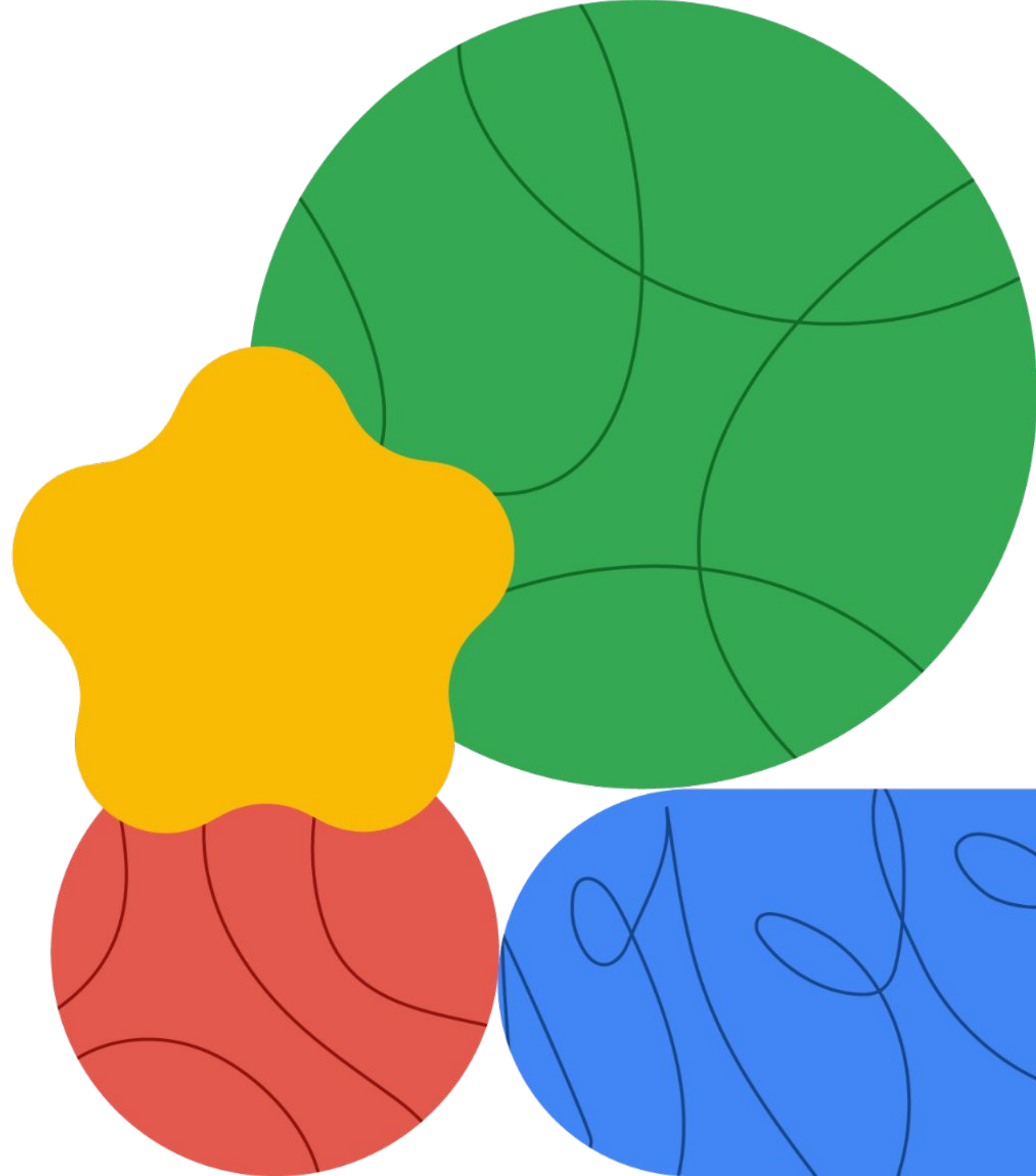


Networking in Google Cloud

Module 13:
Connectivity options

Hybrid





Today's agenda



01

Connection options

02

Dedicated Interconnect

03

Partner Interconnect

04

Cross-Cloud Interconnect

05

Quiz

Cloud Interconnect and Cloud VPN

Fiber

3Gbps - IPsec

10 Gbps

- ✓ Cloud Interconnect provides a fast connection to the Google network.
- ✓ Google offers three different Cloud Interconnect products.
 - To connect at a colocation facility, use Dedicated Interconnect. *POP*
 - To connect through a supported service provider, use Partner Interconnect.
 - To connect to other cloud providers directly, use Cross-Cloud Interconnect.
- ✓ Google also offers Cloud VPN, which can be used over the internet for lower bandwidth needs.

Comparison of connection 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	8 x 10 Gbps or 2 x 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	Supported Service Provider with Google Cloud connectivity	
Cross-Cloud Interconnect	Dedicated physical connection between Google VPC and other cloud service provider network	8 x 10 Gbps or 2 x 100 Gbps per connection	Primary and redundant ports (Google Cloud and remote cloud service provider)	



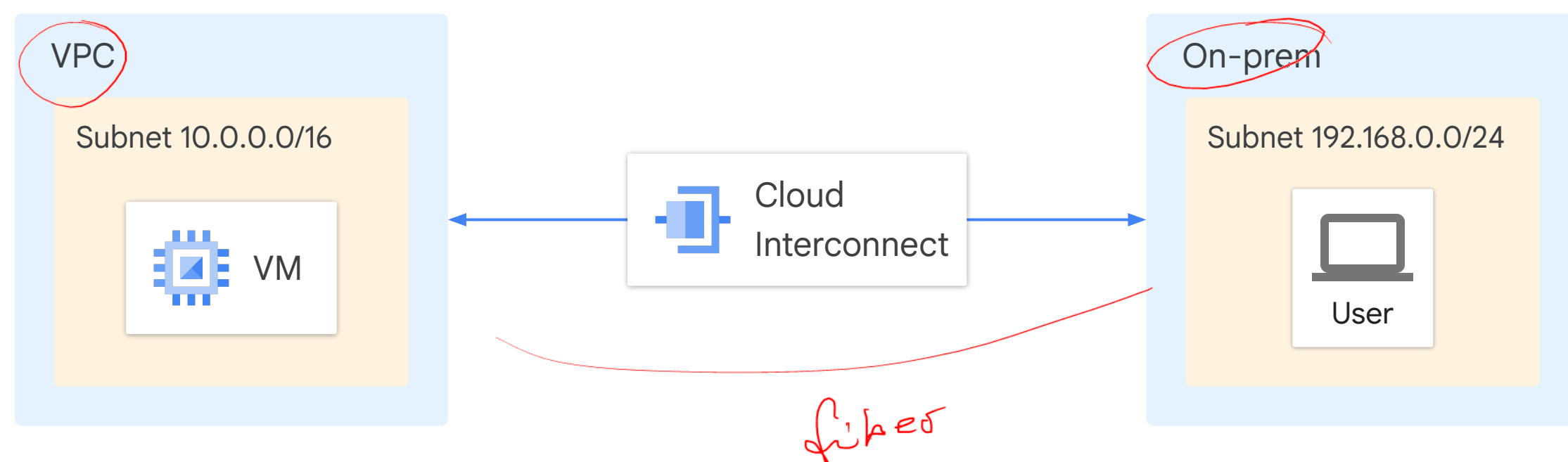
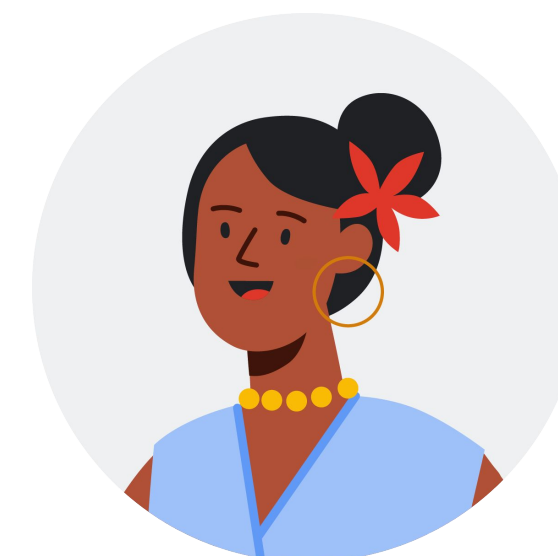
Today's agenda



- 01 Connection options
- 02 Dedicated Interconnect
- 03 Partner Interconnect
- 04 Cross-Cloud Interconnect
- 05 Quiz

