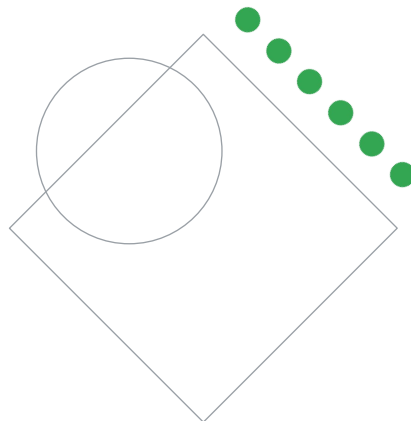


Preparing for Your Professional Cloud Network Engineer Journey

Module 4: Implementing hybrid network interconnectivity

Welcome to Module 4: Implementing hybrid network interconnectivity.

Review and study planning

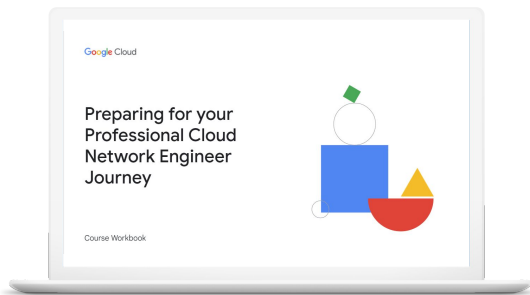


Google Cloud

You'll now review the diagnostic questions and your answers to help you identify what to include in your study plan.

Your study plan:

Implementing hybrid network interconnectivity



4.1

Configuring Cloud Interconnect

4.2

Configuring a site-to-site IPsec VPN

4.3

Configuring Cloud Router

4.4

Configuring Network Connectivity Center

Google Cloud

The diagnostic questions align with these objectives of this exam section. Use the PDF resource that follows to review the questions and how you answered them. Pay specific attention to the rationale for both the correct and incorrect answers. Use the resources detailed under **Where to look** and **Content mapping** to build a study plan that meets your learning needs.

4.1 | Configuring Cloud Interconnect

Considerations include:

- Creating Dedicated Interconnect connections and configuring VLAN attachments
- Creating Partner Interconnect connections and configuring VLAN attachments
- Creating Cross-Cloud Interconnect connections and configuring VLAN attachments
- Setting up and enabling MACsec.
- Configuring HA VPN over Cloud Interconnect

Google Cloud


A Professional Cloud Network Engineer should be familiar with the benefits of Interconnect as well as the varieties and tradeoffs between them. You should also be able to perform the necessary administration, setup and configuration in Google Cloud to enable Interconnect connectivity.

Question 1 tested your knowledge of Partner Interconnect options (layer 2 vs layer 3) and configuration, and question 2 focused on Direct Interconnect. Question 3 tested your knowledge of single versus multi-VLAN attachments.

4.1 Diagnostic Question 01 Discussion

Cymbal Bank is configuring a Layer 3 Partner Interconnect connection to Google Cloud.

Select the sequence of high-level activities you will need to perform in order to accomplish this.

- 
- A. Establish connection to selected partner service provider. Create and activate VLAN attachments and Google-generated pairing keys. Request VLAN attachments providing pairing keys.
 - B. Establish connection to selected partner service provider. Create and activate VLAN attachments and receive Google-generated pairing keys. Request connections for VLAN attachments from partner specifying region and capacity and providing attachment pairing key. Configure BGP for on-premises routers.
 - C. Establish connection to selected partner service provider. Create VLAN attachments and receive Google-generated pairing keys. Request connections for VLAN attachments from partner specifying region and capacity and providing attachment pairing key. Activate VLAN attachments. Configure BGP for on-premises routers.
 - D. Establish connection to selected partner service provider. Create VLAN attachments and receive Google-generated pairing keys. Request connections for VLAN attachments from partner specifying region and capacity and providing attachment pairing key. Activate VLAN attachments.

Feedback:

A. Incorrect. This sequence of activities is missing the required step of requesting connections for the VLAN attachments from the partner.

B. Incorrect. Configuration of BGP for on-premises routers is not required for Layer 3 Partner Interconnect.

C. Incorrect. Configuration of BGP for on-premises routers is not required for Layer 3 Partner Interconnect.

*D. Correct! This is the correct set of activities in the correct order. Optionally the VLAN attachment could also be pre-activated after it is created.

