Cisco Multicloud Defense

Architecture Guide

March 2024

Contents

Overview

The Cisco Multicloud Defense Architecture Guide provides Reference Architecture diagrams of how the Cisco Multicloud Defense solution is deployed within each Cloud Provider and for each security use-case. These diagrams describe the architectural deployment scenarios available to address different security requirements. Cisco Multicloud Defense simplifies cloud security by orchestrating the deploy and management of advanced workload protection. The reference architectures are intended to provide users with information on how Cisco Multicloud Defense is deployed and are not intended for manual configuration.

The Cisco Multicloud Defense solution is made up of a set of components: Controller/UI, Gateway and Terraform Provider. The Cisco Multicloud Defense Controller/UI is a SaaS delivered component that is managed and maintained by Cisco. The Multicloud Defense Gateways are a PaaS component that is deployed within the customer Cloud Service Provider (CSP) account/subscription/project and managed through Cisco Defense Orchestrator. The Multicloud Defense Gateways are orchestrated and managed by the CDO using either the Multicloud Defense UI or the Multicloud Defense Terraform Provider. The Reference Architectures will primarily focus on how the Multicloud Defense Gateways are deployed to protect cloud workloads.

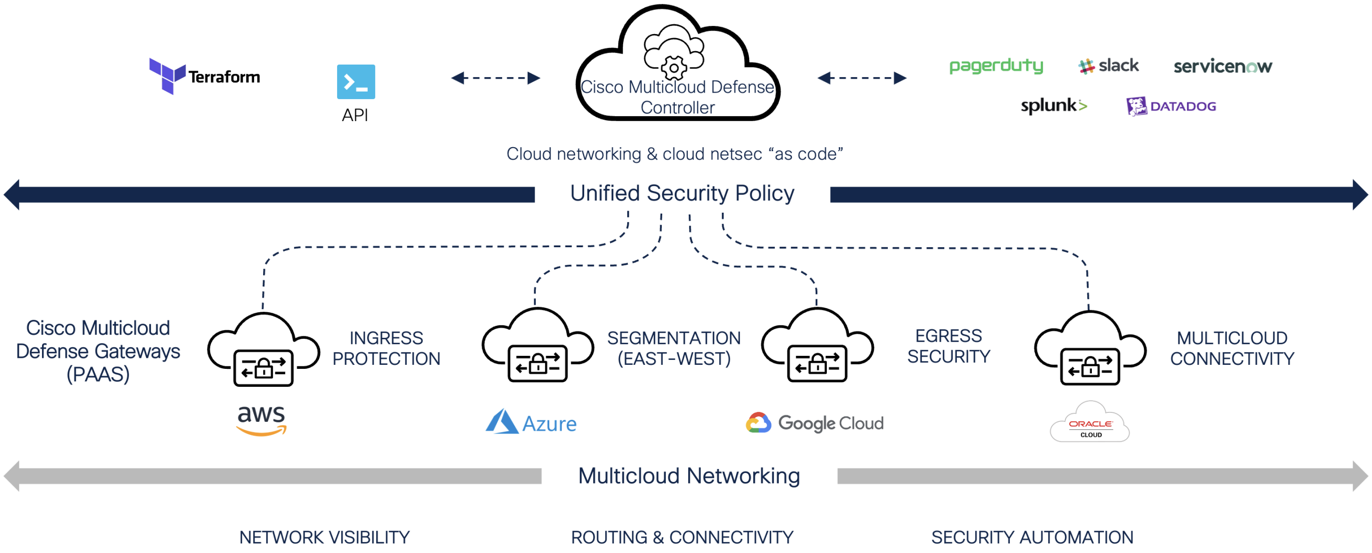


Figure 1.
Cisco Multicloud Defense

AWS

AWS Centralized Ingress

In a centralized ingress deployment, a Service VPC will be used as a centralized security hub to connect all spoke VPCs and route traffic using an AWS Transit Gateway (TGW). Multicloud Defense will orchestrate the deployment of the Service VPC and attach the Service VPC to an existing or new TGW (orchestrated by Multicloud Defense). The Service VPC will use an AWS Network Load Balancer (NLB) as the destination for all ingress traffic. The NLB will load balance the traffic across one or more Multicloud Defense Gateway instances deployed to accommodate protection. The Multicloud Defense Gateway will act as a Reverse Proxy to inspect and protect northbound traffic destined for applications and workloads.

Deployment Architecture – AWS Centralized Ingress

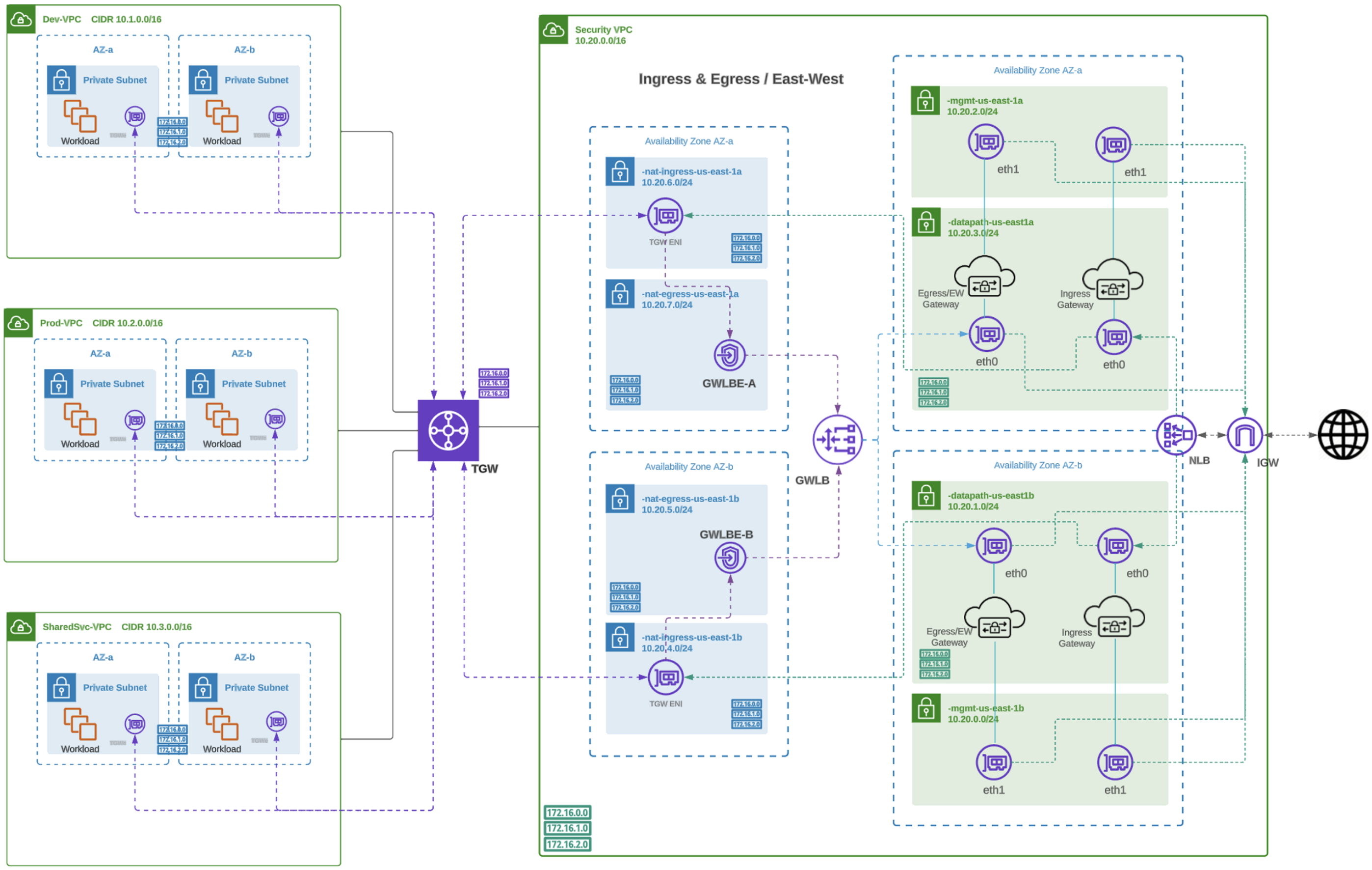


Figure 2.
Centralized Ingress Deployment Architecture (AWS)

