

Inside VPC



clever cloud VPC



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Clever Cloud
CTO





Wish list

- **Deterministic**
 - Avoid dynamism
 - Simplicity, Cost less and more robust
 - Using dumb network devices
- **Scalable**
 - Easy Virtual Network Functions development
 - typical clos-network fabric
- **Programmable**
 - FaaS cold start **ms**, hot start **ns**
 - **API** everything
- **Secure**
 - Encryption is free
 - Isolation
 - Control

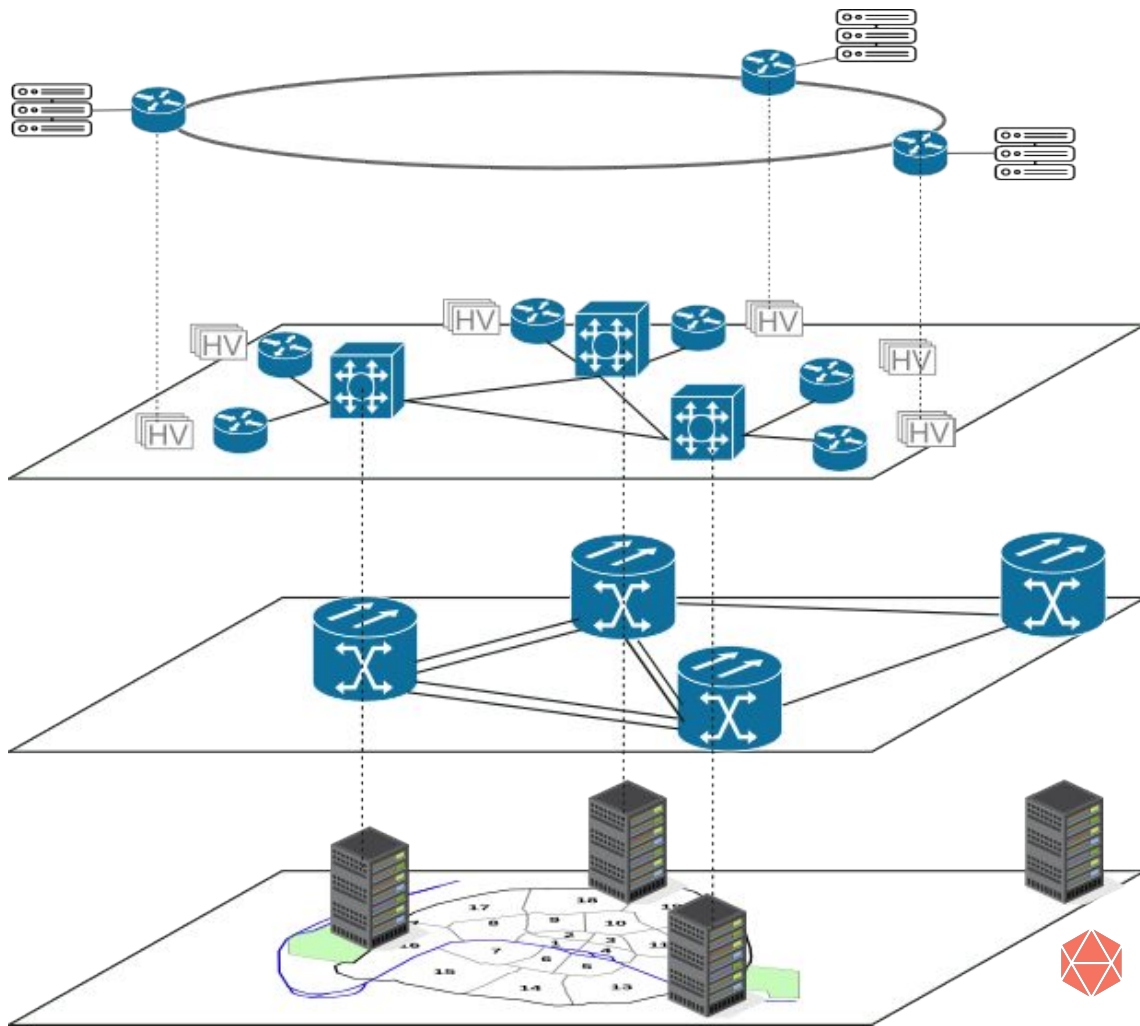


Overlay Network

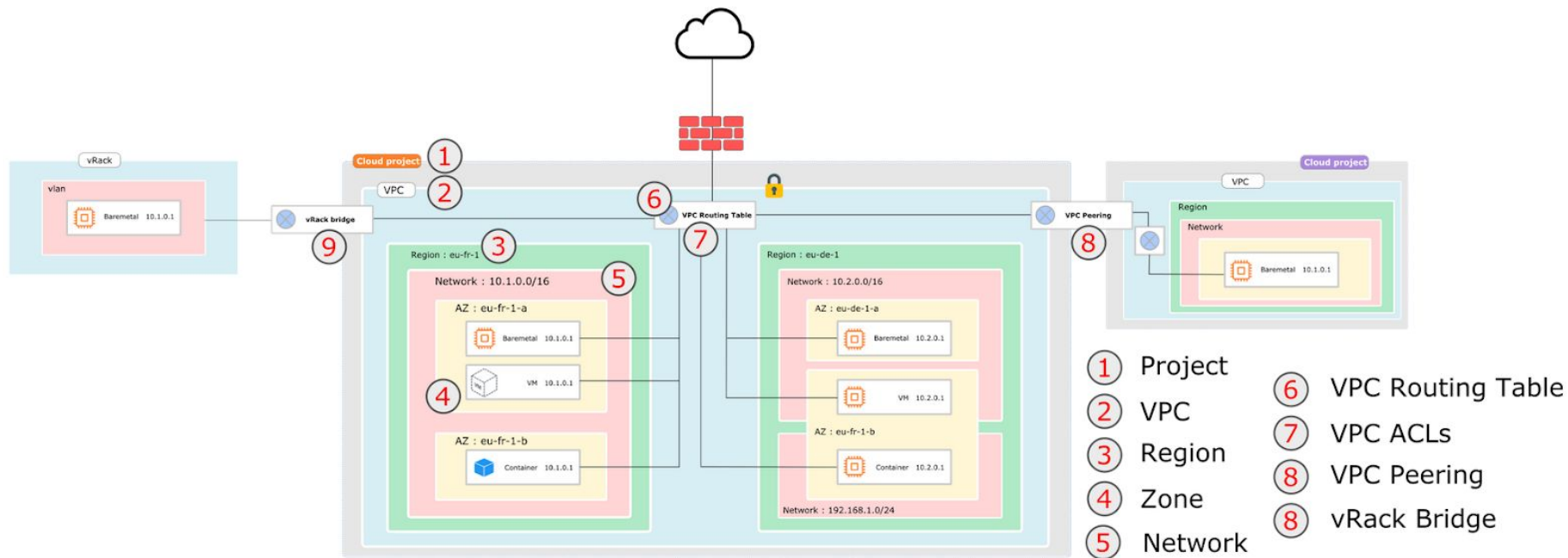
Underlay Network

Optical layer

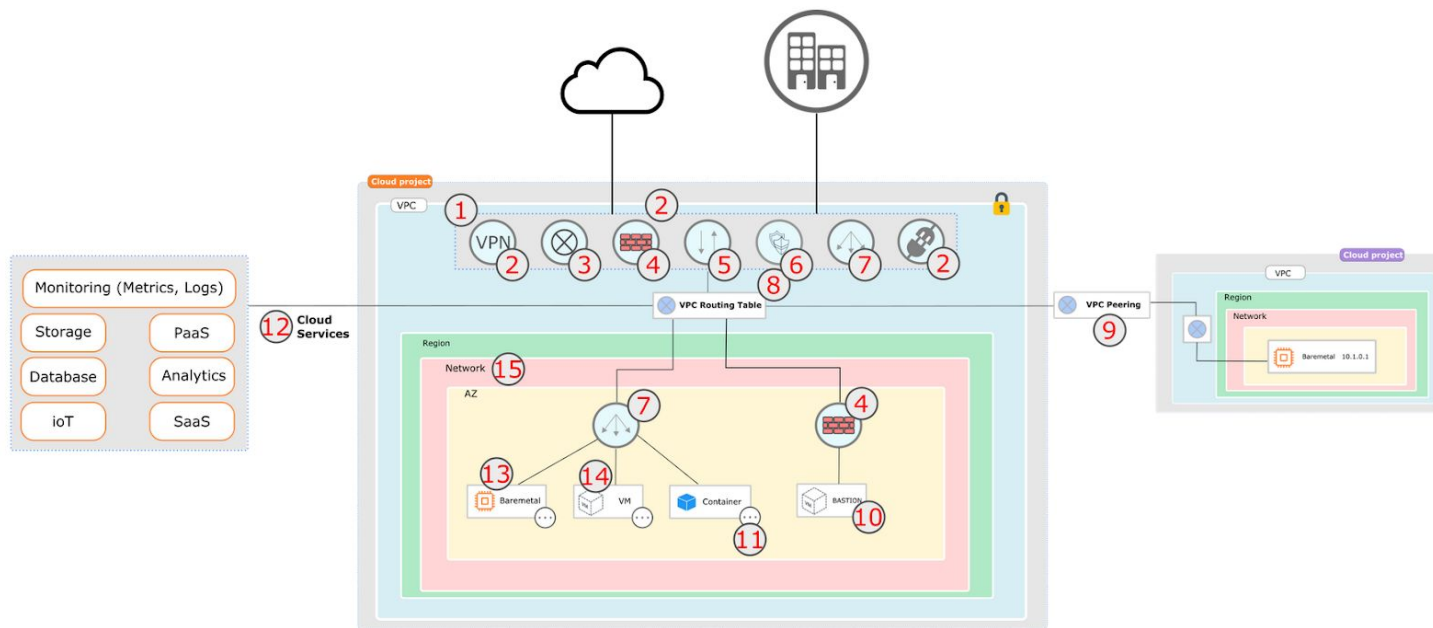
Sites



VPC Architecture



VPC Customer Experience



① Edge Services

② Connectivity

③ Router

④ Firewall

⑤ Cloud NAT

⑥ Network Defense

⑦ Load Balancer

⑧ Access Controls