Where to look:

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/best-practices>

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/terminology>

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/partner-overview>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/provisioning-overview>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/creating-vlan-attachments>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/requesting-connections>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/activating-connections>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/configuring-onprem-routers>

Content mapping:

- ILT course: **Networking in Google Cloud**
 - M13 Connectivity Options

- On-demand course: **Networking in Google Cloud: Hybrid and Multicloud**
 - M1 Connectivity Options

Summary:

Partner Interconnect provides private connectivity between on-premises networks and Google Cloud through a partner network. The two main classes of Partner Interconnect are Layer 2 and Layer 3 Partner Interconnect. Both approaches have similar setup, but for Layer 2 BGP configuration must be done for the on-premises routers, because the BGP session is established between them and the Cloud Routers in Google Cloud. For Layer 3, the BGP configuration is done in the partner's routers.

4.1 Diagnostic Question 02 Discussion



You are setting up a Dedicated Interconnect connection and need to provide the highest capacity possible.

- A. 1 200 Gbps circuit
- B. 2 100 Gbps circuits**
- C. 8 10 Gbps circuits
- D. 8 50 Gbps circuits

Select the circuit configuration that achieves this.

Feedback:

- A. Incorrect. This option is not supported. 200 Gbps circuits are not available.
- *B. Correct! This option provides the highest capacity of 200 Gbps.
- C. Incorrect. This option does not provide the highest capacity. It provides 80 Gbps whereas 2 100 Gbps circuits provide 200 Gbps.
- D. Incorrect. This option is not supported. 50 Gbps circuits are not available.

Where to look:

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/best-practices>

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/terminology>

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/dedicated-overview>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/dedicated/provisioning-overview>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/dedicated/creating-dedicated-interconnect>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/dedicated/retrieving-loas>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/dedicated/testing-connections>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/dedicated/creating-vlan-attachments>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/dedicated/creating-vlan-attachments>

[nfiguring-onprem-routers](#)

Content mapping:

- ILT course: **Networking in Google Cloud**
 - M13 Connectivity Options

- On-demand course: **Networking in Google Cloud: Hybrid and Multicloud**
 - M1 Connectivity Options

Summary:

Dedicated Interconnect provides the highest capacity connectivity between Google Cloud and on-premises networks and supports 1-8 10 Gbps or 1-2 100 Gbps circuits per connection.

4.1 Diagnostic Question 03 Discussion



Cymbal Bank wants to achieve 99.9% availability with Dedicated Interconnect. You want to support 100 Gbps of throughput, even if a single interconnect connection were to fail.

Select the simplest and least expensive configuration that can meet these requirements.

- A. 2 100 Gbps connections in separate edge availability zones of the co-location facility, 4 50 Gbps VLAN attachments
- B. 2 100 Gbps connections in separate edge availability zones of the co-location facility, 2 100 Gbps VLAN attachments
- C. 1 200 Gbps connection in a single edge availability zone of the co-location facility, 4 50 Gbps VLAN attachments
- D. 2 50 Gbps connections in separate edge availability zones of the co-location facility, 4 25 Gbps VLAN attachments

Feedback:

*A. Correct! This is the simplest and least expensive configuration that satisfies the requirements.

B. Incorrect. This configuration is invalid because VLAN attachments have a maximum capacity of 50 Gbps.

C. Incorrect. This configuration does not satisfy the requirements for 99.9% availability, nor does it provide 100 Gbps in the case of a single interconnect connection failure.

D. Incorrect. This configuration satisfies the 99.9% availability requirement, but not the requirement to support 100 Gbps in the case of single interconnect connection outage.

Where to look:

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/best-practices#capacity>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/creating-vlan-attachments>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/dedicated/creating-vlan-attachments>

<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/dedicated-creating-9999-availability>

<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/partner-creating-9999-availability>

<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/dedicated-cr>

[eating-999-availability](https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/partner-creating-999-availability)

<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/partner-creating-999-availability>

Content mapping:

- ILT course: **Networking in Google Cloud**
 - M13 Connectivity Options
- On-demand course: **Networking in Google Cloud: Hybrid and Multicloud**
 - M1 Connectivity Options

Summary:

Multiple VLAN attachments are necessary to provide for high availability configurations for both Dedicated and Partner Interconnect. Dedicated Interconnect also requires multiple connections for high availability. Multiple VLAN attachments may also be required to provide for the capacity requirements of connections as they have a maximum capacity of 50 Gbps whereas connections can have capacities up to 200 Gbps.

