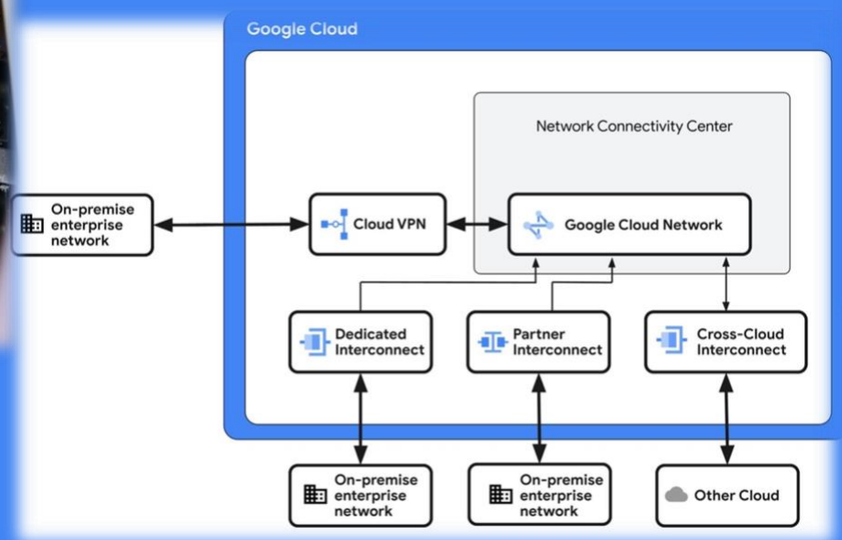
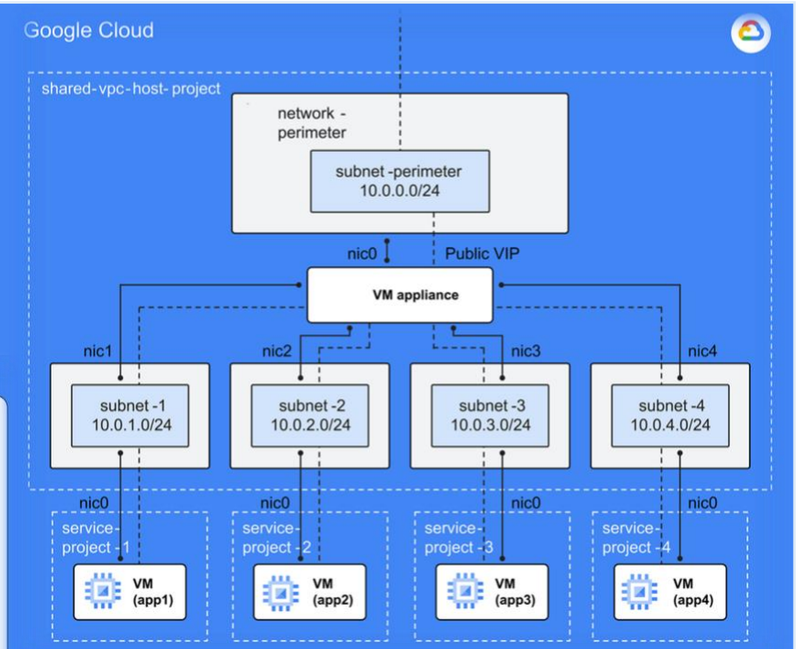
Start Cloud Now





Google Cloud Professional Cloud Network Engineer Exam

Prep Notes by

Ammett

V3.1

Google Cloud

Google Cloud Professional Cloud Network Engineer

Exam Prep Sheet by Ammett

This is my updated guide for the exam. References from Google Docs and other sources.

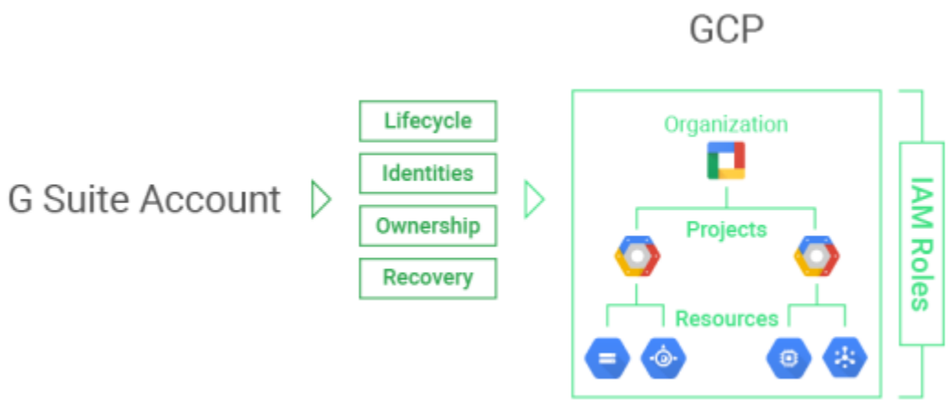
V3.1: 12-2023

White papers you must review

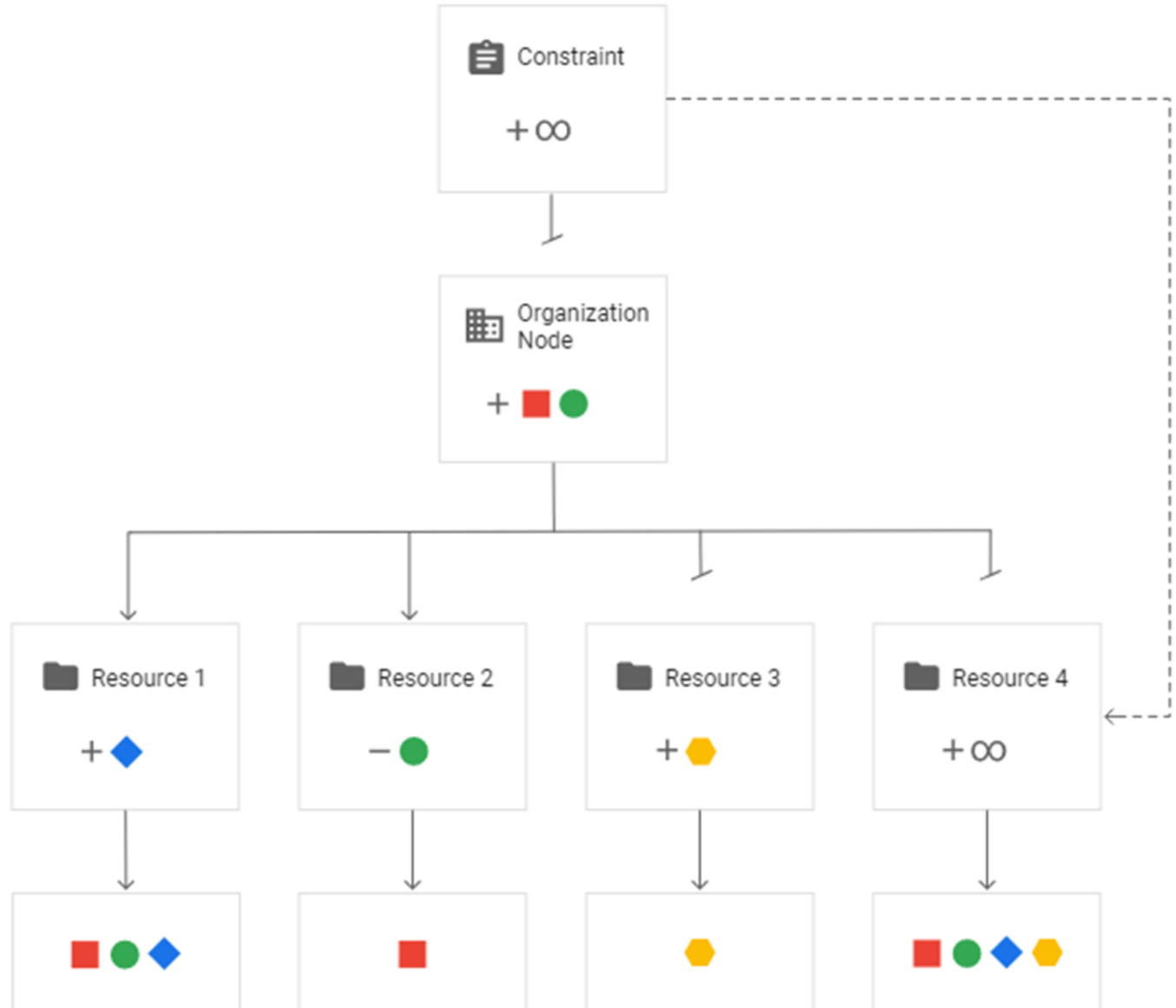
1-Best practices for enterprise organizations
2- VPC Overview
3- Alias IP
4- VPC Network Peering
5- Shared VPC
6- Choosing a load balancer
7- Cloud CDN Overview
8- Choosing a VPN option
9- Cloud Router
10- Direct Peering
11- Carrier peering
12- Cloud Interconnect
13- Creating a VPC-native Cluster
14- Private Cluster Kubernetes
15- Firewall Rules Logging
16- Networking Kubernetes
17- Best practices for Cloud DNS
18- URL_Map
19- Load balancer health checks

