

# AWS re:Inforce

JUNE 13 - 14, 2023 | ANAHEIM, CA

NIS331-R1

# Security inspection architectures with AWS Cloud WAN

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Sr. Solutions Architect  
AWS

**Pratik R. Mankad (he/him)**

Sr. Network Specialist Solutions Architect  
AWS



# Expectations and rules of engagement

This is a chalk talk, so don't hesitate to ask questions!

Since this is a 300-level chalk talk, we assume an associate-level solutions architect knowledge of Amazon Web Services (AWS services, VPCs, multi-VPC networking, inspection and hybrid architectures)

We'll be available after the session to answer any additional questions and discuss further

# Agenda

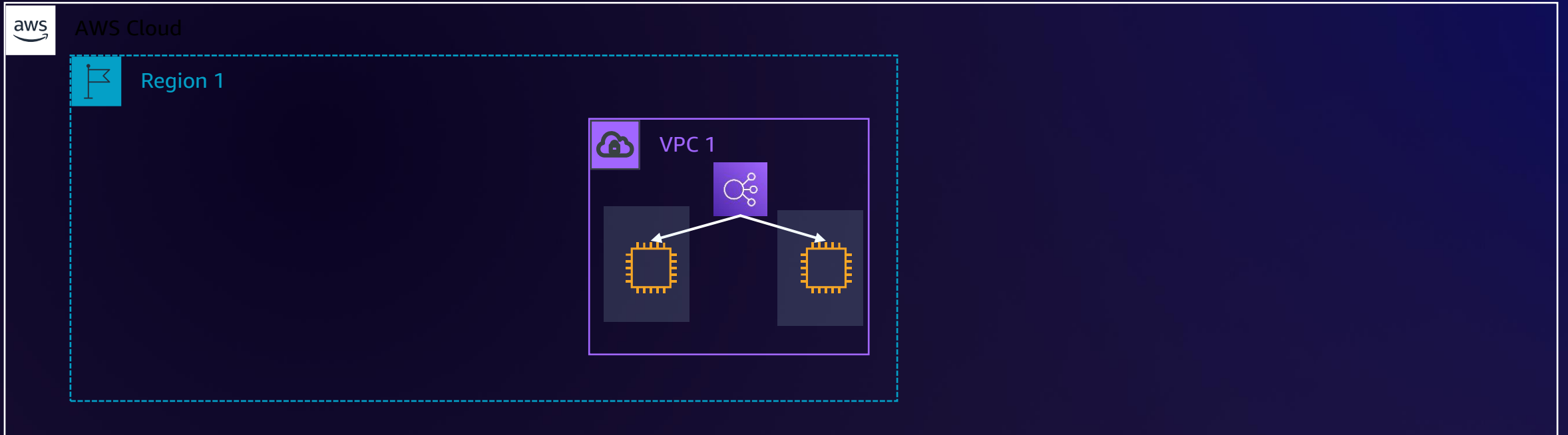
Traffic inspection patterns

Challenges in building a secure global network

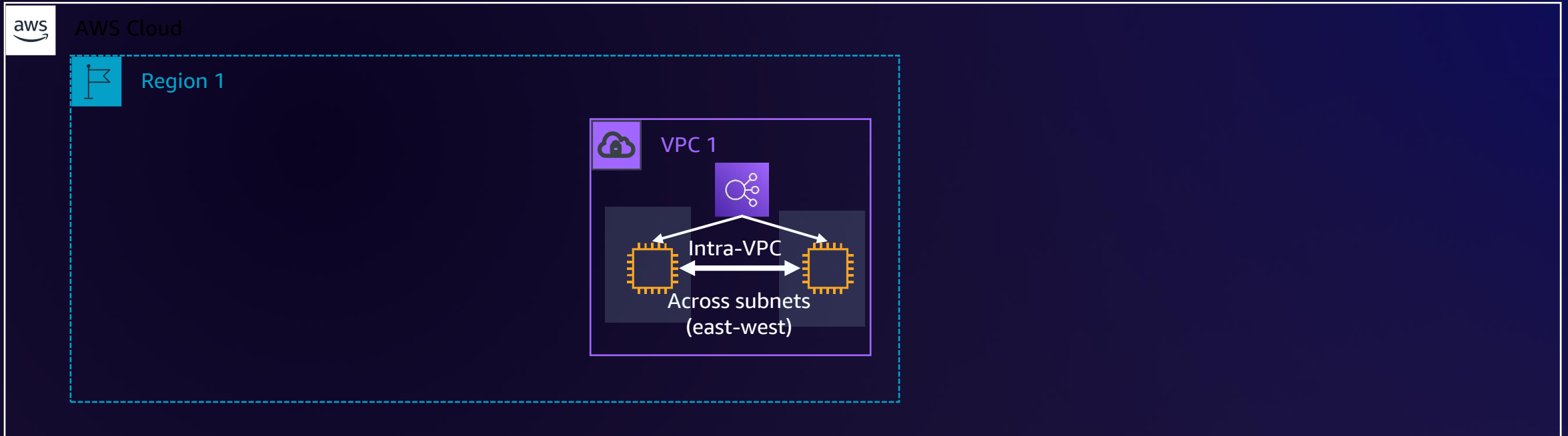
Development of AWS Cloud WAN

Walk through building inspection architecture

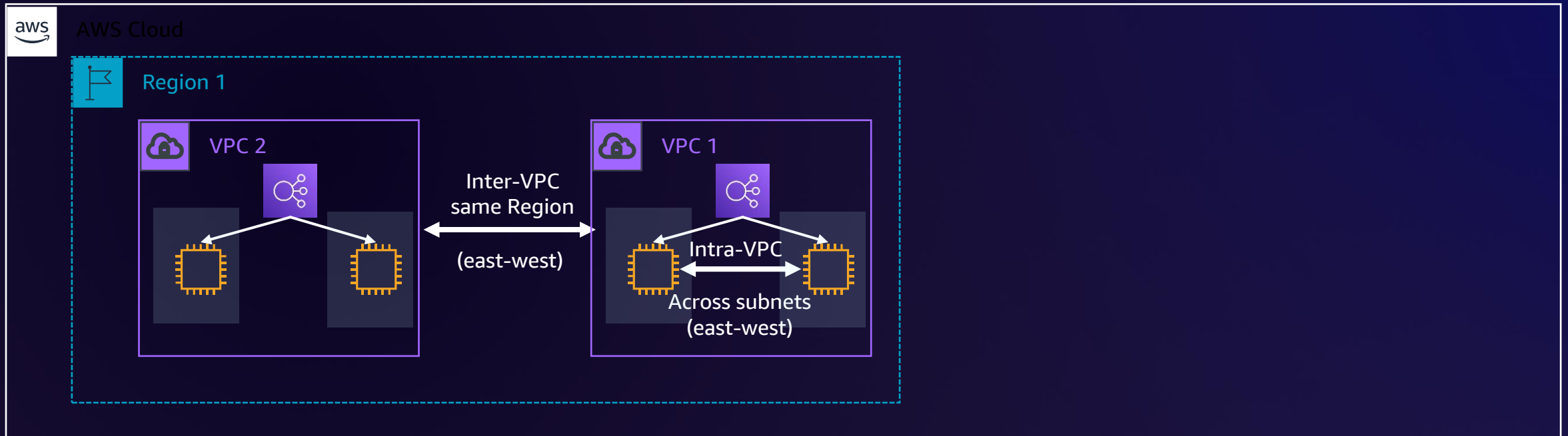