Use case: Faster and optimal data migration

- large volumes
- low latency
- not internet



Dedicated, high performance connection with fiber ports

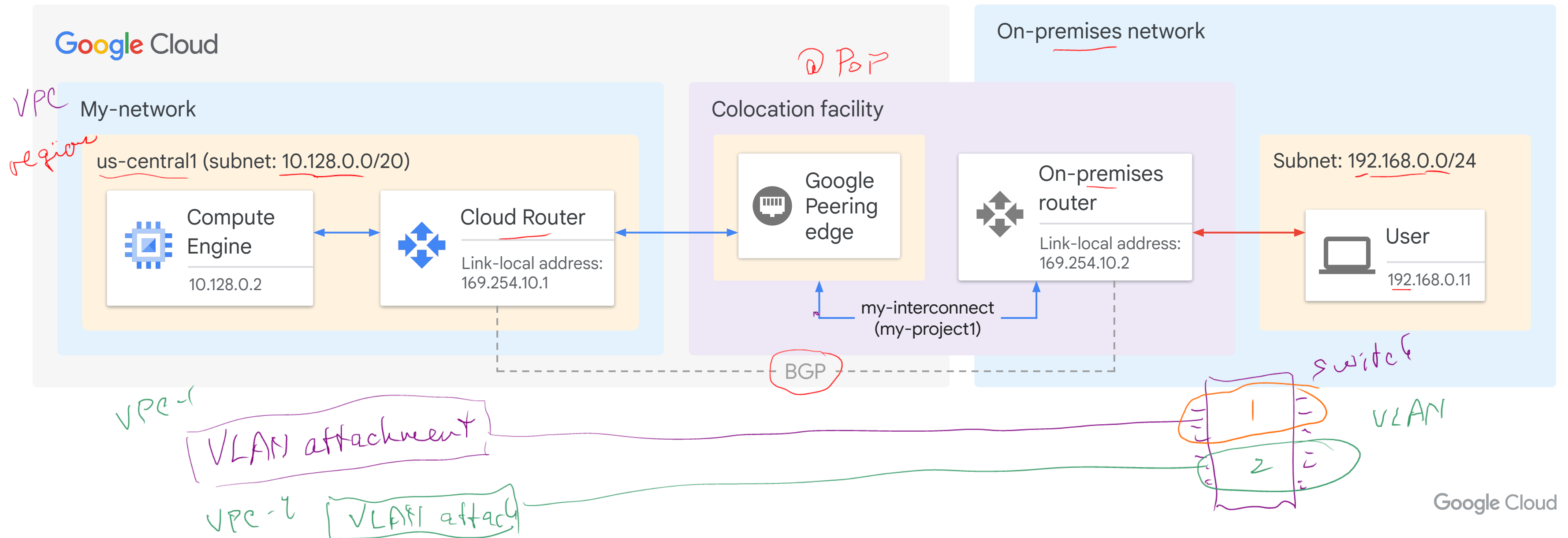


Secure with option for data encryption through IPsec or MACsec.

Dedicated Interconnect to migrate data to Google Cloud

Dedicated Interconnect provides direct physical connections

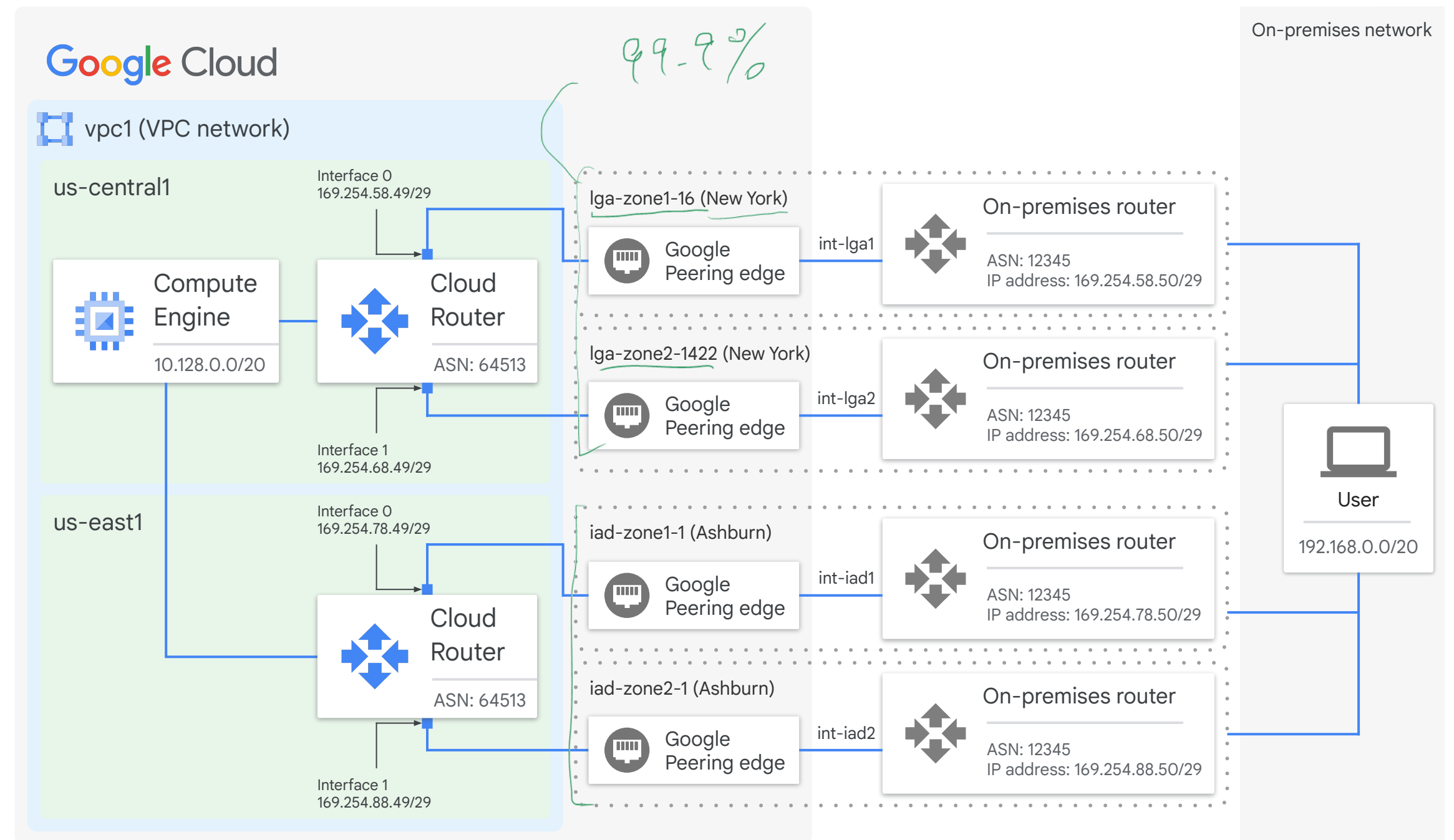
Dedicated Interconnect provides direct physical connections between your on-premises network and the Google network.



High availability with peering edge placement

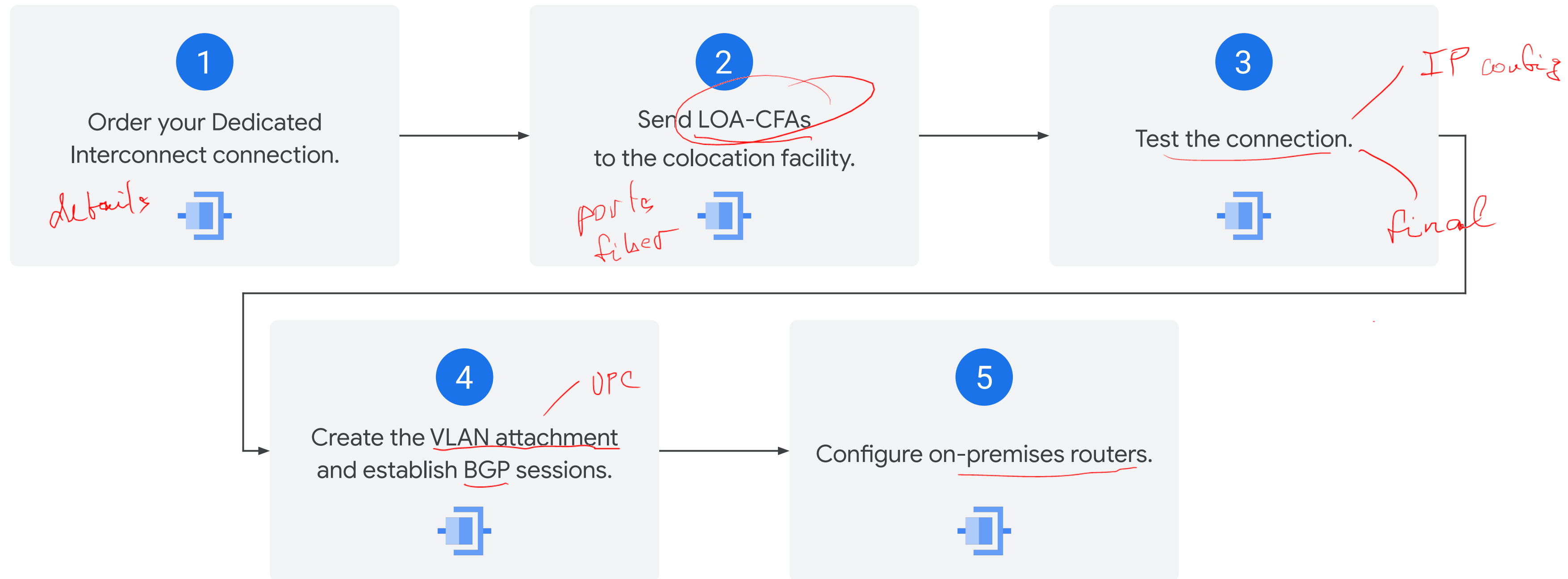
To achieve 99.99% high availability, consider the following:

- Create at least 4 Interconnect connections, 2 in each metropolitan areas.
- In a metro, place 2 connections in different edge availability domains (metro availability zones).
- Deploy a minimum of 2 Cloud Routers across at least 2 regions



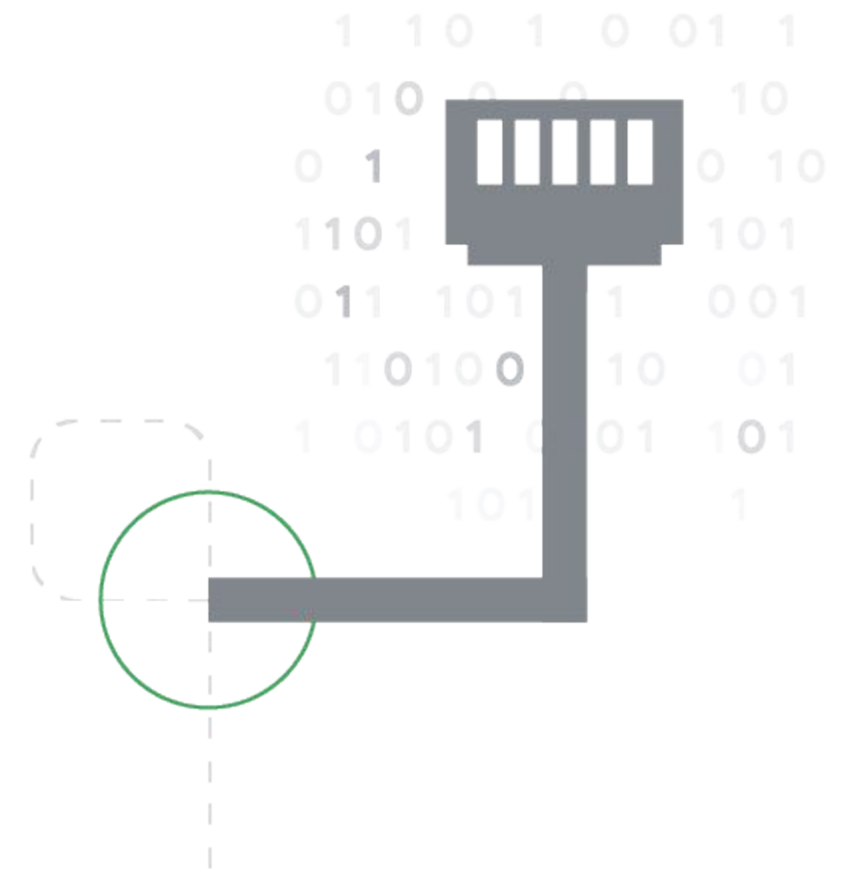
Create a Dedicated Interconnect connection

8 x 10 Gbps ccts
2 x 100 Gbps ccts



Connection bandwidth and circuits

- A Dedicated Interconnect connection consists of one or more fiber circuits.
- The circuits in a connection can be 10 Gbps or 100 Gbps, but not both. *reduces*
- A connection can have one of the following maximum capacities:
 - Eight 10-Gbps circuits (80 Gbps total)
 - Two 100-Gbps circuits (200 Gbps total)





Today's agenda



01

Connection options

02

Dedicated Interconnect

03

Partner Interconnect

04

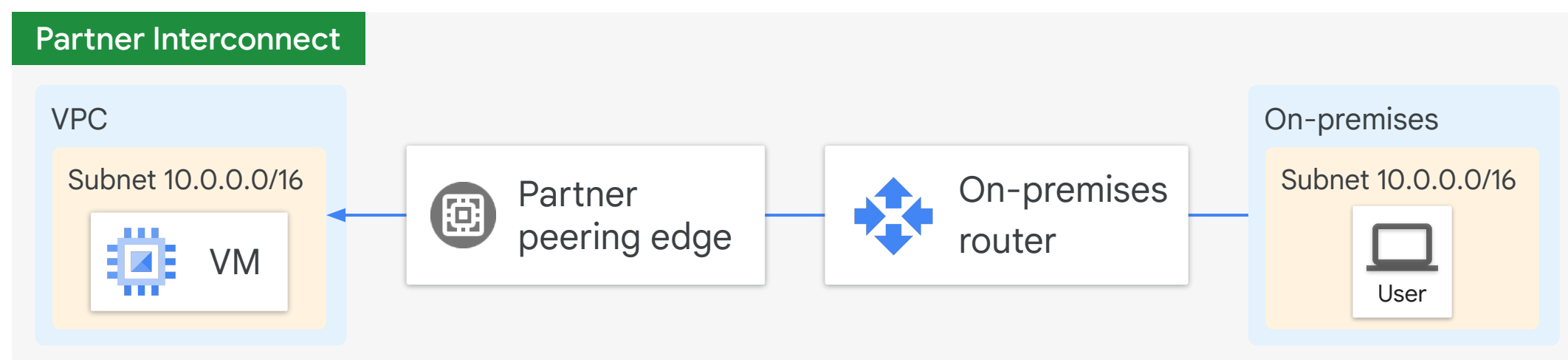
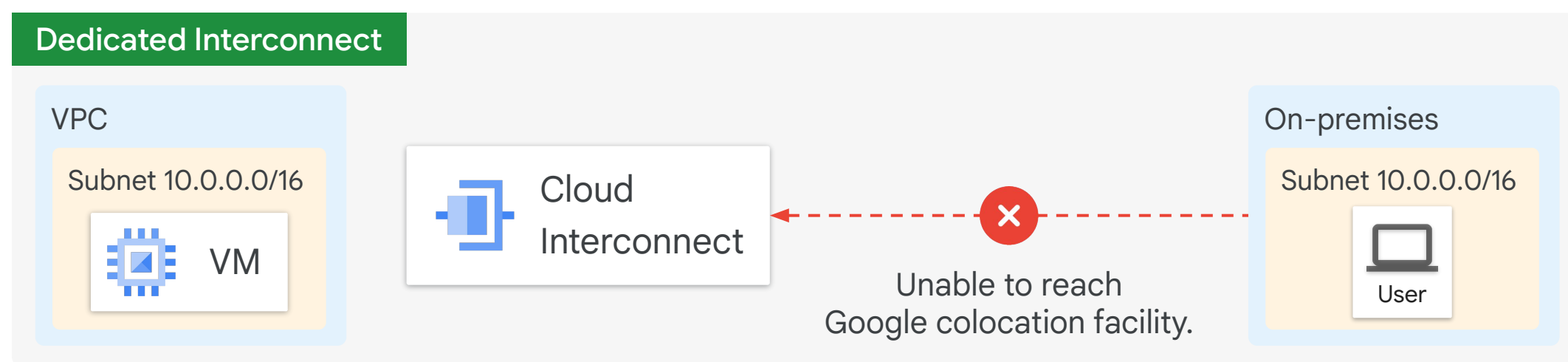
Cross-Cloud Interconnect

