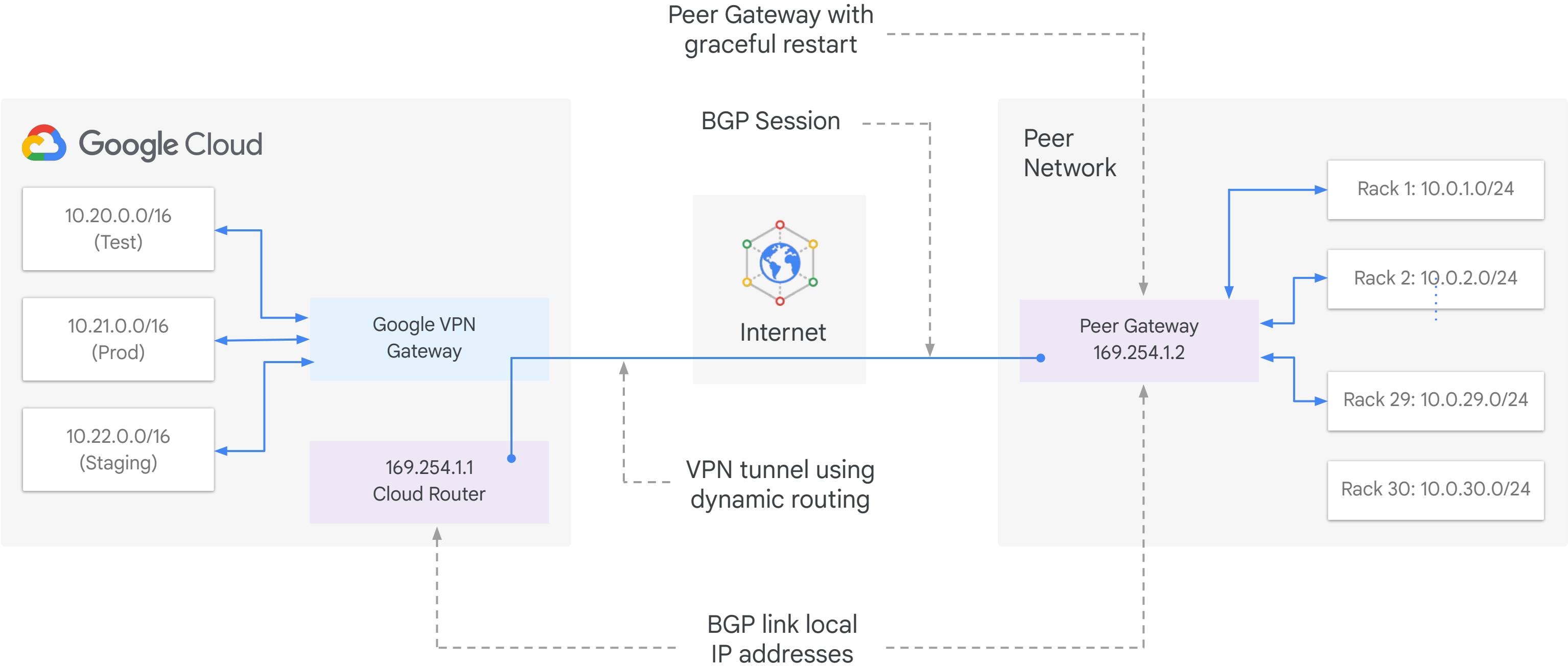
# HA VPN between Google Cloud networks topology