# Traffic inspection patterns



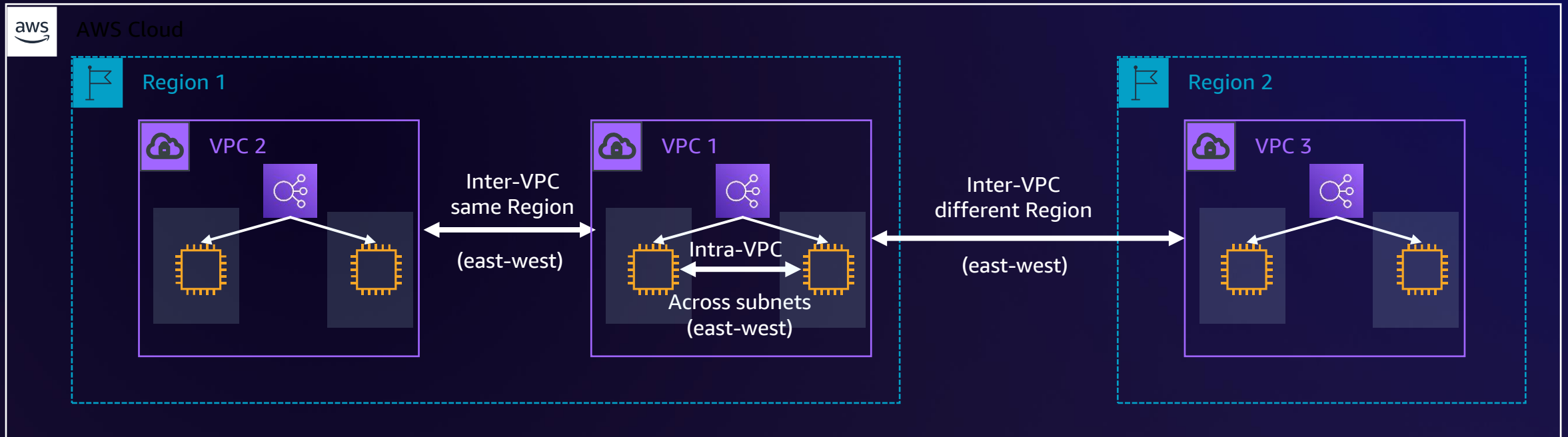
# Traffic inspection patterns



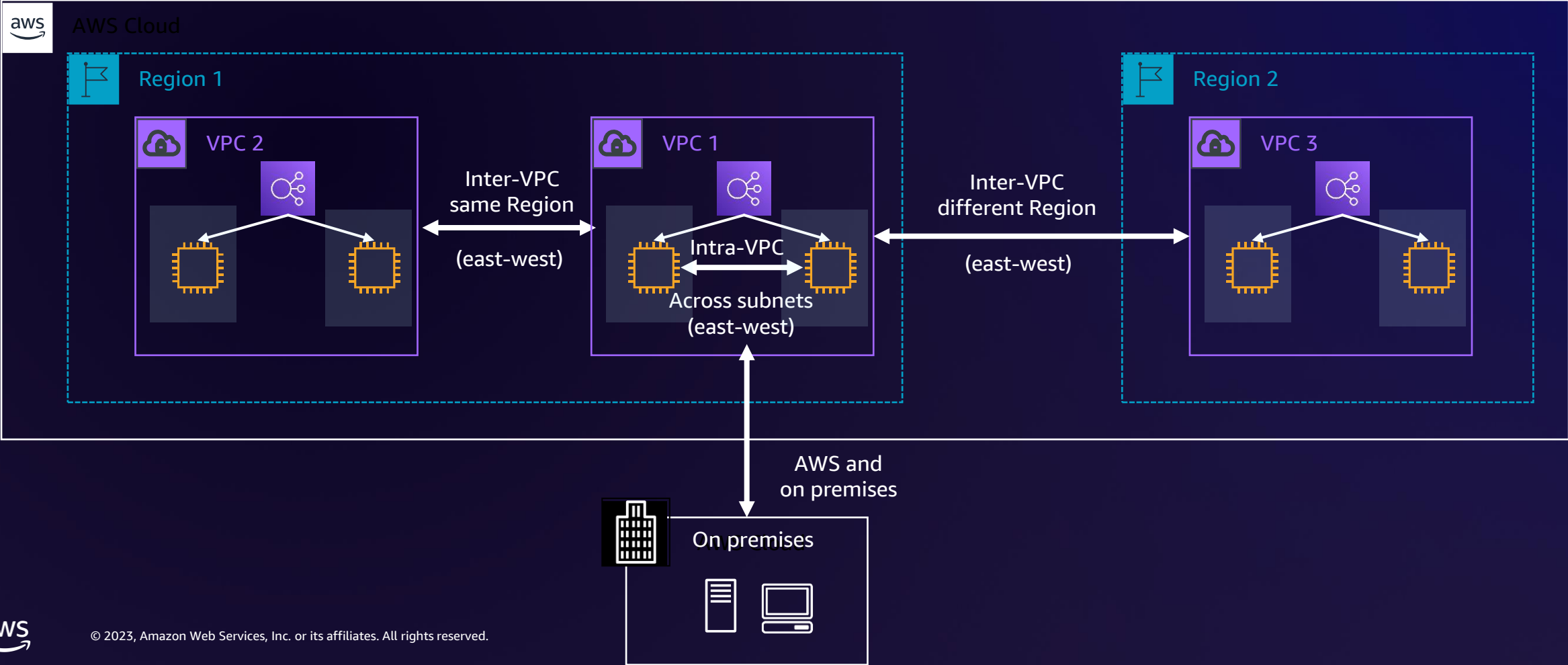
# Traffic inspection patterns



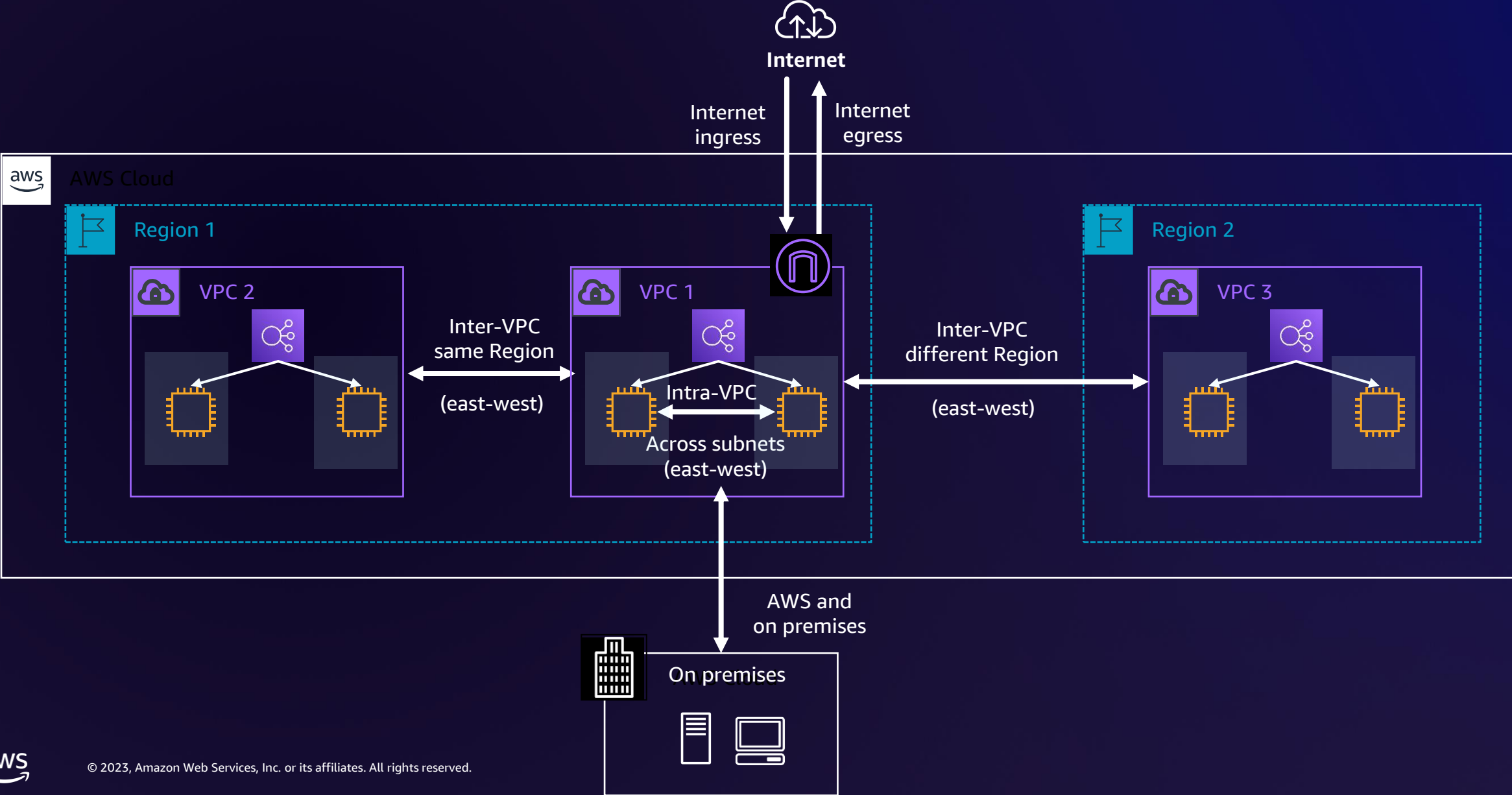
# Traffic inspection patterns



# Traffic inspection patterns



# Traffic inspection patterns



# A story of meeting needs



Alice

1. AnyCompany
2. Alice – Network Security Architect
3. Two data centers
4. AWS presence us-east-1