⑨ Network Peering

⑩ Bastion

⑪ Service autoscaling

⑫ Cloud Services

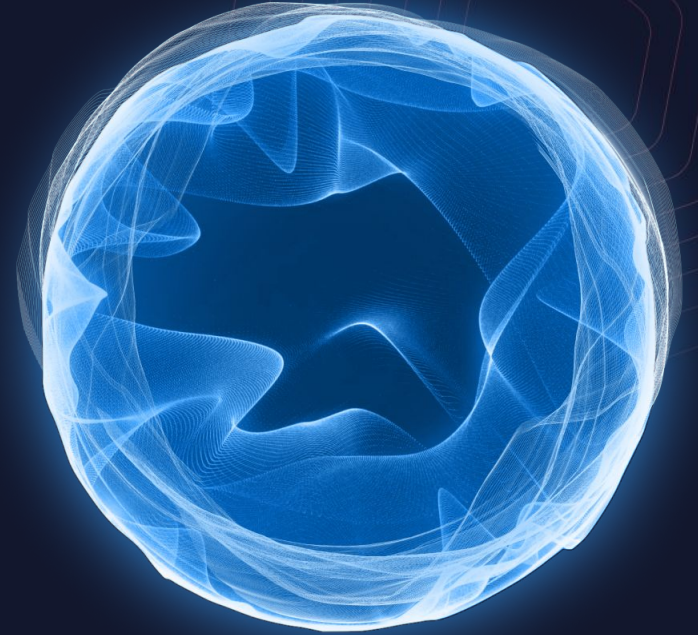
⑬ vIP

⑭ vNI

⑮ Networks



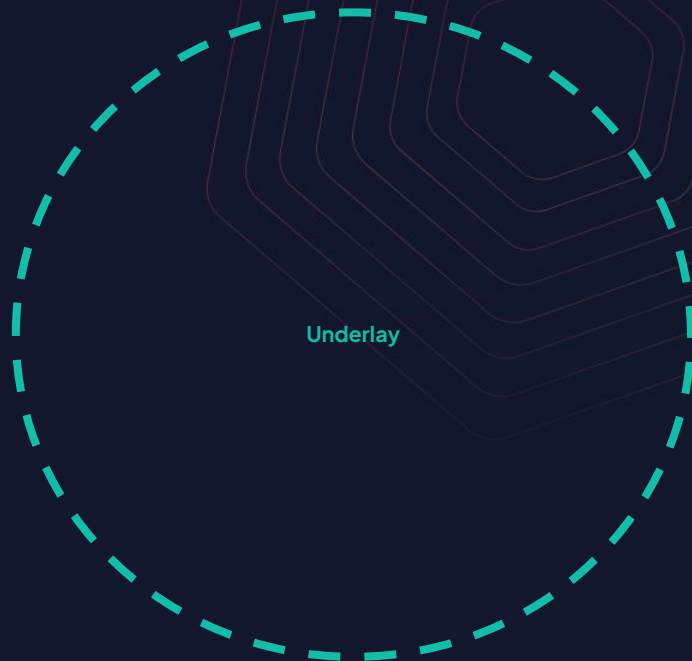
Designing Clever Cloud VPC



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The **fabric underlay** specs :

- maximum performance
- optional Service Chaining
- avoid useless encapsulations



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The **fabric underlay** specs :

- maximum performance
- optional Service Chaining
- avoid useless encapsulations

So this will be an **IPv6 only network**

- Better switching performance at low cost
- make use of **jumbograms** (rfc2675)
- Next-header Type-Length Variable (TLV) field



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An **edge** translates packets from a network to another one.