# Dynamic routing with Cloud Router

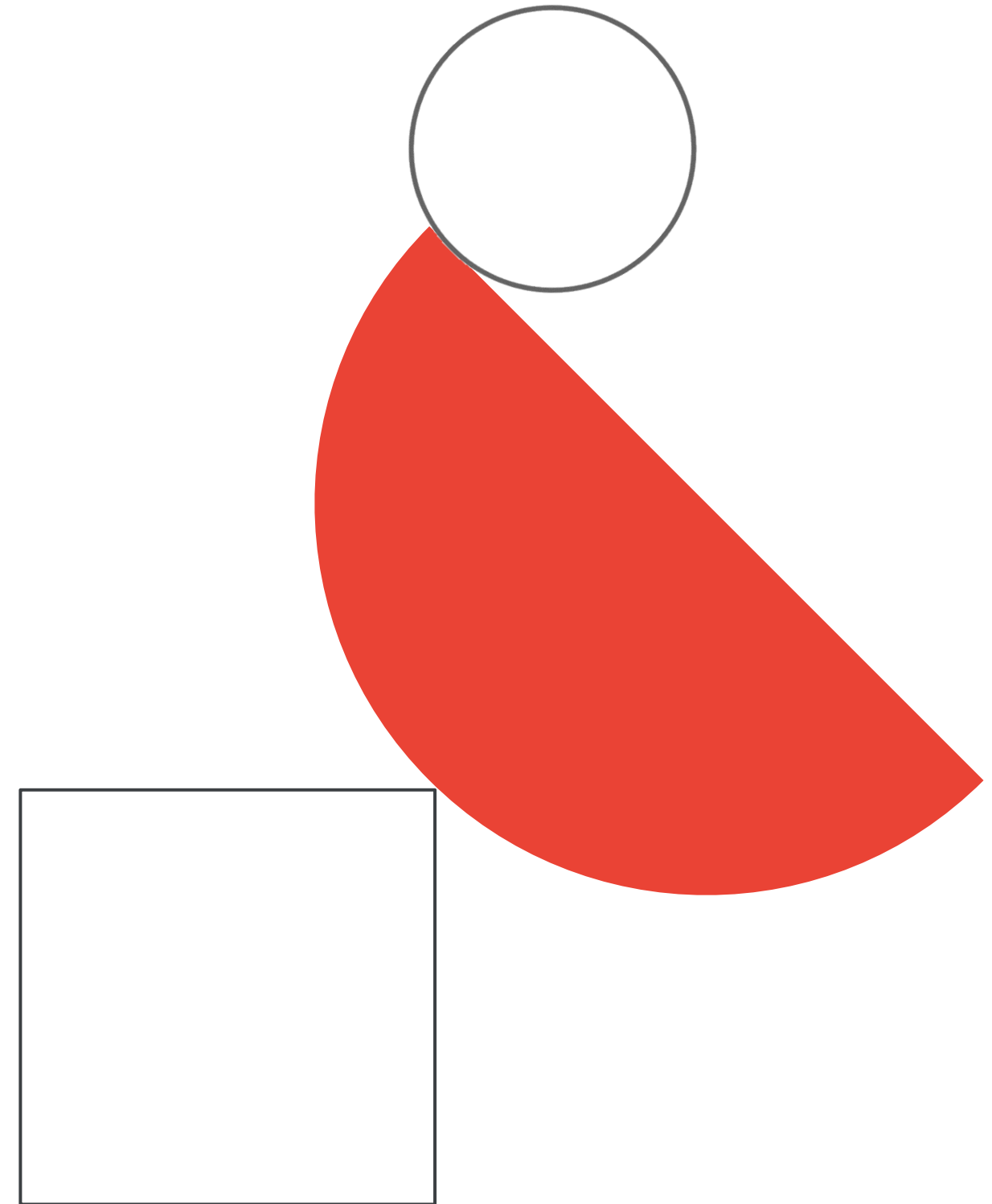


Cloud Router



# Lab Intro

Configuring Google Cloud HA VPN



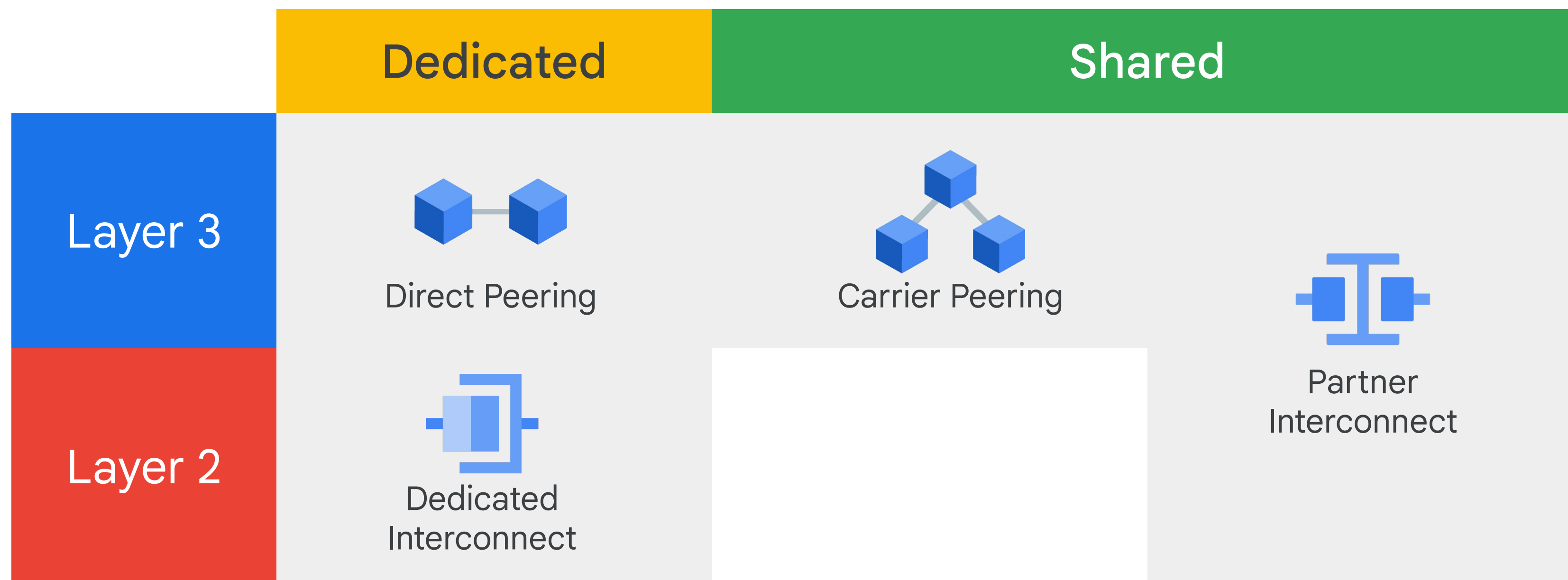
# Lab objectives

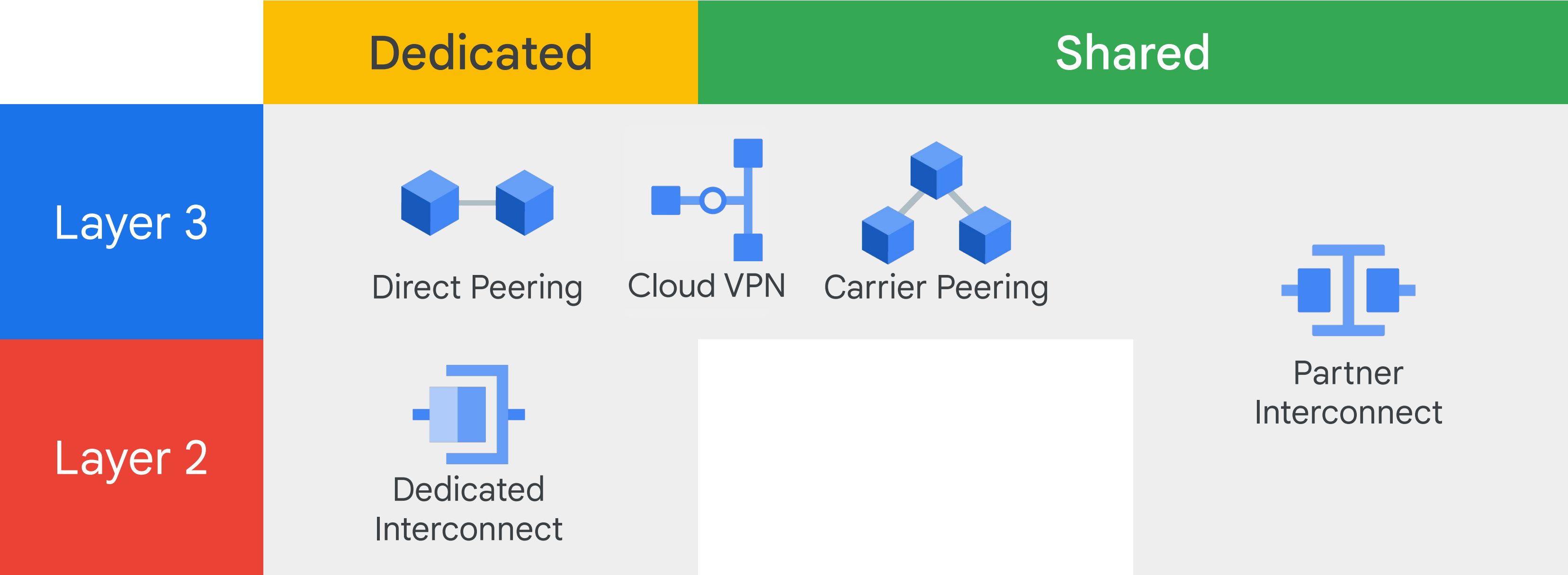
- 01 Create two VPC networks and instances
- 02 Configure HA VPN gateways
- 03 Configure dynamic routing with VPN tunnels
- 04 Configure global dynamic routing mode
- 05 Verify and test HA VPN gateway configuration