# A story of meeting needs



**People who  
want things**

1. AnyCompany
2. Alice – Network Security Architect
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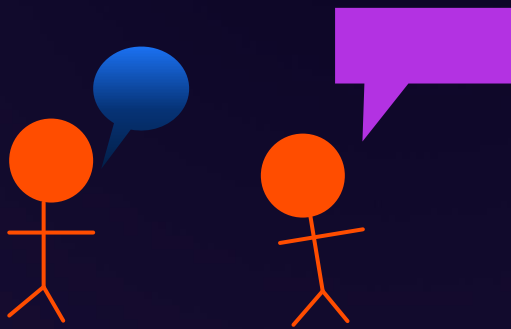
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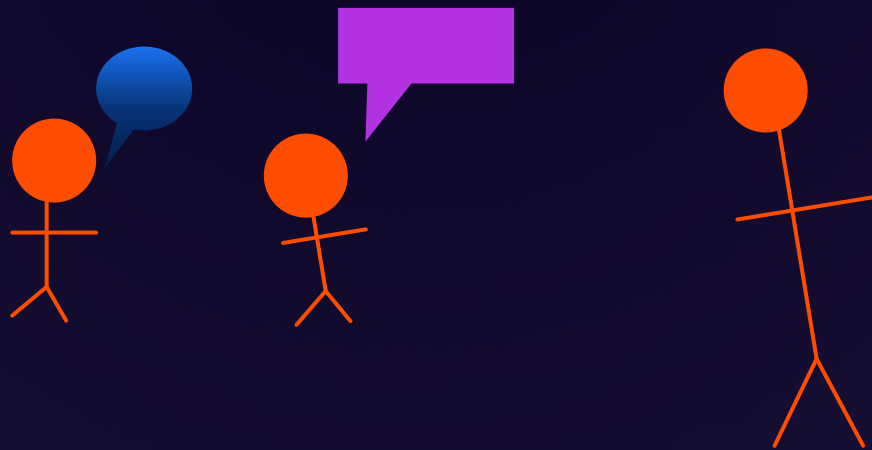
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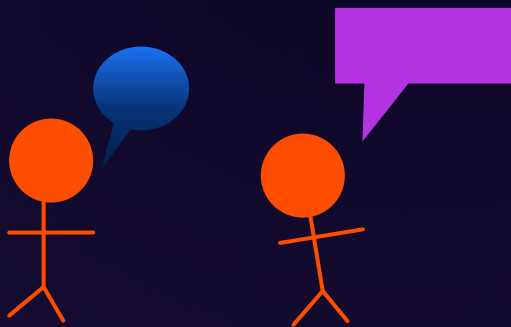
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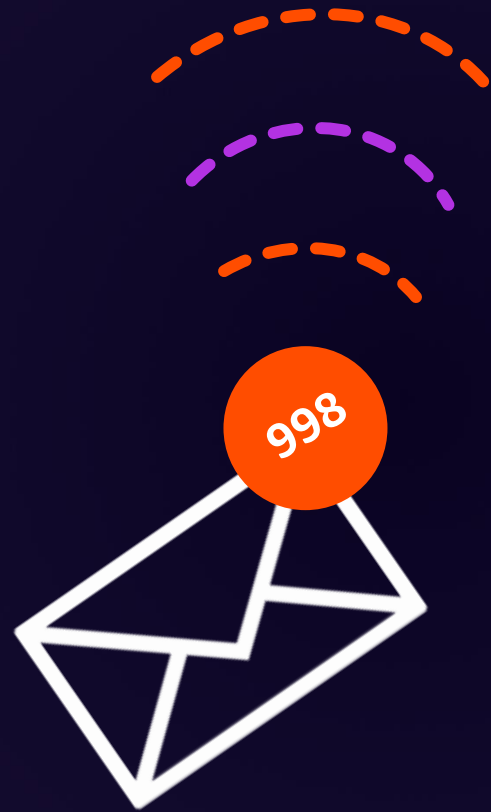