Traffic Flow – AWS Centralized Ingress

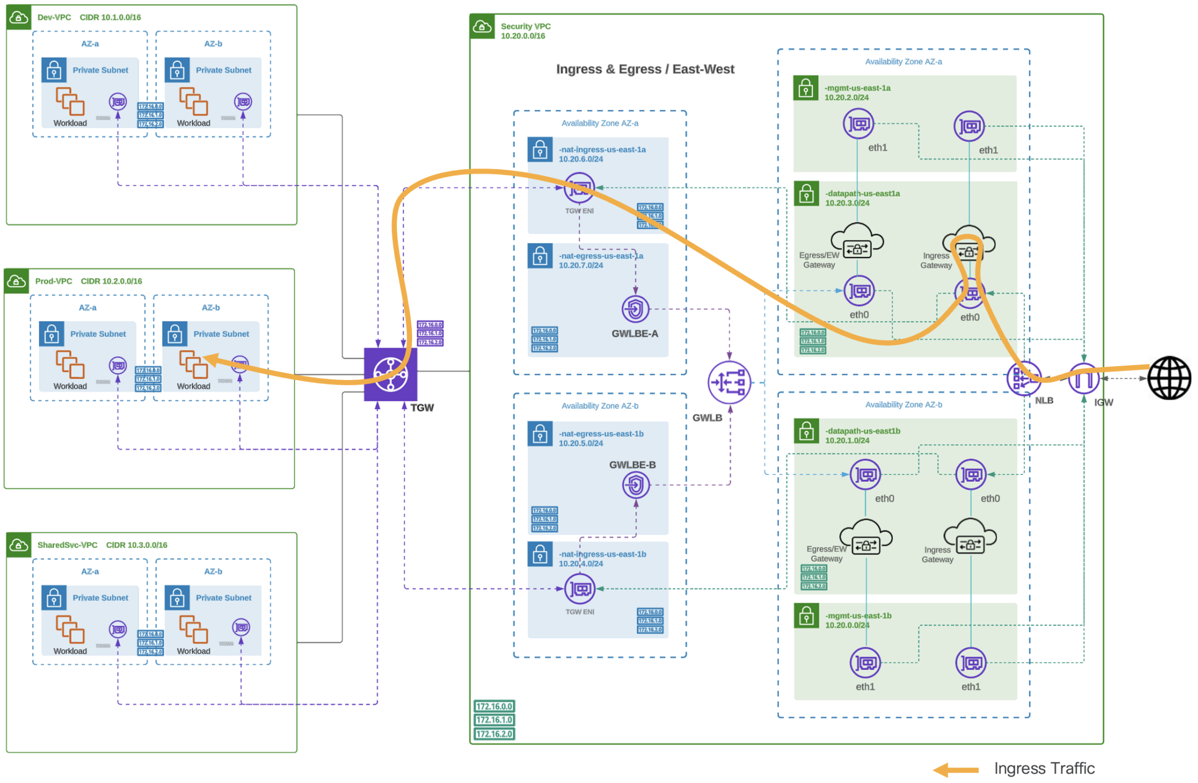
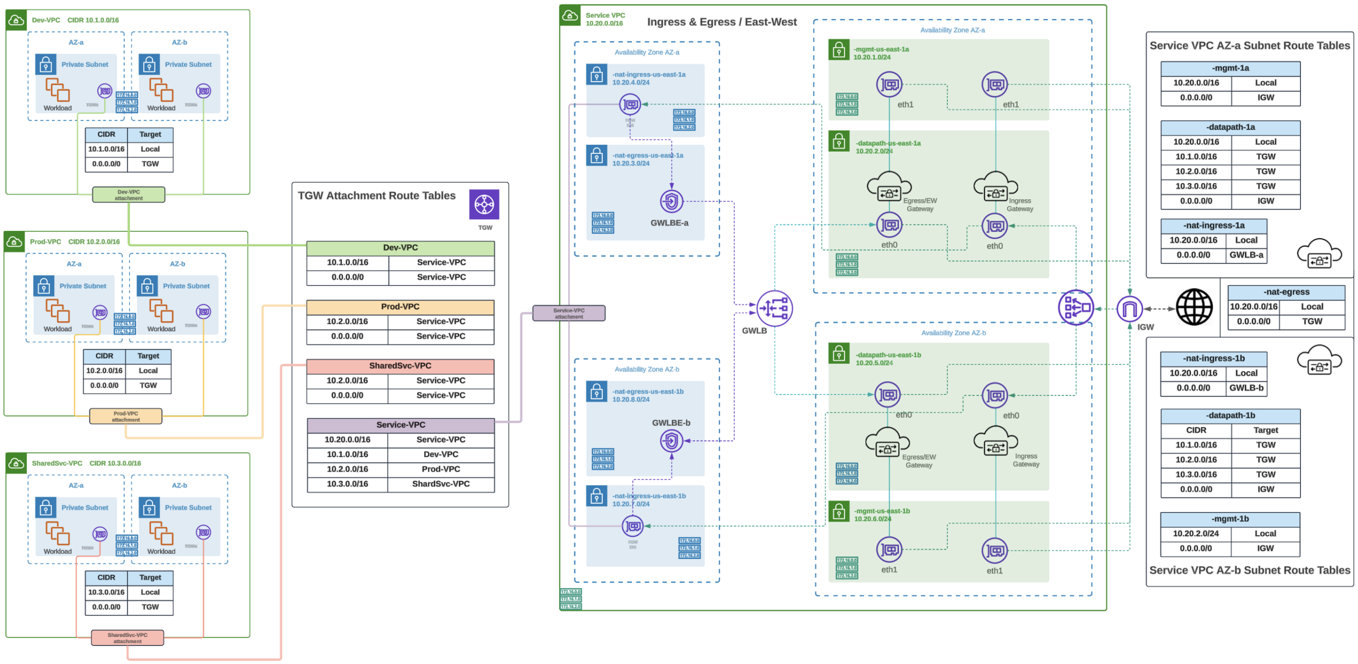


Figure 3.
Centralized Ingress Traffic Flow (AWS)

Routing Configuration - AWS Centralized Ingress



Dev-VPC

CIDR	Target
10.1.0.0/16	Local
0.0.0.0/0	TGW

Prod-VPC

CIDR	Target
10.2.0.0/16	Local
0.0.0.0/0	TGW

SharedSvc-VPC

CIDR	Target
10.3.0.0/16	Local
0.0.0.0/0	TGW

TGW Attachment Route Tables

Dev-VPC	
10.1.0.0/16	Service-VPC
0.0.0.0/0	Service-VPC

Prod-VPC	
10.2.0.0/16	Service-VPC
0.0.0.0/0	Service-VPC

SharedSvc-VPC	
10.2.0.0/16	Service-VPC
0.0.0.0/0	Service-VPC

Service-VPC	
10.20.0.0/16	Service-VPC
10.1.0.0/16	Dev-VPC
10.2.0.0/16	Prod-VPC
10.3.0.0/16	ShardSvc-VPC

Service VPC AZ-a Subnet Route Tables

-mgmt-1a	
10.20.0.0/16	Local
0.0.0.0/0	IGW

-datapath-1a	
10.20.0.0/16	Local
10.1.0.0/16	TGW
10.2.0.0/16	TGW
10.3.0.0/16	TGW
0.0.0.0/0	IGW

-nat-ingress-1a	
10.20.0.0/16	Local
0.0.0.0/0	GWLB-a

-nat-egress	
10.20.0.0/16	Local
0.0.0.0/0	TGW

-nat-ingress-1b	
10.20.0.0/16	Local
0.0.0.0/0	GWLB-b

-datapath-1b	
CIDR	Target
10.1.0.0/16	TGW
10.2.0.0/16	TGW
10.3.0.0/16	TGW
0.0.0.0/0	IGW

-mgmt-1b	
10.20.2.0/24	Local
0.0.0.0/0	IGW

Service VPC AZ-b Subnet Route Tables

Figure 4.
Centralized Ingress Routing Configuration (AWS)

Note: The diagram shows both Ingress and Egress / East-West Gateways. The Ingress and Egress / East-West Gateways can be deployed into the same VPC. If protection is for Ingress only, the Egress / East-West Gateway is not needed.

AWS Centralized Egress

In a centralized Egress deployment, a Service VPC will be used as a centralized security hub to connect all spoke VPCs and route traffic using an AWS Transit Gateway (TGW). Multicloud Defense will orchestrate the deployment of the Service VPC and attach the Service VPC to an existing or new TGW (orchestrated by Multicloud Defense). The Service VPC will use an AWS Gateway Load Balancer (GWLB). The GWLB will load balance the traffic across one or more Multicloud Defense Gateway instances deployed to accommodate protection. The Multicloud Defense Gateway will operate in Forwarding or Forward Proxy to inspect and protect southbound and east-west traffic.

Deployment Architecture – AWS Centralized Egress

Refer to Figure 2 for a diagram of Centralized Egress Deployment Architecture (AWS).

Traffic Flow – AWS Centralized Egress

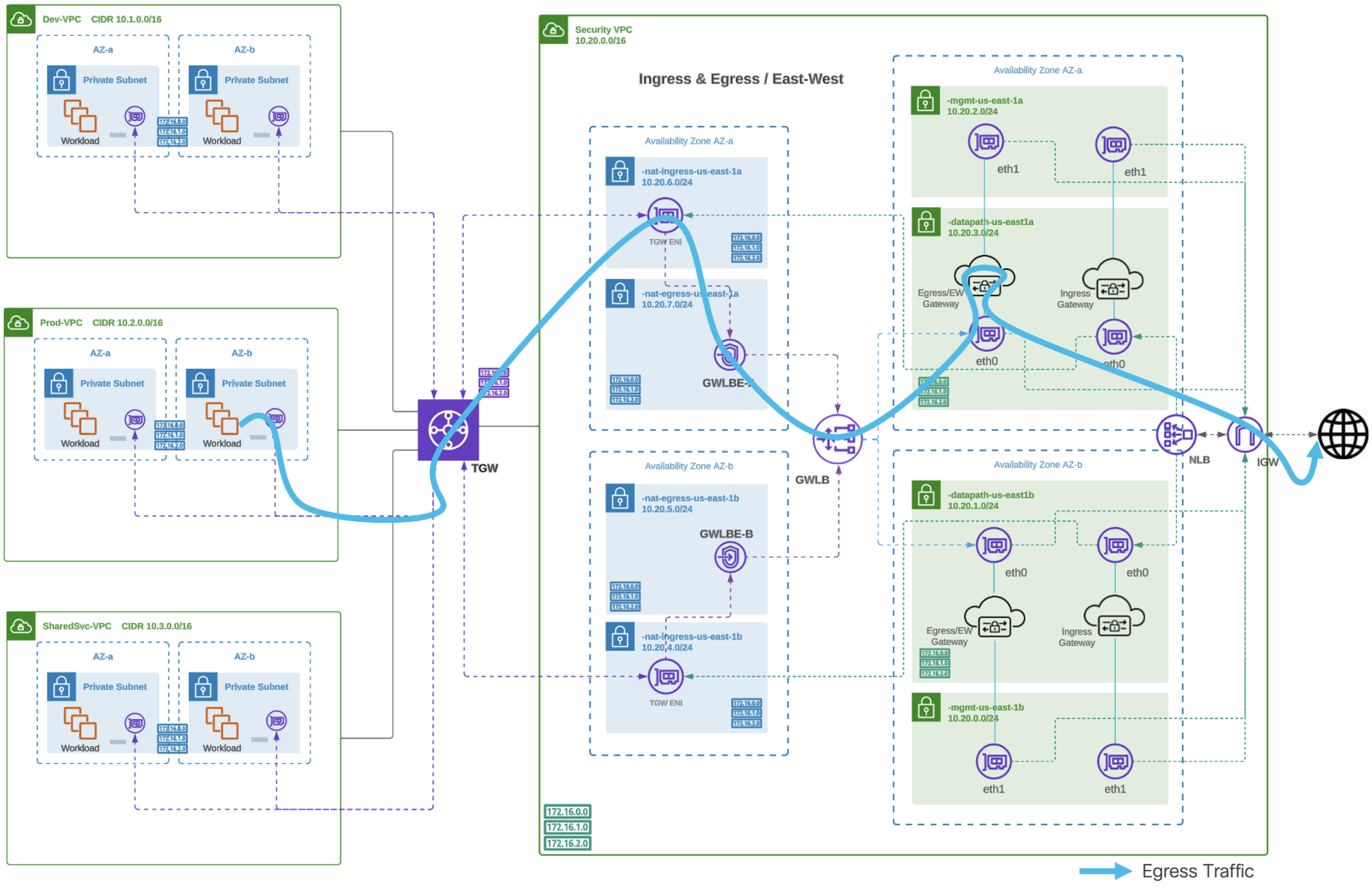


Figure 5.
Centralized Egress Traffic Flow - Egress (AWS)

Routing Configuration – AWS Centralized Egress

Refer to Figure 4 for a diagram of Centralized Egress Routing Configuration (AWS).

Note: The diagram shows both Ingress and Egress / East-West Gateways. The Ingress and Egress / East-West Gateways can be deployed into the same VPC. If protection is for Egress /East-West only, the Ingress Gateway is not needed.