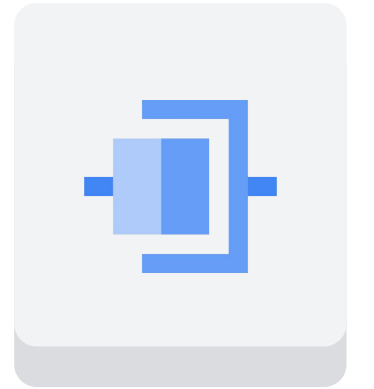


# Cloud Interconnect and Peering

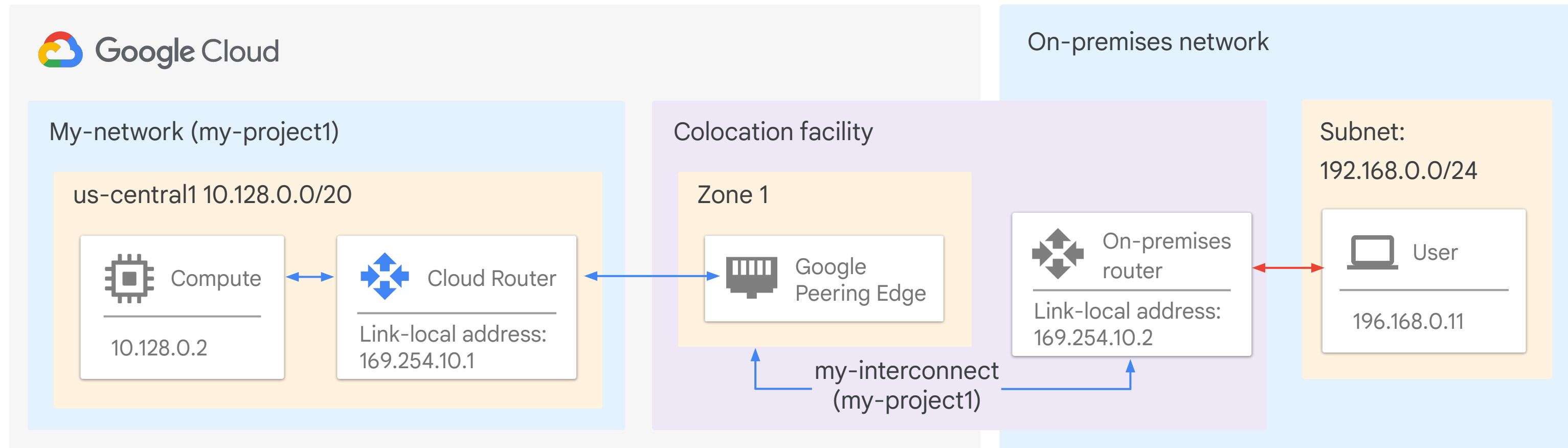




# Dedicated Interconnect provides direct physical connections



Dedicated Interconnect

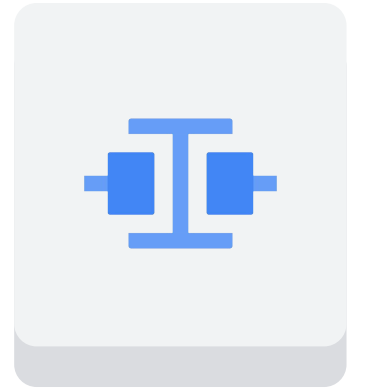




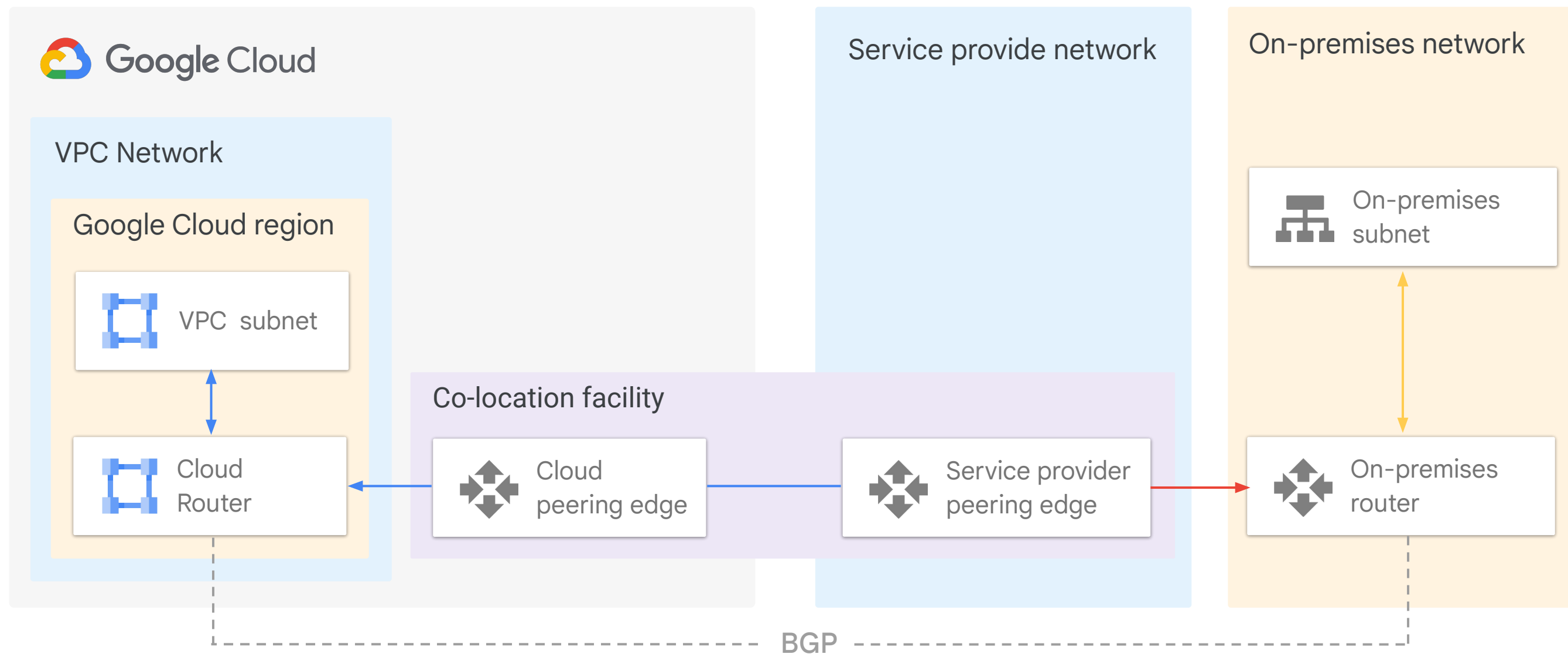
# Colocation facility locations



# Partner Interconnect provides connectivity through a supported service provider



Partner  
Interconnect



# Use Cross-Cloud Interconnect to connect to a network hosted by another cloud service provider

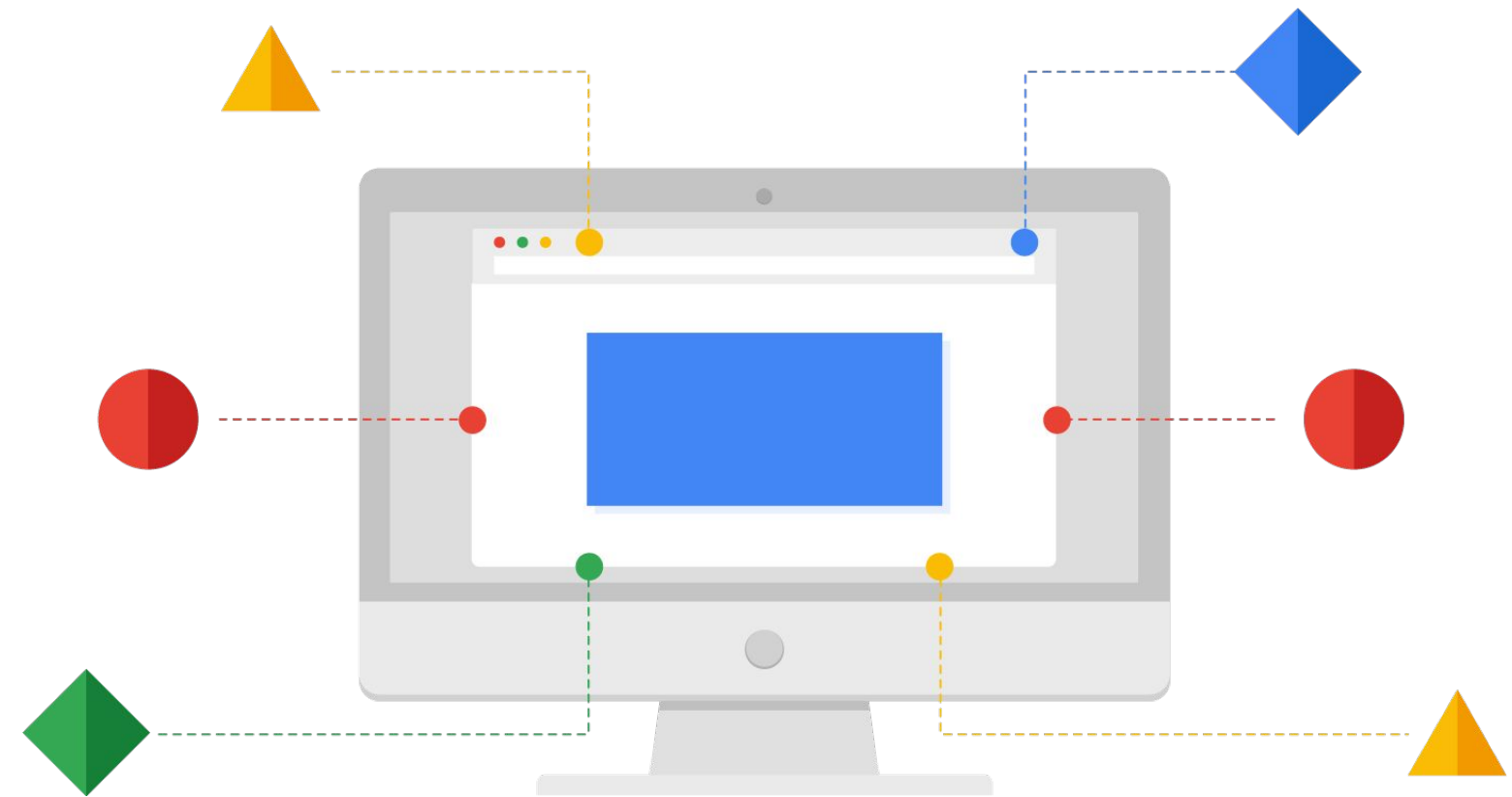
- ✓ Amazon Web Services (AWS)
- ✓ Microsoft Azure
- ✓ Oracle Cloud Infrastructure (OCI)
- ✓ Alibaba Cloud