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# A story of meeting needs



1. AnyCompany
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# Alice gets an email from the security team

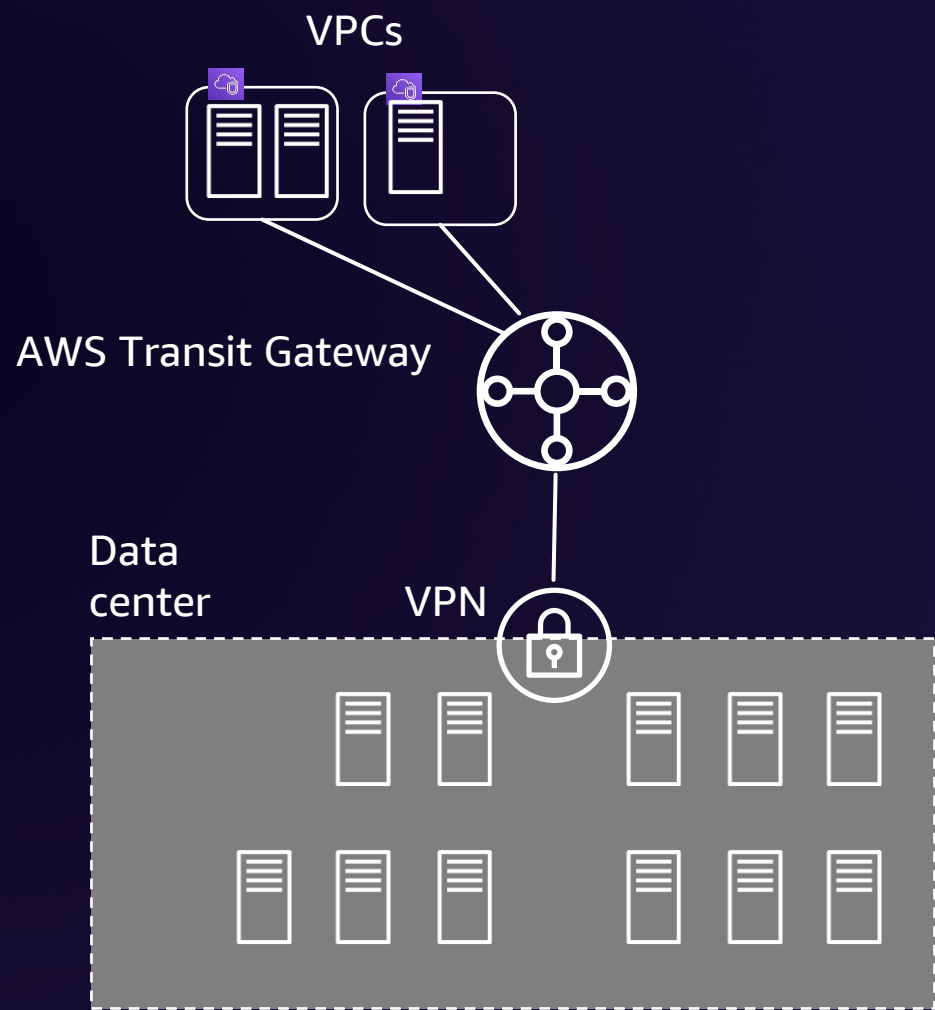
The security team found unidentified traffic from the dev environment to production environment. Alice's manager wants her to design an architecture for traffic inspection to bolster security posture of AnyCompany.

# Security inspection requirements

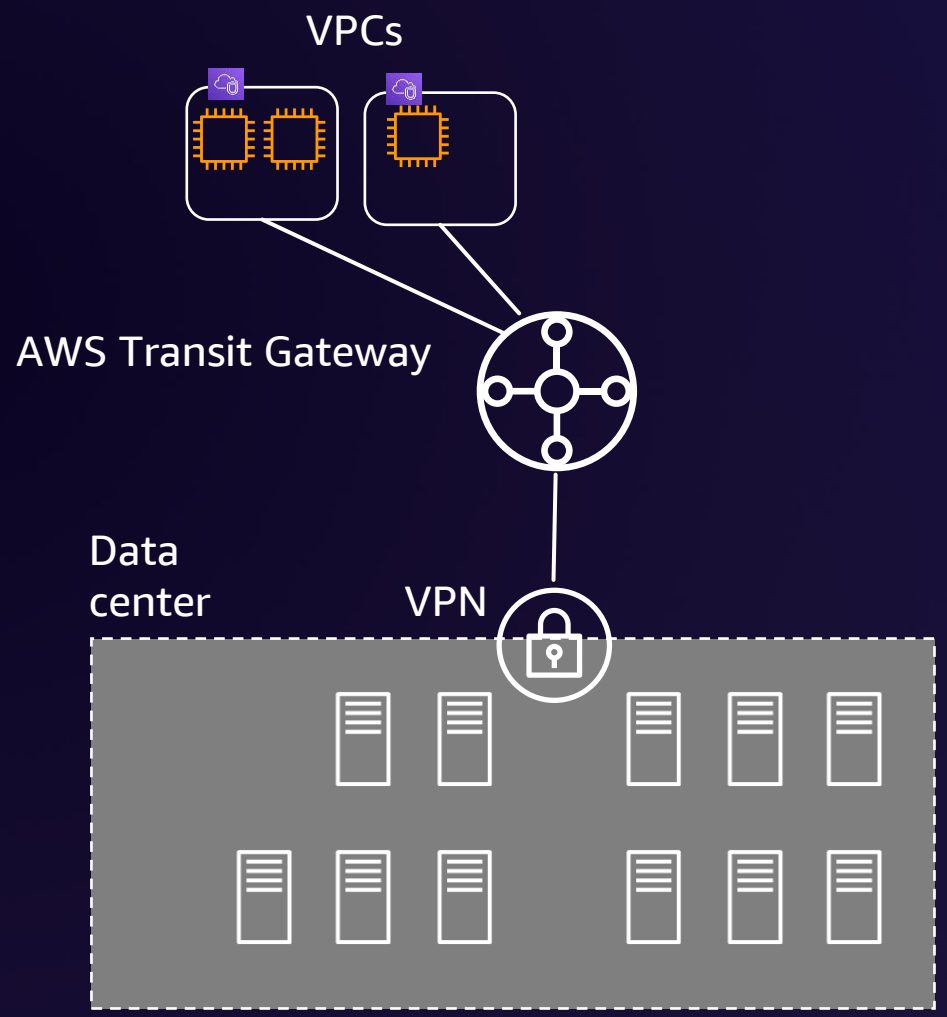
	Production	Development	Hybrid	Inspection
Production	Red	Red	Red	Green
Development	Red	Green	Red	Green
Hybrid	Red	Red	Green	Green
Inspection	Green	Green	Green	Green