4.1

Configuring Google Cloud Interconnect

Courses



[Networking in Google Cloud](#)

- M13 Connectivity Options



[Networking in Google Cloud: Hybrid and Multicloud](#)

- M1 Connectivity Options

Documentation

[Best practices for Cloud Interconnect](#)

[Key terms | Cloud Interconnect](#)

[Partner Interconnect overview](#)

[Partner Interconnect provisioning overview](#)

[Creating VLAN attachments | Cloud Interconnect](#)

[Requesting connections | Cloud Interconnect](#)

[Activating connections | Cloud Interconnect](#)

[Configuring on-premises routers | Cloud Interconnect Best practices for Cloud Interconnect](#)

[Creating VLAN attachments | Partner Interconnect](#)

[Creating VLAN attachments | Dedicated Interconnect](#)

[Establishing 99.99% availability for Dedicated Interconnect](#)

[Establishing 99.99% availability for Partner Interconnect](#)

[Establishing 99.9% availability for Dedicated Interconnect](#)

[Establishing 99.9% availability for Partner Interconnect](#)

Let's take a moment to consider resources that can help you build your knowledge and skills in this area.

The concepts in the diagnostic questions we just reviewed are covered in these modules and in this documentation. Reviewing the documentation is highly recommended. You'll find this list in your workbook so you can take a note of what you want to include later when you build your study plan. Based on your experience with the diagnostic questions, you may want to include some or all of these.

[Networking in Google Cloud \(ILT\)](#)

[Networking in Google Cloud: Hybrid and Multicloud \(On-demand\)](#)

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/best-practices>

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/terminology>

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/partner-overview>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/provisioning-overview>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/creating-vlan-attachments>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/requesting-connections>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/activating-connections>

[ting-connections](#)

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/configuring-onprem-routers>

<https://cloud.google.com/network-connectivity/docs/interconnect/concepts/best-practices#capacity>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/partner/creating-vlan-attachments>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/dedicated/creating-vlan-attachments>

<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/dedicated-creating-9999-availability>

<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/partner-creating-9999-availability>

<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/dedicated-creating-999-availability>

<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/partner-creating-999-availability>

4.2 | Configuring a site-to-site IPsec VPN

Considerations include:

- Configuring HA VPN
- Configuring Classic VPN (e.g., route-based, policy-based)

Google Cloud

A Professional Cloud Network Engineer should be familiar with the purpose and benefits of Cloud VPN as well as the options and configurations involved.

Question 4 tested your knowledge of using VPC and VPC Peering options with Interconnect or VPN. Question 5 explored static VPN policy-based configuration, and question 6 explored static VPN route-based configuration. Question 7 tested your knowledge of dynamic VPN: HA configurations.

4.2 Diagnostic Question 04 Discussion

Cymbal Bank is connecting one of their Shared VPC networks to their on-premises network via Dedicated Interconnect.

Select the recommended approach for configuring their VLAN attachments and Cloud Routers.

- 
- A. Create the Cloud Routers in the Shared host project and the VLAN attachments in the Shared VPC service projects.
 - B. Create the VLAN attachments and Cloud Routers in the Shared VPC host project.**
 - C. Create the VLAN attachments in the Shared VPC host project and the Cloud Routers in the Shared VPC service projects.
 - D. Create the VLAN attachments and Cloud Routers in the Shared VPC service projects.

Feedback:

A. Incorrect. This is not a valid configuration.

*B. Correct! This is the only valid configuration option. For Interconnect connections to Shared VPC, both the VLAN attachments and the Cloud Routers must be created in the Shared VPC host project.

C. Incorrect. This is not a valid configuration.

D. Incorrect. This is not a valid configuration.

Where to look:

https://cloud.google.com/vpc/docs/vpc-peering#on-premises_access_from_peer_network

https://cloud.google.com/vpc/docs/shared-vpc#hybrid_cloud_scenario

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/enabling-multiple-networks-access-same-attachment>

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/dedicated/creating-vlan-attachments>

Content mapping:

- ILT course: **Networking in Google Cloud**
 - M13 Connectivity options
- On-demand course: **Networking in Google Cloud: Hybrid and Multicloud**
 - M1 Connectivity options

- Skill badge: Network Performance and Optimization

Summary:

To share an Interconnect connection to on-premises infrastructure across multiple projects you can use Shared VPC or VPC peering. For projects with their own VPC networks, you can create separate VLAN attachments and Cloud Routers per project. Shared VPC is the recommended approach as the configuration is simpler and the solution is easier to scale compared to VPC peering and cheaper than having separate VLAN attachments per project. In Shared VPC, the Interconnect and associated resources should all be created in the Shared VPC host project.

4.2 Diagnostic Question 05 Discussion



Cymbal Bank is connecting a branch office with an old VPN gateway that doesn't support BGP. The old VPN gateway only supports IKEv1 and does not support local and remote traffic selectors to be configured as 0.0.0.0/0.