# Comparison of Interconnect options

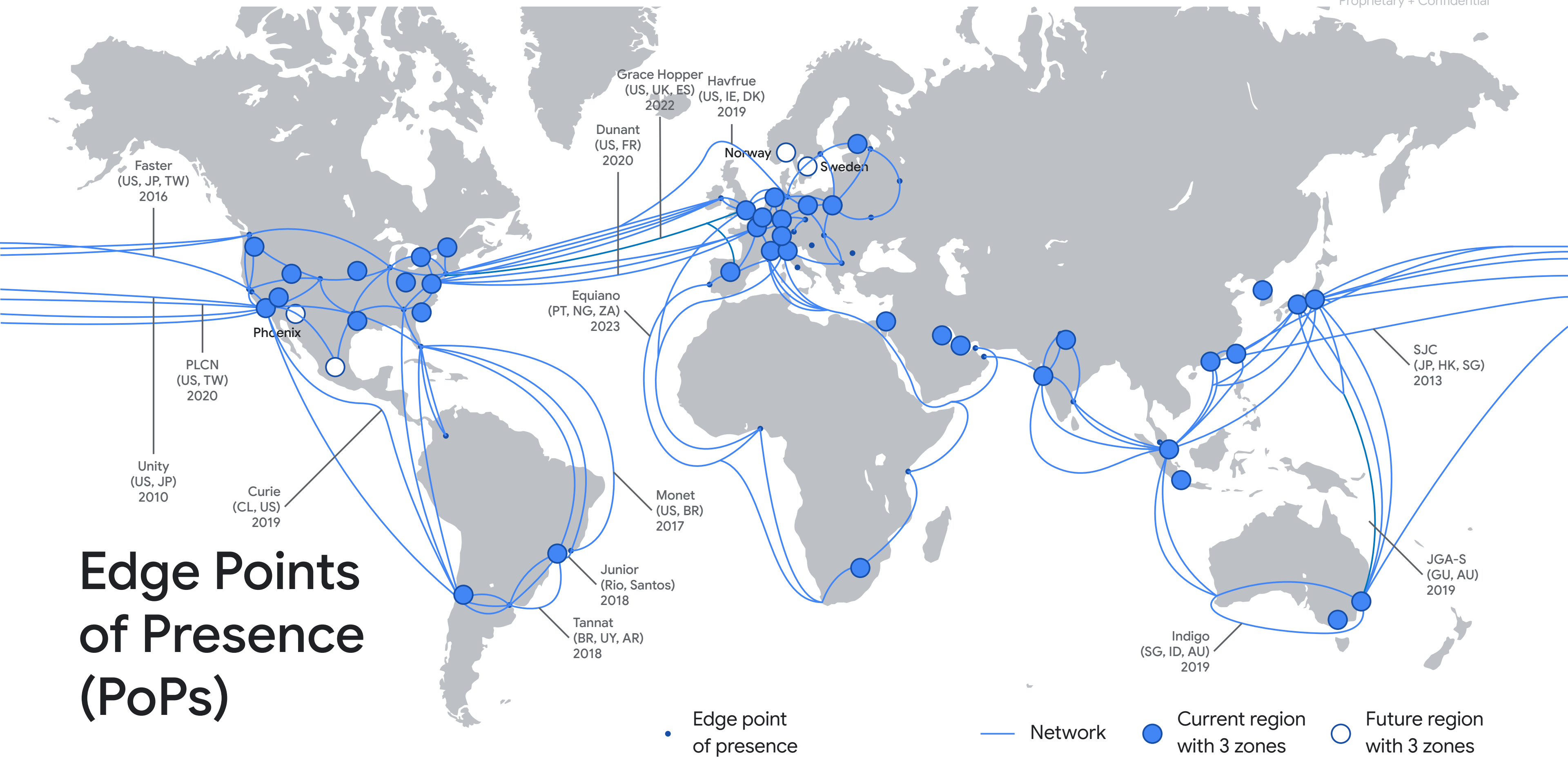
Connection	Provides	Capacity	Requirements	Access Type
VPN tunnel	Encrypted tunnel to VPC networks through the public internet	1.5–3 Gbps per tunnel	Remote VPN gateway	Internal IP addresses
Dedicated Interconnect	Dedicated, direct connection to VPC networks	10 Gbps or 100 Gbps per link	Connection in colocation facility	
Partner Interconnect	Dedicated bandwidth, connection to VPC network through a service provider	50 Mbps – 50 Gbps per connection	Service provider	
Cross-Cloud Interconnect	Dedicated physical connection between VPC network and network hosted by service provider	10 Gbps or 100 Gbps per connection	Primary and redundant ports (Google Cloud and remote cloud service provider)	

# Direct Peering provides a direct connection between your business network and Google's

- Broad-reaching edge network locations
- Exchange BGP routes
- Reach all of Google's services
- Peering requirements
- No SLA



# Edge Points of Presence (PoPs)



# Carrier Peering provides connectivity through a supported partner

- Carrier Peering partner
- Reach all of Google's services
- Partner requirements
- No SLA