An **edge** is also responsible to **encrypt overlay network packets** inside the **fabric underlay**

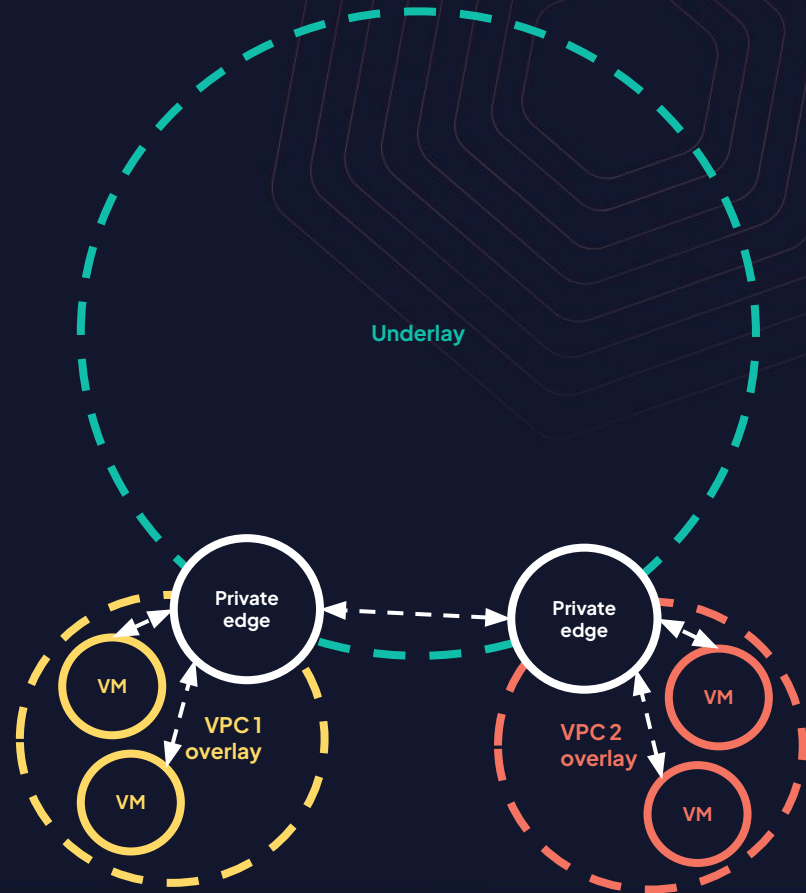
private edges translate packets between the **fabric underlay** and customer **VPC overlays**



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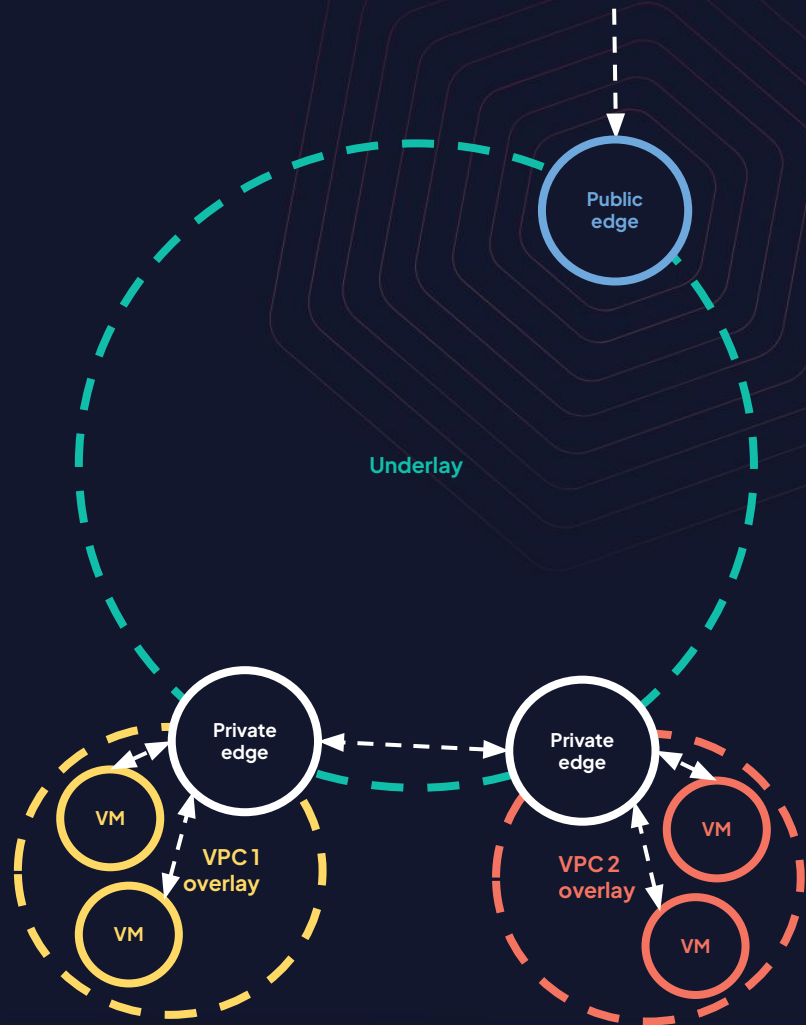
Private edges communicate in the **fabric underlay** to route traffic between **virtual machines** of the same **VPC** or with **another VPCs** (VPC peering)