AWS Centralized East-West

In a centralized East-West deployment, a Service VPC will be used as a centralized security hub to connect all spoke VPCs and route traffic using an AWS Transit Gateway (TGW). Multicloud Defense will orchestrate the deployment of the Service VPC and attach the Service VPC to an existing or new TGW (orchestrated by Multicloud Defense). The Service VPC will use an AWS Gateway Load Balancer (GWLB). The GWLB will load balance the traffic across one or more Multicloud Defense Gateway instances deployed to accommodate protection. The Multicloud Defense Gateway will operate in Forwarding or Forward Proxy to inspect and protect southbound and east-west traffic.

Deployment Architecture – AWS Centralized East-West

Refer to Figure 2 for a diagram of Centralized East-West Deployment Architecture (AWS).

Traffic Flow – AWS Centralized East-West, Inter-VPC

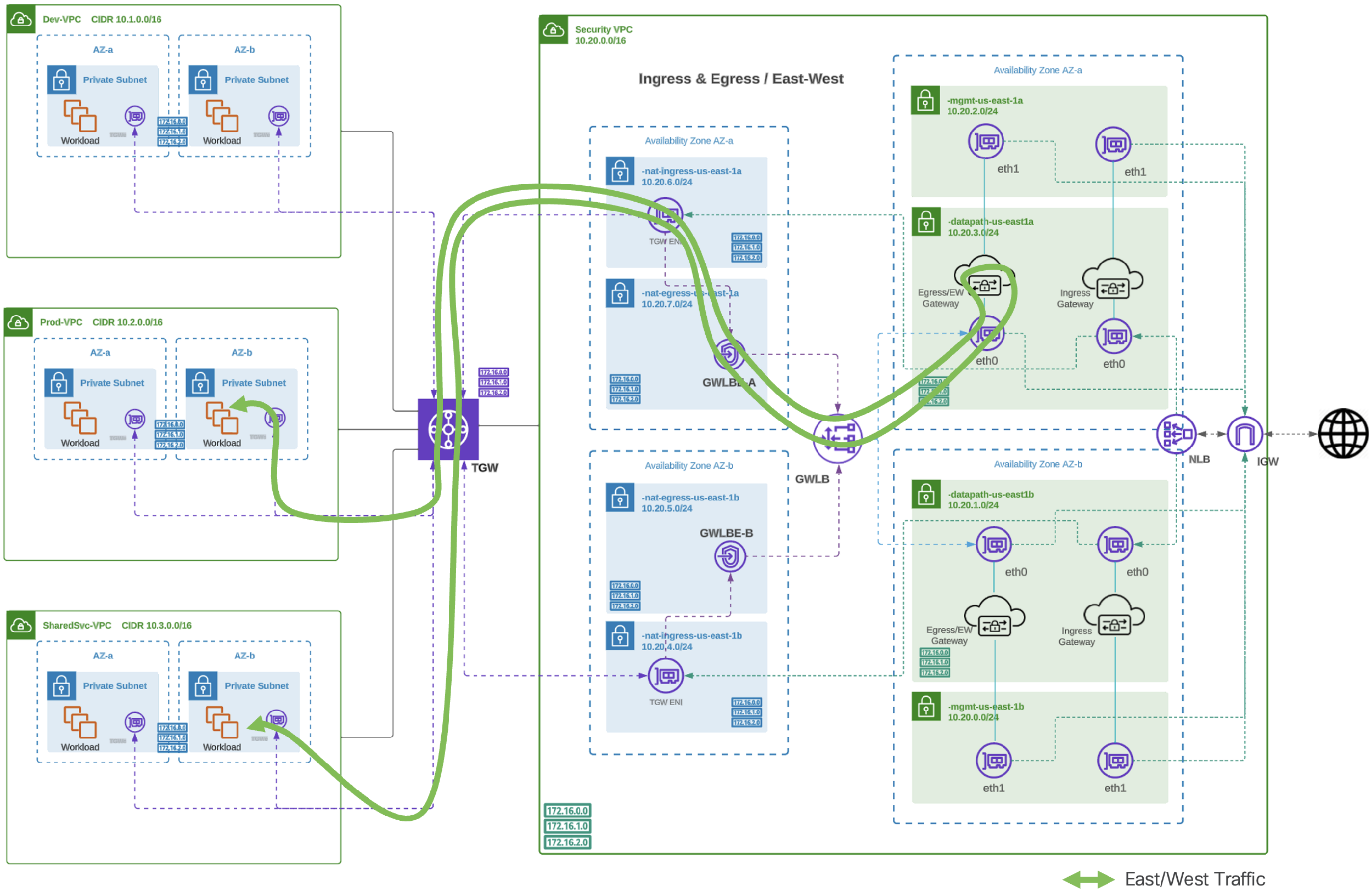


Figure 6.
Traffic Flow Centralized East-West, Inter-VPC (AWS)

Traffic Flow – AWS Centralized East-West, Intra- VPC

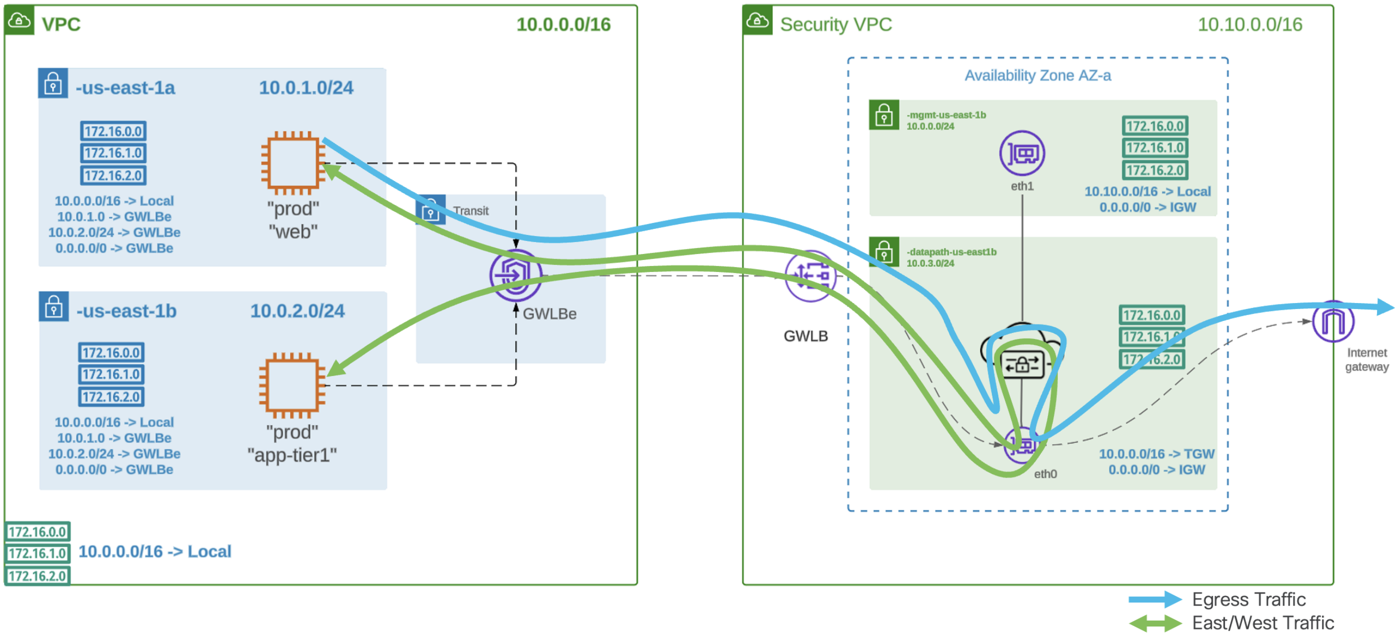


Figure 7.
Traffic Flow Centralized East-West, Intra-VPC (AWS)

Routing Configuration – AWS Centralized East-West

Refer to Figure 4 for a diagram of Centralized East-West Routing Configuration (AWS).

Note: The diagram shows both Ingress and Egress / East-West Gateways. The Ingress and Egress / East-West Gateways can be deployed into the same VPC. If protection is for Egress /East-West only, the Ingress Gateway is not needed.

AWS Centralized East-West with More Specific Routing (MSR)

The advent of More Specific Routing (MSR) in AWS allow for traffic communicating between subnets within a VPC to be inspected by Multicloud Defense. Multicloud Defense uses the Service VPC as the security hub and placement of a Gateway Load Balancer (GWLB) Endpoint into the Spoke VPC to route traffic to the Service VPC. The route table for each subnet would have MSR configured to route traffic through the Endpoint to the Service VPC for inspection.

Deployment Architecture and MSR Configuration

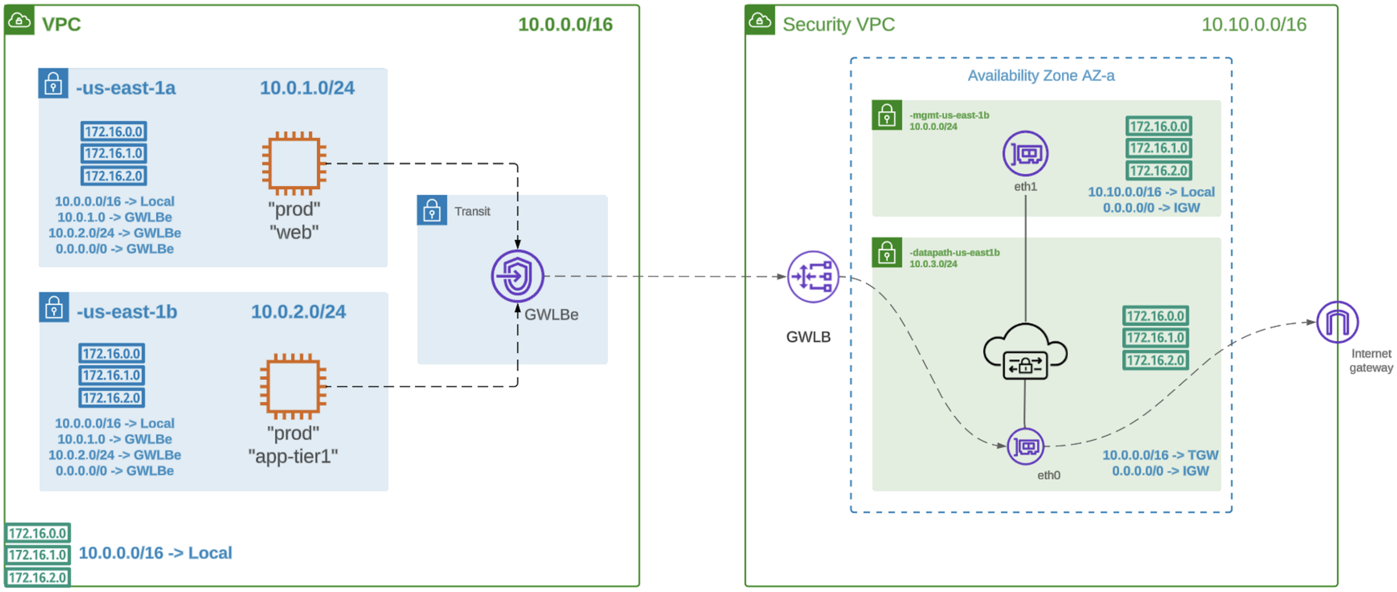


Figure 8.
AWS Centralized MSR Configuration

AWS Centralized Egress / East-West (NAT Gateway)

When using Multicloud Defense to protect Egress traffic, traffic sent to the Internet will have a source IP of the Multicloud Defense Gateway instance. If there is a need for the Gateway instances to be deployed as private, and the IP address used to send traffic to the Internet needs to be static (does not change), the Service VPC can be deployed using a NAT Gateway. When the NAT Gateway option is enabled, the Multicloud Defense Gateway is deployed into private subnets and public subnets will be created to host the NAT Gateways (per AZ). All traffic to the Internet will be sent from the Gateway instances through the NAT Gateways using the NAT Gateway public IP addresses. This allows the IP address of the NAT Gateways to be whitelisted, which is often required when interfacing a cloud resource to a SaaS-delivered Identity Provider for authentication.