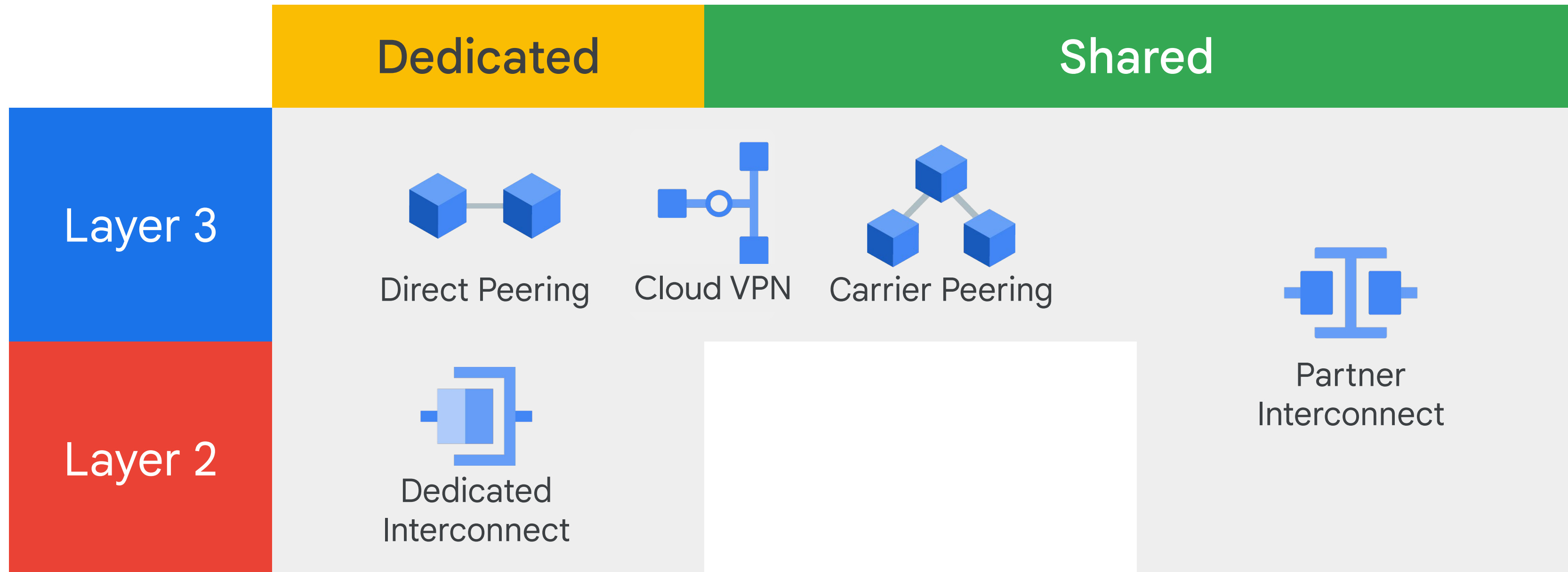


# Comparison of Peering options

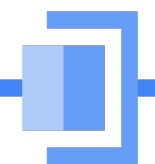


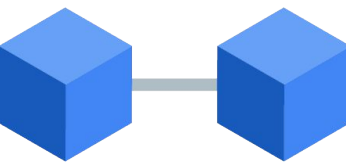
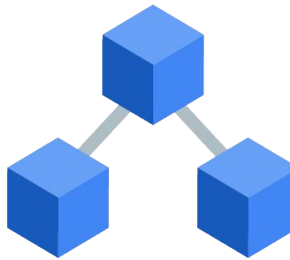
Connection	Provides	Capacity	Requirements	Access Type
Direct Peering	Dedicated, direct connection to Google's network	10 Gbps Per link	Connection in Google Cloud PoPs	Public IP addresses
Carrier Peering	Peering through service provider to Google's public network	Varies based on partner offering	Service provider	



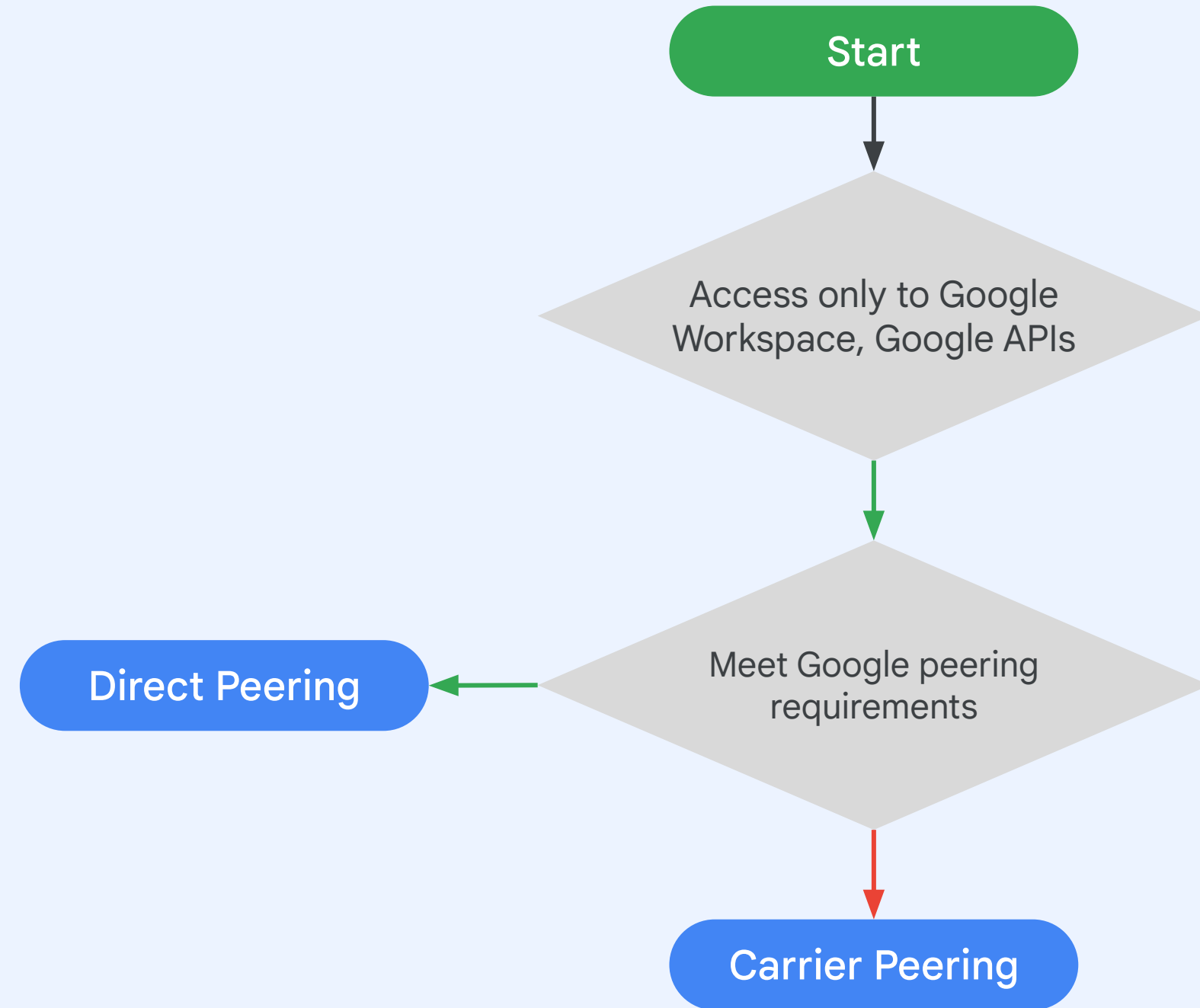
# 5 ways to connect your infrastructure to Google Cloud