VPC overlays provide **IPv4** and/or **IPv6** L3 networks



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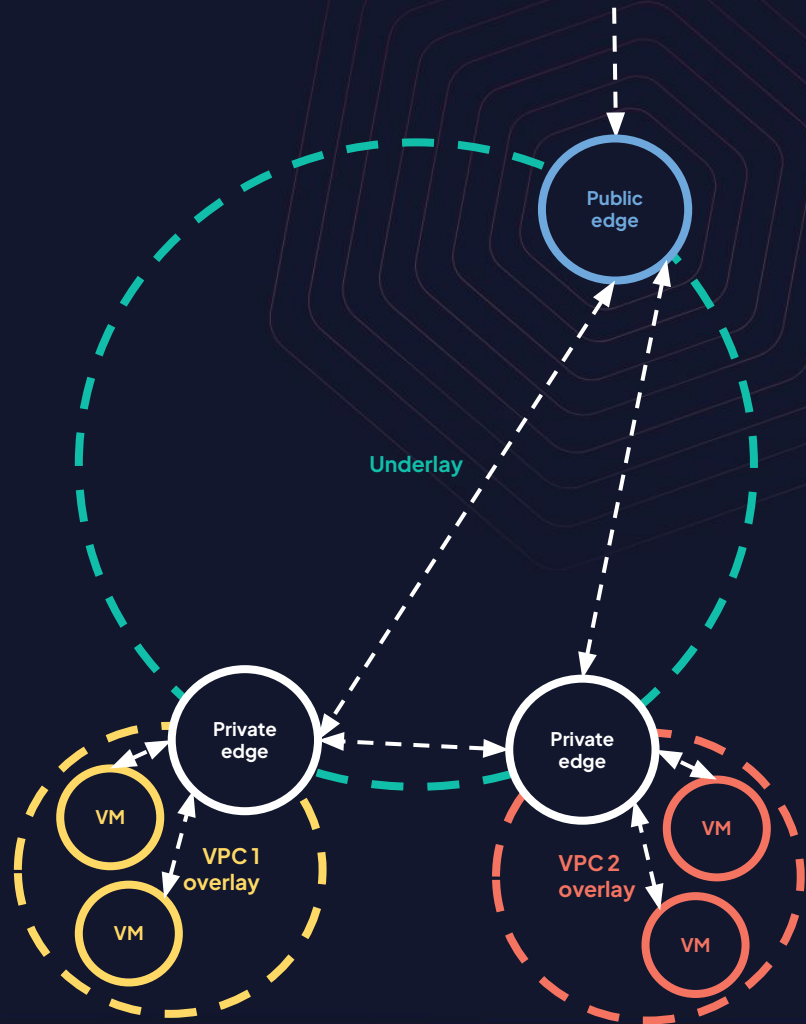
A **public edge** translates packets coming from the Internet into **fabric underlay**



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Private edges also interact through the **fabric underlay** with the **Public edge** to provide internet access

Together they provide **VPC Gateway** to users

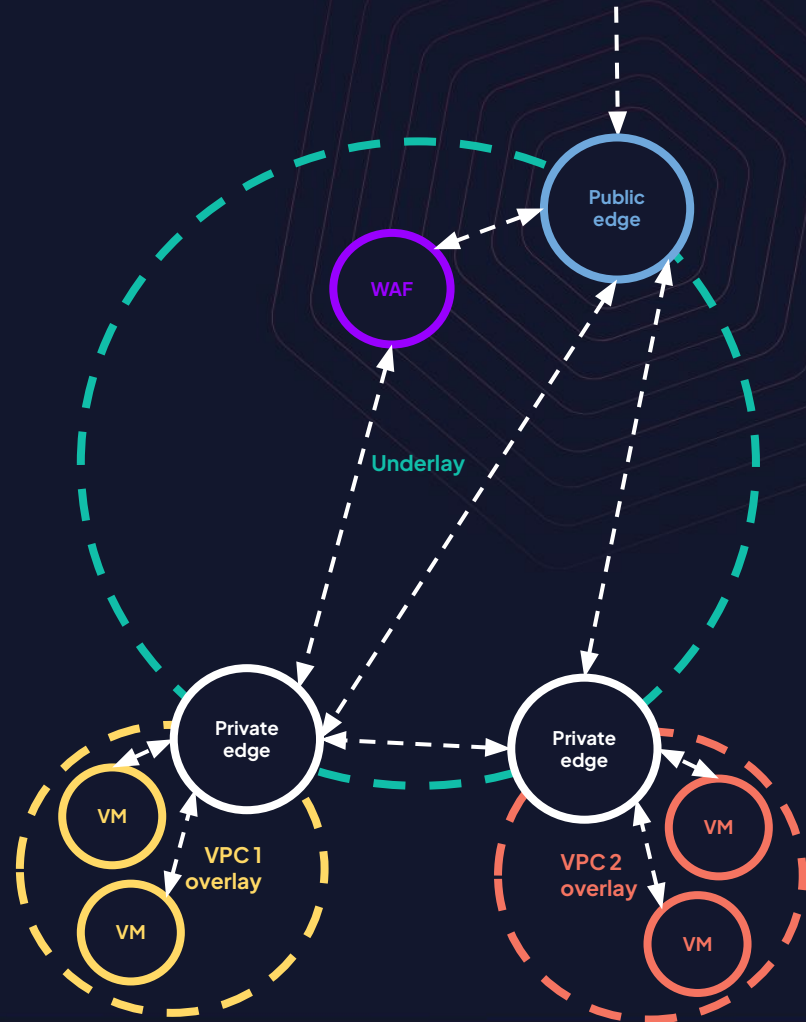


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Stateful network function can be transparently inserted by an **edge** for a given flow for additional traffic management (reverse proxy, L4LB, L7LB, FW, WAF, ...)