	What it is	Key points	What you should know	Review documents	Video	My experience
Organisation Structures	Resources are organized hierarchically. This allows you to map your enterprise's operational structure to GCP, and to manage access control and permissions for groups of related resources.	1- Flow (Organisation, Folders, Projects, Resources) 2- Where to manage permissions for groups, department, entire organisation, etc	1- Permissions level necessary to do certain functions 2- Domains, Groups, G Suite domain, Super users.	Cloud Platform hierarchy	Hierarchy	This area is fundamental please understand how to control to get the separation and security in your domain.
IAM	IAM which lets you manage access control by defining who (identity) has what access (role) for which resource.	1- Best way to manage (use groups) 2- Roles (primitive, predefined & custom) 3- Roles necessary to do certain functions (network, security, IAM, cloud storage)	1- Permissions level necessary 2- Permission errors 3- How & when to create custom roles 4- Service account permissions	Cloud IAM overview	Cloud IAM Best practices for identity	IAM on a networking exam? Yes, know it well because it will come. Knowing the roles necessary for certain actions may help if you can figure it out.
CIDR RFC-1918	You can choose any private RFC 1918 CIDR block for the primary IP address range of the subnet	1- The 4 Reserved Address (network, gateway, google reserved, broadcast) 2- How to assign your own range	1- How to assign static internal IP 2- How to change IP	IP Addresses Reserve Internal IP	Networking with IP Address	Some form of RFC-1918 will come. Keep in mind what is reserved, auto-mode RFC 1918 addresses.
External IP	These are routable on the public internet and allow you access to the internet.	1- This is optional 2- Default is ephemeral-these change 3- Static can be assigned 3- How to create static external IP	1- Charged if not attached to VM 2- How to change ephemeral IP to another ephemeral IP	Reserve External IP IP Addressing Options		These can appear but shouldn't be too difficult to handle
Subnet Types	Subnets are used to separate resources and control communication between tiers. Access can be controlled via routes and firewalls	1- Default (automatically generated with a project) they have default firewall rules and a subnet in every region 2- Auto-mode- automatically creates a subnet in every region (the default subnet is an auto mode subnet) IP range 10.128.0.0/9	1- Custom is fully user controlled 2- Avoid overlapping ranges 3- You can convert from auto to custom (one way). Things can get affected. 4- You can increase range not decrease		Create Custom Subnet	Take note of this area. CIDR block host availability for VPC and also in Kubernetes.
Alias IP	Alias IP ranges let you assign ranges of internal IP addresses as aliases to a (VM) nic. Alias IP ranges also work with GKE Pods.	1- Alias can be from main CIDR or 2- Alias IP can be from secondary rages. 3- This is useful if you have multiple services running on a VM and you want to assign each service a different IP address.	1- Use of alias IP ranges does not require secondary subnet ranges. These secondary subnet ranges merely provide an organizational tool.	Alias IP Configuring Alias IP	Access GCP and 3rd party services privately	General awareness.

IAM example 1



Hierarchy Flow



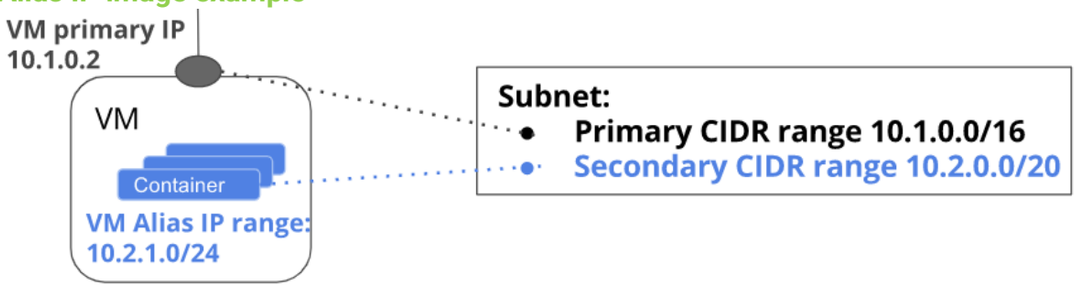
Reserved range example

Reserved Address	Description	Example
Network	First address in the primary IP range for the subnet	`10.1.2.0` in `10.1.2.0/24`
Default gateway	Second address in the primary IP range for the subnet	`10.1.2.1` in `10.1.2.0/24`
Second-to-last address	Second-to-last address in the primary IP range for the subnet that is reserved by GCP for potential future use	`10.1.2.254` in `10.1.2.0/24`
Broadcast	Last address in the primary IP range for the subnet	`10.1.2.255` in `10.1.2.0/24`

Private Access	**What it is** Allows VM with internal (RFC 1918) IP addresses to reach certain APIs and services without internet access.	**Key points** 1- No public IP address 2- Enabled on subnet 3- Default route	**What you should know** 1- Services that support Private access 2- Default route 0.0.0.0/0 next hop " default internet gateway" or custom routes 199.36.153.4/30 or 199.36.153.8/30 nexthop "default internet gateway"	**Review documents** Configure private services Private Google Access	**Video** Access GCP and 3rd party services privately	**My experience** This is a **interesting topic.** Especially what services are supported and how to set up.
private.googleapis.com	**What it is** Use **private.googleapis.com** to access Google APIs and services using a set of IP addresses only routable from within Google Cloud.	**What you should know** 1- Choose when you don't use VPC Service Controls. 2- Choose when you do use VPC Service Controls, but you also need to access Google APIs and services that are not supported by VPC Service Controls. 3- **199.36.153.8/30**	**What you should know** 1- Know the range address 2- How to create a route to these 3- How to configure custom DNS for this.			
restricted.googleapis.com	**What it is** Use **restricted.googleapis.com** to access Google APIs and services using a set of IP addresses only routable from within Google Cloud.	**What you should know** 1- Choose when you only need access to Google APIs and services that are supported by VPC Service Controls 2- **199.36.153.4/30**	**What you should know** 1- Know the range address 2- How to create a route to these 3- How to configure custom DNS for this.			**My experience** This is very confusing. Take the time to understand how to setup the hybrid access using private access, DNS, interconnect, routing, next hop etc
Private access – on prem	**What it is** How to configure in hybrid environment					**My experience** This is tricky.
Private Service	**What it is** The private connection enables VM in your VPC network and the services that you access to communicate exclusively by using internal (RFC 1918) IP addresses.	**Key points** 1- External IP addresses are not required or used 2- Service producers network 3- Private IP 4- **Cloud SQL** supports this and others	**What you should know** 1- Works via peering from customer to service producer network 2- Must define CIDR range for services. 3- Connect within same region 4- Connect to Cloud SQL from on prem over interconnect	**Review documents** Config private service access Private service Connect	**Video** Private Service Connect Access GCP and 3rd party services privately **Labs** Connecting to Cloud SQL: Private IP Multiple VPC VPC network	**My experience** Private services access is tricky. This requires you some time to understand how it works and flows. Also check out private service connect.
Configure private services	**What it is** How to configure private service access	**Key points** 1- Create an Ip allocation 2- Create private connection to services				
Organization constraints				**Review documents** Organisation policy Resource Hierarchy Resource constraints How to guides	**Video** GCP resource Organisation and Access management	