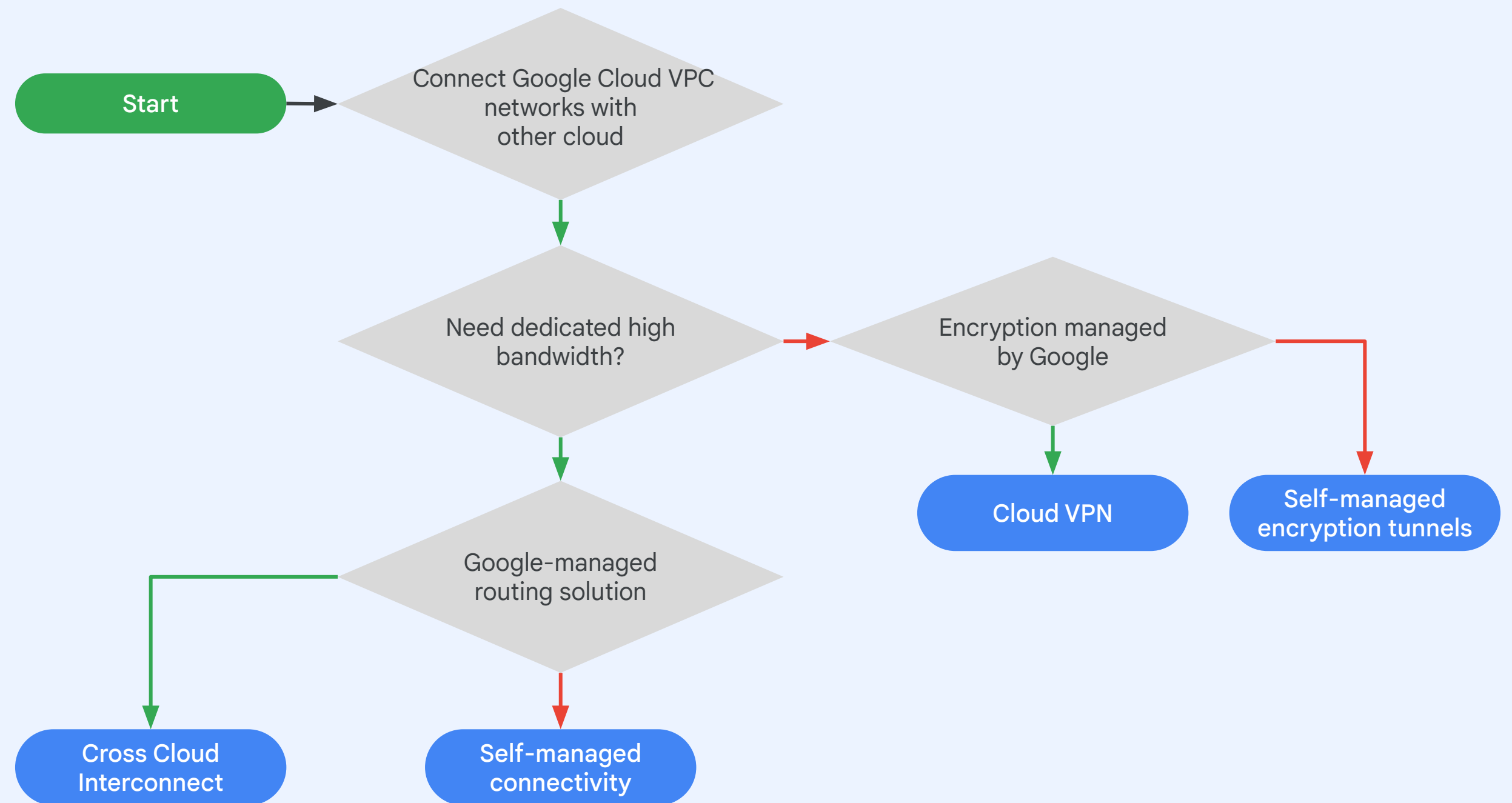
# Choosing a network connection option

Interconnect	Peering
<p data-bbox="549 722 1616 891">Direct access to RFC1918 IPs in your VPC - with SLA</p> <div data-bbox="533 1078 1599 1369"><p data-bbox="533 1256 833 1369">Dedicated Interconnect</p><p data-bbox="932 1256 1232 1369">Partner Interconnect</p><p data-bbox="1349 1256 1599 1313">Cloud VPN</p></div>	<p data-bbox="1749 722 2682 891">Access to Google public IPs only - without SLA</p> <div data-bbox="1832 1013 2732 1313"><p data-bbox="1832 1247 2165 1303">Direct Peering</p><p data-bbox="2382 1247 2732 1303">Carrier Peering</p></div>

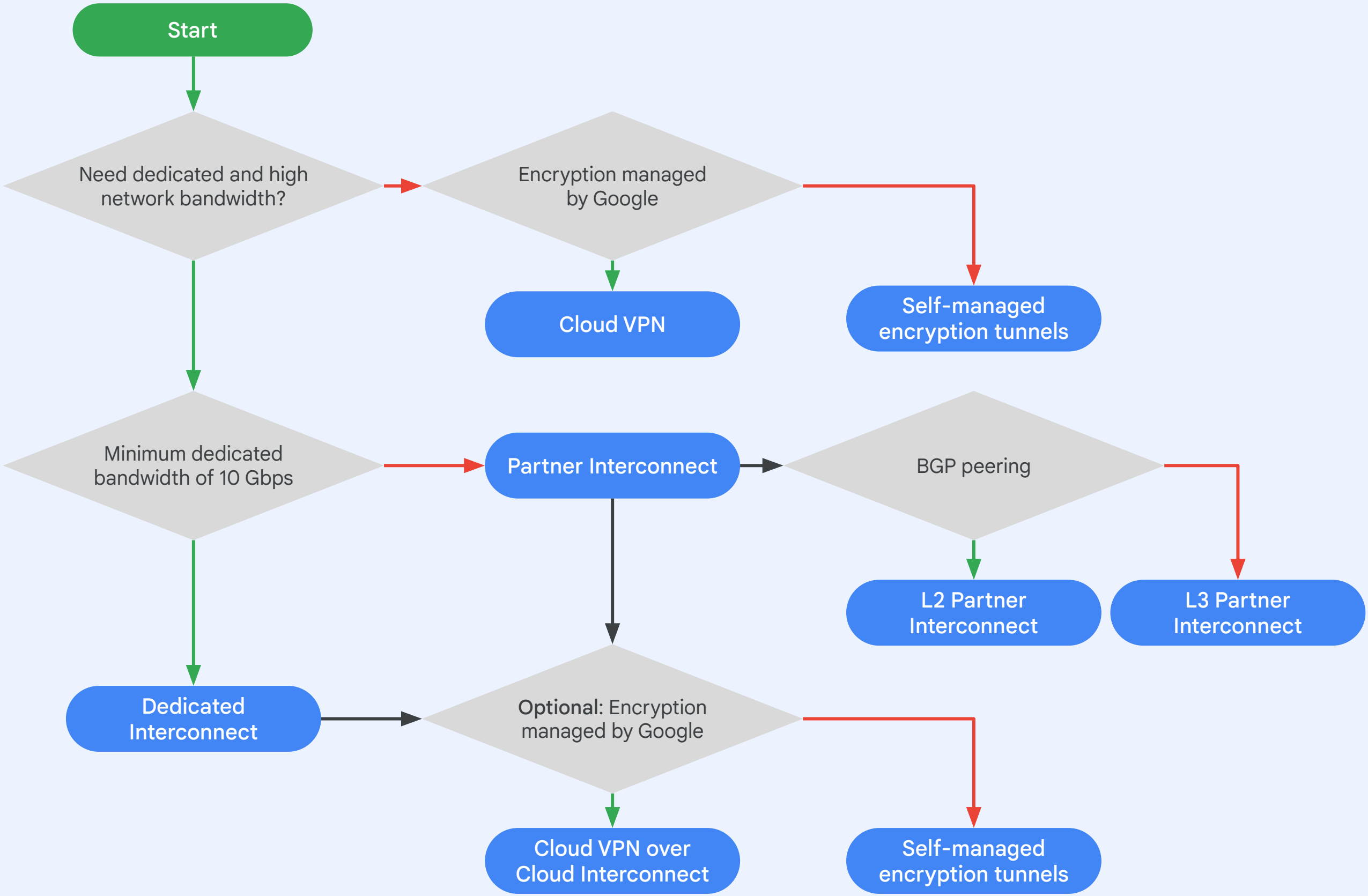
# Connect on-premises to Google Workspace