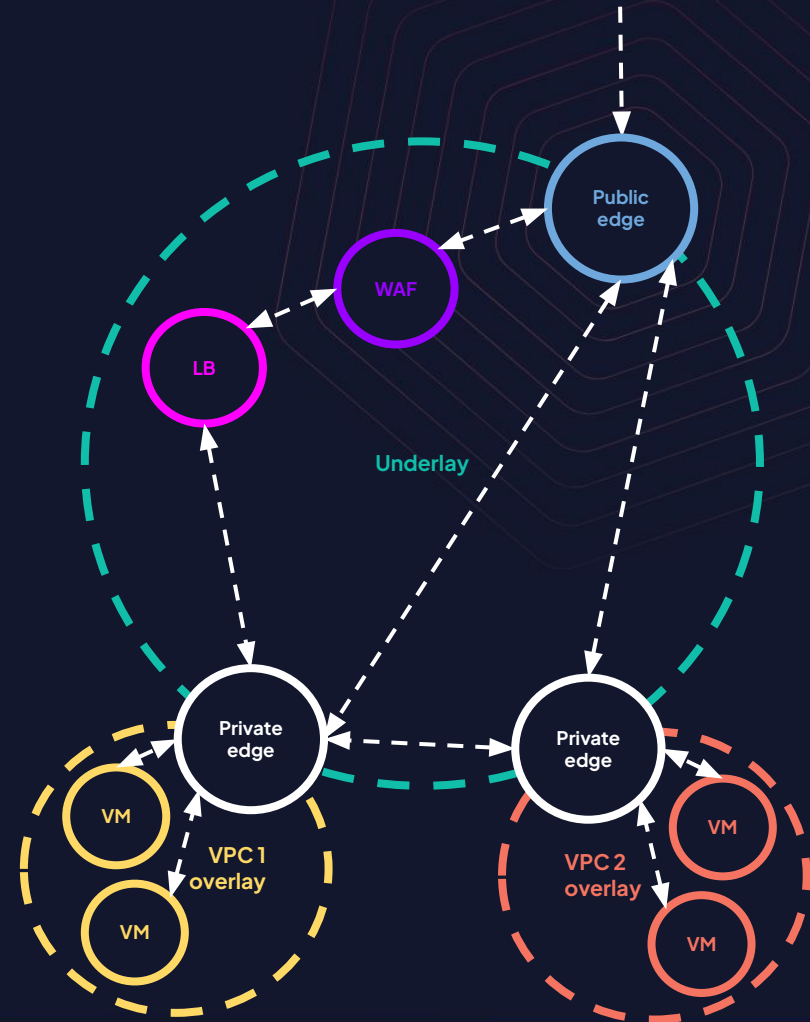
FW can be a customer vendor appliance

This is achieved by using similar concept used in Segment Routing v6 (SRv6) or MPLS



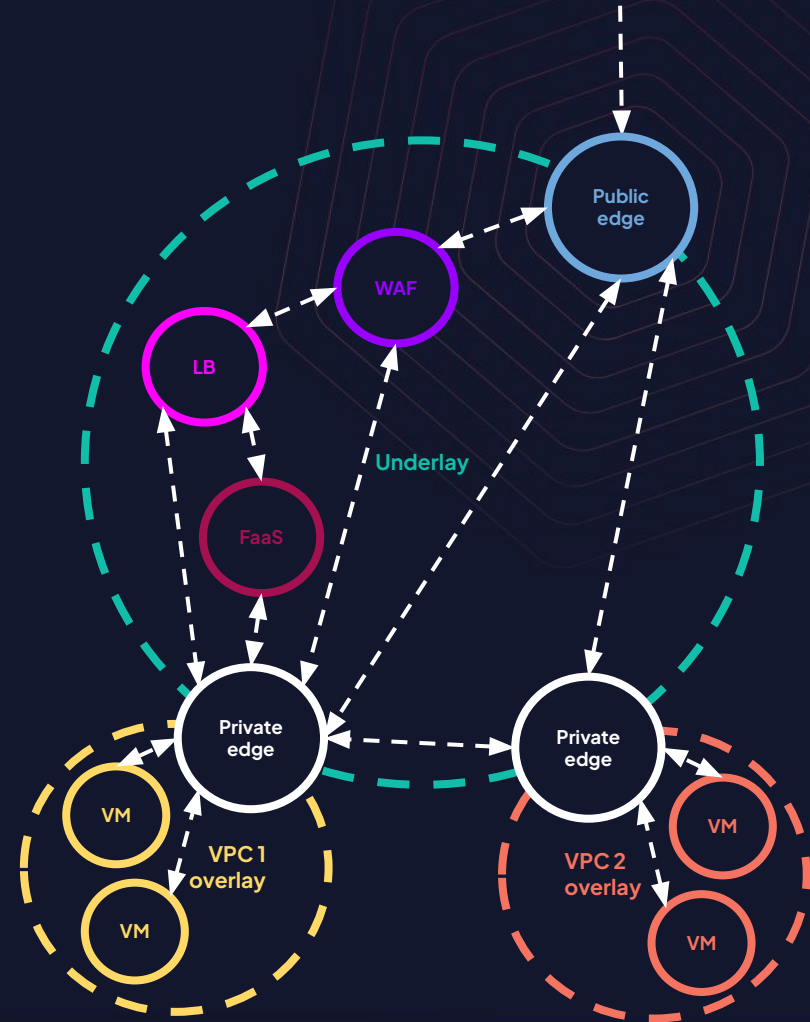
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With Service Chaining, we chain **stateful**
and stateless network functions (L3LB,
Security Groups/ACLs)



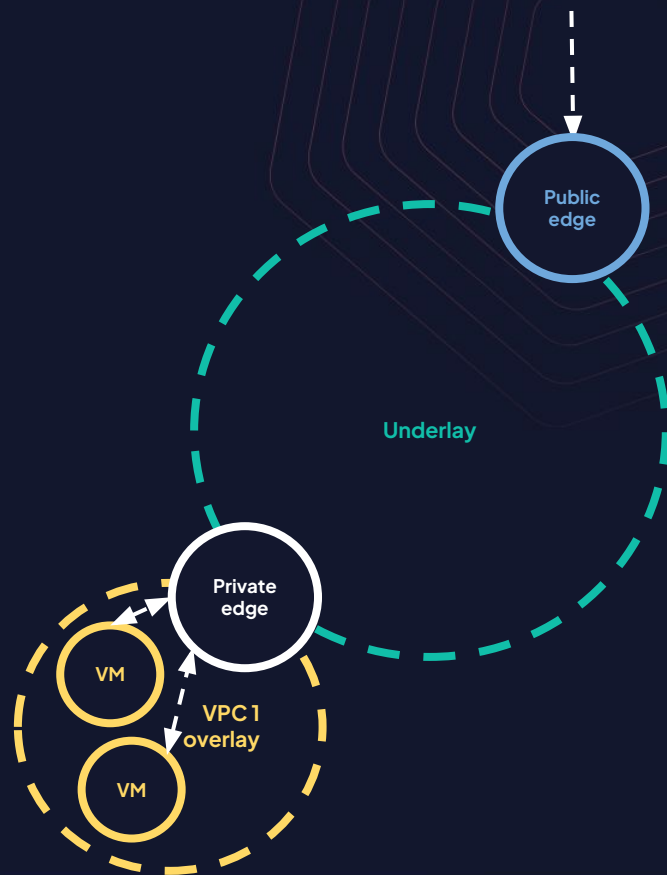
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Chain multiple **network functions**, before
accessing **VPC overlay** or returning to **the Internet**