1. Production segment isolated
2. East-west traffic inspection
3. North-south traffic inspection
4. Hybrid traffic inspection
5. Future-proof design
6. Automation
7. Visibility and control

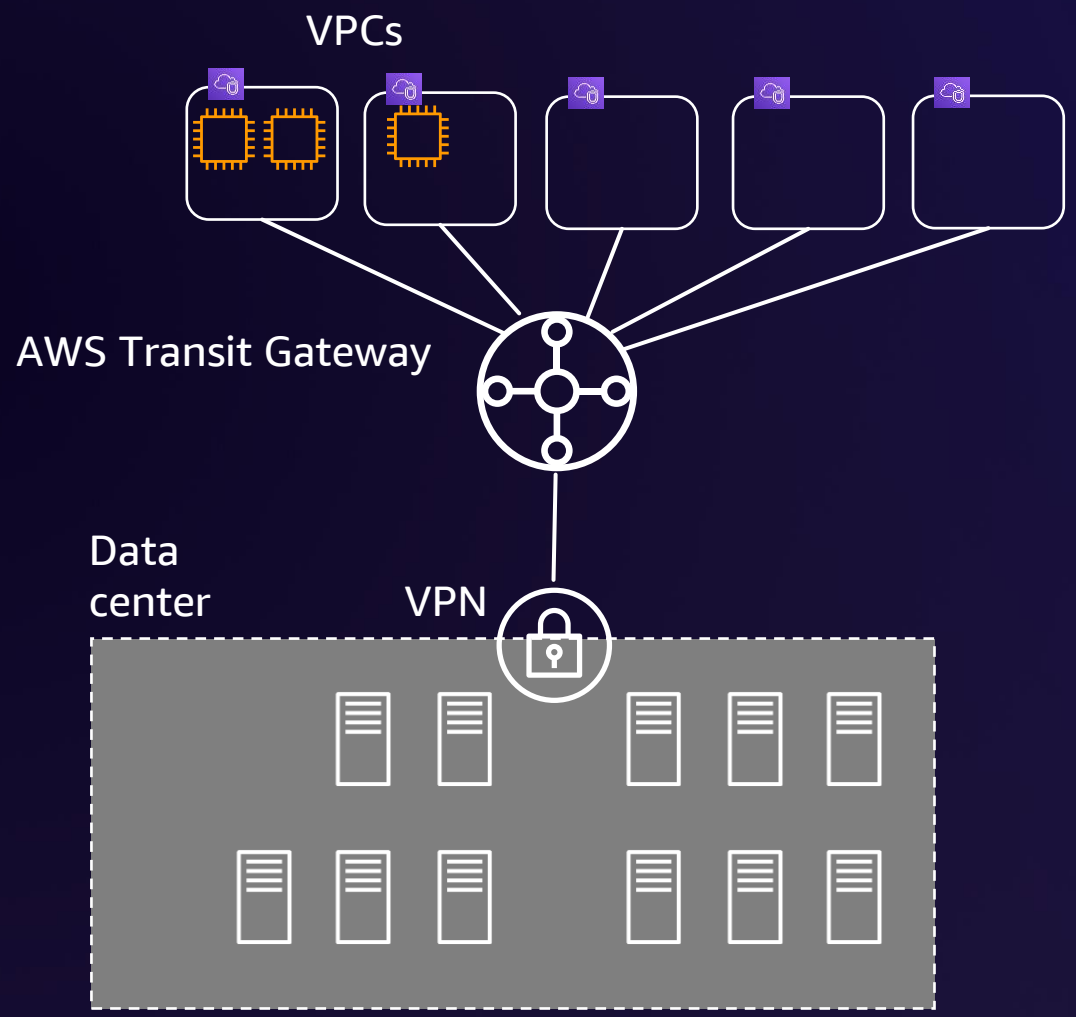
# Challenges in building a secure global network