Deployment Architecture – AWS Centralized Egress/East-West

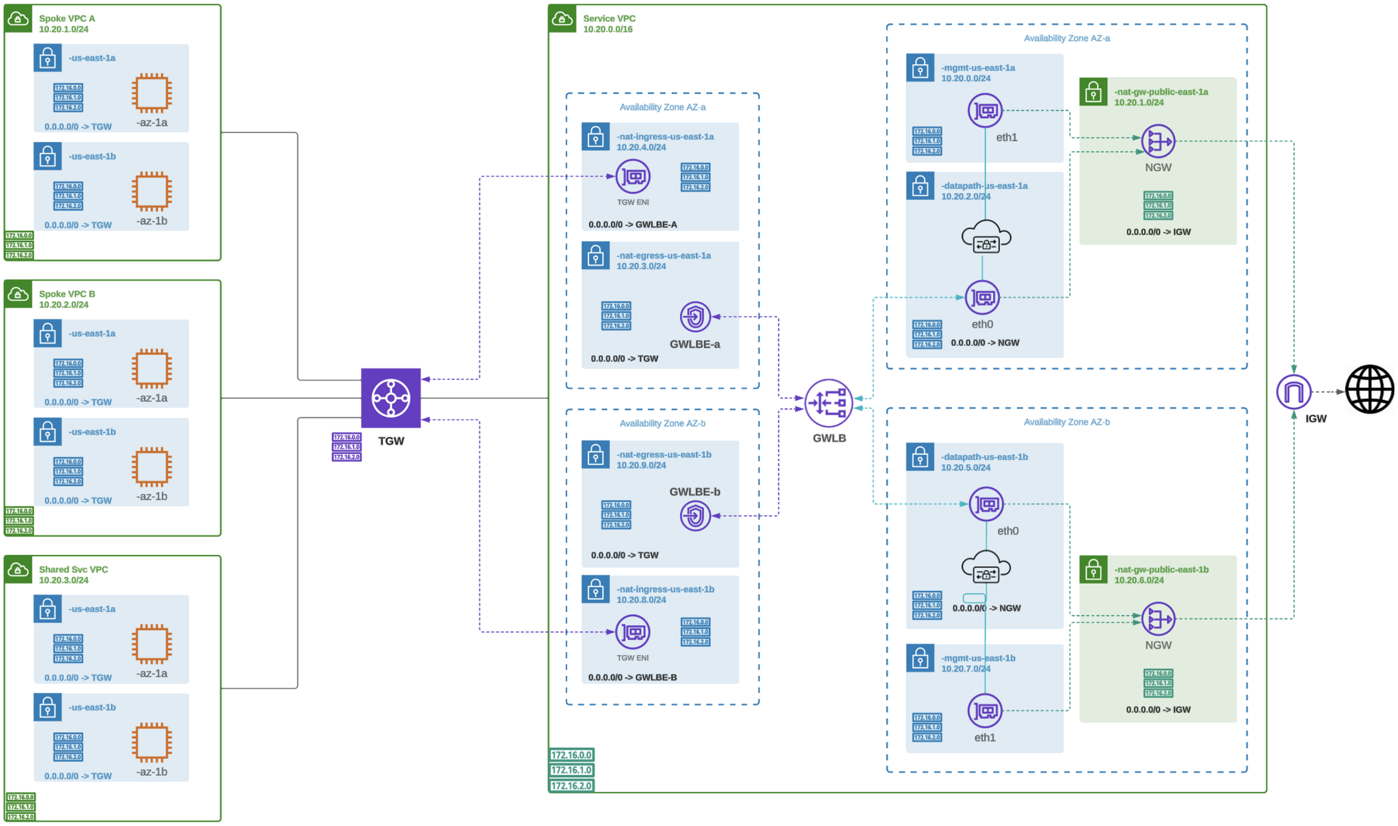


Figure 9.
AWS Centralized Egress / East-West (NAT Gateway) – Deployment Architecture

Traffic Flow – AWS Centralized Egress/East-West

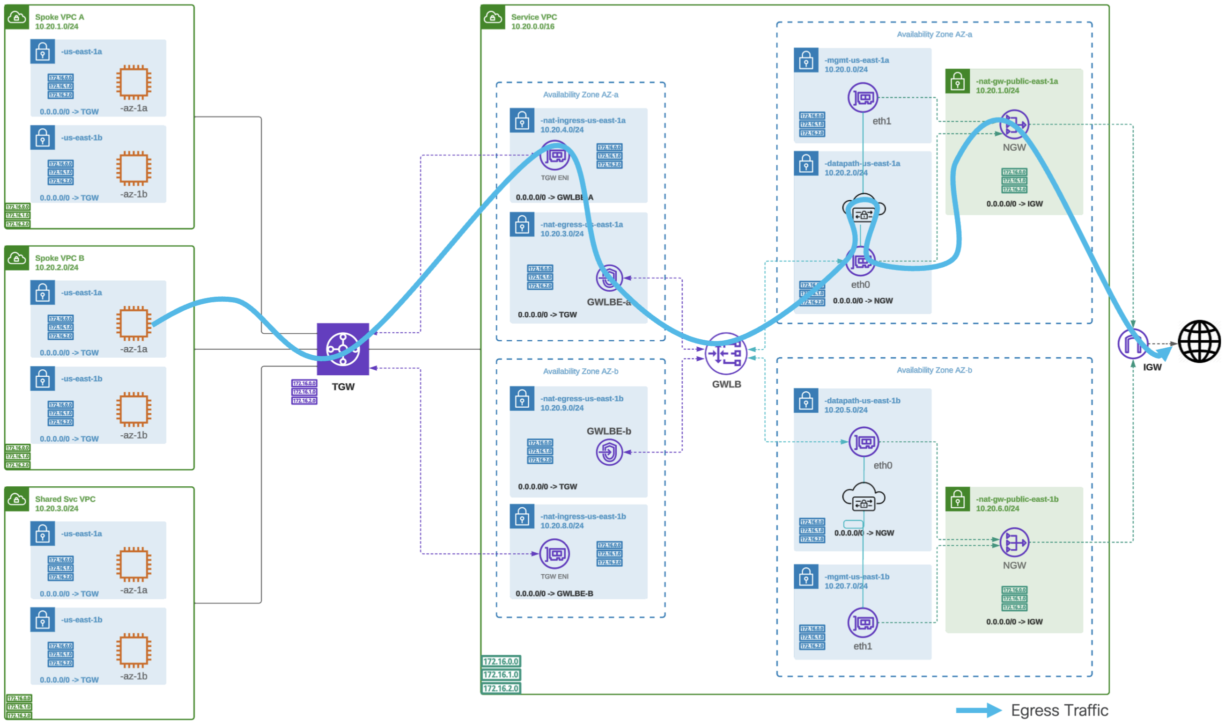
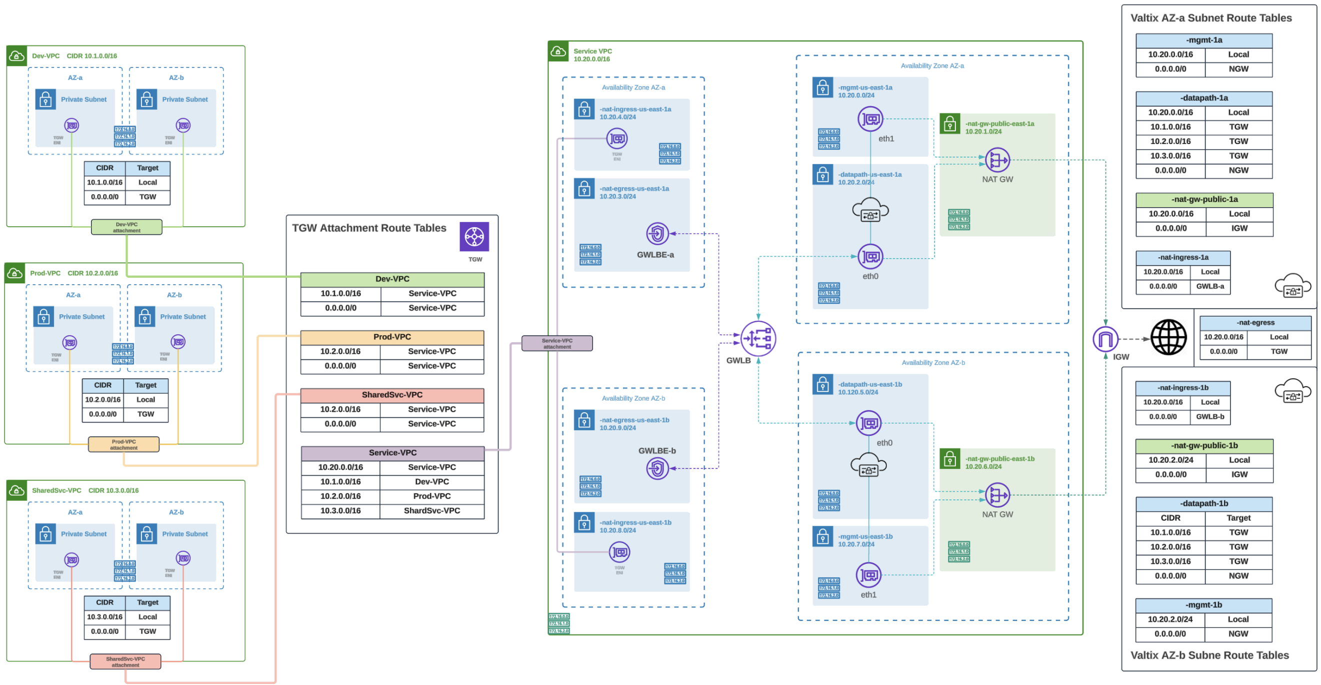