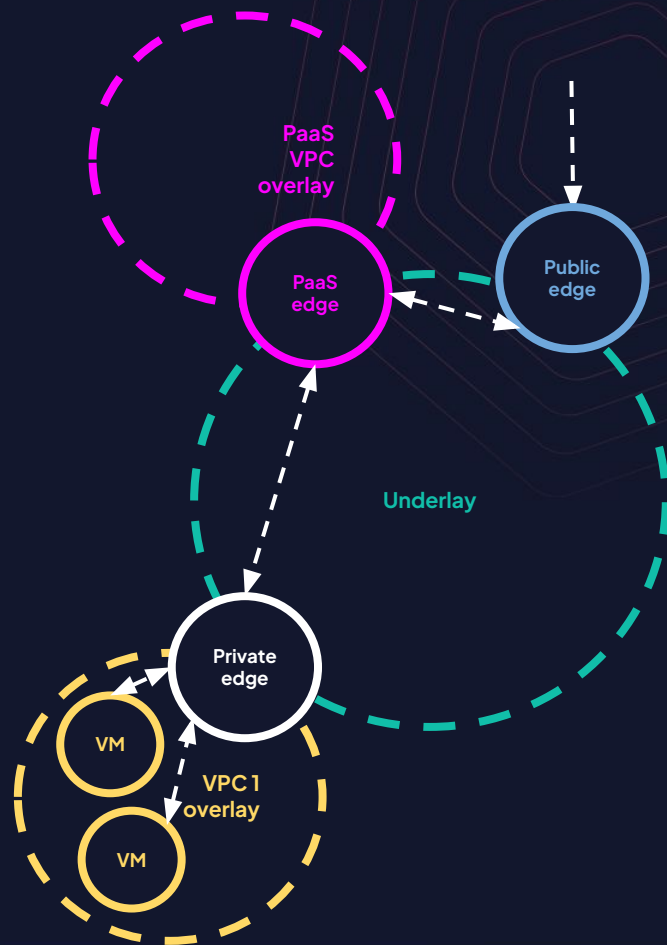
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Taking a few steps back from earlier...



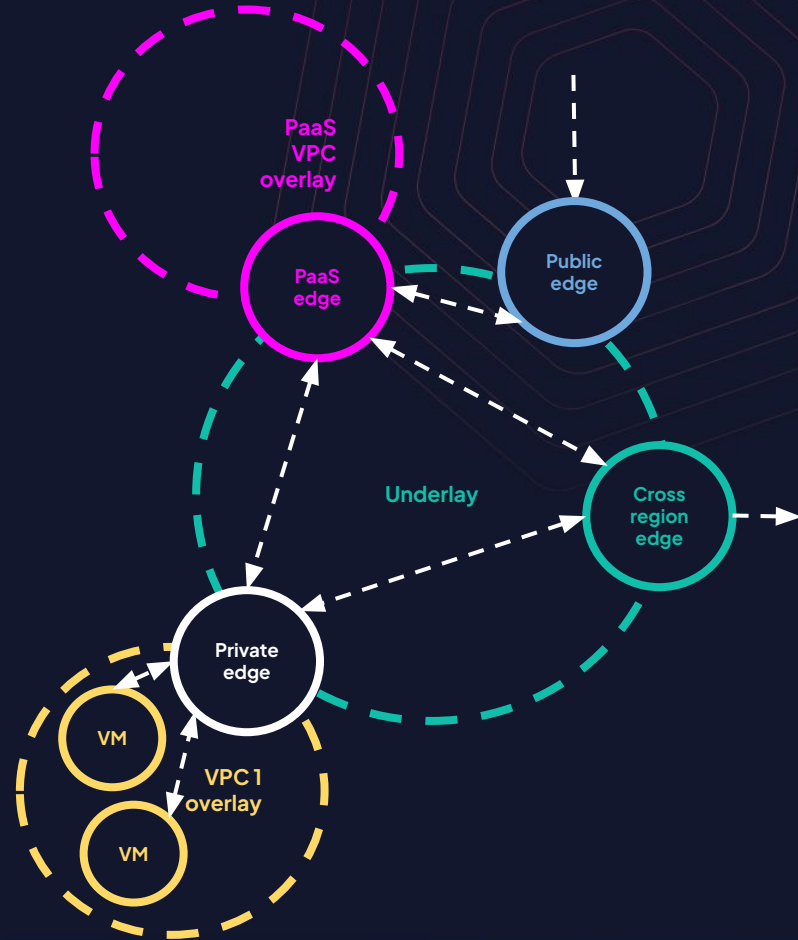
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(PaaS) edge interacts with the current
Platform



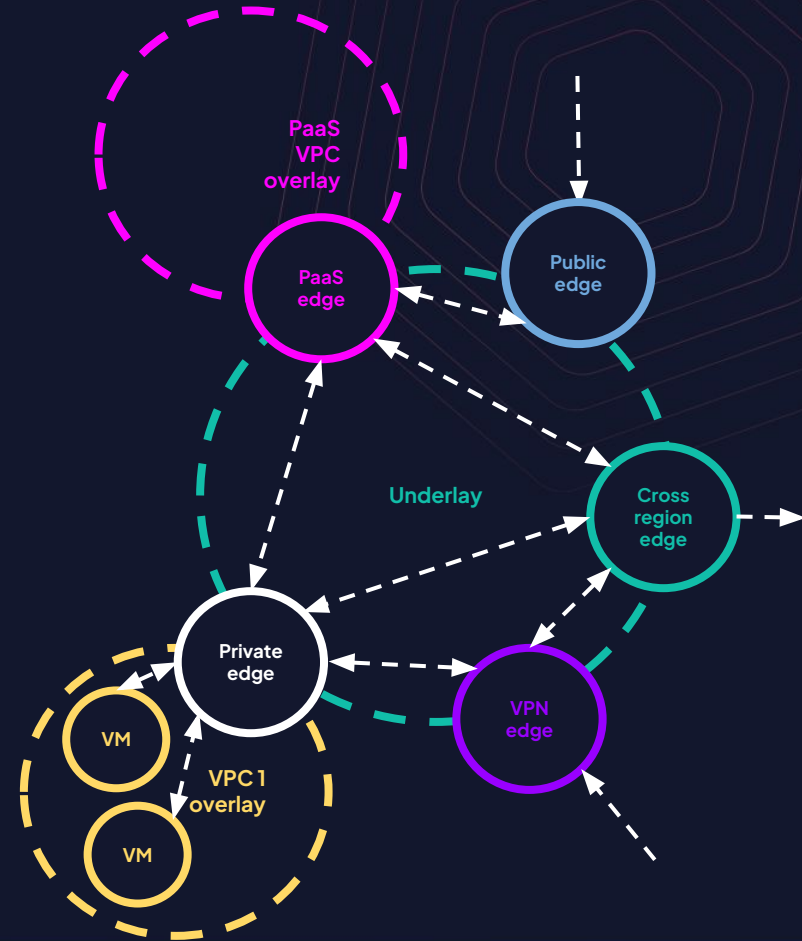
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Cross region edge is designed to manage **peering** between **two or more VPCs** across two **fabric underlays** through the backbone



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VPN edge provides connectivity through
VPN and **directly joins a VPC**



IPv6 Header

Version	Traffic Class	Flow Label	
Payload Length		Next Header	Hop Limit
Source Address			
Destination Address			