05

Quiz

Use case: Connect from a partner location of your choice

not @ POP
≤ 10 Gbps
immediate



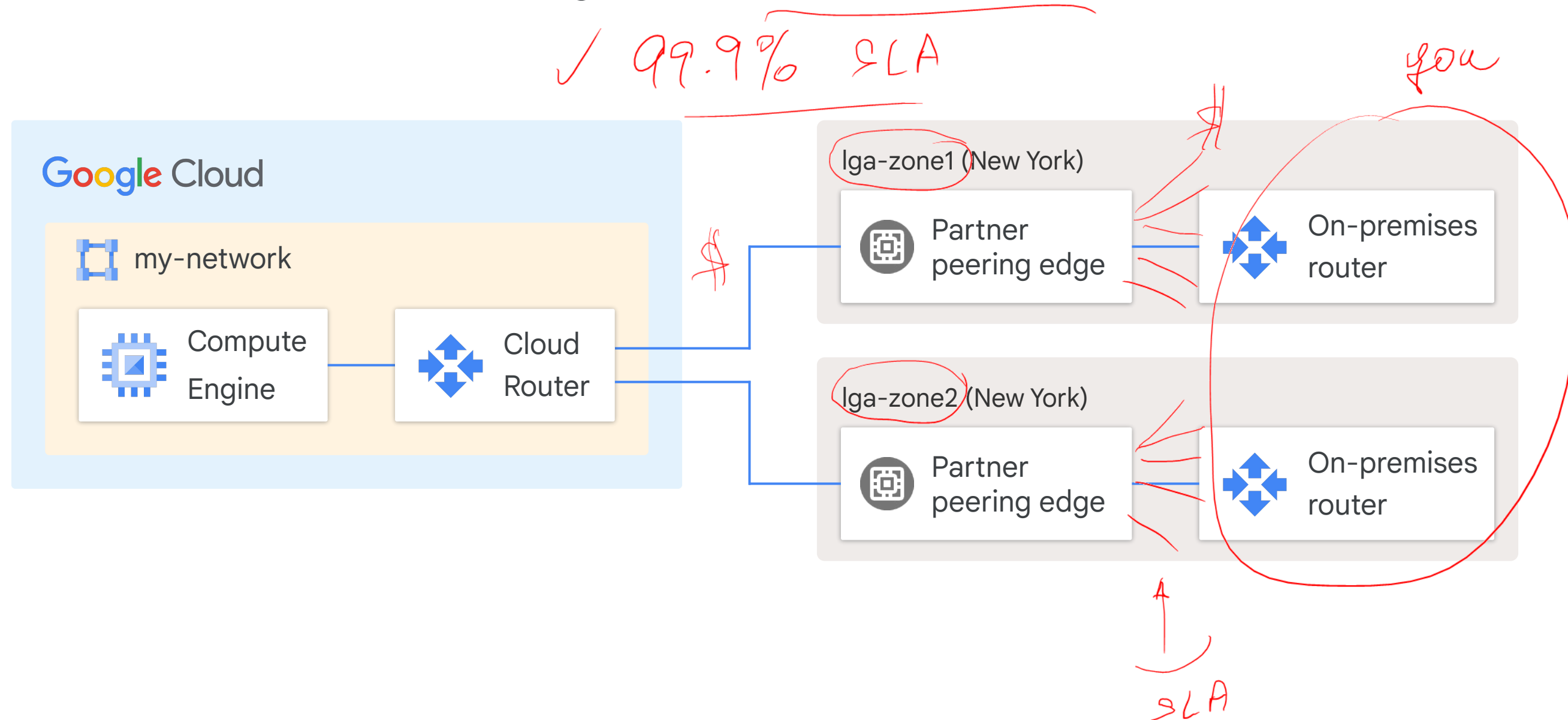
High bandwidth, low latency connectivity even without a nearby colocation facility.



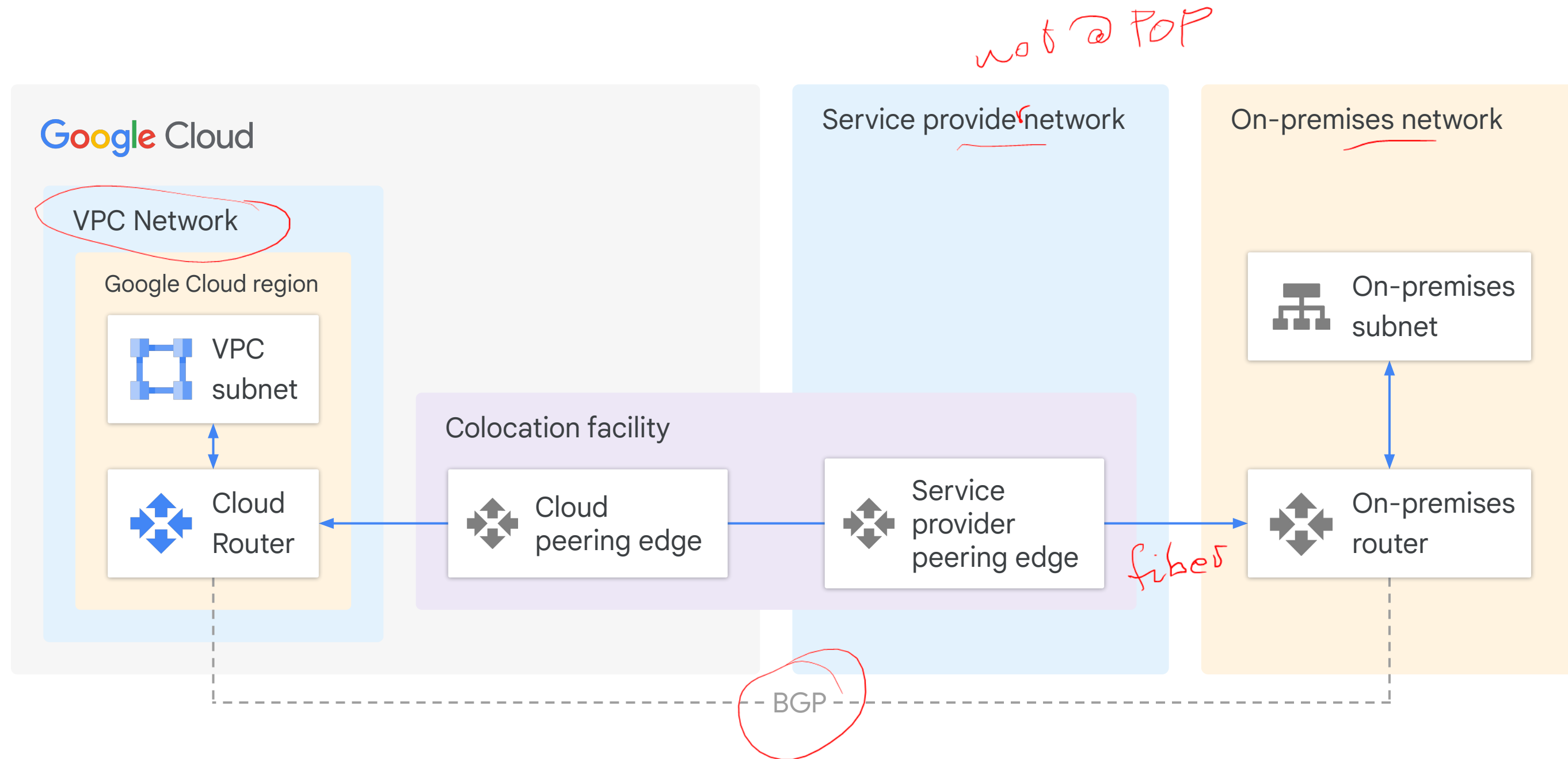
Uses the partner's underlying infrastructure to connect to Google Cloud.

Partner Interconnect

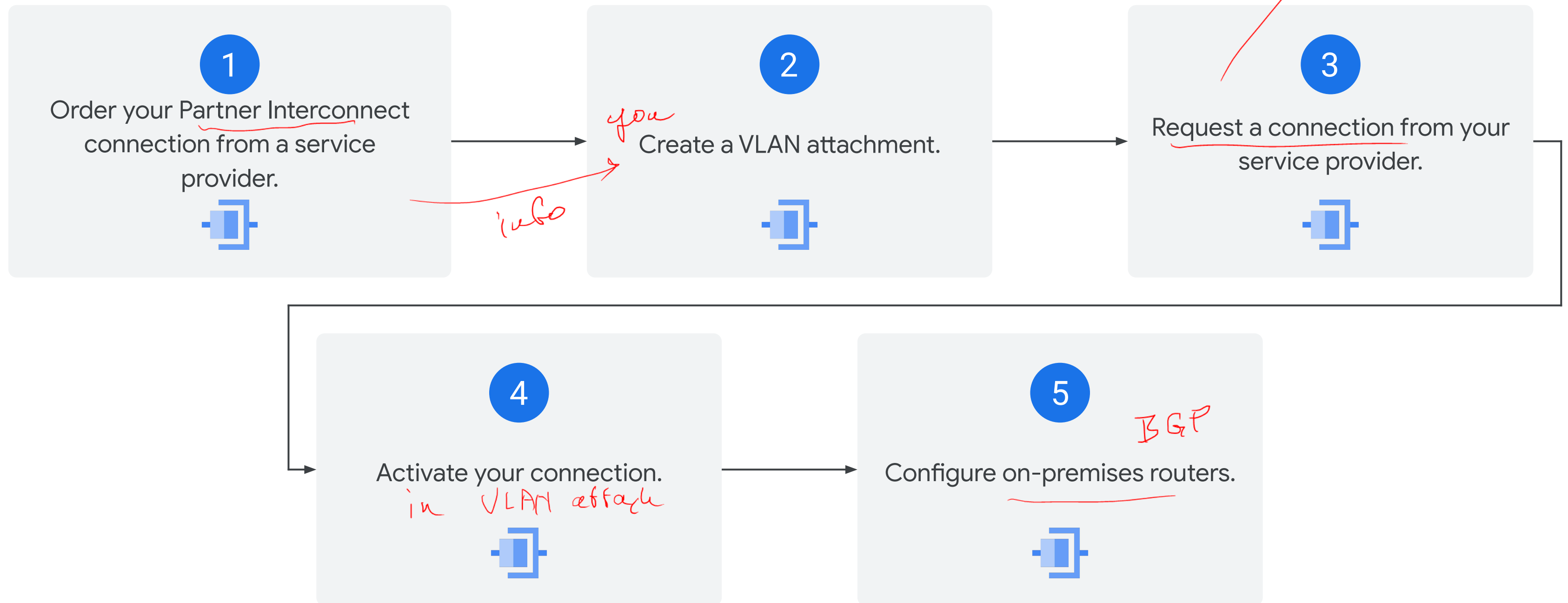
- Partner Interconnect is similar to Dedicated Interconnect.
- The physical connection is made through a supported service provider.