Next hop	**What it is** The address of the next router on a path to a destination.	**Key points** 1- Understand how to configure static next hop as necessary to alter traffic flow both on prem and in the cloud	**What you should know** 1- What address should be the next hop			
VPC	**What it is** A VPC network is your virtual network in the cloud just like an on premise physical network or data centre or office network.	**Key points** 1- **VPC are global** SDN 2- How to get traffic flowing 3- Using RFC 1918 subnets 4- **Internal and external** access	**What you should know** 1- Internal and external access 2- Controlling access and firewalls 3- How to Connect VPC together (peering or sharing)	**Review documents** VPC Overview	**Video** VPC Deep Dive	**My experience** **Core area**. Let me put it like this; If you do not understand all of the elements of a VPC; then don't do the exam.
VPC-service-controls	**What it is** VPC Service Controls provides an extra layer of security defence for Google Cloud services that is independent of Identity and Access Management (IAM).	**Key points** 1- **VPC are global** SDN	**What you should know** 1- Internal and external access 2- Controlling access and firewalls 3- How to Connect VPC together (peering or sharing)	**Review documents** VPC Overview	**Video** VPC Deep Dive	**My experience** Get familiar with these from a networking point of view.
Routes	**What it is** These define the paths network traffic takes from a VM instance to other destinations. These destinations can be inside or outside of your VPC.	**Key points** 1- The route table is defined at network level 2- The routing to next hop where should the next hop be	**What you should know** 1- Type (system and custom) 2- Default route & Subnet route 3- Static and Dynamic routes 4- Routing order 5 – Route all traffic to on-prem	**Review documents** Routes in GCP Default route	**Video** Cloud Router	**My experience** You cannot have networking without routes. (Static, dynamic, subnet, custom, default, import, export)
Cloud Router	**What it is** This enables you too dynamically exchange routes between (VPC) and on-premises networks by using Border Gateway Protocol (BGP).	**Key points** 1- Cloud Router automatically learns new subnets in your VPC network and announces them to your on-premises network	**What you should know** 1- Global dynamic routing 2- Regional dynamic routing	**Review documents** Cloud Router		**My experience** Another critical area. Know how these are setup. Has lot of small parts get familiar.
BGP	**What it is** Border Gateway Protocol is a protocol that manages how packets are routed across the internet through the exchange of routing and reachability information between edge routers.	**Key points** 1- The ASN number range (64512 - 65534, 4200000000 – 4294967294) 2- IP range used 169.254.0.0/16	**What you should know** 1- **MED** (route priority) 2- What can be configured without BGP 3- Troubleshooting	**Review documents** Establishing BGP sessions Troubleshooting Cloud Router		**My experience** A question or 3 may come on BGP. Know what is required, problems and how it works.
Firewall	**What it is** Allow or deny traffic to and from your virtual machine (VM) etc, based on configurations you specify.	**Key points** 1- How they work (Stateful) & Scope 2- Implied rules 3- Default rules	**What you should know** 1- How to restrict traffic 2- Use of tag 3- Use of service account 4- Apply rules to folders (firewall policy)	**Review documents** Firewalls Firewall policies	**Video** Firewalls Network and security telemetry	**My experience** You can't allow everything on your network so expect a few firewall questions in the networking exam also.
Firewall logging	**What it is** **Firewall Rules Logging** allows you audit, verify, and analyze the effects of your firewall rules.	**Key points** 1- Individually enabled 2- Supported for TCP & UDP only 3- Firewall Insights view options 4- Assign priority	**What you should know** 1- Troubleshooting viewing (Log entries missing, cannot view logs, where to apply logs)	**Review documents** Firewall Logging		**My experience** You should have an idea where to look, what rules are logged, priorities and how to fix.

Alias IP image example



Trouble shooting logs

Log entries missing

Possible cause: Connections might not match the firewall rule you expect

Verify that the firewall rule you expect is in the list of applicable firewall rules for an instance. Use the GCP Console to view details for the relevant instance, then click the **View details** button in the *Network interfaces* section on its *VM instance details* page. Inspect applicable firewall rules in the *Firewall rules and routes details* section of its *Network interface details* page.

Review the firewall rules overview to make sure you have created your firewall rules correctly.

You can use tcpdump on the VM to determine if connections it sends or receives have addresses, ports, and protocols that would match the firewall you expect.

Possible cause: A higher priority rule with firewall rules logging disabled might apply

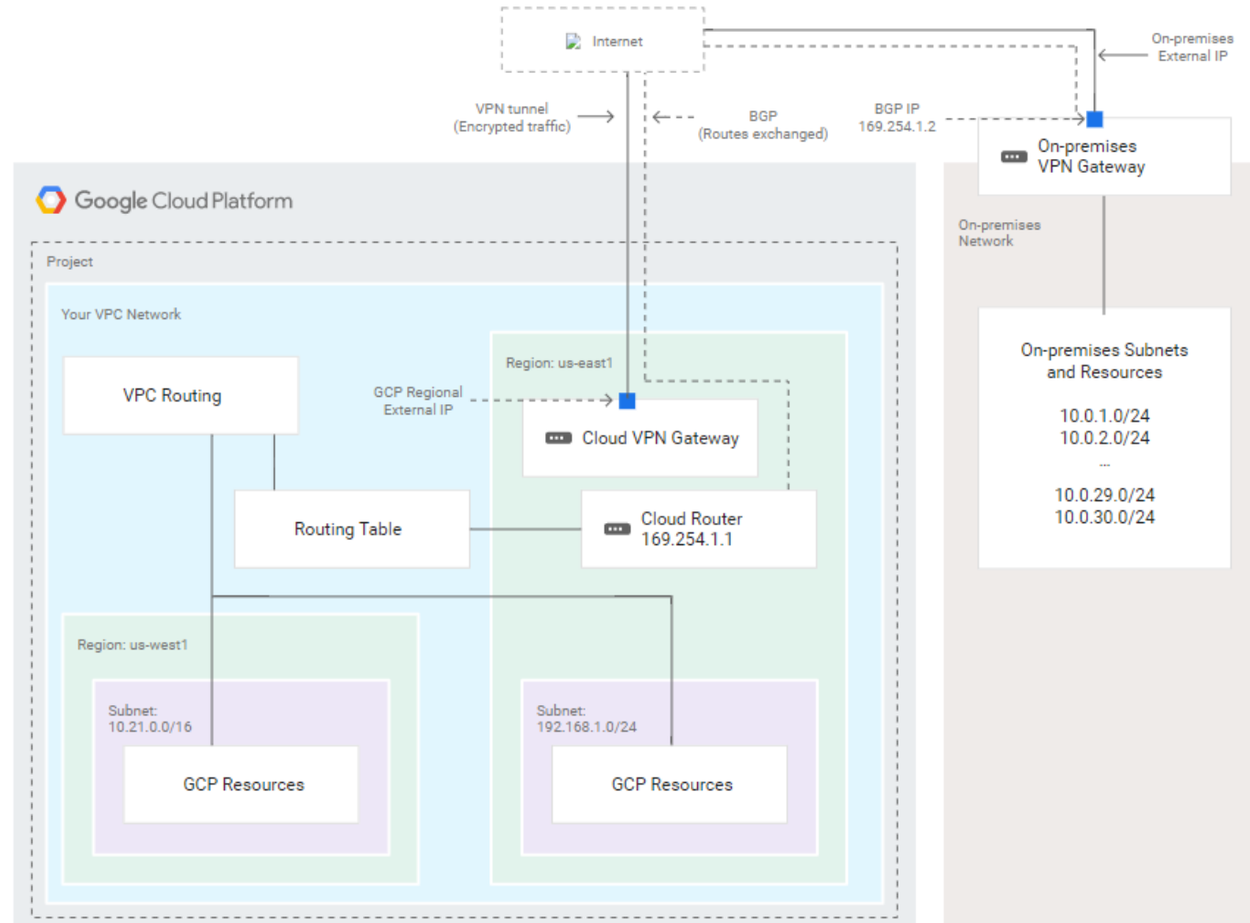
Firewall rules are evaluated according to their priorities. From the perspective of a VM instance, only one firewall rule applies to the traffic.

A rule that you think would be the highest priority applicable rule might not actually be the highest priority applicable rule. A higher priority rule that does not have logging enabled might apply instead.

To troubleshoot, you can temporarily enable logging for *all* possible firewall rules applicable to a VM. Use the GCP Console to view details for the relevant VM, then click the **View details** button in the *Network interfaces* section on its *VM instance details* page. Inspect applicable firewall rules in the *Firewall rules and routes details* section of its *Network interface details* page, and identify your custom rules in that list. Temporarily enable logging for all of those custom firewall rules.

With logging enabled, you can identify the applicable rule. Once identified, be sure to disable logging for all rules that do not actually need it.