Figure 10.
AWS Centralized Egress / East-West (NAT Gateway) – Traffic Flow

Routing Configuration – AWS Centralized Egress/East-West



Dev-VPC CIDR 10.1.0.0/16

CIDR	Target
10.1.0.0/16	Local
0.0.0.0/0	TGW

Prod-VPC CIDR 10.2.0.0/16

CIDR	Target
10.2.0.0/16	Local
0.0.0.0/0	TGW

SharedSvc-VPC CIDR 10.3.0.0/16

CIDR	Target
10.3.0.0/16	Local
0.0.0.0/0	TGW

TGW Attachment Route Tables

Dev-VPC	
10.1.0.0/16	Service-VPC
0.0.0.0/0	Service-VPC

Prod-VPC	
10.2.0.0/16	Service-VPC
0.0.0.0/0	Service-VPC

SharedSvc-VPC	
10.2.0.0/16	Service-VPC
0.0.0.0/0	Service-VPC

Service-VPC	
10.20.0.0/16	Service-VPC
10.1.0.0/16	Dev-VPC
10.2.0.0/16	Prod-VPC
10.3.0.0/16	ShardSvc-VPC

Valtix AZ-a Subnet Route Tables

-mgmt-1a	
10.20.0.0/16	Local
0.0.0.0/0	NGW

-datapath-1a	
10.20.0.0/16	Local
10.1.0.0/16	TGW
10.2.0.0/16	TGW
10.3.0.0/16	TGW
0.0.0.0/0	NGW

-nat-gw-public-1a	
10.20.0.0/16	Local
0.0.0.0/0	IGW

-nat-ingress-1a	
10.20.0.0/16	Local
0.0.0.0/0	GWLB-a

-nat-egress	
10.20.0.0/16	Local
0.0.0.0/0	TGW

-nat-ingress-1b	
10.20.0.0/16	Local
0.0.0.0/0	GWLB-b

-nat-gw-public-1b	
10.20.2.0/24	Local
0.0.0.0/0	IGW

-datapath-1b	
CIDR	Target
10.1.0.0/16	TGW
10.2.0.0/16	TGW
10.3.0.0/16	TGW
0.0.0.0/0	NGW

-mgmt-1b	
10.20.2.0/24	Local
0.0.0.0/0	NGW

Valtix AZ-b Subne Route Tables

Figure 11.
AWS Centralized Egress / East-West (NAT Gateway) – Routing Configuration

AWS Centralized GWLB-based Ingress / Egress

In a centralized GWLB-based ingress and egress deployment, a Service VPC will be used as a centralized security hub to connect all spoke VPCs and route traffic using a Gateway Load Balancer (GWLB) and GWLB Endpoints. Multicloud Defense will orchestrate the deployment of the Service VPC, Service VPC infrastructure, Gateways and the GWLB. The GWLB Endpoints in the Spoke VPCs, used to connect to the GWLB, will need to be orchestrated by the user (AWS Console or Terraform). The GWLB Endpoints will be used to pass traffic to Multicloud Defense. The GWLB will load balance the traffic across one or more Multicloud Defense Gateway instances. The Multicloud Defense Gateway will Forward or Forward Proxy the traffic to inspect and protect north- and south-bound traffic destined for applications and workloads, or the Internet.

Routing Configuration – AWS Centralized GWLB-based Ingress/Egress

Refer to Figure 11 for a diagram of AWS Centralized GWLB-based Ingress / Egress – Routing Configuration.

Azure

Azure Centralized Ingress

In Centralized Ingress model, Multicloud Defense would orchestrate a Service VNet and create a VNet peering between the Spoke VNet and Service VNet. Multicloud Defense will create User Defined Routes (UDR) in Spoke VNets to have traffic routed to the Service VNet. All necessary component inside the Service VNet(Multicloud Defense Gateway, Network Security Group, NLB) will be created and managed by Multicloud Defense. The NLB would be a public endpoint to receive internet traffic and load balanced to Multicloud Defense Gateways. Multicloud Defense Gateways will act as a reverse proxy and protect your workloads.

Deployment Architecture – Azure Centralized Ingress

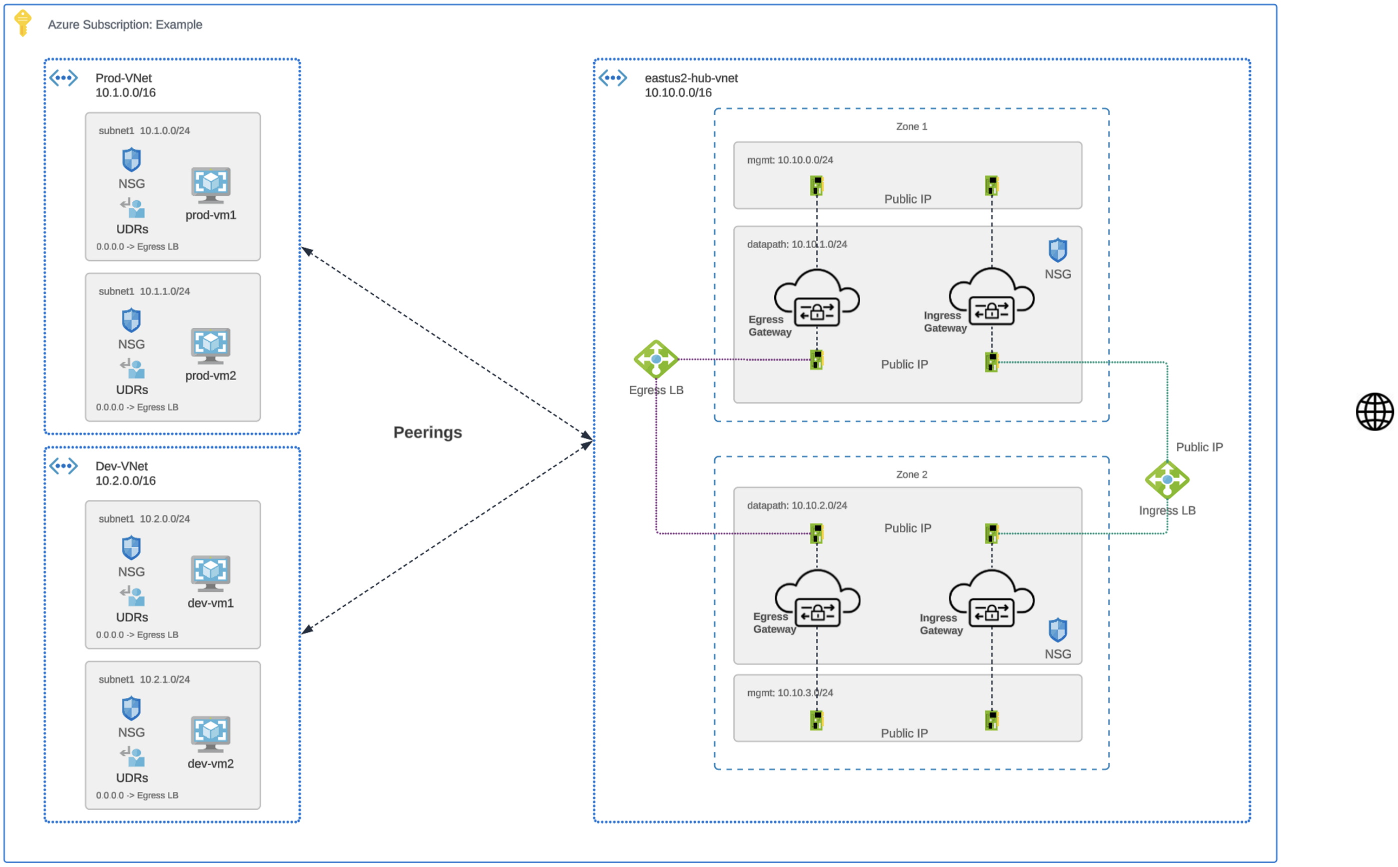


Figure 12.
Azure Centralized Ingress - Deployment Architecture

Note: The diagram shows both Ingress Gateway and Egress+East-West Gateway. User can choose to deploy Ingress and Egress+East-West Gateway in the same VPC. If protection is for Ingress only, deployment of Egress Gateway is not needed.