Partner Interconnect provides connectivity through a supported service provider



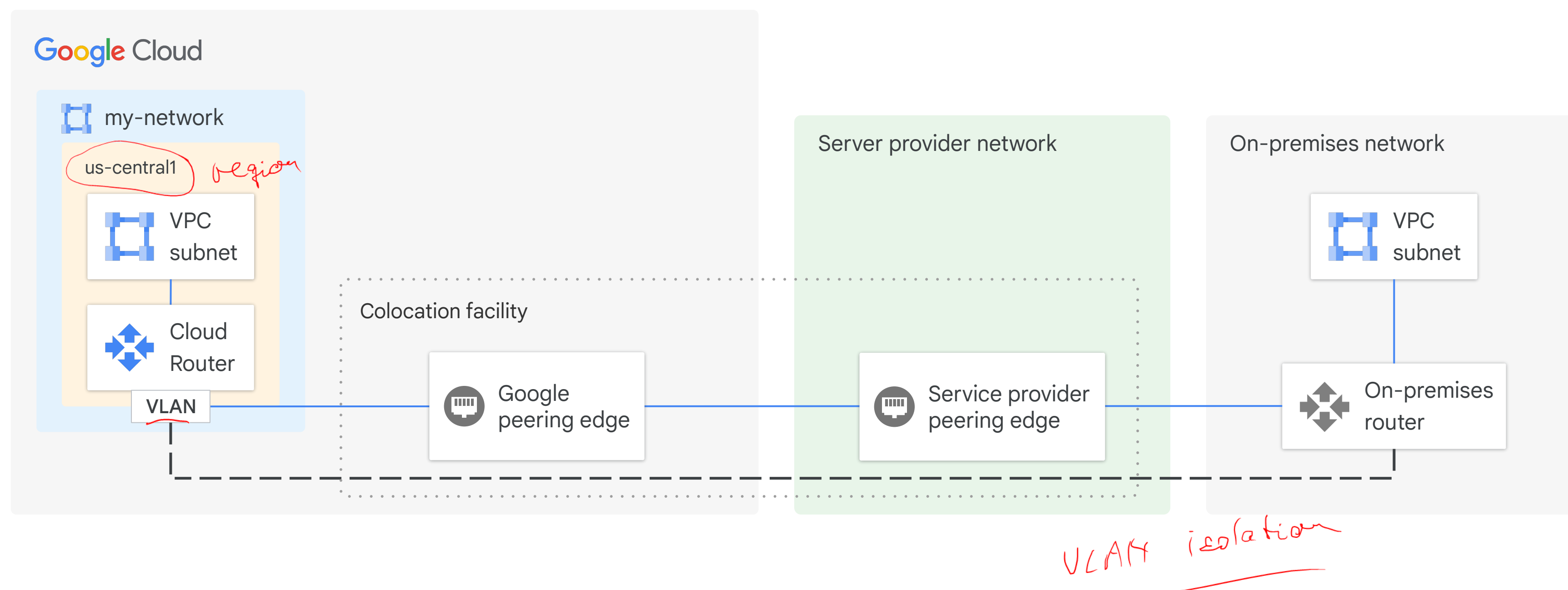
Create a Partner Interconnect connection



Layer 2 connections

For each VLAN attachment, configure and establish a BGP session between your Cloud Routers and on-premises routers.

— Data plane
- - - BGP session

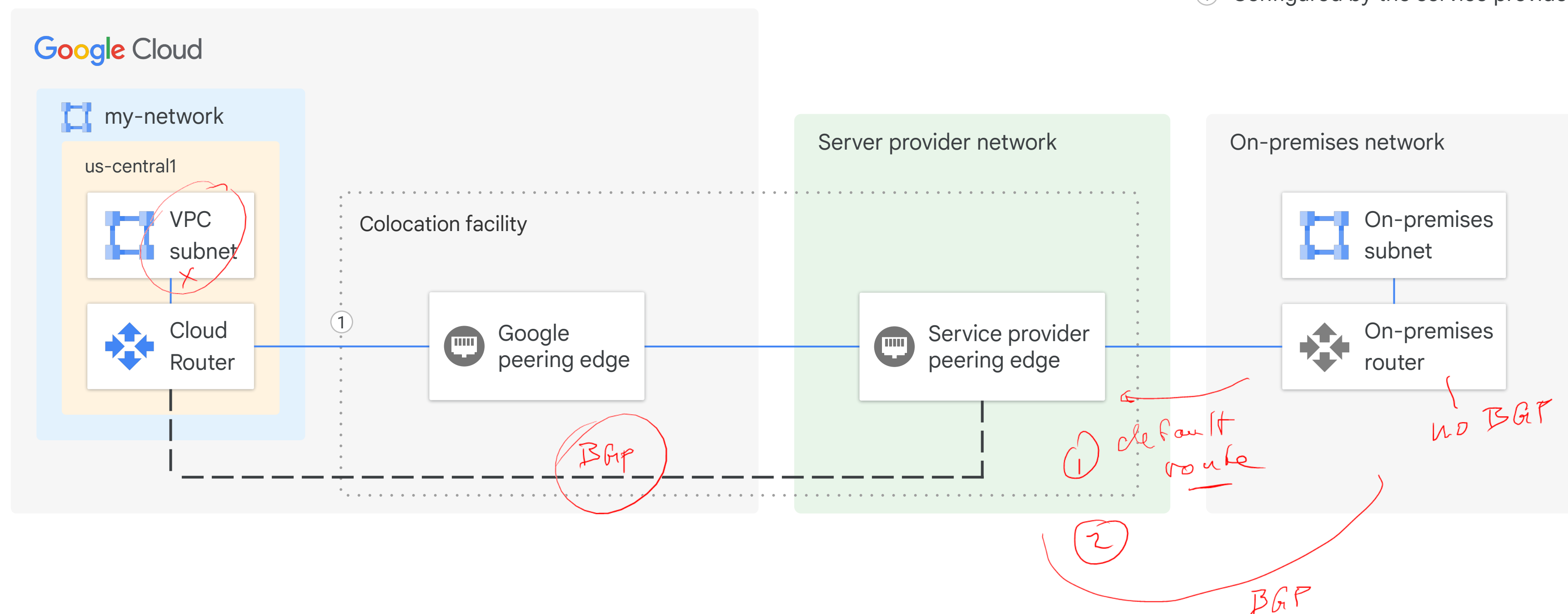


Layer 3 connections

Your service provider completes VLAN connections from the service provider peering edge to Cloud Router.