Cloud Router for VPNs with VPC network



Cloud DNS	**What it is** Cloud DNS is a high-performance, resilient, global Domain Name System (DNS) service that publishes your domain names to the global DNS in a cost-effective way.	**Key points** 1- Types Zones (managed, Public, Private, forwarding, peering) 2-Internal DNS, delegated subzones)	**What you should know** 1- On Prem connection 2- Private Zones 3- Importing Zone record-sets BIND or YAML 4- Forwarding zones	**Review documents** DNS Best practices for cloud DNS	**Video** How to use GCP	**My experience** Core. Understand as much about DNS as possible and it's interactions, configurations. **If you don't understand DNS don't do the exam.**
On-prem integration -DNS	**What it is** Using DNS between cloud and on prem to resolve queries.	**Key points** 1- Conditional forwarding 2-TCP, UDP port 53 3- Firewall rules for 35.199.192.0/19 4- Inbound, outbound forwarding	**Review documents** Single shared VPC Multiple separate VPC VPC hub connected to spoke VPC	**Review documents** Best practices for DNS forwarding and servicer policies	**Video** How to use GCP DNS	**My experience** This area is very confusing. Understand these flows between cloud and on-prem. **Very important for the exam**
DNSSEC	**What it is** Prevents attackers from manipulating or poisoning the responses to DNS requests.	**Key points** 1- How to set up 2- How to **disable**	**Key Points** 1- The components to make this work and be removed.	**Review Documents** DNSSEC		**My experience** Grab a quick point. Good to know just in case.
Network tags	**What it is** Use tags on compute resources that can be filter in firewall-rules etc.			**Review Document** configure network tags		
Traffic Director	**What it is** Traffic Director is a managed control plane for application networking.			**Review Document** Traffic director		
Network Intelligence Center	**What it is** Network Intelligence Center provides a single console for managing Google Cloud network visibility, monitoring, and troubleshooting.	**Key points** 1- Use cases 2- Components (Network Topology, Connectivity test, Performance dashboard, Firewall Insights)		**Review Document** Network Intelligence Center		**My experience** Understand the uses for the different tools in the
Netowrk Connectivity Center	**What it is** Similar to a transit gateway.	**Key points** 1- Use cases 2- Types of spokes supported (either VPC and Hybrid) 3 – Site to site transfer		**Review Document** Network Connectivity Center Site to site data transfer		**My experience** Good to know just in case.

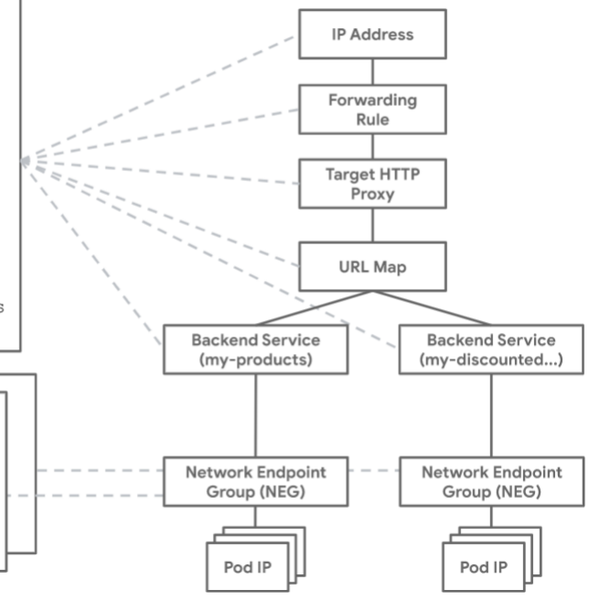
HTTP(S) Load balancer	SSL Proxy	TCP Proxy	Network Load balancer	Internal load balancer	Kubernetes Load balancing	**Review documents** Choosing a load balanced Troubleshooting health HTTPS logging Kubernetes HTTP(s) LB ingress
What it is Load balancer for HTTP(S) traffic, global, external, 80 or 8080 on 443.	**What it is** Load balancer for TCP with SSL offload, global, external. (25, 43, 110, 143,195, 443, 465, 587, 700, 993, 995, 1883, and 5222)	**What it is** Load balancer for TCP without SSL, global, external. (25, 43, 110, 143,195, 443, 465, 587, 700, 993, 995, 1883, and 5222)	**What it is** Load balancer for TCP/UDP no SSL offload, regional, external. (any port)	**What it is** Load balancer for TCP /UDP regional, Internal traffic (any port)	**What it is** This allows you balance between you application running in Kubernetes	Setting up HTTP Ingress LB **Video** Cloud Load balancers **My experience** **Loads and loads** of variation on this area. (**Global** vs **Regional**, External vs Internal, **Traffic type**, VoIP, TFTP, IP, TCP, UDP). **Note: Load balancer types updated in 2023 now (Application and Network)**
What you should know 1- Scope global 2- HTTPS traffic 3- Health checks	**What you should know** 1- Scope Global 2- Non HTTPS traffic with SSL termination	**What you should know** 1- Scope Global 2- TCP/UDP traffic 3- Health checks	**What you should know** 1- Scope regional 2- TCP/UDP traffic 3- Health checks	**What you should know** 1- Scope Regional 2- Internal TCP/UDP traffic	**What you should know** 1- How it works 2- Connections points 3- Type of LB supported (HTTPS-**Ingress**, Internal, External)	
Key Points 1- Services that need HTTPS Load balancing	**Key Points** 1- SSL termination	**Key Points** 1- Scope global	**Key Points** 1- Scope regional	**Key Points** 1- Scope regional	**Key Points** 1- What IP you connect to 2- HTTPS traffic	
DDoS	URL-Mapping	Managed Instance Groups	Unmanaged Instance Groups	Canary Deployments	Rolling Deployments	**Review documents** Rolling Updates Managed instances Unmanaged instances URL Map
What it is A (DDoS) attack is a malicious attempt to disrupt normal traffic to a targeted service or network by overwhelming the target infrastructure with a flood of Internet traffic.	**What it is** Google Cloud Platform HTTP(S) load balancers use a URL map to direct incoming requests to backend services and backend buckets.	**What it is** A managed instance group contains identical instances that you can manage as a single entity in a single zone.	**What it is** Unmanaged instance groups are collections of instances that are not necessarily identical and do not share a common instance template.	**What it is** A canary update is an update that **is applied** to a partial number of instances in the instance group.	**What it is** A rolling update is an update that is gradually applied to all instances in an instance group until all instances have been updated	**Video** Highly available deployments **Labs** Create Internal LB
What you should know 1- How to prevent with GCP tools	**What you should know** 1- How to configure 2- It works with HTTPS LB's	**What you should know** 1- Global 2- TCP/UDP traffic 3- Health checks	**What you should know** 1- When to use. 2- Different template.	**What you should know** 1- Applies to a defined amount or % of host	**What you should know** 1- Applies to 100% of the target as defined 2- You can configure time etc	
Key Points 1- Traffic controlling tools is necessary	**Key Points** 1- Hostname and path 2- Characters / an *	**Key Points** 1- Managed instance groups support Autoscaling, load balancing, rolling updates, autohealing, and more.	**Key Points** 1- Unmanaged groups do not create, delete, or scale the number of instances in the group.	**Key Points** 1- Understand when to use for minimization of application performance issues	**Key Points** 1- Understand when to use and impact on application performance	**My experience** All these area combined made for some **VERY** challenging questions. Kubernetes is well represented, learn networking, subnetting and load balancing well.

NEG	**What it is** Network Endpoint Groups is a configuration object that specifies a group of backend endpoints or services	**Key points** 1- Types of NEGs (Hybrid, Serverless, PSC) 2-How to use with load balancers)	**What you should know**	**Review documents** Network Endpoint Groups		**My experience** Be aware of these and the types.
VPC serverless connector	**What it is** Serverless VPC Access makes it possible for you to connect directly to your Virtual Private Cloud (VPC) network from serverless environments such as Cloud Run, App Engine, or Cloud Functions	**Key points** 1- How it works 2- How to connect to it		**Review documents** Serverless VPC access		**My experience** May pick you up a point or two. Know about this.