Select the configuration option that can satisfy these requirements.

- A. Configure an HA VPN gateway to connect to the on-premises gateway and use dynamic routing.
- B. Configure a Classic VPN gateway to connect to the on-premises gateway using static routing with a route-based tunnel.
- C. **Configure a Classic VPN gateway to connect to the on-premises gateway using static routing with a policy-based tunnel with local and remote traffic selectors matching the office VPN but reversed.**
- D. Configure a Classic VPN gateway to connect to the on-premise gateway and use dynamic routing.

Feedback:

A. Incorrect. HA VPN gateways can only connect with dynamic routing using BGP and the on-premises gateway doesn't support BGP.

B. Incorrect. Classic VPN gateway with static routing and a route-based tunnel uses remote and local traffic selectors as 0.0.0.0/0 and these should match the on-premise local and remote traffic selectors which cannot be 0.0.0.0/0.

*C. Correct! This satisfies the IKEv1 requirement of having single CIDR local and remote selectors and the requirement that they not be 0.0.0.0/0. The Classic VPN gateway local and remote selectors should match the peer VPN gateway remote and local selectors.

D. Incorrect. The on-premises gateway does not support BGP routing which is required for dynamic routing.

Where to look:

<https://cloud.google.com/network-connectivity/docs/vpn/concepts/overview>

<https://cloud.google.com/network-connectivity/docs/vpn/how-to/creating-static-vpns>

<https://cloud.google.com/network-connectivity/docs/vpn/concepts/choosing-networks-routing#traffic-selectors>

Content mapping:

- ILT course: **Networking in Google Cloud**
 - M14 Cloud VPN
- On-demand course: **Networking in Google Cloud: Hybrid and Multicloud**

- M2 Cloud VPN

Summary:

Google Cloud has HA and Classic VPN gateways. HA VPN gateways only support dynamic routing with BGP while Classic VPN can be used with dynamic or static routing. Classic VPN with static routing supports route-based or policy-based tunnels. Classic VPN route-based tunnels use 0.0.0.0/0 as local and remote traffic selectors and policy-based tunnels allow configuration of both. The Classic VPN gateway local and remote selectors should match the peer VPN gateway remote and local selectors.

4.2 | Diagnostic Question 06 Discussion



You are using the gcloud tool to create a Classic VPN with static routing and a route-based tunnel. The on-premises resources are all in the 192.168.1.0/24 range. You have issued commands to create the VPN gateway, IP addresses, forwarding rules, and the VPN tunnel.

Select the correct final resource that must be created.

- A. A Cloud Router with default route advertisements
- B. A Cloud Router with a custom route advertisements including the range 192.168.1.0/24
- C. A route with destination 192.168.1.0/24 and next hop set to the VPN gateway**
- D. A route with destination 0.0.0.0/0 and next hop set to the VPN gateway

Feedback:

A. Incorrect. Cloud Routers would only be used with VPN configured for dynamic routing.

B. Incorrect. Cloud Routers would only be used with VPN configured for dynamic routing. Cloud Routers' custom advertisements are intended to advertise IP ranges that are destinations on the VPC side.

*C. Correct! This route sends traffic destined to the on-premises IP range to the VPN gateway to send across the tunnel to the on-premises network.

D. Incorrect. A route with destination 0.0.0.0/0 would conflict with the default internet gateway route and would be unnecessarily general.

Where to look:

<https://cloud.google.com/network-connectivity/docs/vpn/concepts/overview>

<https://cloud.google.com/network-connectivity/docs/vpn/how-to/creating-static-vpns>

<https://cloud.google.com/network-connectivity/docs/vpn/concepts/choosing-networks-routing#traffic-selectors>

Content mapping:

No coverage in training material.

Summary:

When creating VPN gateways with the gcloud tool, the routes directing appropriate traffic to the gateway are not created automatically and require creation with separate gcloud commands.

4.2 Diagnostic Question 07 Discussion



Cymbal Bank is connecting a branch office with a modern VPN gateway that supports BGP to Google Cloud in a region. The office VPN gateway has two interfaces and only requires a single tunnel to each to provide 99.99% availability.

Select the simplest Google Cloud VPN configuration that will provide 99.99% availability.