# Connect Google Cloud with another cloud service



# Connect on-premises with Google Cloud

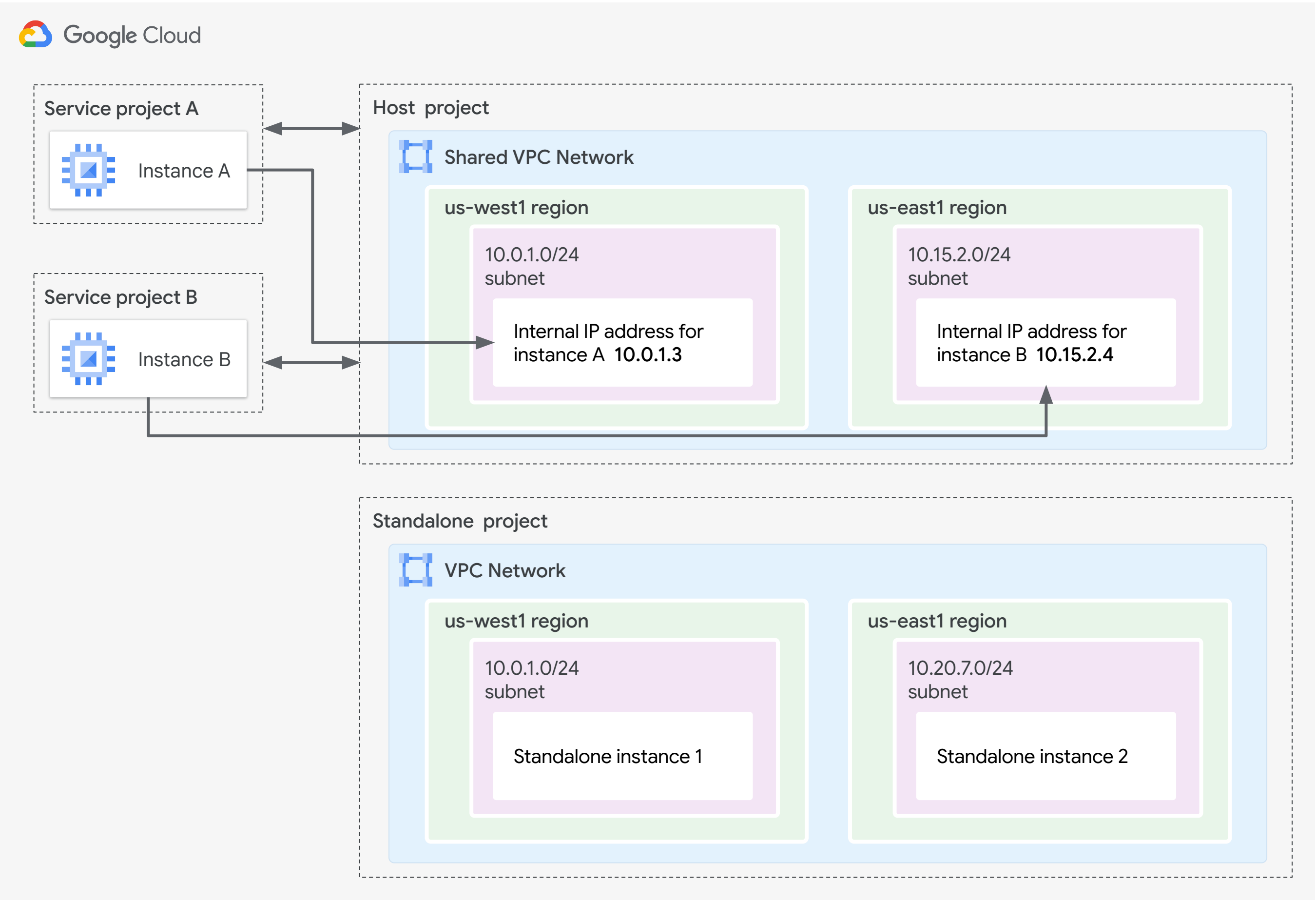


03

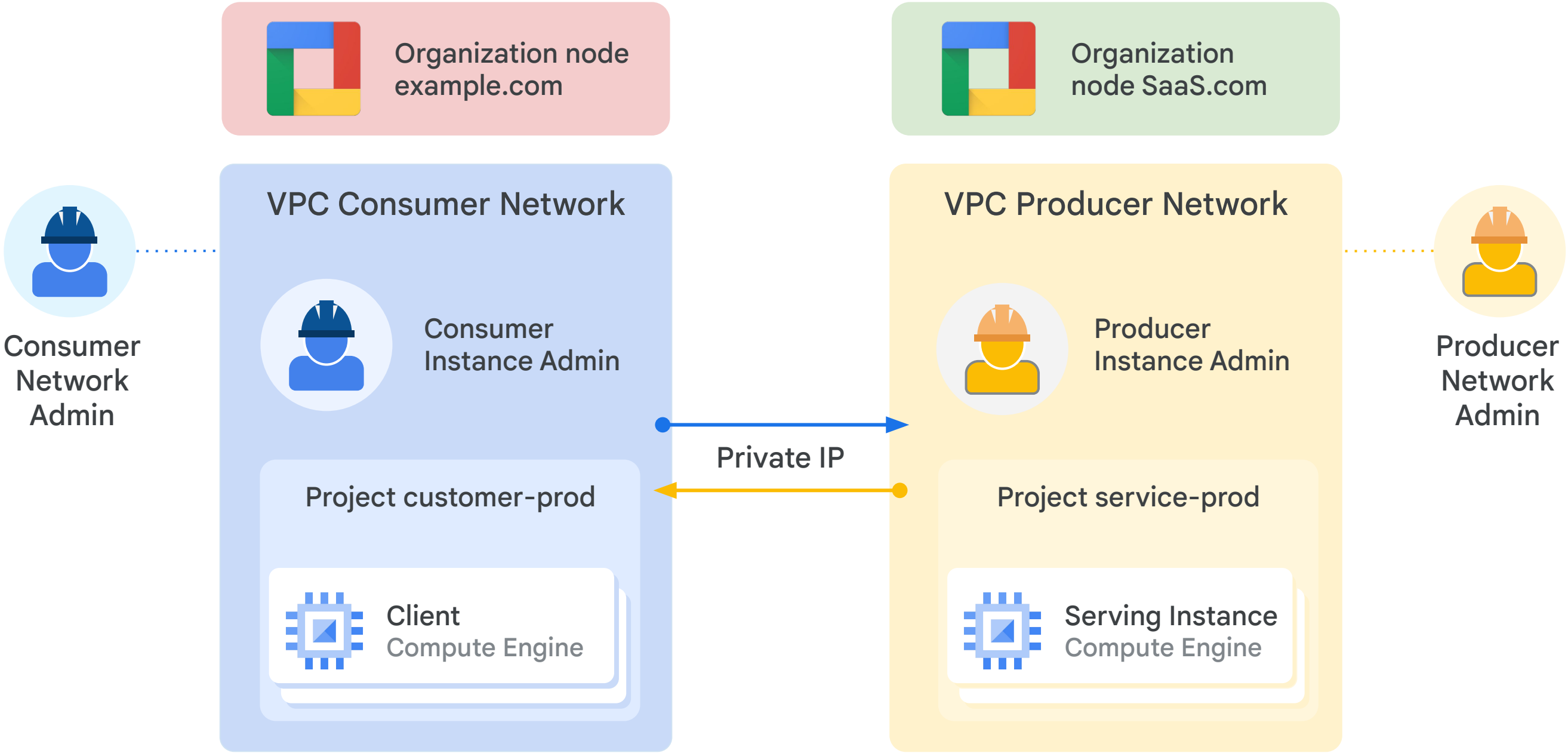


# Sharing VPC Networks

# Shared VPC



# VPC peering

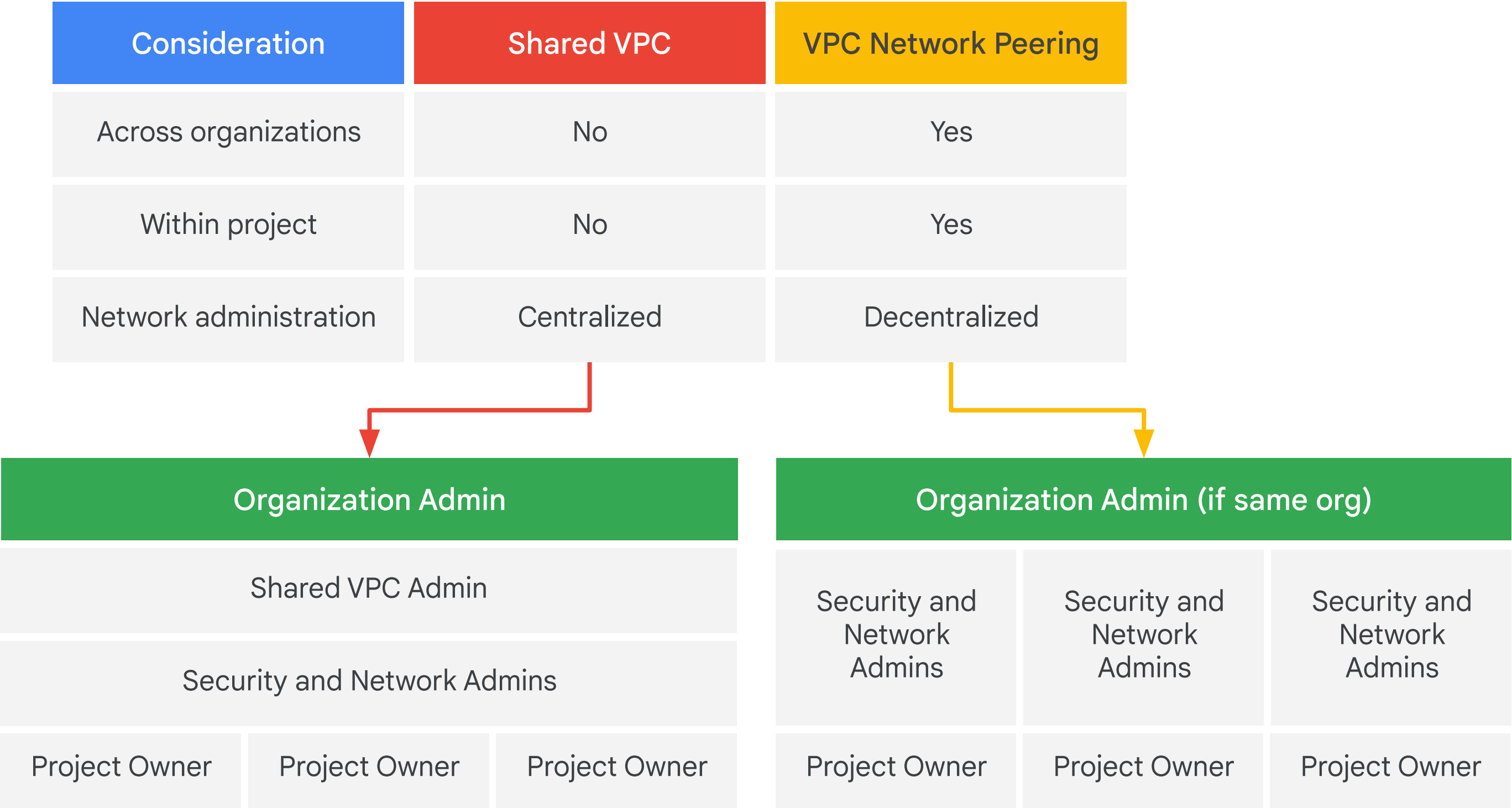




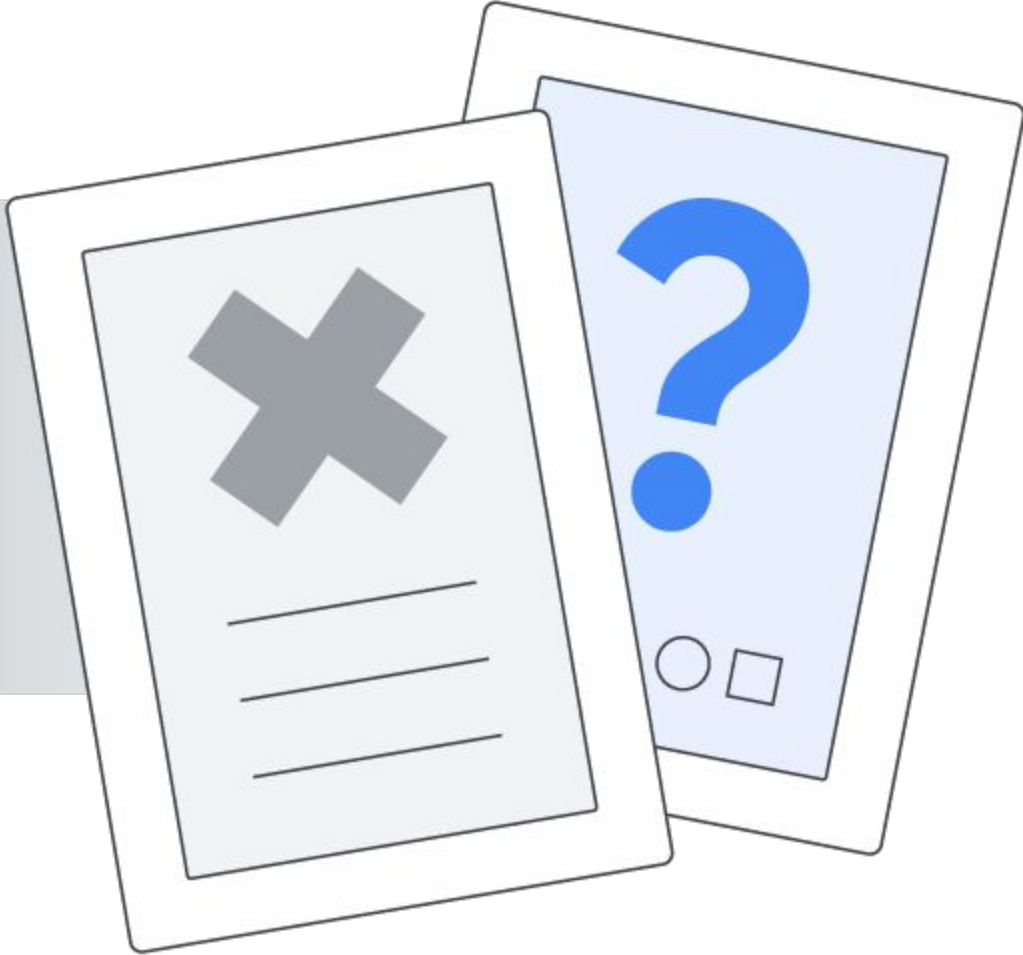
# Shared VPC versus VPC peering

Consideration	Shared VPC	VPC Network Peering
Across organizations	No	Yes
Within project	No	Yes
Network administration	Centralized	Decentralized

# Shared VPC vs. VPC peering



# Quiz



# Question #1

## Question

What is the purpose of virtual private networking (VPN)?

- A. It is a method to detect intruders at the edge of a network boundary
- B. VPNs are also called access control lists, or ACLs, and they limit network access
- C. To enable a secure communication method (a tunnel) to connect two trusted environments through an untrusted environment, such as the internet
- D. The main purpose is to encrypt data so that it can be stored in an encrypted format

# Question #1

## Answer

What is the purpose of virtual private networking (VPN)?

- A. It is a method to detect intruders at the edge of a network boundary
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- C. To enable a secure communication method (a tunnel) to connect two trusted environments through an untrusted environment, such as the internet
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# Question #2