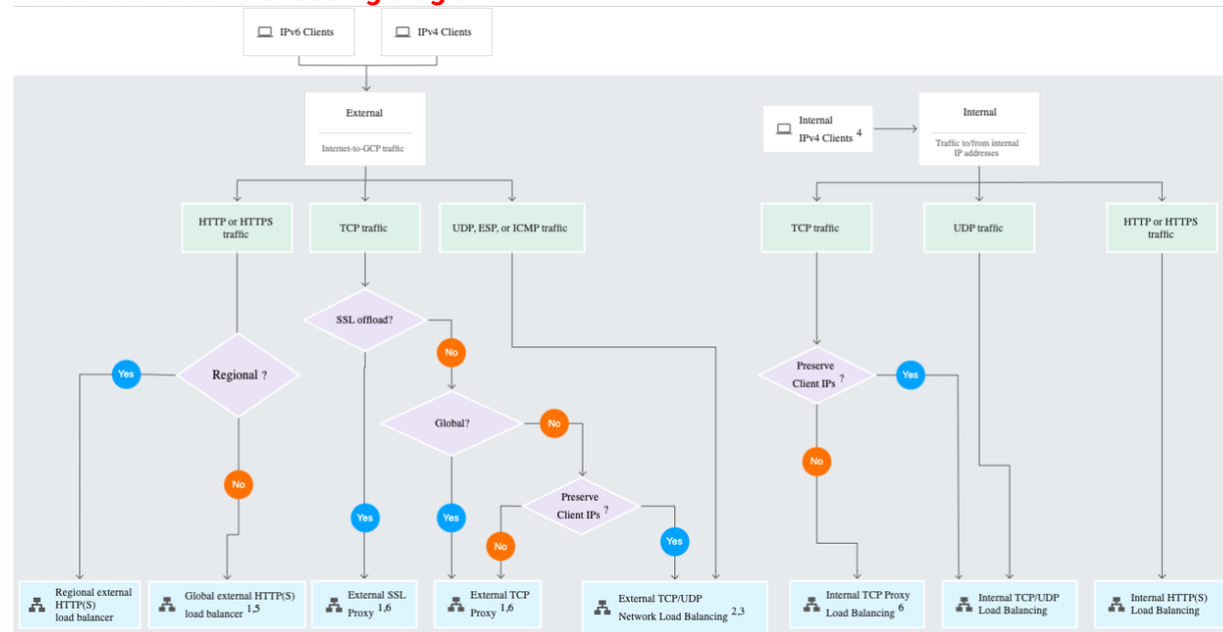
Kubernetes networking example

```
apiVersion: networking.k8s.io/v1beta1
kind: Ingress
metadata:
  name: my-ingress
spec:
  rules:
  - http:
      paths:
      - path: /*
        backend:
          serviceName: my-products
          servicePort: 60000
      - path: /discounted
        backend:
          serviceName: my-discounted-products
          servicePort: 80
```

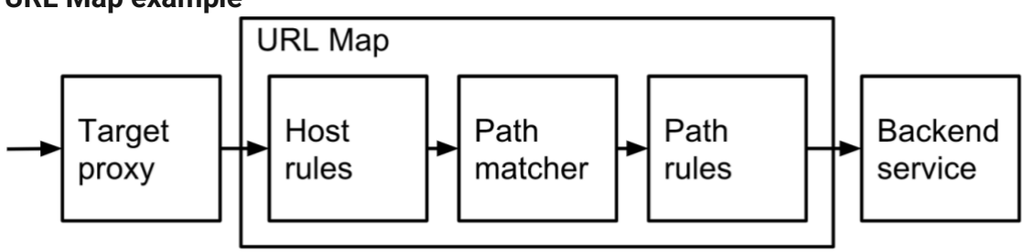
```
apiVersion: v1
kind: Service
metadata:
  name: my-discounted-products
spec:
...
```



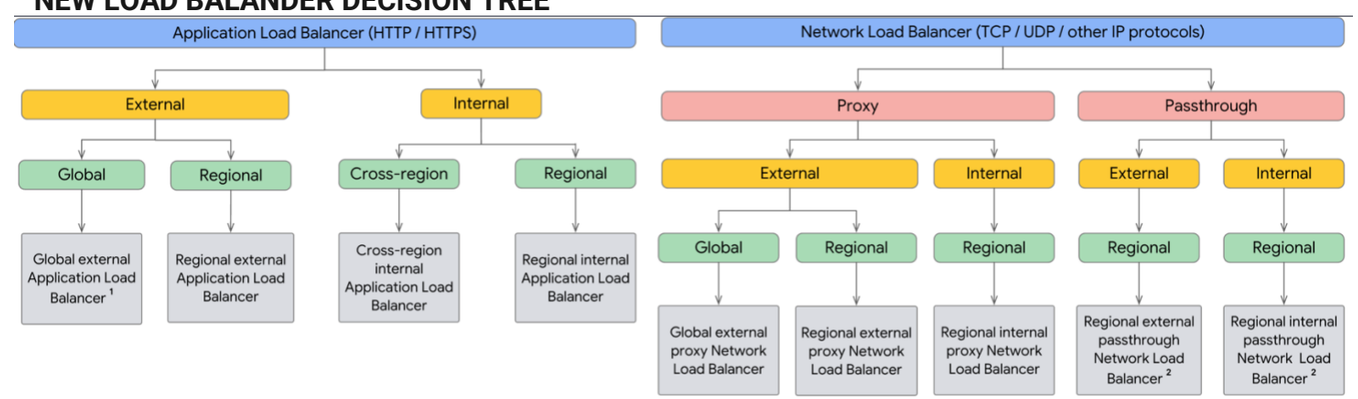
OLD load balancer choosing diagram



URL Map example



NEW LOAD BALANDER DECISION TREE



Google Kubernetes Engine	Cluster	Node	Pods	IP tables	Kubernetes subnetting
What it is GKE provides a managed environment for deploying, managing, and scaling your containerized applications using Google infrastructure.	**What it is** A cluster consists of at least one **cluster master** and multiple nodes. These master and node machines run the Kubernetes cluster orchestration system	**What it is** They are the worker machines that run your containerized applications and workloads Each node is managed from the master.	**What it is** **Pods** are the smallest, most basic deployable objects in Kubernetes. Pods contain one or more *containers*,	**What it is** Kube-proxy manages the iptables rules on the node.	**What it is** IP addresses are used for Pods, Nodes and services. The IP subbnetting scheme must take into consideration enough for expansion.
What you should know 1- IP allocation to (nodes, pods, services) 2- Health checks 3-Cluster network policy 4- masterAuthorizedNetworksConfig	**What you should know** 1- Kubernetes object all run on top a cluster 2- Cluster master runs control plane, API server, scheduler and resource controllers. 3-Cluster with shared VPC 4-Private cluster	**What you should know** 1- You can run a maximum of 110 Pods on a node with a /24 range. 2- Node run kubelet and services to support Docker containers. 3- IP assigned from primary range.	**What you should know** 1- Pods are ephemeral. 2- Pods do not "heal" or repair themselves. 3- Containers in a pod communicate via local host 4- IP assigned to Virtual NIC in the pod's network namespace.	**What you should know** 1- Facilitate forwarding within a cluster. 2- These differ from one scenario to the other	**What you should know** 1- How to assigned based on network requirement (Node, Pod, Services/Cluster IP) 2- Know subnet host count and restrictions 3- Node get IP from primary range, Pod and services from secondary range.

Review documents

Networking in Kubernetes
Cluster with shared VPC
Network policy
Authorized networks
Autopilot

Video

Deep dive Into Kubernetes Networking

GKE: Concepts of Networking

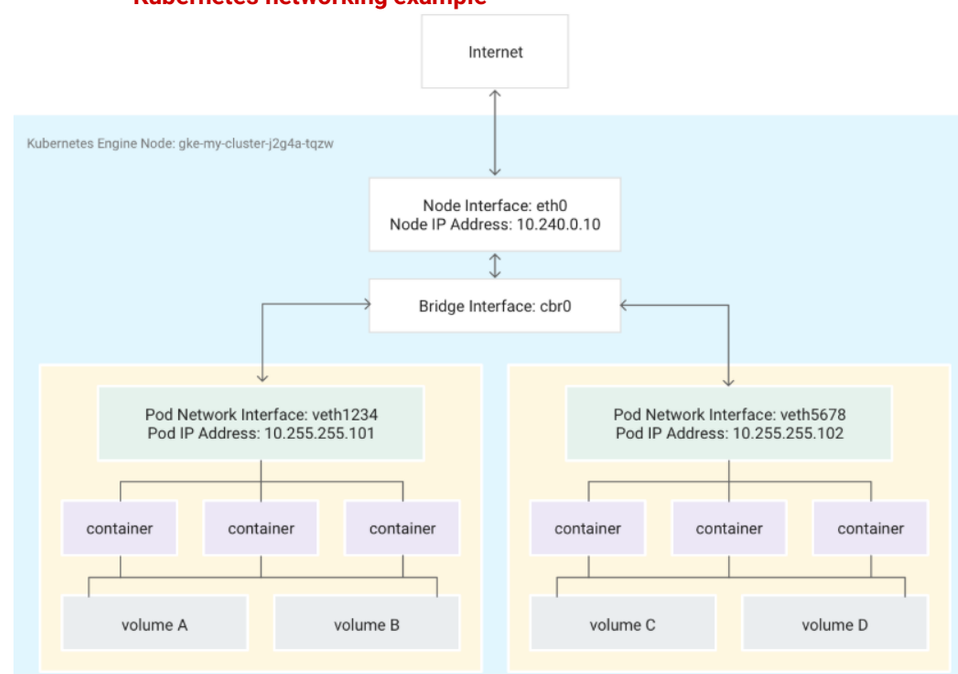
My experience

Kubernetes is represented as it should be on this exam. Pay attention to the networking components, subnetting and structure.