- A. An external VPN gateway resource with 2 interfaces, a Cloud Router in the same region, a cloud HA VPN gateway with one tunnel from each interface to each external VPN gateway interface, and BGP sessions for both tunnels
- B. An external VPN gateway resource with 2 interfaces, 2 Cloud Routers in the same region, a cloud HA VPN gateway with one tunnel from each interface to each external VPN gateway interface, and BGP sessions for both tunnels
- C. An external VPN gateway resource with 4 interfaces, a Cloud Router in the same region, 2 cloud HA VPN gateway with one tunnel from each interface to each external VPN gateway interface, and BGP sessions for all 4 tunnels
- D. An external VPN gateway resource with 4 interfaces, 2 Cloud Routers in the same region, 2 cloud HA VPN gateways with one tunnel from each interface to each external VPN gateway interface, and BGP sessions for all 4 tunnels

Feedback:

- *A. Correct! Given the office VPN capabilities and configuration, this is the simplest configuration that will provide 99.99% availability.
- B. Incorrect. A single Cloud Router is sufficient with the 2 tunnels to provide 99.99% availability, so the second Cloud Router is unnecessary.
- C. Incorrect. The office VPN only provides 2 interfaces, and 2 tunnels are sufficient for 99.99% availability.
- D. Incorrect. The office VPN only provides 2 interfaces, and 2 tunnels are sufficient for 99.99% availability.

Where to look:

<https://cloud.google.com/network-connectivity/docs/vpn/concepts/overview>
<https://cloud.google.com/network-connectivity/docs/vpn/concepts/topologies>
<https://cloud.google.com/network-connectivity/docs/vpn/how-to/creating-ha-vpn>

Content mapping:

- ILT course: **Networking in Google Cloud**
 - M14 Cloud VPN
- On-demand course: **Networking in Google Cloud: Hybrid and Multicloud**
 - M2 Cloud VPN

Skill badge: Network Performance and Optimization

Summary:

HA VPN gateways provide 2 interfaces, and both must have tunnels to peer VPN gateway interfaces with BGP sessions to provide 99.99% availability. When configuring HA VPN gateways, an external VPN gateway resource must be created that matches the number of interfaces available on the peer VPN gateway.

4.2 | Configuring a site-to-site IPsec VPN

Courses



[Networking in Google Cloud](#)

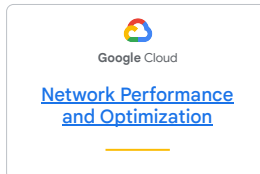
- M13 Connectivity options
- M14 Cloud VPN



[Networking in Google Cloud: Hybrid and Multicloud](#)

- M1 Connectivity options
- M2 Cloud VPN

Skill Badge



Documentation

[VPC Network Peering overview](#)

[Shared VPC overview](#)

[Enabling multiple VPC networks to access the same VLAN attachment](#)

[Cloud VPN overview](#)

[Creating a Classic VPN using static routing](#)

[Networks and tunnel routing | Cloud VPN](#)

[HA VPN topologies](#)

[Creating an HA VPN gateway to a peer VPN gateway](#)

Let's take a moment to consider resources that can help you build your knowledge and skills in this area.

The concepts in the diagnostic questions we just reviewed are covered in these modules and in this documentation. Reviewing the documentation is highly recommended. You'll find this list in your workbook so you can take a note of what you want to include later when you build your study plan. Based on your experience with the diagnostic questions, you may want to include some or all of these.

[Networking in Google Cloud \(ILT\)](#)

[Networking in Google Cloud: Hybrid and Multicloud \(On-demand\)](#)

[Network Performance and Optimization \(Skill badge\)](#)

https://cloud.google.com/vpc/docs/vpc-peering#on-premises_access_from_peer_network

https://cloud.google.com/vpc/docs/shared-vpc#hybrid_cloud_scenario

<https://cloud.google.com/network-connectivity/docs/interconnect/how-to/enabling-multiple-networks-access-same-attachment>

<https://cloud.google.com/network-connectivity/docs/vpn/concepts/overview>

<https://cloud.google.com/network-connectivity/docs/vpn/how-to/creating-static-vpns>

<https://cloud.google.com/network-connectivity/docs/vpn/concepts/choosing-networks-routing#traffic-selectors>

<https://cloud.google.com/network-connectivity/docs/vpn/concepts/topologies>

<https://cloud.google.com/network-connectivity/docs/vpn/how-to/creating-ha-vpn>

4.3 | Configuring Cloud Router

Considerations include:

- Implementing Border Gateway Protocol (BGP) attributes (e.g., ASN, route priority/MED, link-local addresses, authentication)
- Configuring Bidirectional Forwarding Detection (BFD)
- Creating custom advertised routes and custom learned routes

Google Cloud

Professional Cloud Network Engineers are expected to understand the purpose and benefits of BGP and the Cloud Router as well as how to configure the Cloud Router to support Cloud VPN and Interconnect scenarios.