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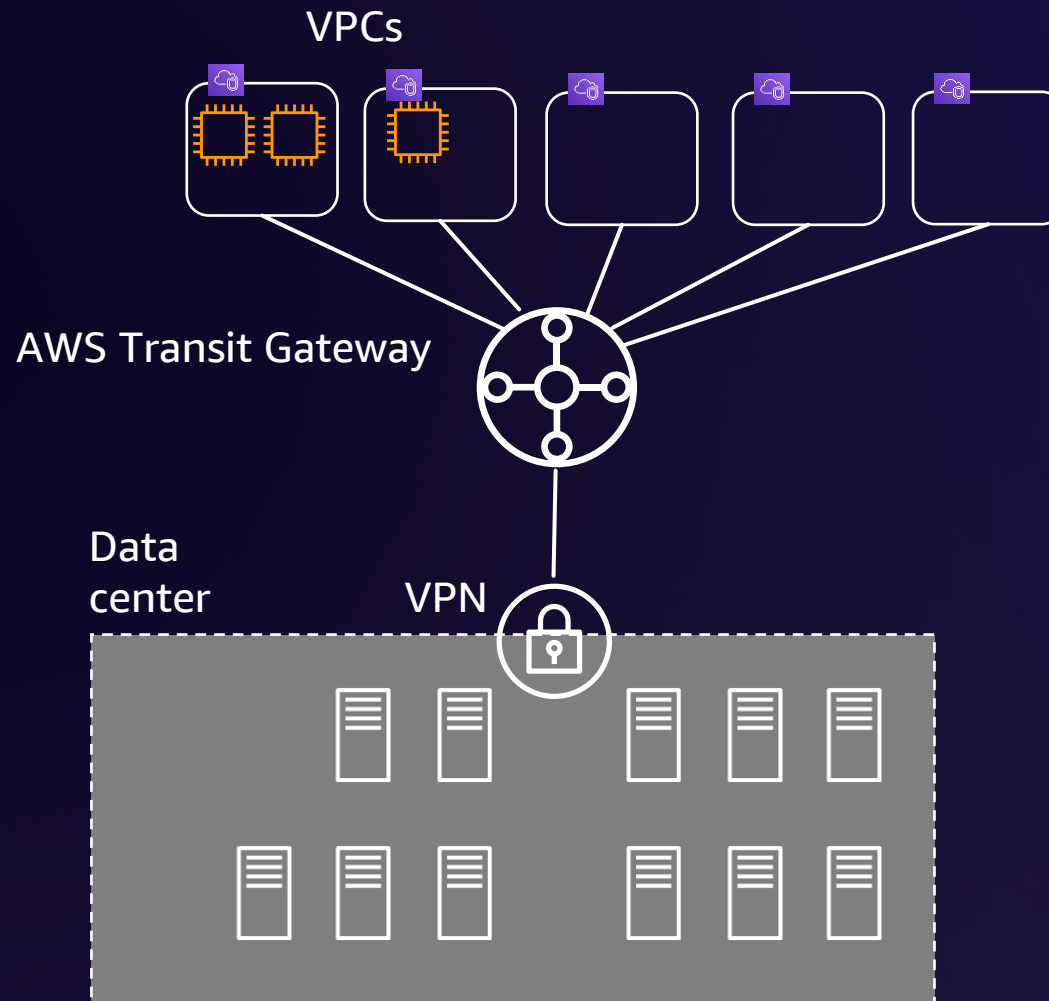
# Challenges in building a secure global network