Subnetting guide

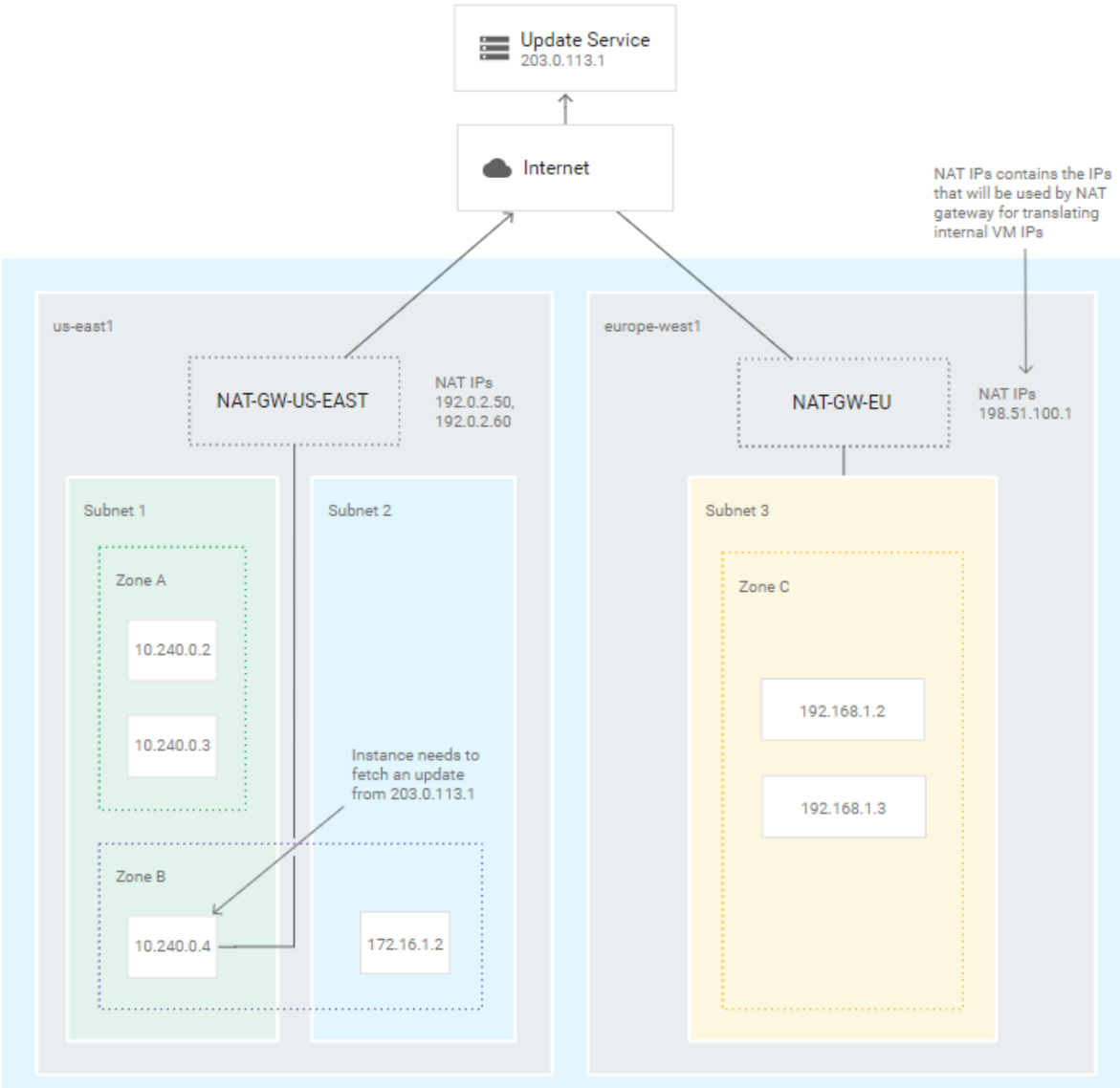
Range	Guidance
Nodes	Node IPs are taken from the primary range of subnetwork associated with the cluster. Your cluster subnetwork must be large enough to fit the total number of nodes in your cluster. For example, if you plan to create a 900-node cluster, the subnet used with the cluster must be at least a /22 in size. A subnet size /22 contains $2^{(32-22)} = 2^{10} = 1024$ - 4 reserved IP addresses = 1020 IP addresses, which is sufficient for the 900 node IP addresses needed for the cluster.
Pods	Each node currently allocates a /24 ($2^{(32-24)} = 2^8 = 256$) block of Pod IP addresses. These Pod IP addresses are taken from the associated secondary range for Pods. The Pod range as determined by the `--cluster-ipv4-cidr` or `--cluster-secondary-range-name` flags must be at least large enough to fit (total number of nodes × 256) IP addresses. For example, for a 900-node cluster, you need 900 × 256 = 230,400 IP addresses. The IP addresses must come in /24-sized blocks, as that is the granularity assigned to a node. You need a secondary range of size /14 or larger. A /14 range of IP addresses results in $2^{(32-14)} = 2^{18} \approx 262k$ IP addresses.
Services	Every cluster needs to reserve a range of IP addresses for Kubernetes Service cluster IP addresses. The Service IP addresses are assigned from the associated secondary range for Services. You must ensure that the block of IP addresses is sufficient for the total number of Services that you anticipate to run in the cluster. You define the ranges defined using the `--services-ipv4-cidr` or `--services-secondary-range-name` flags. For example, for a cluster that runs at most 3000 Services, you need 3000 IP addresses to be used for cluster IP addresses. You need a secondary range of size /20 or larger. A /20 range of IP addresses results in $2^{(32-20)} = 2^{12} \approx 4k$ IP addresses.