Question 8 asked you to select appropriate Cloud Router BGP configuration.

Question 9 tested your ability to configure custom Cloud Router advertisements.

Question 10 focused on configuring Cloud Router for High Availability conditions (HA).

4.3 Diagnostic Question 08 Discussion



You have an HA VPN gateway with 2 interfaces in active/active mode. You would like to reconfigure them to active/passive mode.

Select the simplest configuration change that will satisfy this requirement.

- A. Remove the BGP session for one of the HA VPN tunnels.
- B. Disable the BGP session for one of the HA VPN tunnels.
- C. Update the base advertised route priorities for both of the HA VPN tunnels' BGP sessions.
- D. **Update the base advertised route priority for one of the HA VPN tunnel's BGP sessions.**

Feedback:

- A. Incorrect. This configuration would no longer provide 99.99% availability and would not be an active/passive configuration.
- B. Incorrect. This configuration would no longer provide 99.99% availability and would not be an active/passive configuration.
- C. Incorrect. This configuration change can achieve the desired effect of converting from active/active to active/passive, but it is not the simplest possible configuration change.

Simply updating one of the HA VPN tunnel's BGP sessions base advertised route priority is sufficient.

*D. Correct! This is the simplest change that will achieve the desired effect. As long as the tunnels have different base advertised route priority, they will be active/passive because the on-premises router will prefer the tunnel with the lower advertised priority value.

Where to look:

<https://cloud.google.com/network-connectivity/docs/router/concepts/overview>
<https://cloud.google.com/network-connectivity/docs/router/how-to/creating-routers>
<https://cloud.google.com/network-connectivity/docs/router/how-to/configuring-bgp>
<https://cloud.google.com/network-connectivity/docs/router/how-to/updating-priority>

Content mapping:

No coverage in training material.

Summary:

When creating BGP sessions in Cloud Routers for VPN tunnels or Interconnect VLAN attachments, the base advertised route priority can be configured for the BGP session. That value is sent as a multi-exit discriminator (MED) attribute. That particular tunnel or attachment is typically preferred, because lower values are preferred to higher values with all else being equal. Two BGP sessions with equal advertised priority would be equally preferred (active/active) and with different values, one would be prioritized (active/passive).

4.3 Diagnostic Question 09 Discussion



Cymbal Bank has a Cloud Router in a region; the VPC advertises some of its subnets. The VPC advertises none of the subnets in other regions. You require an update to advertise all subnets in all regions for that VPC. You also want to automatically advertise newly added subnets, as well as stop advertising removed subnets in the future.

Select the simplest configuration that will accomplish this goal.

- A. Update the Cloud Router custom advertisements by advertising the IP ranges for all the subnets across all regions, then update the configured list whenever subnets are added or removed.
- B. Check the dynamic routing mode of the VPC and update it to global if it is currently regional. Update the Cloud Router custom advertisements by advertising the IP ranges for all the subnets across all regions, then update the configured list whenever subnets are added or removed.
- C. Check the dynamic routing mode of the VPC and update it to global if it is currently regional. Configure the Cloud Router to default advertisement mode.**
- D. Check the dynamic routing mode of the VPC and update it to regional if it is currently global. Configure the Cloud Router to default advertisement mode.

Feedback:

- A. Incorrect. This will require manual updates whenever subnets are added or removed.
- B. Incorrect. This will require manual updates whenever subnets are added or removed. With this approach, the dynamic routing mode of the VPC will be irrelevant and the initial step is unnecessary.
- *C. Correct! This is the simplest configuration to ensure all subnets are advertised across all regions with automatic updates to the advertised list as subnets are added or removed.**
- D. This configuration would not advertise all subnets in all regions but would only advertise subnets in the Cloud Router region.

Where to look:

<https://cloud.google.com/network-connectivity/docs/router/concepts/overview>
<https://cloud.google.com/network-connectivity/docs/router/how-to/advertising-overview>
<https://cloud.google.com/network-connectivity/docs/router/how-to/advertising-custom-ip>
<https://cloud.google.com/network-connectivity/docs/router/how-to/advertising-subnets>

Content mapping:

No coverage in training material.

Summary:

Cloud Routers have default and custom route advertisement modes that can be set for the router as a whole or separately for each BGP session. The default advertisement mode will advertise all subnets in the same region when the VPC in the Cloud Router is set to regional dynamic routing mode, or all subnets in all regions when the VPC is set to global dynamic routing mode. When in custom route advertisement mode, the Cloud Router can be configured to advertise a specified set of IP ranges. In addition, Cloud Router can also be configured to advertise all subnets in the region or across all regions, based on the VPC's dynamic routing mode.