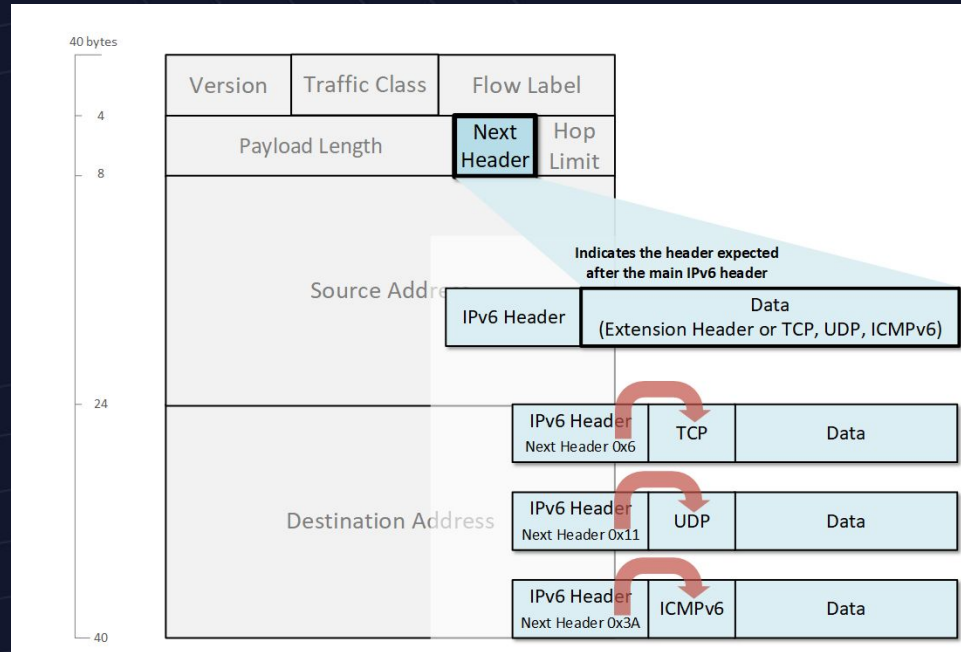
IPv4 Header

Version	IHL	Type of Service	Total Length	
Identification			Flags	Fragment Offset
TTL		Protocol	Header Checksum	
Source Address				
Destination Address				
Options				Padding

Legend

- Fields **kept** in IPv6
- Fields **kept** in IPv6, but name and position changed
- Fields **not kept** in IPv6
- Fields that are **new** in IPv6





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encoding / decoding

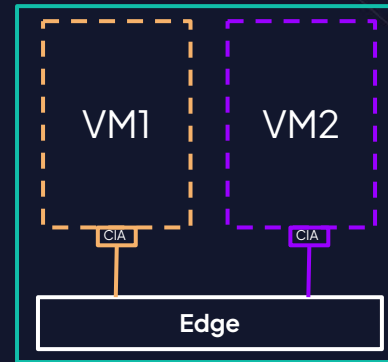
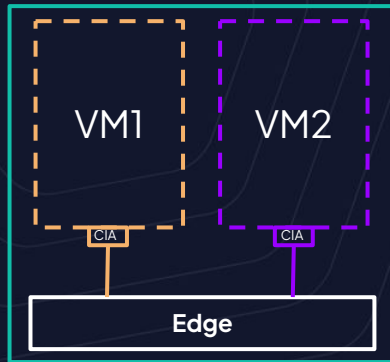
VPC id + pck src + pck dst

VPC id + pck src + [pck dst]



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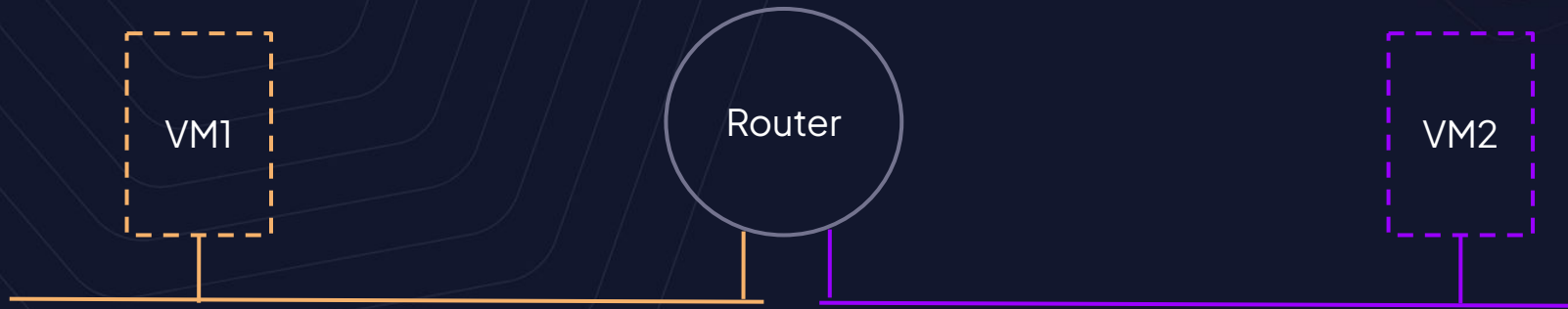
```
$ vpc vpc add 1000 vm0@vpc2_0 fd00::0:10 CC:2A:2A:00:00:0A -410.0.0.10 -6 fd00::cc:0:10  
$ vpc vpc add 1000 vmgtw@vpc2_0 fd00::0:11 CC:2A:2A:00:00:0B -410.0.0.11 -6 fd00::cc:0:11  
$ vpc vpc add 1001 vm1@vpc2_1 fd00::1:10 CC:2A:2A:00:01:0A -410.0.1.10 -6 fd00::cc:1:10  
$ vpc vpc add 1001 vmgtw@vpc2_1 fd00::1:11 CC:2A:2A:00:01:0B -410.0.1.11 -6 fd00::cc:1:11
```