— Data plane
- - - BGP session

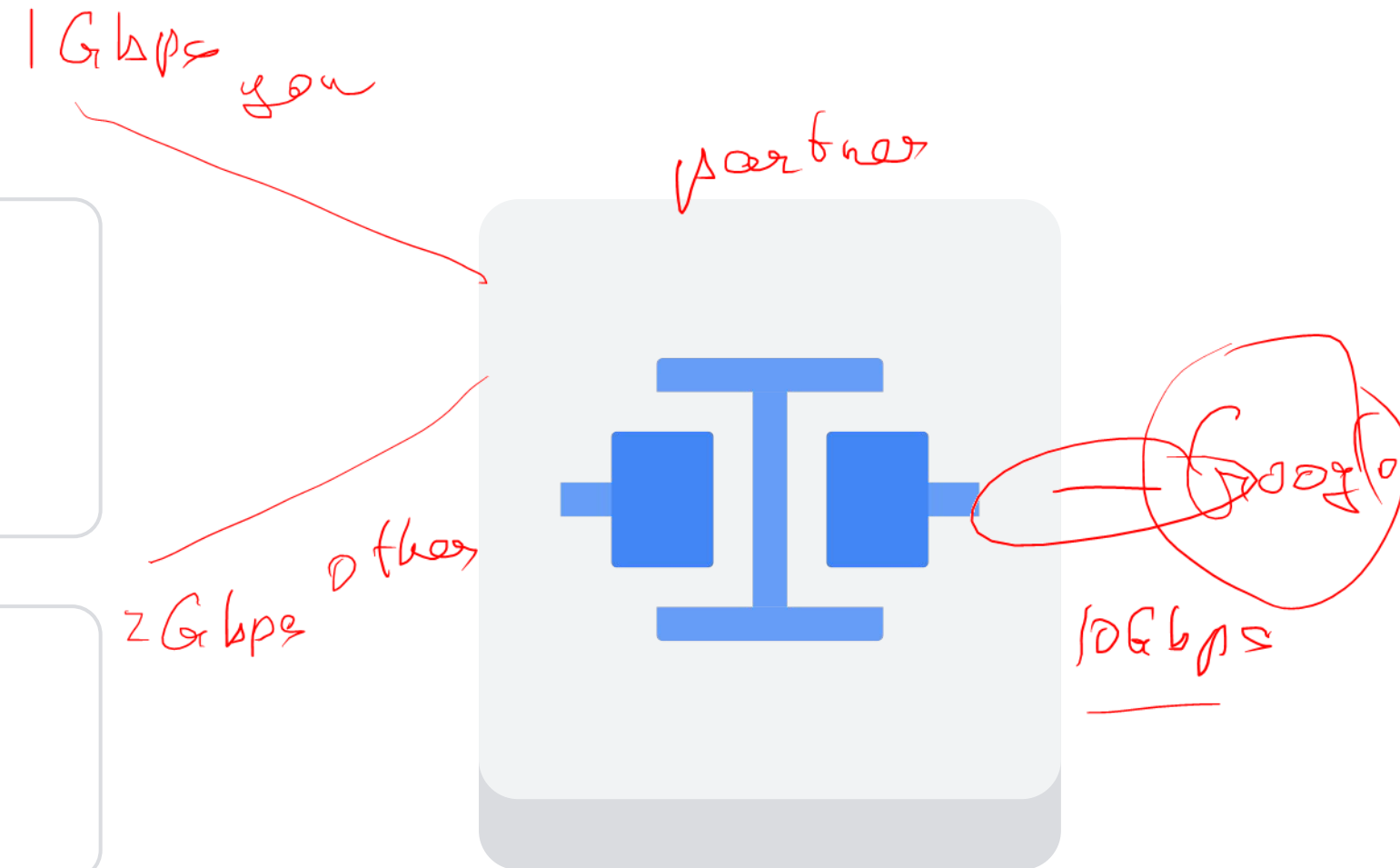
① Configured by the service provider



Partner Interconnect recommendations

Use Partner Interconnect when you:

- ✗ 01 Cannot physically connect from a facility where Google has a presence.
- 02 Need to procure a connection quickly.
- 03 Have lower bandwidth needs (50 Mbps - 50 Gbps).



Partner Interconnect recommendations

Use Partner Interconnect when you:

- Cannot physically connect from a facility where Google has a presence.
- Need to procure a connection quickly.
- Have lower bandwidth needs (50 Mbps - 50 Gbps).





Today's agenda



01

Connection options

02

Dedicated Interconnect

03

Partner Interconnect

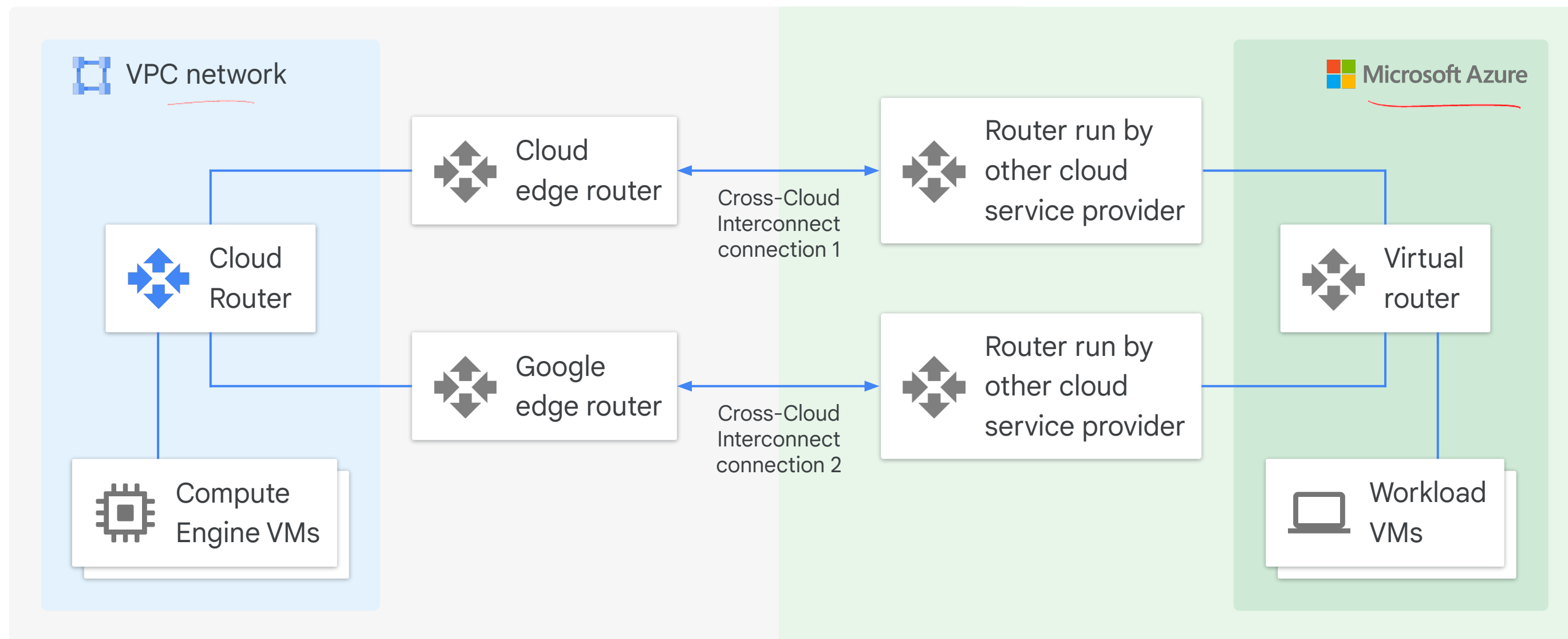
04

Cross-Cloud Interconnect

05

Quiz

Use case: Connect from another cloud provider to Google Cloud



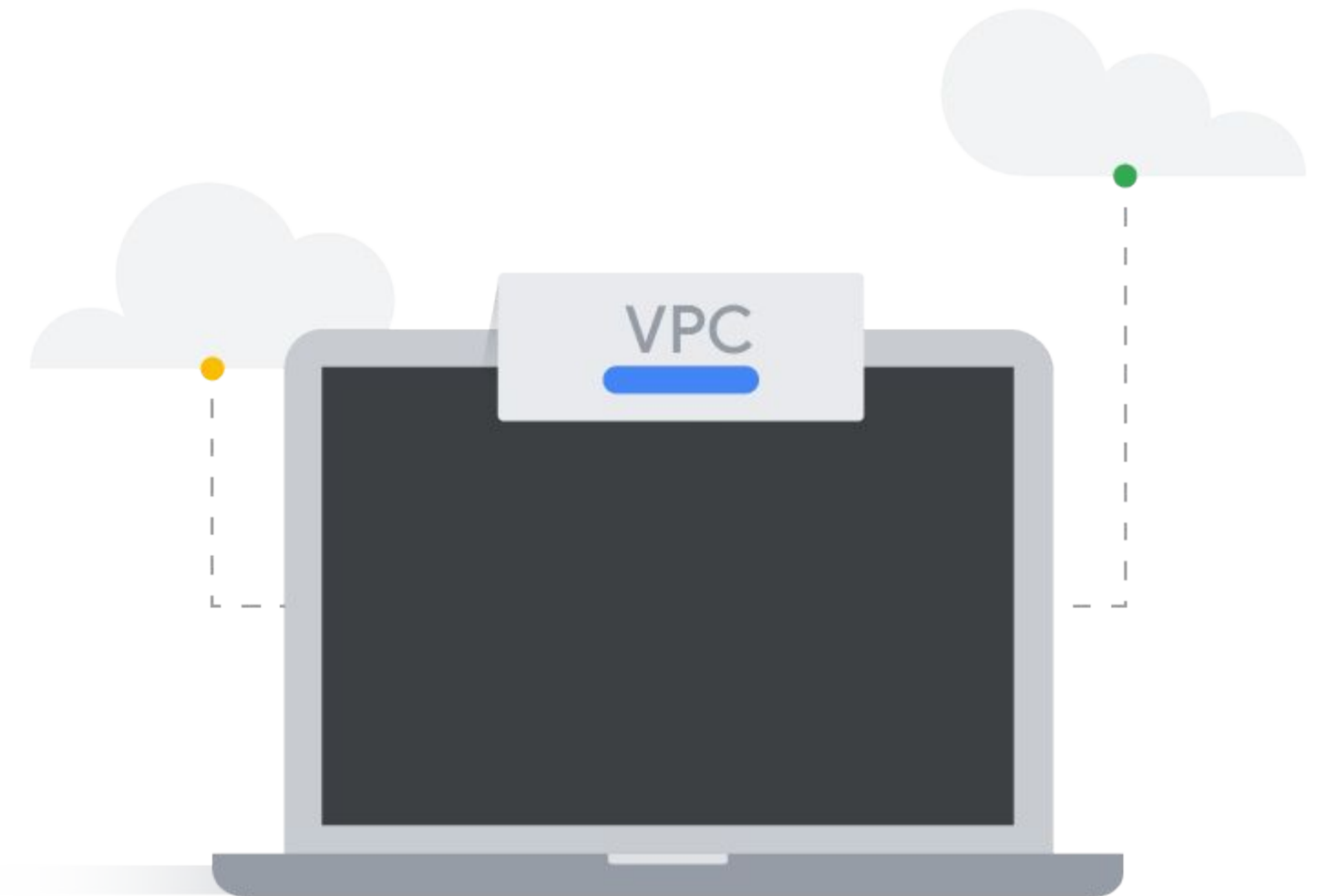
Use Cross-Cloud Interconnect to connect to a network hosted by another cloud service provider