4.3 Diagnostic Question 10 Discussion



Cymbal Bank would like to achieve 99.99% availability for their Dedicated Interconnect link from an on-premises network to their VPC.

Select the configuration that will achieve this.

- A. 1 Cloud Router in one region with the VPC in regional dynamic routing mode
- B. 2 Cloud Routers in one region, with the VPC in global dynamic routing mode
- C. 2 Cloud Routers in 2 distinct regions, with the VPC in regional dynamic routing mode
- D. 2 Cloud Routers in 2 distinct regions, with the VPC in global dynamic routing mode

Feedback:

- A. Incorrect. This configuration will not provide 99.99% availability. You need 2 Cloud Routers in distinct regions, and the VPC needs to be in global dynamic routing mode.
- B. Incorrect. This configuration will not provide 99.99% availability. The 2 Cloud Routers need to be in 2 distinct regions.
- C. Incorrect. This configuration will not provide 99.99% availability. The VPC needs to be in global dynamic routing mode.
- *D. Correct! This configuration meets the requirements.

Where to look:

<https://cloud.google.com/network-connectivity/docs/router/concepts/overview>
<https://cloud.google.com/network-connectivity/docs/vpn/how-to/creating-ha-vpn>
<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/dedicated-creating-9999-availability>
<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/partner-creating-9999-availability>
<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/dedicated-creating-999-availability>
<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/partner-creating-999-availability>

Content mapping:

- ILT course: **Networking in Google Cloud**
 - M14 Cloud VPN

- On-demand course: **Networking in Google Cloud: Hybrid and Multicloud**
 - M2 Cloud VPN

Skill badge: Network Performance and Optimization

Summary:

For 99.99% availability for Dedicated and Partner Interconnect, 2 Cloud Routers in distinct regions are required. To achieve this same 99.99% availability with HA VPN, only a single Cloud Router in a single region is necessary.

4.3 | Configuring Cloud Router

Courses



[Networking in Google Cloud](#)

- M14 Cloud VPN



[Networking in Google Cloud: Hybrid and Multicloud](#)

- M2 Cloud VPN

[VPC Networking: Cloud HA-VPN](#)

Skill Badge



[Network Performance and Optimization](#)

Documentation

[Cloud Router overview](#)

[Creating Cloud Routers](#)

[Establishing BGP sessions | Cloud Router](#)

[Updating the base advertised route priority | Cloud Router](#)

[Custom route advertisements introduction | Cloud Router](#)

[Advertising custom IP ranges | Cloud Router](#)

[Advertising specific VPC subnets | Cloud Router](#)

[Creating an HA VPN gateway to a peer VPN gateway](#)

[Establishing 99.99% availability for Dedicated Interconnect](#)

[Establishing 99.99% availability for Partner Interconnect](#)

[Establishing 99.9% availability for Dedicated Interconnect](#)

[Establishing 99.9% availability for Partner Interconnect](#)

Let's take a moment to consider resources that can help you build your knowledge and skills in this area.

The concepts in the diagnostic questions we just reviewed are covered in this module, labs, and in this documentation. Reviewing the documentation is highly recommended. You'll find this list in your workbook so you can take a note of what you want to include later when you build your study plan. Based on your experience with the diagnostic questions, you may want to include some or all of these.

[Networking in Google Cloud \(ILT\)](#)

[Networking in Google Cloud: Hybrid and Multicloud \(On-demand\)](#)

[VPC Networking: Cloud HA-VPN](#) (Self-paced lab)

[Network Performance and Optimization \(Skill badge\)](#)

<https://cloud.google.com/network-connectivity/docs/router/concepts/overview>

<https://cloud.google.com/network-connectivity/docs/router/how-to/creating-routers>

<https://cloud.google.com/network-connectivity/docs/router/how-to/configuring-bgp>

<https://cloud.google.com/network-connectivity/docs/router/how-to/updates-priority>

<https://cloud.google.com/network-connectivity/docs/router/how-to/advertising-overview>

[w](#)

<https://cloud.google.com/network-connectivity/docs/router/how-to/advertising-custom-ip>

[p](#)

<https://cloud.google.com/network-connectivity/docs/router/how-to/advertising-subnets>
<https://cloud.google.com/network-connectivity/docs/vpn/how-to/creating-ha-vpn>
<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/dedicated-creating-9999-availability>
<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/partner-creating-9999-availability>
<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/dedicated-creating-999-availability>
<https://cloud.google.com/network-connectivity/docs/interconnect/tutorials/partner-creating-999-availability>