Underlay

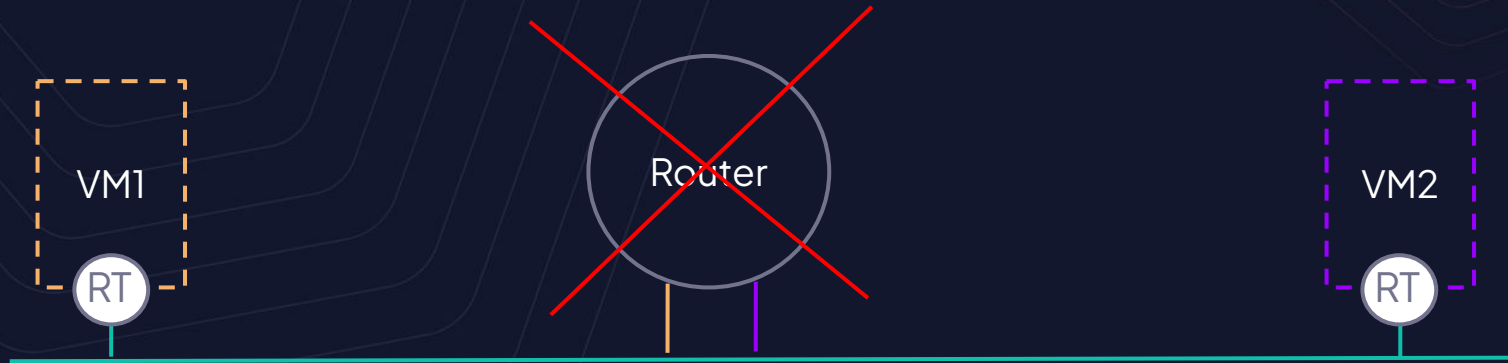
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VPC Peering



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VPC Peering



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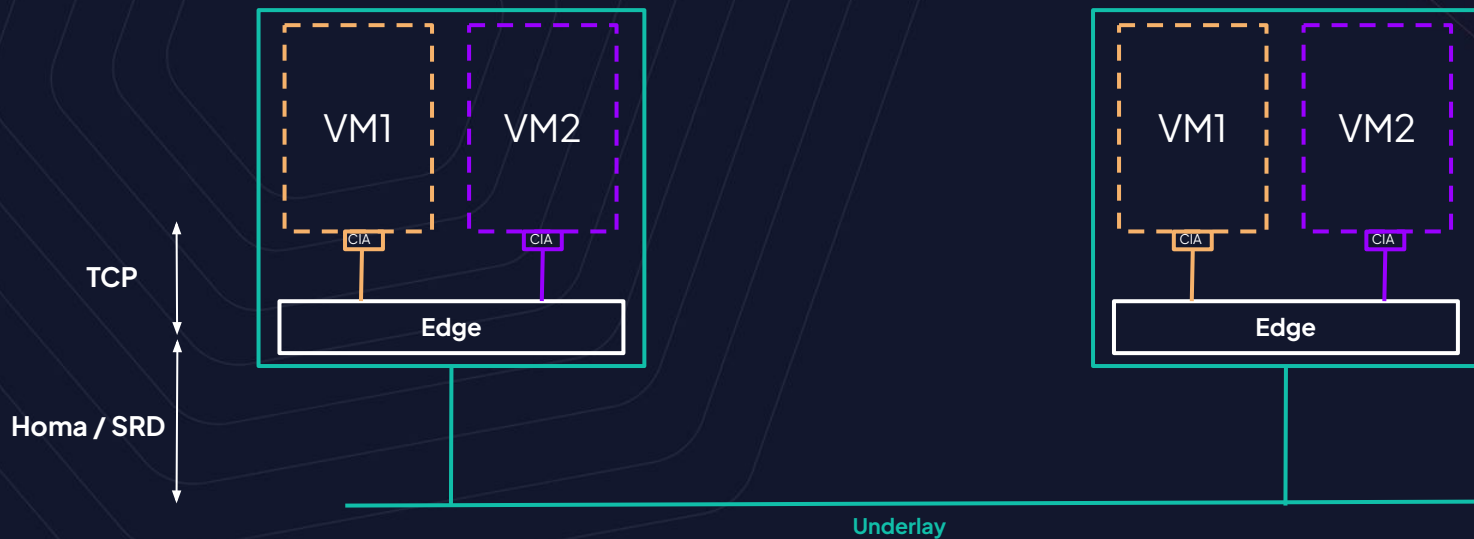
Kalray

- Accelerated Networking (Hardware offload)
- Manycore architecture
- Virtualized baremetal (network & storage)
- next step : hypervisor



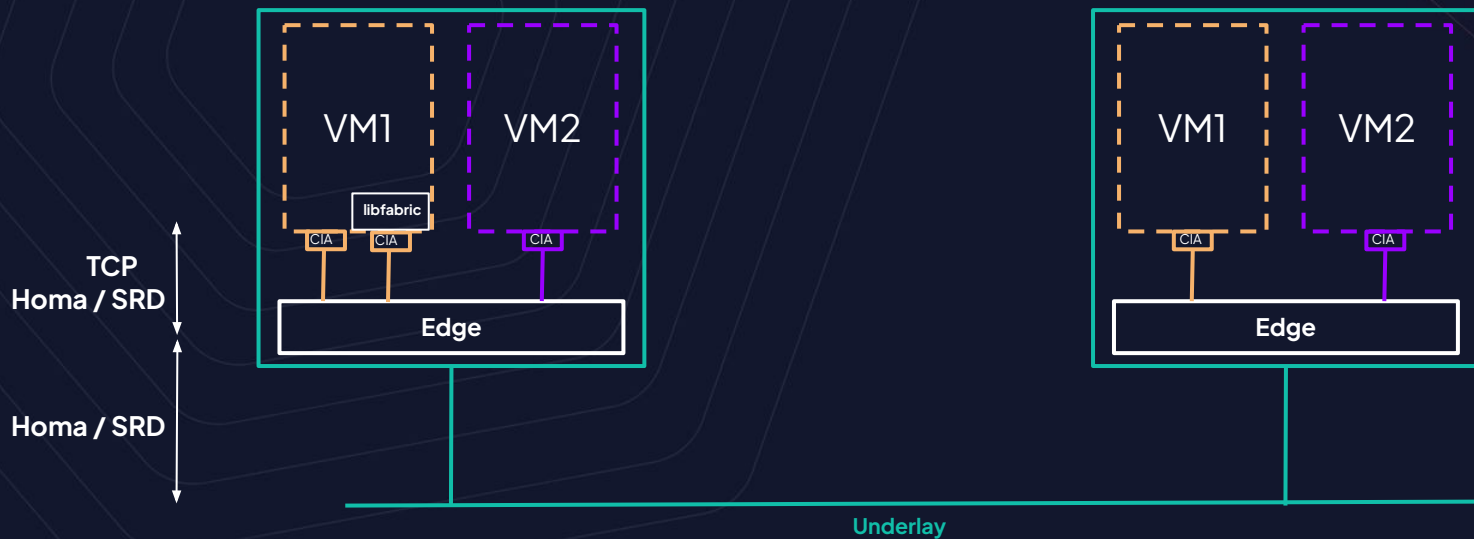
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Next... (Next...) step



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Next... (Next...) step



?



Overlay Network

Underlay Network

Optical layer

Sites

Overlay portability & Network Groups

Underlay Portability

Overlay Mesh Network

Alternative Cloud Provider



Custom Firewall Appliance?