Traffic Flow – Azure Centralized Ingress

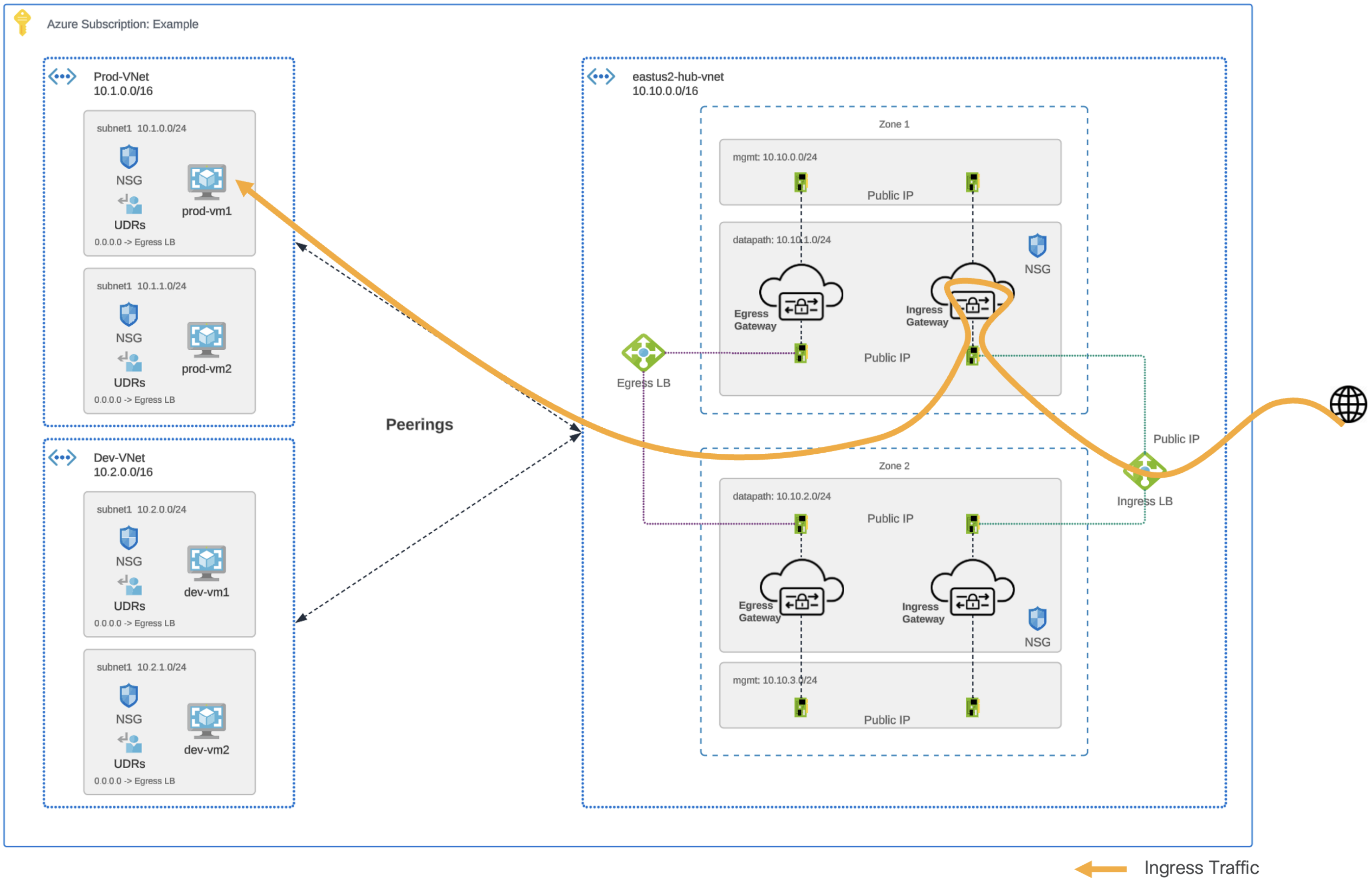
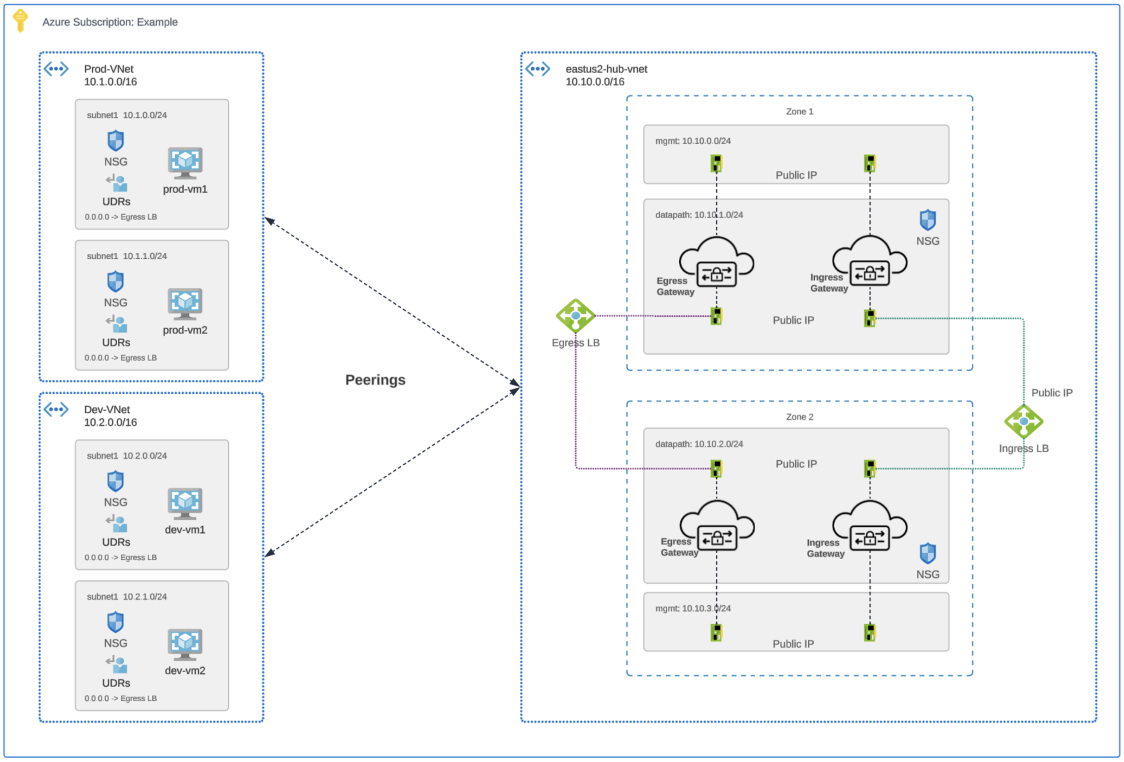


Figure 13.
Azure Centralized Ingress – Traffic Flow

Routing Configuration – Azure Centralized Ingress



Prod-VNet-UDR	
0.0.0.0/0	Egress LB

Dev-VNet-UDR	
0.0.0.0/0	Egress LB

mgmt-UDR	
0.0.0.0/0	Internet

datapath-UDR	
0.0.0.0/0	Internet
10.1.0.0/16	Peering 1 (dynamic route)
10.2.0.0/16	Peering 2 (dynamic route)

Figure 14.
Azure Centralized Ingress - Routing Configuration

Azure Centralized Egress

Multicloud Defense orchestrate a Service VNet in a centralized model where the Service VNet will act as the enforcement hub. A VNet peering would be created between the Spoke VNet and the Service VNet. Multicloud Defense will create/update User Defined Routes(UDR) in Spoke VNets to have traffic routed to the Service VNet. Inside the Service VNet, there would be a Network Load Balancer(NLB) and Multicloud Defense Gateway. Traffic from Spoke VNet would be routed to the NLB, which would then be load balanced between Multicloud Defense Gateways in multiple Availability Zones.

Deployment Architecture – Azure Centralized Egress

Refer to Figure 12 for a diagram of Azure Centralized Egress - Deployment Architecture.

Note: The diagram shows both Ingress Gateway and Egress+East-West Gateway. User can choose to deploy Ingress and Egress+East-West Gateway in the same VPC. If protection is for Egress/East-West only, deployment of Ingress Gateway is not needed.

Traffic Flow – Azure Centralized Egress

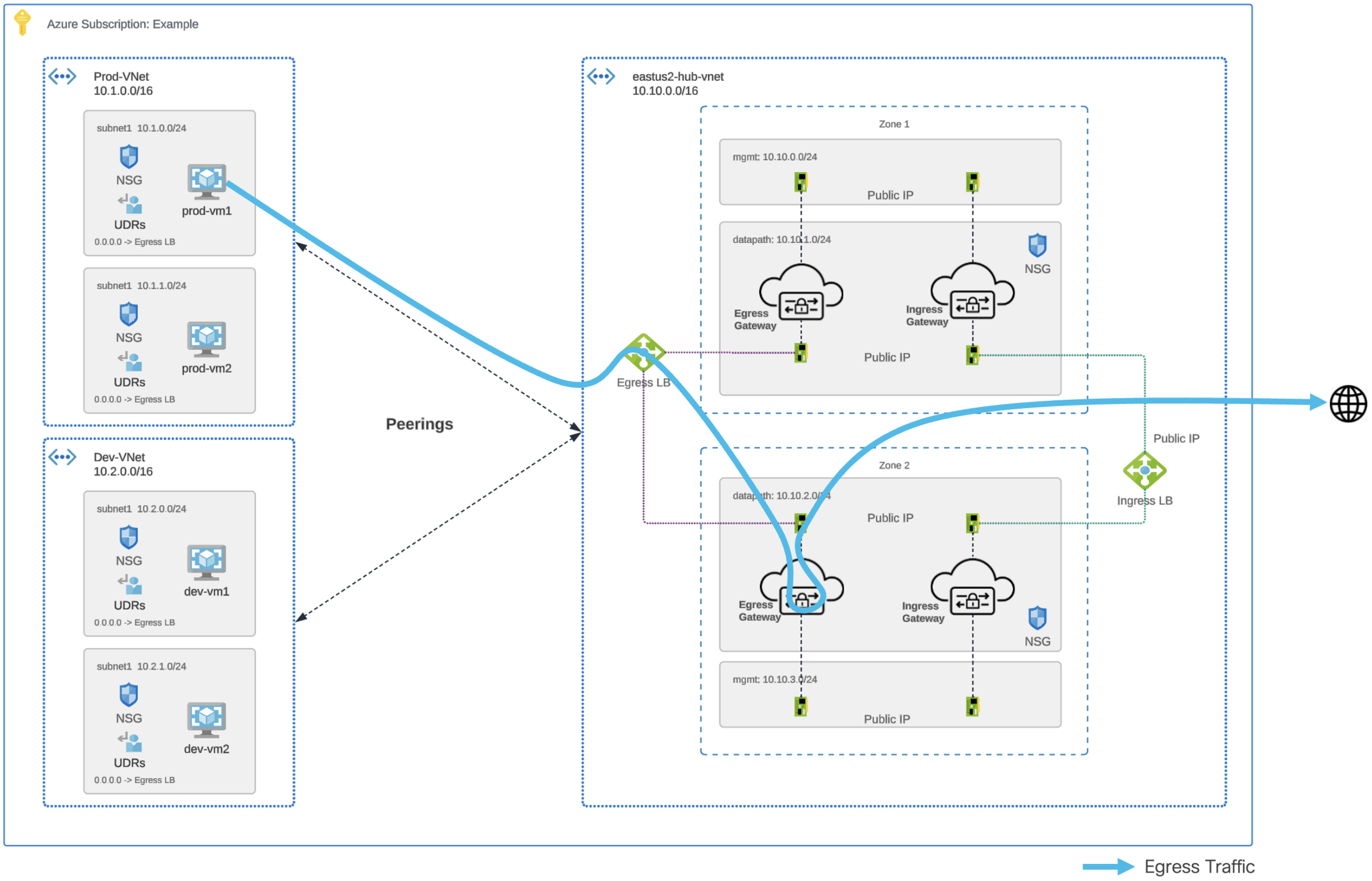


Figure 15.
Azure Centralized Egress – Traffic Flow

Routing Configuration – Azure Centralized Egress

Refer to Figure 14 for a diagram of Azure Centralized Egress - Routing Configuration.

Azure Centralized East-West

Deployment Architecture – Azure Centralized East-West

Refer to Figure 12 for a diagram of Azure Centralized East-West - Deployment Architecture.