01 Amazon Web Services (AWS)

02 Microsoft Azure

03 Oracle Cloud Infrastructure (OCI)

04 Alibaba Cloud



Benefits of using Cross-Cloud Interconnect

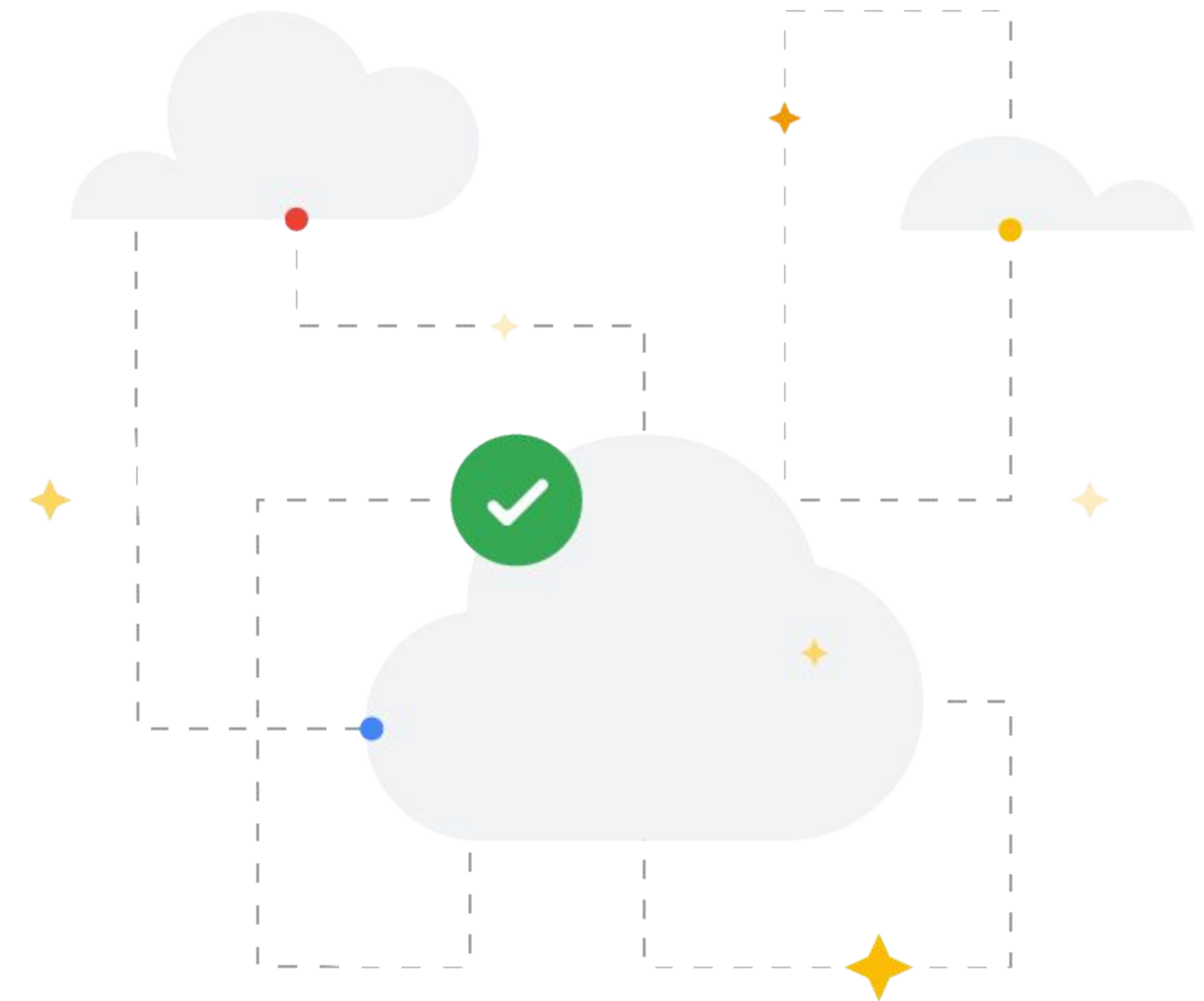
01 Integrated multicloud strategy ✓

* 02 Reduced complexity

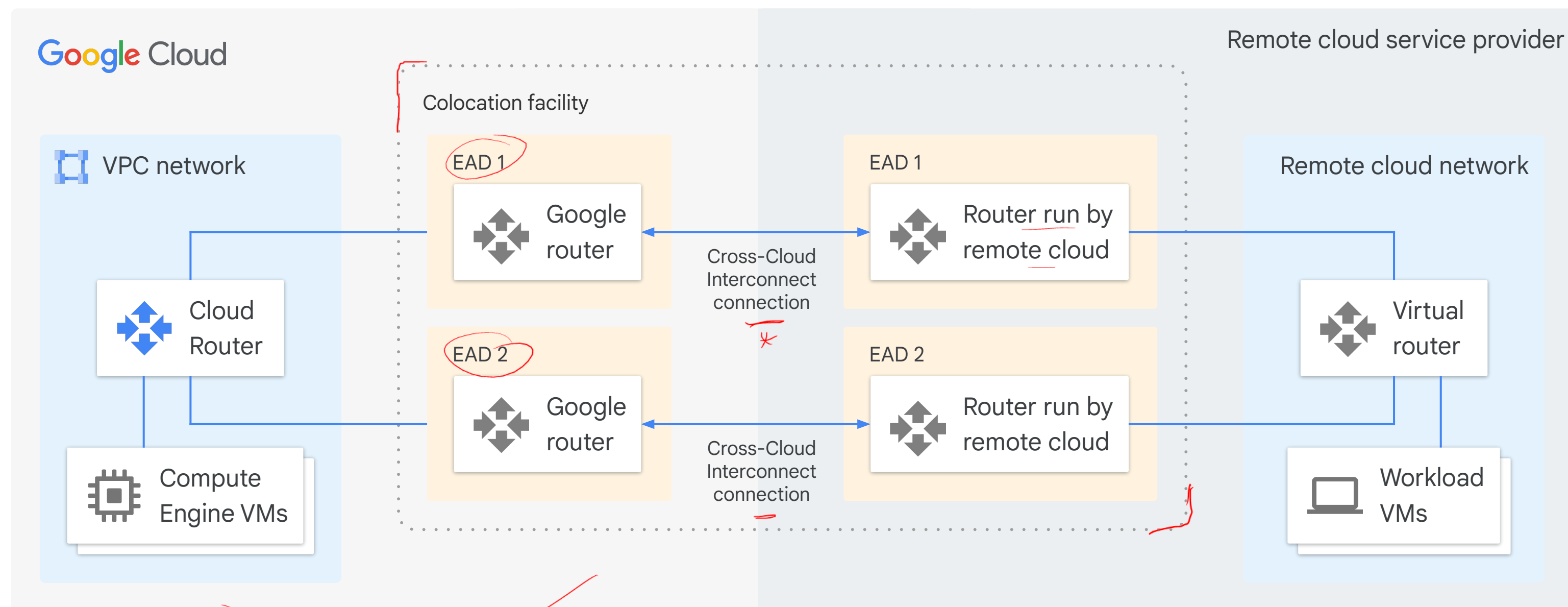
03 Site-to-site data transfer — NCC

spoke
AWS

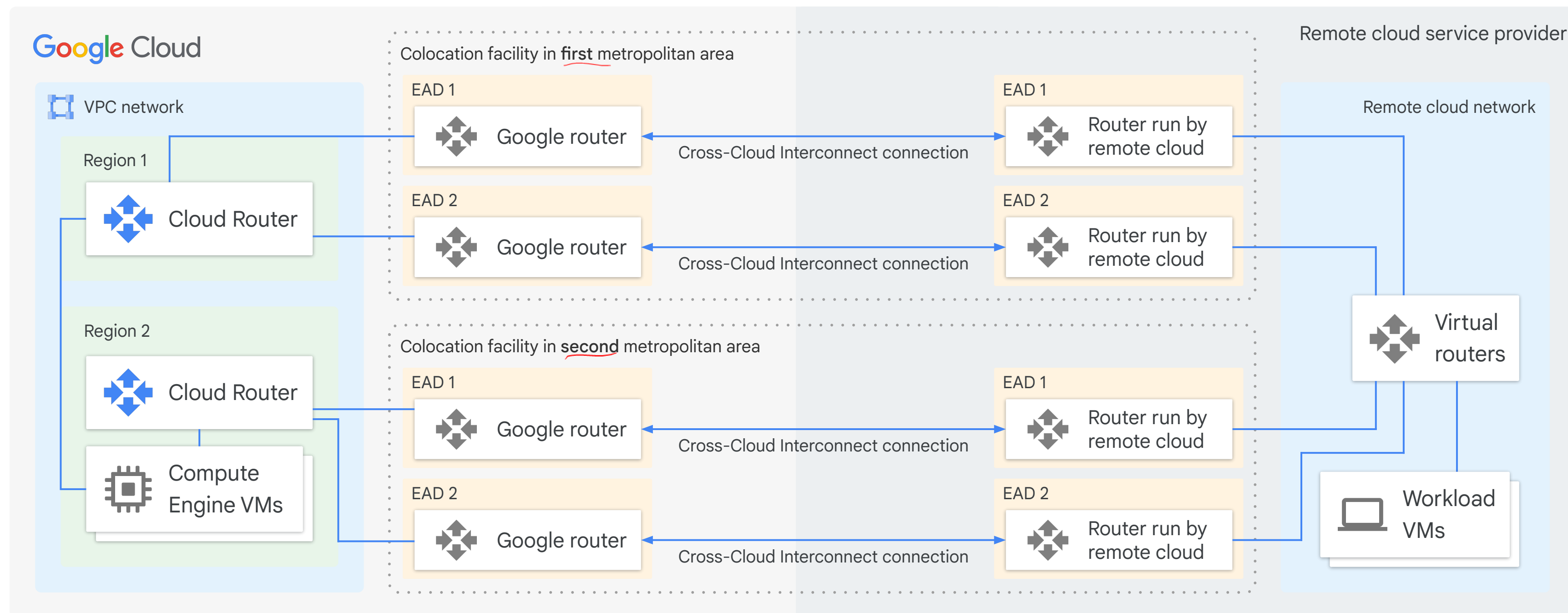
spoke
Azure



Cross-Cloud Interconnect minimum requirement (99.9% availability)



High availability configuration (99.99%)



② MACsec for Cloud Interconnect

l2 ethernet

① VPN - 3 Gbps
GCM-AES-256 - XPN

physical security - fiber

MACsec for Cloud Interconnect helps you secure traffic on Cloud Interconnect connections.

MACsec encrypts traffic like this:

- On **Dedicated Interconnect**—between Google's peering edge router and an on-premises router.
- On **Partner Interconnect**—between Google's peering edge router and the service provider's peering edge router.
- On **Cross Cloud Interconnect** - Between Google's peering edge router and router run by remote cloud.

MACsec for Cloud Interconnect doesn't provide encryption in transit within Google. For stronger security, use MACsec with other network security protocols.



Let's ask Gemini



Which should I use, Cloud VPN or Cloud Interconnect? Please provide details supporting the use of each according to their respective strengths.



List the steps to generate a report on the past week's performance of my Cloud Interconnect link, including bandwidth utilization, latency, and packet loss.

Let's ask Gemini



Which should I use, Cloud VPN or Cloud Interconnect? Please provide details supporting the use of each according to their respective strengths.



The best choice for connecting your on-premises network to Google Cloud depends on your specific needs and requirements. Here is a comparison of Cloud VPN and Cloud Interconnect to help you make a decision.