Kubernetes networking example



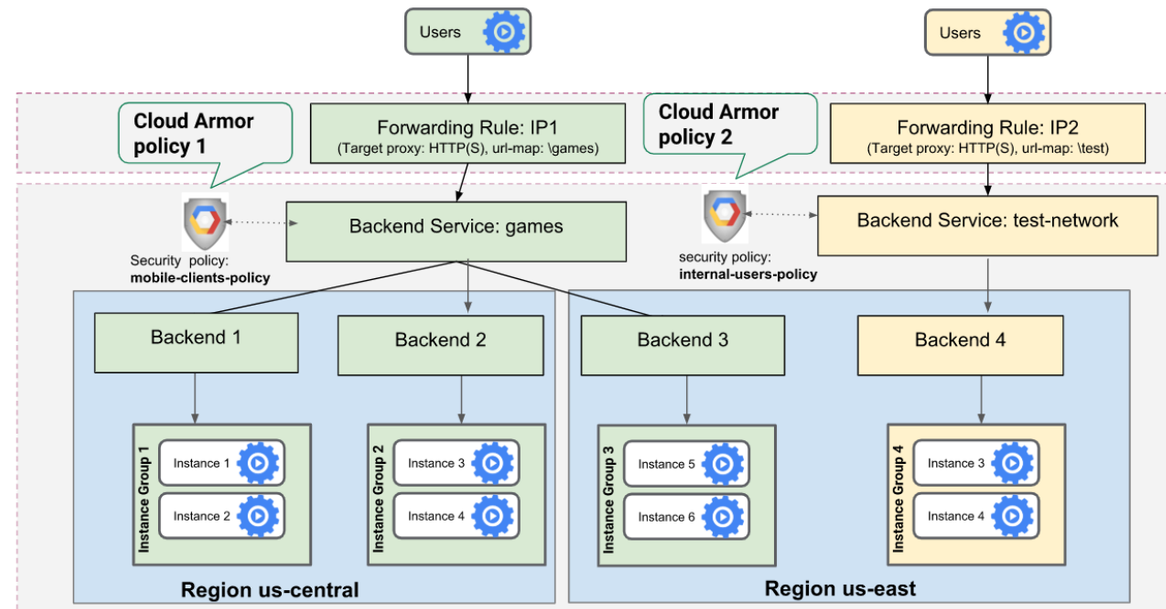
Session Affinity	Logging	Flow logs	Route based VPN	Policy based routing	IKEv1/v2	**Review documents** HTTPS logging Network and Tunnel routing
What it is Session affinity sends all requests from the same client to the VM instance as long as the instance stays healthy and has capacity.	**What it is** Log generation can be exported to Stackdriver Logging, Cloud Pub/Sub, Cloud Storage, or BigQuery.	**What it is** VPC Flow Logs record a sample of network flows sent from and to by VM instances. These are used for monitoring, forensics, real-time security analysis, and expense optimization.	**What it is** Consider when the peer gateway cannot use BGP. In route based VPN, you specify only the remote traffic selector. Classic VPN **static routing.**	**What it is** Consider when the peer gateway cannot use BGP. Policy based routing uses local and a remote traffic selectors. Use with classic VPN **static routing**	**What it is** IKEv1 limits remote traffic selectors to a single CIDR. Cloud VPN does not support creating a tunnel using IKEv1 with multiple Child SAs, each with a single CIDR	Session affinity Flow Logs Import Record-sets Static Routing **Labs** High Throughput VPN VPC flow Logs
What you should know 1- Supported by the following LB (Internal, TCP and SSL proxy, HTTP(s) & Network)	**What you should know** 1- Benefit of logging 2 – What kinds of logs 3- How to view data	**What you should know** 1- Cases to use this to gather info to lock down access, see traffic etc 2- How to enable	**What you should know** 1 - Local and remote traffic selector always **0.0.0.0/0**	**What you should know** 1- Configurable remote and local traffic selectors	**What you should know** 1- Difference between **IKEv1** and **IKEv2**	**My experience** Routes based, Policy based, logging, session affinity these can be troublesome if you do not understand each concept clearly for exams. **Get my hint, really troublesome.**
Key Points 1- How each type of LB handle session affinity options (None, IP, Protocol, Port)	**Key Points** 1- General awareness of log types and viewing.	**Key Points** 1- What it records, how to read it	**Key Points** 1- You must manually create and maintain the routes to the subnets in your VPC network on your peer routers.	**Key Points** 1- You must manually create and maintain the routes to the subnets in your VPC network on your peer routers.	**Key Points** 1- How this affect Multiple CIDR's traffic selectors Cloud VPN	
Compute instance	Key Management	SSH keys	NGFW	Cloud Armour	Cloud NAT	**Review documents** NAT Organization Cloud NAT Connecting using advanced methods
What it is Your virtual machine in the cloud. This is part of Google IaaS offering	**What it is** By creating and managing SSH keys, you can allow users to access a Linux instance through third-party tools.	**What it is** Create an SSH key pair for Compute Engine and manage ssh.	**What it is** Typical features of NGFW products include deep packet inspection (DPI) and firewalling on the application layer.	**What it is** Google Cloud Armor security policies are made up of rules that allow or prohibit traffic from IP addresses or ranges defined in the rule.	**What it is** Allows virtual machine (VM) instances without external IP addresses and private (GKE) clusters to connect to the Internet.	OS Login **Video** DDoS **Labs** HTTP Load balancer and cloud Armour
What you should know 1- IP assignment internal, external 2- Static IP's	**What you should know** 1- **How to configure** 2- What are the risk	**What you should know** 1- Manage SSH to your VM's	**What you should know** 1- Use multiple nic to setup	**What you should know** 1- Where and how it works (Edge, HTTPS load balancing proxy)	**What you should know** 1- How it works 2- Port allocations	**My experience** All these areas combined made for some very challenging questions. It's worth spending a bit of time reviewing.
Key Points 1- Testing updates 2- **Tagging** 3- SSH into VM	**Key Points** 1- How to assign to your VM's 2- How to remove from VM	**Key Points** 1- SSH to VM's	**Key Points** 1- Multiple network interfaces	**Key Points** 1- How it works (whitelist, blacklist) 2- DDOS	**Key Points** 1- Hide internal IP from external host.	

NAT image



Cloud Armour image

HTTP(S) LB + Cloud Armor Data Model



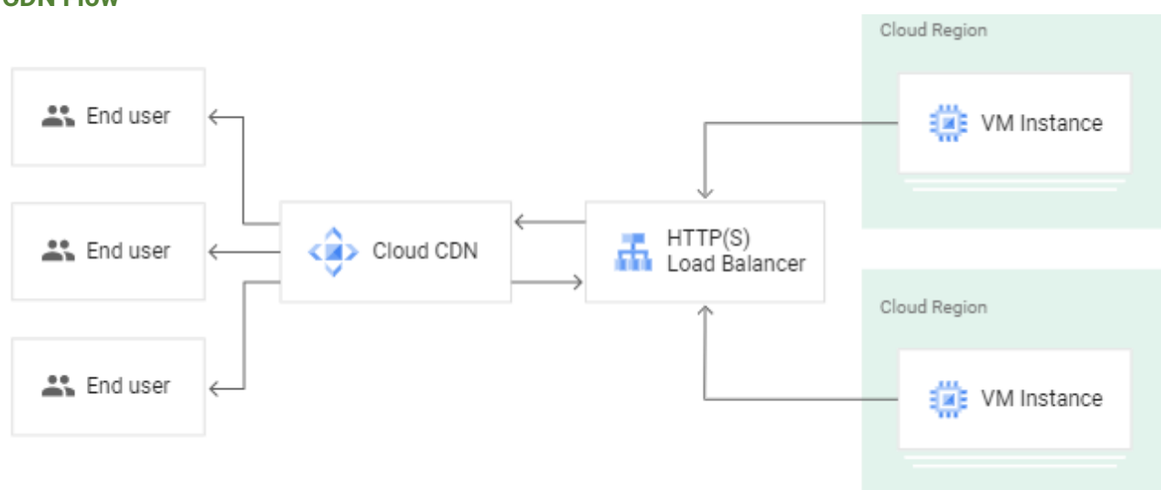
Session affinity image

Load balancer	Session affinity options
• Internal	• None • Client IP • Client IP and protocol • Client IP protocol and port
• TCP Proxy • SSL Proxy	• None • Client IP
• HTTP(S)	• None • Client IP • Generated cookie
• Network	Network Load Balancing doesn't use backend services. Instead, you set session affinity for network load balancers through target pools. See the `sessionAffinity` parameter in Target Pools.