Traffic Flow – Azure Centralized East-West

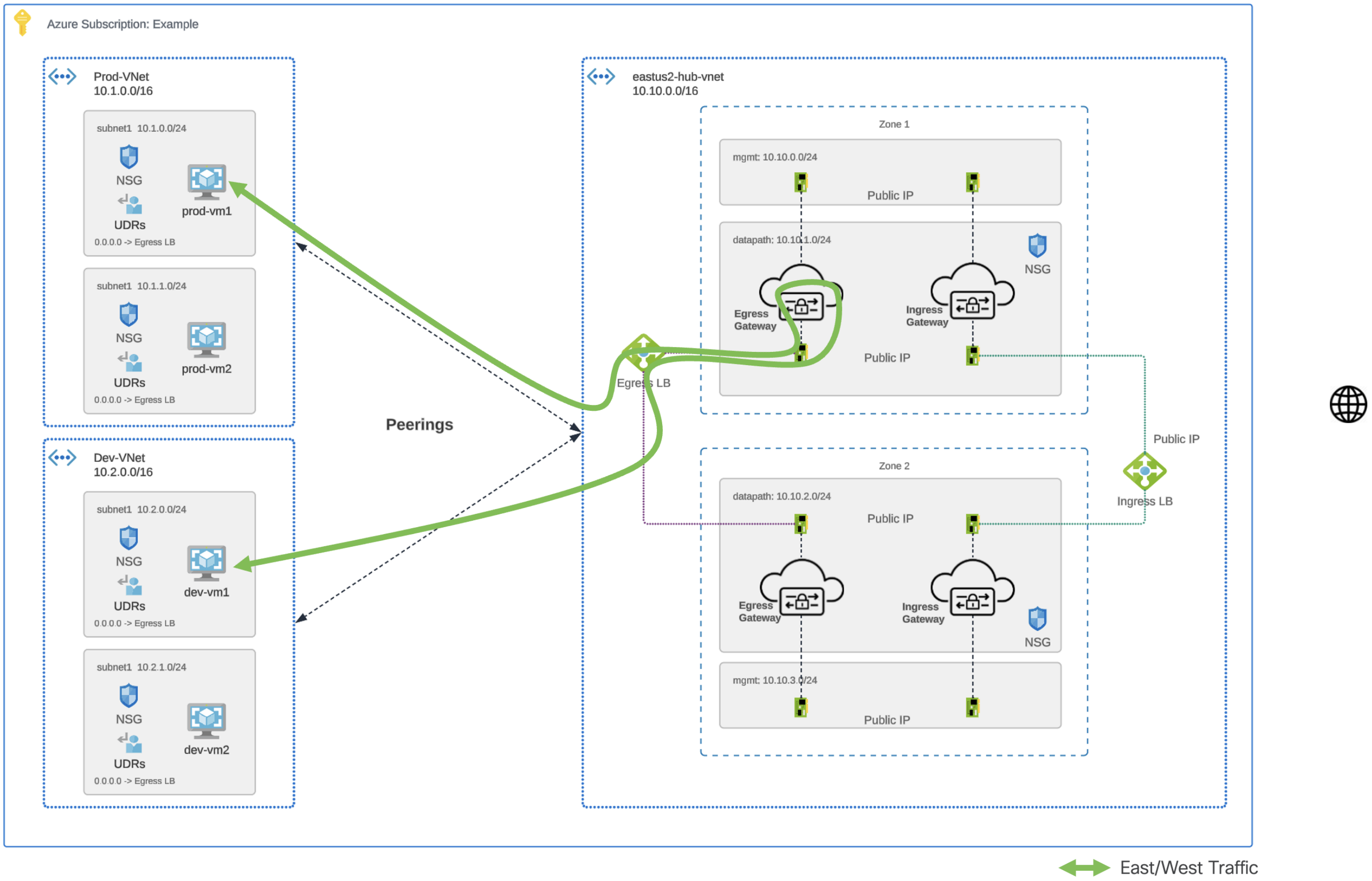


Figure 16.
Azure Centralized East-West - Traffic Flow

Routing Configuation – Azure Centralized East-West

Refer to Figure 14 for a diagram of Azure Centralized East-West - Routing Configuration.

GCP

Multicloud Defense's Centralized Security in GCP is achieved by deploying a VPC (called Security VPC or Service VPC) for all security components and perform a VPC Peering between the Security VPC and all spoke VPCs. Multicloud Defense orchestrates the Service VPC (and all necessary component) to protect all type of traffic (ingress, egress, and east-west). Inside the Service VPC, there would be two (2) gateways, one for ingress and one for egress/east-west. Multicloud Defense can also orchestrate the VPC peering between Service VPC and all Spoke VPCs by a simple click of a button.

GCP Centralized Ingress

Deployment Architecture – GCP Centralized Ingress

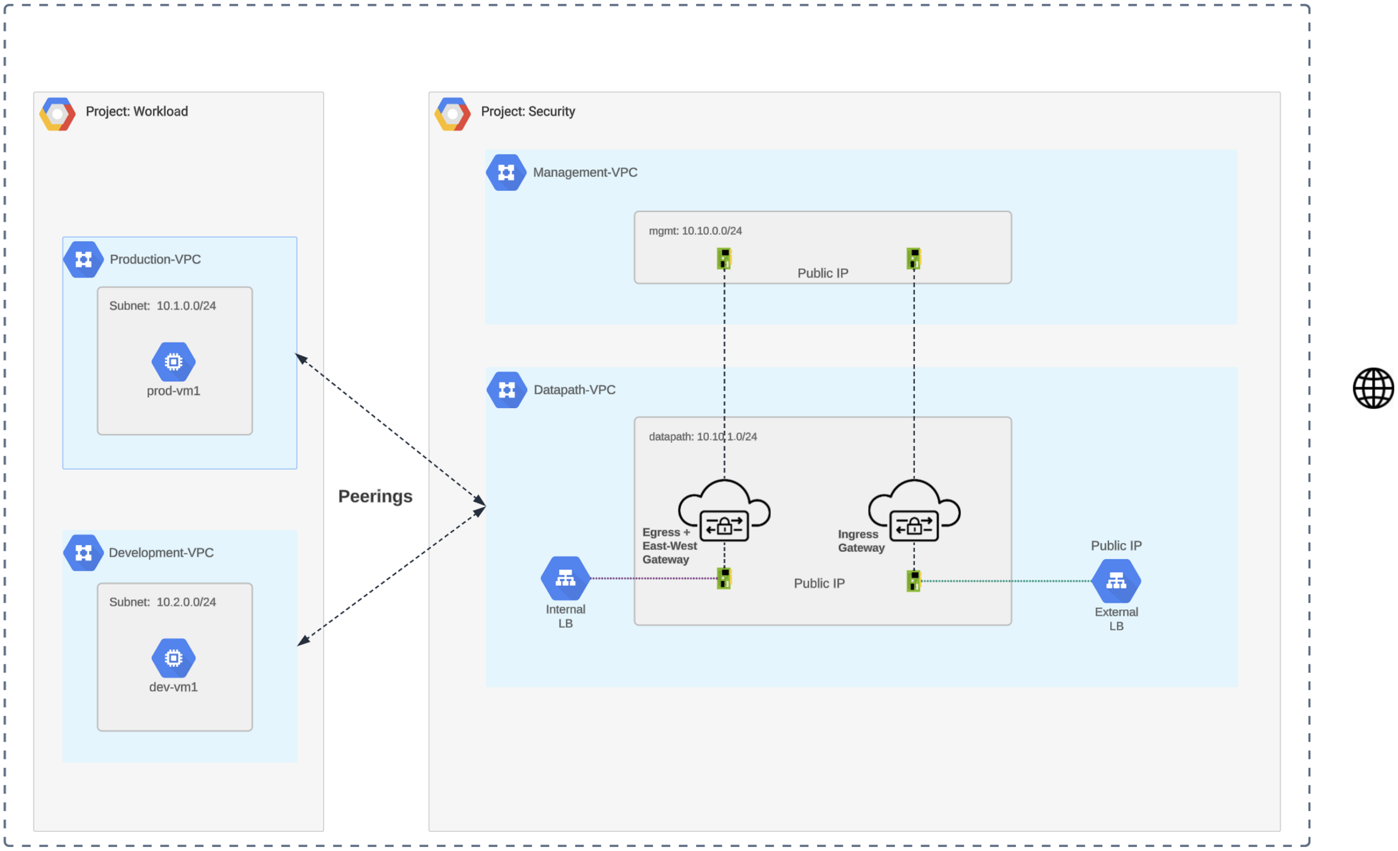


Figure 17.
GCP Centralized Ingress – Deployment Architecture

Traffic Flow – GCP Centralized Ingress

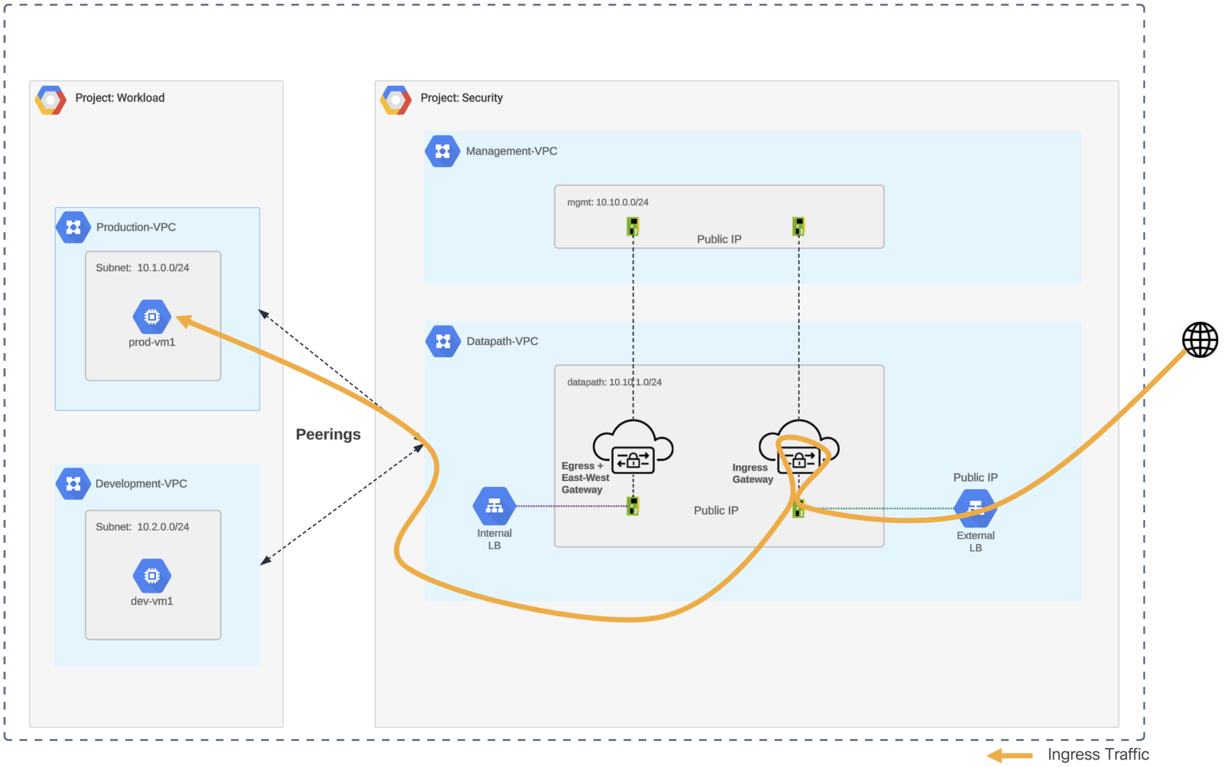
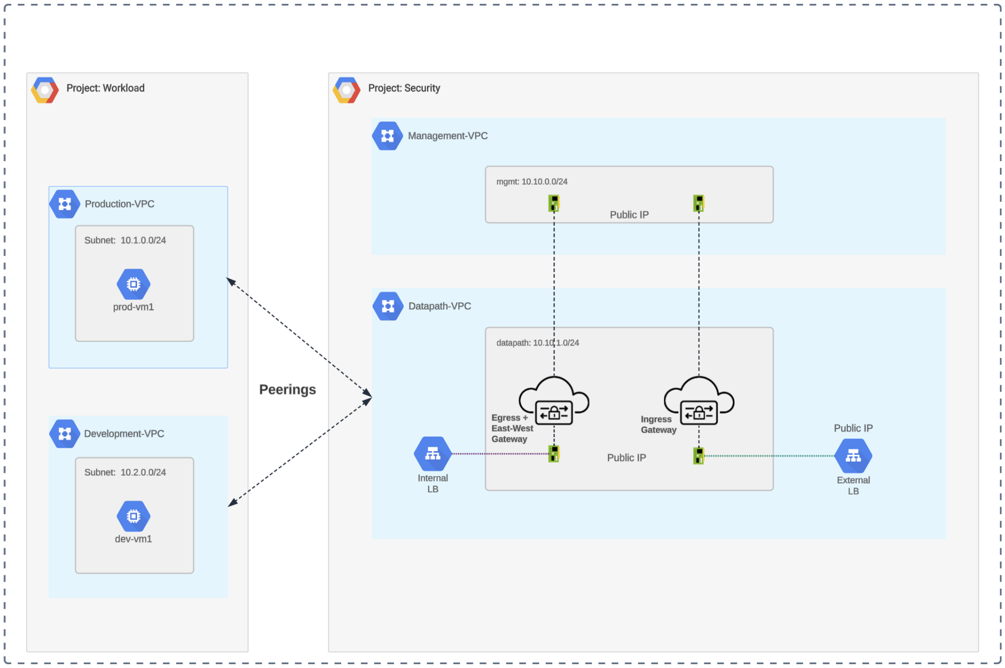