Feature	Cloud VPN	Cloud Interconnect
Connection type	Point-to-point	Dedicated
Bandwidth	Up to 10 Gbps	Up to 100 Gbps

...

*Gemini responses may vary



Today's agenda



01

Connection options

02

Dedicated Interconnect

03

Partner Interconnect

04

Cross-Cloud Interconnect

05

Quiz

Quiz | Question 1

Question

Which Google Cloud Interconnect option requires the customer to provide their own routing equipment and establish a Border Gateway Protocol (BGP) session with Google's edge network?

- A. Cross-Cloud Interconnect
- B. Network Connectivity Center
- C. Dedicated Interconnect
- D. Partner Interconnect

Quiz | Question 1

Answer

Which Google Cloud Interconnect option requires the customer to provide their own routing equipment and establish a Border Gateway Protocol (BGP) session with Google's edge network?

- A. Cross-Cloud Interconnect
- B. Network Connectivity Center
- C. Dedicated Interconnect
- D. Partner Interconnect



Quiz | Question 2

Question

Your company is located in a city where Google Cloud does not have a Dedicated Interconnect location, but you need a private connection to your Google Cloud Virtual Private Cloud (VPC). Which Cloud Interconnect option is most suitable for this scenario?

- A. Dedicated Interconnect
- B. Network Connectivity Center
- C. Carrier Peering
- D. Partner Interconnect

Quiz | Question 2

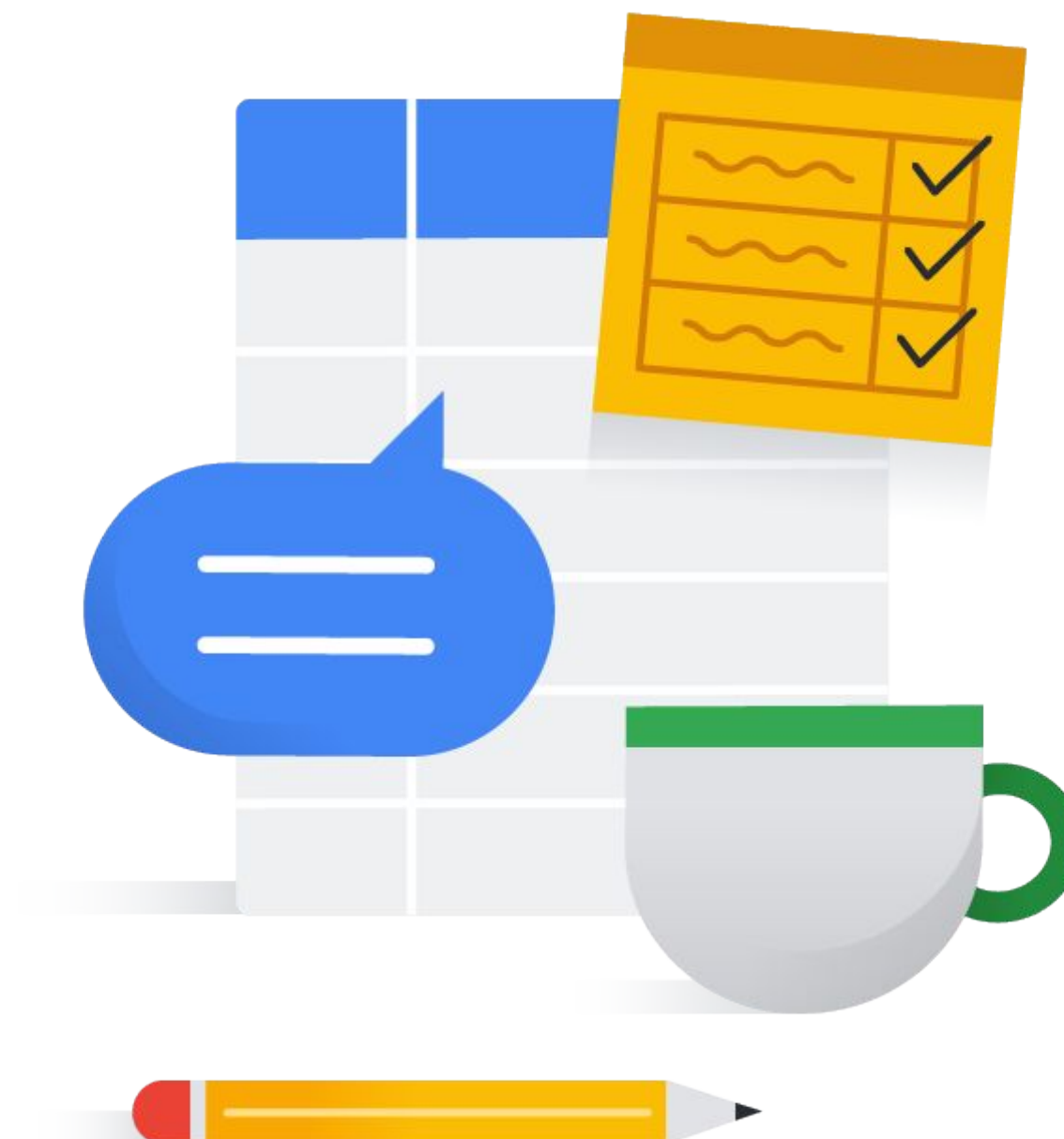
Question

Your company is located in a city where Google Cloud does not have a Dedicated Interconnect location, but you need a private connection to your Google Cloud Virtual Private Cloud (VPC). Which Cloud Interconnect option is most suitable for this scenario?

- A. Dedicated Interconnect
- B. Network Connectivity Center
- C. Carrier Peering
- D. Partner Interconnect



Debrief





Thank you.