## Question

Which Google Cloud Interconnect service requires a connection in a Google Cloud colocation facility and provides 10 Gbps per link?

- A. Cloud VPN
- B. Dedicated Interconnect
- C. Partner Interconnect
- D. Direct Peering
- E. Carrier Peering

# Question #2

## Answer

Which Google Cloud Interconnect service requires a connection in a Google Cloud colocation facility and provides 10 Gbps per link?

- A. Cloud VPN
- B. Dedicated Interconnect
- C. Partner Interconnect
- D. Direct Peering
- E. Carrier Peering



# Question #3

## Question

If you cannot meet Google's peering requirements, which network connection service should you choose to connect to Google Workspace and YouTube?

- A. Dedicated Interconnect
- B. Partner Interconnect
- C. Direct Peering
- D. Carrier Peering



# Question #3

## Answer

If you cannot meet Google's peering requirements, which network connection service should you choose to connect to Google Workspace and YouTube?

- A. Dedicated Interconnect
- B. Partner Interconnect
- C. Direct Peering
- D. Carrier Peering



# Question #4

## Question

Which of the following approaches to multi-project networking, uses a centralized network administration model?

- A. VPC Network Peering
- B. Shared VPC
- C. Cloud VPN

# Question #4

## Answer

Which of the following approaches to multi-project networking, uses a centralized network administration model?

A. VPC Network Peering

B. Shared VPC

C. Cloud VPN



# Review: Interconnecting Networks