Figure 18.
GCP Centralized Ingress – Traffic Flow

Routing Configuration – GCP Centralized Ingress



Production-VPC route	
0.0.0.0/0	Peering ILB (imported route)

Development-VPC route	
0.0.0.0/0	Peering (imported route)

Management-VPC route	
0.0.0.0/0	Default Internet

Datapath-VPC route	
0.0.0.0/0	Default Internet (only for Multicloud defense datapath)
0.0.0.0/0	Internal LB (exported to all spoke VPCs)
10.1.0.0/24	Peering 1 (peering route)
10.2.0.0/24	Peering 2 (peering route)

Figure 19.
GCP Centralized Ingress – Routing Configuration

GCP Centralized Egress

Deployment Architecture – GCP Centralized Egress

Refer to Figure 17 for a diagram of GCP Centralized Egress – Deployment Architecture.

Traffic Flow – GCP Centralized Egress

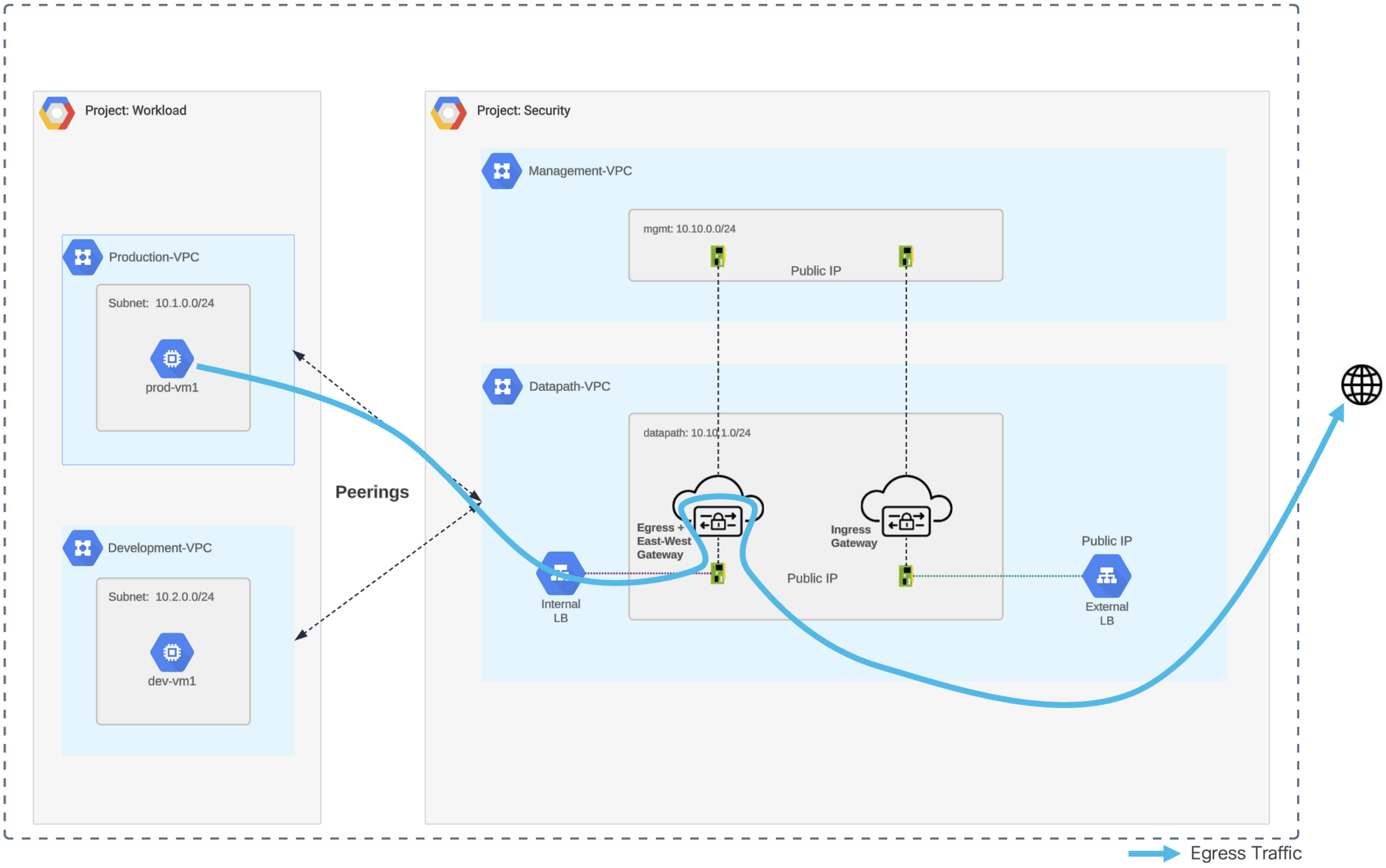


Figure 20.
GCP Centralized Egress – Traffic Flow

Routing Configuration – GCP Centralized Egress

Refer to Figure 19 for a diagram of GCP Centralized Egress – Routing Configuration.

GCP Centralized East-West

Deployment Architecture – GCP Centralized East-West

Refer to Figure 17 for a diagram of GCP Centralized East-West – Deployment Architecture.

Traffic Flow – GCP Centralized East-West

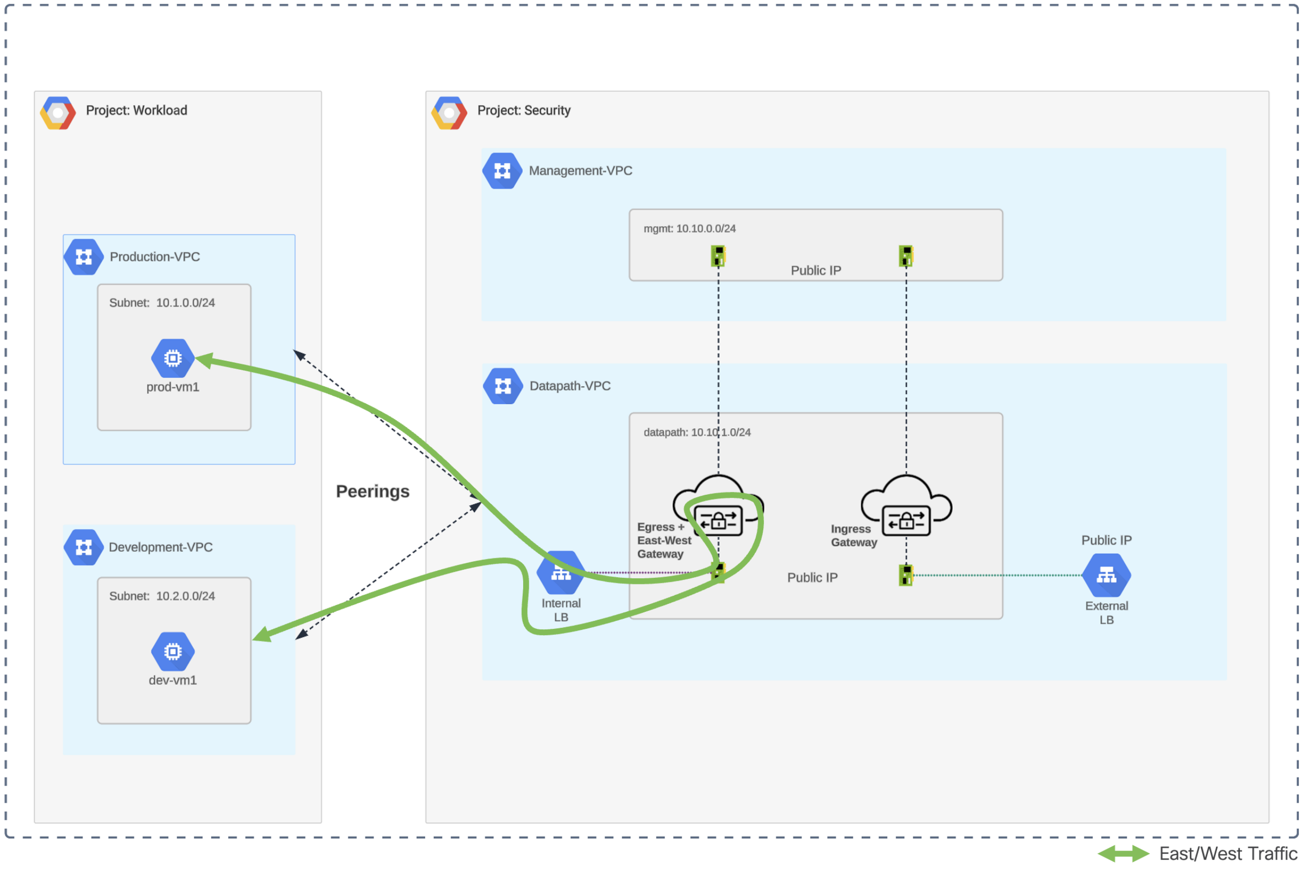


Figure 21.
GCP Centralized East-West – Traffic Flow

Routing Configuration – GCP Centralized East-West

Refer to Figure 19 for a diagram of GCP Centralized East-West – Routing Configuration.

Appendix

Appendix A - Feedback

If you have feedback on this architecture guide, please send an email to ask-multicloud-defense@cisco.com.

For more information on Cisco Multicloud Defense, see www.cisco.com/go/multicloud-defense.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at **https://www.cisco.com/go/offices**.

Printed in USA 03/24