4.4 | Configuring Network Connectivity Center

Considerations include:

- Creating hybrid spokes (e.g., VPN, Cloud Interconnect).
- Establishing site-to-site data transfer.
- Creating Router appliances (RAs)

Google Cloud

Professional Cloud Network Engineers are expected to understand the intricacies of Network Connectivity Center to design, implement, and manage complex hybrid network topologies. A deep comprehension of hub-and-spoke architectures, including the creation and management of various spoke types, is essential. This involves a strong grasp of hybrid spoke configurations, enabling seamless connectivity between on-premises and cloud environments. Additionally, expertise in site-to-site data transfer is crucial for optimizing data movement between different locations. Furthermore, proficiency in creating and configuring router appliances within Network Connectivity Center can be helpful to establish secure and efficient network connectivity.

Question 11 tests your advanced troubleshooting skills to diagnose and resolve network issues within the Network Connectivity Center environment.

4.4 Diagnostic Question 11 Discussion



Cymbal Bank has implemented a hub-and-spoke topology using Network Connectivity Center to interconnect its on-premises data centers and cloud-based workloads. The bank is experiencing performance degradation in application response times between its New York data center and a critical cloud-based application hosted in the us-central1 region.

Your task is to identify potential bottlenecks or configuration issues within the environment that could be causing the performance degradation.

Which specific step can you take to help identify the issues?

- A. Analyze Cloud Load Balancing configuration and health checks associated with the application.
- B. Evaluate the Network Connectivity Center hub's network performance metrics, such as latency and packet loss.**
- C. Verify the MTU size configuration of the VPN tunnels connecting the New York data center to the Network Connectivity Center hub.
- D. Check for BGP routing inconsistencies between the Network Connectivity Center hub and the New York VPC spoke.

Feedback:

A. Incorrect. While important, this option focuses on the application layer and might not directly address the underlying network issue.

*B. Correct The Network Connectivity Center hub is the central point of connectivity, and performance issues at this level would directly impact application response times. Analyzing metrics like latency and packet loss will help pinpoint potential bottlenecks.

C. Incorrect. This is a valid consideration, but the question emphasizes overall performance degradation rather than a specific connectivity issue like fragmentation.

D. Incorrect. While BGP is crucial for Network Connectivity Center, the question focuses on performance degradation, suggesting a network-level issue rather than routing problems.

Where to look:

<https://cloud.google.com/network-connectivity/docs/network-connectivity-center/concepts/overview>

<https://cloud.google.com/network-connectivity/docs/network-connectivity-center/concepts/ra-overview>

<https://cloud.google.com/network-connectivity/docs/network-connectivity-center/concepts/ra-overview>

<https://cloud.google.com/network-connectivity/docs/network-connectivity-center/how-to/creating-router-appliances>

Content mapping:

- ILT course: **Networking in Google Cloud**

- M14 Cloud VPN
- On-demand course: **Networking in Google Cloud: Hybrid and Multicloud**
 - M2 Cloud VPN

Summary:

This question focuses on troubleshooting network performance issues within an Network Connectivity Center environment. It requires you to apply your knowledge of Network Connectivity Center components and metrics to identify potential causes of performance degradation.

4.4 | Configuring Network Connectivity Center

Courses



[Networking in Google Cloud](#)

- M14 Cloud VPN



[Networking in Google Cloud: Hybrid and Multicloud](#)

- M2 Cloud VPN

Documentation

[Network Connectivity Center overview | Google Cloud](#)

[Router appliance overview | Network Connectivity Center | Google Cloud](#)

[Router appliance overview | Network Connectivity Center | Google Cloud](#)

[Create router appliance instances | Network Connectivity Center | Google Cloud](#)

Let's consider resources that can help you build your knowledge and skills in this area.

The concepts in the diagnostic question we just reviewed are covered in this module and in this documentation. You'll find this list in your workbook so you can take a note of what you want to include later when you build your study plan. Based on your experience with the diagnostic questions, you may want to include some or all of these.

[Networking in Google Cloud \(ILT\)](#)

[Networking in Google Cloud: Hybrid and Multicloud \(On-demand\)](#)

<https://cloud.google.com/network-connectivity/docs/network-connectivity-center/concepts/overview>

<https://cloud.google.com/network-connectivity/docs/network-connectivity-center/concepts/ra-overview>

<https://cloud.google.com/network-connectivity/docs/network-connectivity-center/concepts/ra-overview>

<https://cloud.google.com/network-connectivity/docs/network-connectivity-center/how-to/creating-router-appliances>