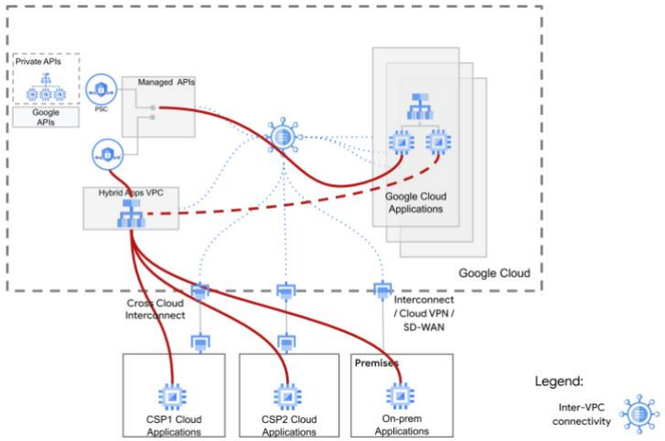
	What it is	Key points	What you should know	Review documents	Video	My experience
VPC Sharing	Used to connect to a common VPC network. Resources in those projects can communicate with each other securely and efficiently across project boundaries using internal IPs.	1- Centralised management 2- Firewall control 3- Internal RFC1918 communication	1- When to use (depend of services and controls necessary etc) 2- Who gets billed	Hybrid Connectivity Shared VPC	CONNECTIVITY Connecting to Datacentre	This will pop up. Who knows peering is sharing ☺. **Core topic**
VPC Peering	Allows internal IP address connectivity across two Virtual Private Cloud (VPC) networks regardless of whether they belong to the same project or the same organization	1- When to peer 2- What services you have access to 3- max peerings	1- How to peer to a shared VPC 2- Advertise custom routes	VPC Peering Option to exchange subnets routes		This will come. Know requirements of peering and how to peer to shared networks. **Core topic**
VPN	Connect your on-premises or other public cloud networks to GCP Virtual Private Cloud (VPC) securely over the internet through IPSec VPN	1- How to setup 2- IPSEC used 3- Best practices 4- UDP 500, UDP 4500, and ESP (IPsec, IP protocol 50)	1- Multiple tunnels 2- ECMP 3- View VPN activity logs (mql) 3- Max bandwidth 3 Gbps	Cloud VPN Logs		**Core area**. Make sure you know VPN very well. Know high availability, multi tunnelling various scenarios for use.
Dedicated Interconnect	Use dedicated Interconnect to connect to Google's network through a highly available, low latency connection. (**10GB** or higher)	1- Single mode fiber 10GBase-LR 2- LACP for links & 802.1q Vlan 3- Support EBGP with multihop min 4 4- IPv4 link local addresses (169.*.*.*) 5- Meet at Co Location facilities	1- Type (system and custom) 2- Default route & Subnet route 3- Static and Dynamic routes 4- Min 10GB 5 - Layer2	Dedicated Interconnect		**Core area** well represented in exam. Did I say **well** represented?
Partner Connect	Use Google Cloud Interconnect - Partner (Partner Interconnect) to connect to Google through a supported service provider. (from 50 MB up)	1- Best case use 2- Min size 50MB 3- Not over the internet 4- Use ASN 16550	1- How to setup (VLAN, Key, request location and capacity) 2- Difference L2 and L3	Partner Interconnect		**Core area** well represented in exam also. **If you don't know all the interconnect options well don't do the exam.**
Cross-Cloud Interconnect	Allow high speed dedicated connection directly to other cloud providers.	1- Options 10GB/ 100GB 2- Steps to step up	1- Process to set up	Cross-Cloud Interconnect overview		Not on exam but could be in the future.
VLAN	VLAN attachments (also known as **Interconnect Attachments**) determine which Virtual Private Cloud networks can reach your on-premises network through an interconnect	1- Works with Cloud router 2- Maximum speed 10 Gbps 3- Multiple VLANs	1- Create VLAN attachments over Cloud Interconnect connections that have passed all tests and that are ready to use	Creating VLAN attachment		Questions on this point may appears. You need a VLAN for what?
Dynamic routing	Dynamic routing is suitable for any size network. It frees you from maintaining static routes. Also, if a link fails, dynamic routing can automatically reroute traffic if possible.	1- Cloud router necessary 2- BGP session necessary	1- IP automatically updated and propagated 2- Modes are Global or regional	Setting the network dynamic routing mode		How are routes updated? Manually or automatically. Understand how this works.

Operations (stackdriver)	**What it is** Stackdriver Logging allows you to store, search, analyze, monitor, and alert on log data and events from Google Cloud Platform and Amazon Web Services (AWS).	**Key points** 1- Individually enabled 2- Logging is supported for TCP and UDP only	**What you should know** 1- Troubleshooting viewing (Log entries missing, cannot view logs, where to apply logs)	**Review documents** Stackdriver	**Video** Stackdriver	**My experience** You should have an idea where to look, what rules are logged, priorities and how to fix.
Cloud CDN	**What it is** Cloud CDN uses Google's global edge network to serve content closer to users, which accelerates your websites and applications.	**Key points** 1- **What it does how to enable** 2- How to enable (HTTPS LB)	**What you should know** 1- How to trouble shoot 2- Invalidation 3- Serve none cached content 4- Cache Control 5- How to enable	**Review documents** CDN Overview CDN Invalidation CDN troubleshooting CDN Signed URL's	**Video** CDN **Labs** Cloud CDN	**My experience** **Core area**. This helps serve content faster. Know how it works well for exam.
Media CDN	**What it is** Google Cloud Media content delivery solution.	**Key points** 1- **use cases** 2- Support streaming media and live streams	**What you should know** 1- Difference between media CDN and Cloud CDN	**Review documents** Media CDN	**Video** Media CDN	**My experience** **Good to know.**
Peering	**What it is** Access G Suite and Google Cloud features. Connect directly with Direct Peering, or choose a partner with Carrier Peering.	**Key points** 1- When to peer 2- What services you have access to		**Review documents** Direct peering Carrier Peering		

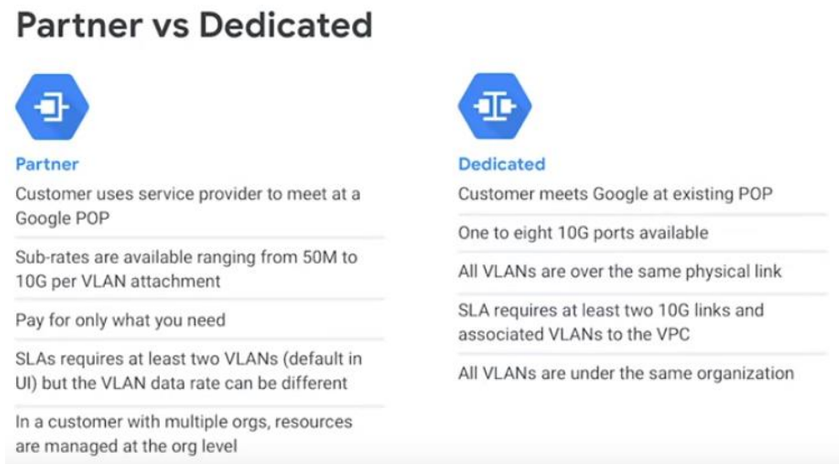
CDN Flow



Cross-Cloud Network



Partner and Dedicated Interconnect comparison



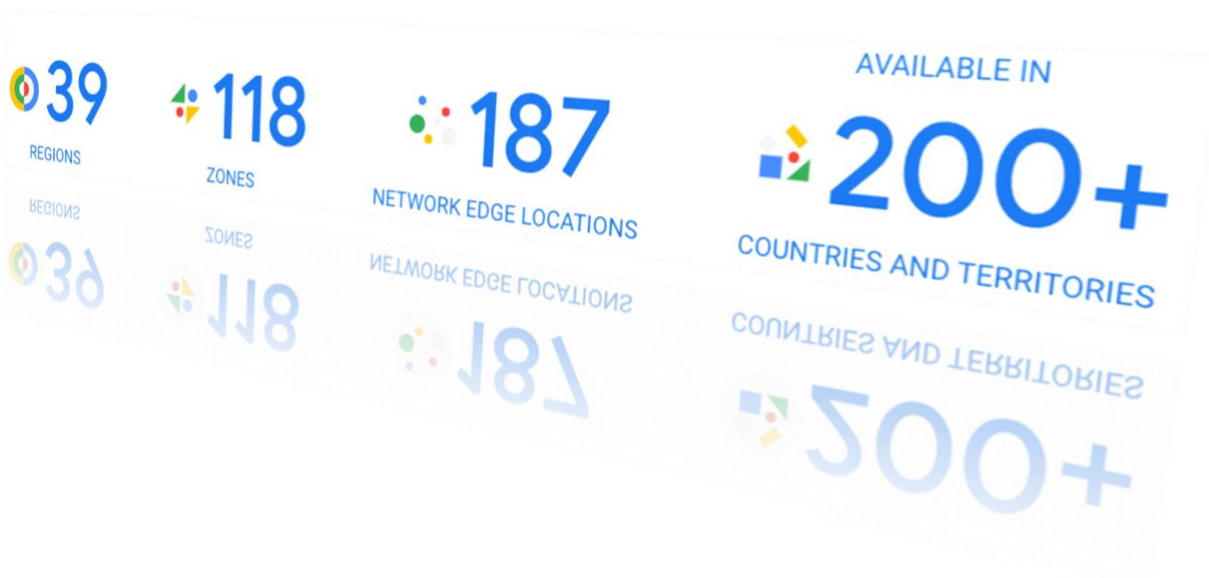
Cloud Networking

My closing thoughts

Networking is a core component of the cloud. In fact, public cloud is based on advanced SDN networking and the internet. Whether you are using code to deploy your environment or IaaS, the end result is that you want people to connect to your apps and services. If your apps are not reachable then it makes no sense. Constructing a well-defined network is important to ensure content delivery and performance is kept at its **SLO** ☺ as much as possible.

Video
A year in GCP networking
Documents
Networking 101 sheet

Google presence



Thanks for reviewing

Please visit the official certification outline HERE

Official practice test HERE

ps. These are my notes and tips that helped me pass the networking exam on the second attempt this is a tough exam. Every area on the document represents a topic that has a strong probability of appearing. Some are not on the exam but great to stay updated. Google may change the exam requirements at any time so always review the outline.

The knowledge is free it just cost me some time to put together. Please share with your network who may be interested in Google Cloud Networking or need a quick refresher on networking topics.

You can also check my other Google **prep notes** for the **Security, DevOps and Engineer** exam **HERE**

Bonne Journée