# Challenges in building a secure global network

## Network requirements

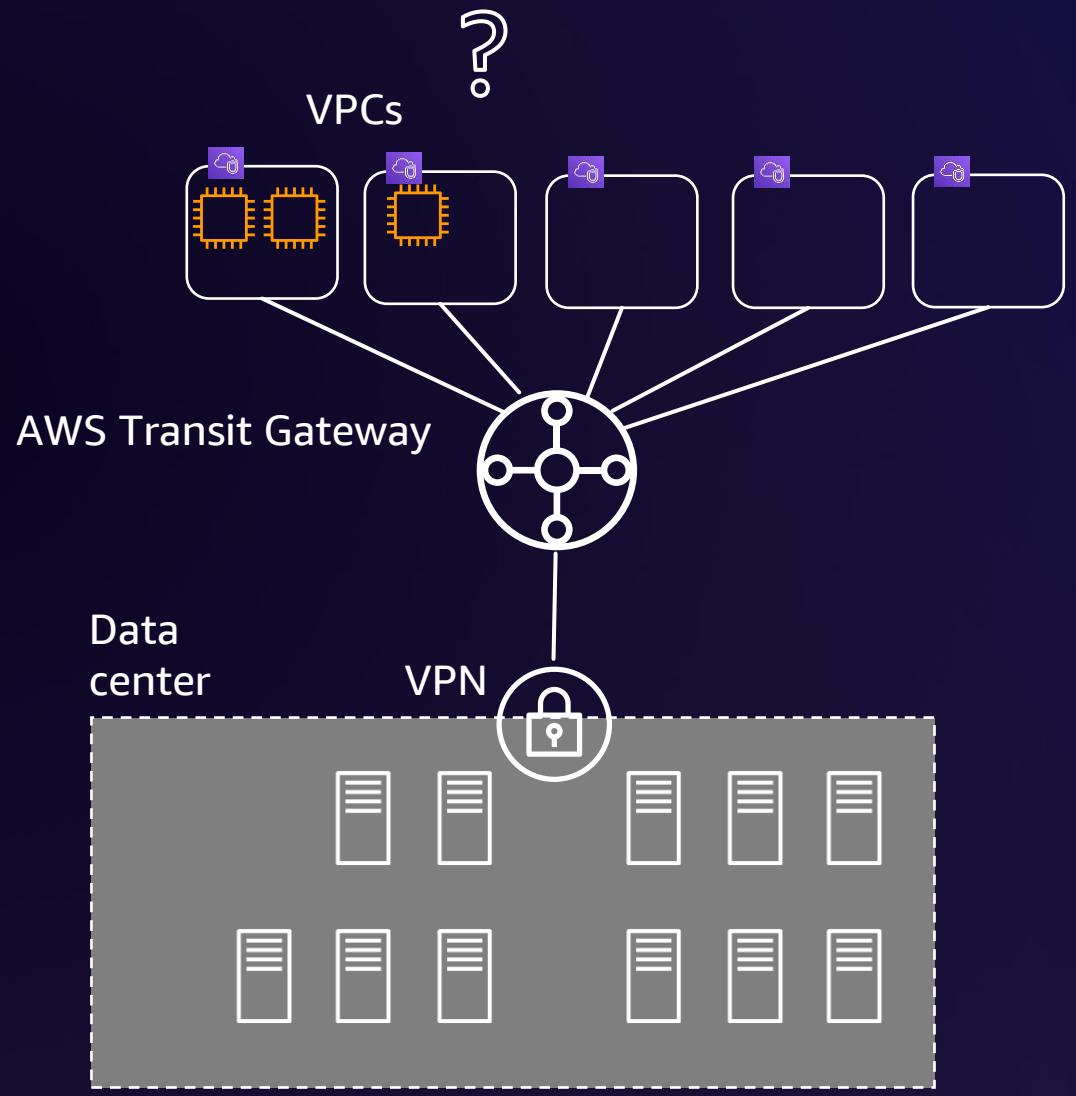
- Automation



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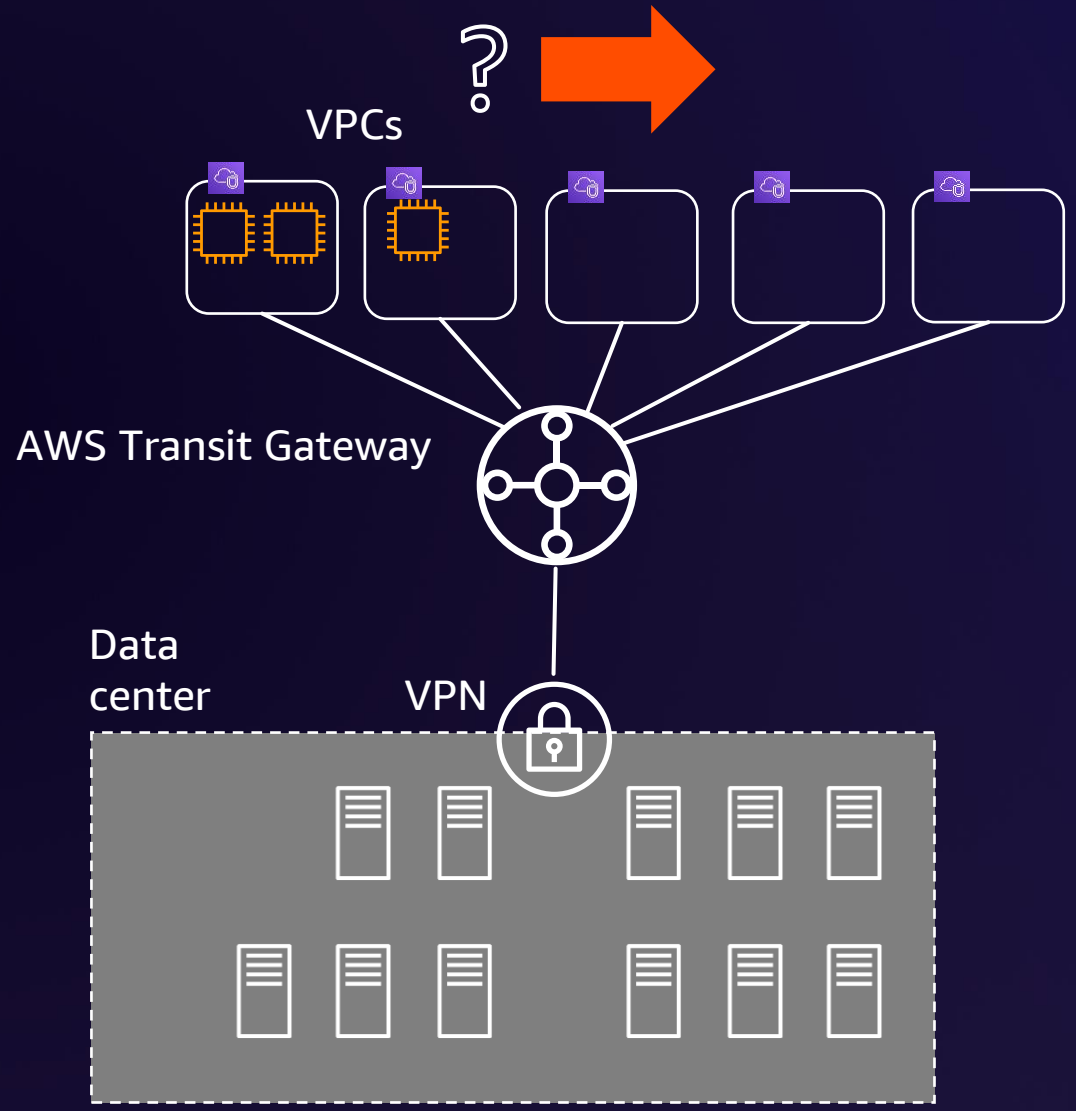
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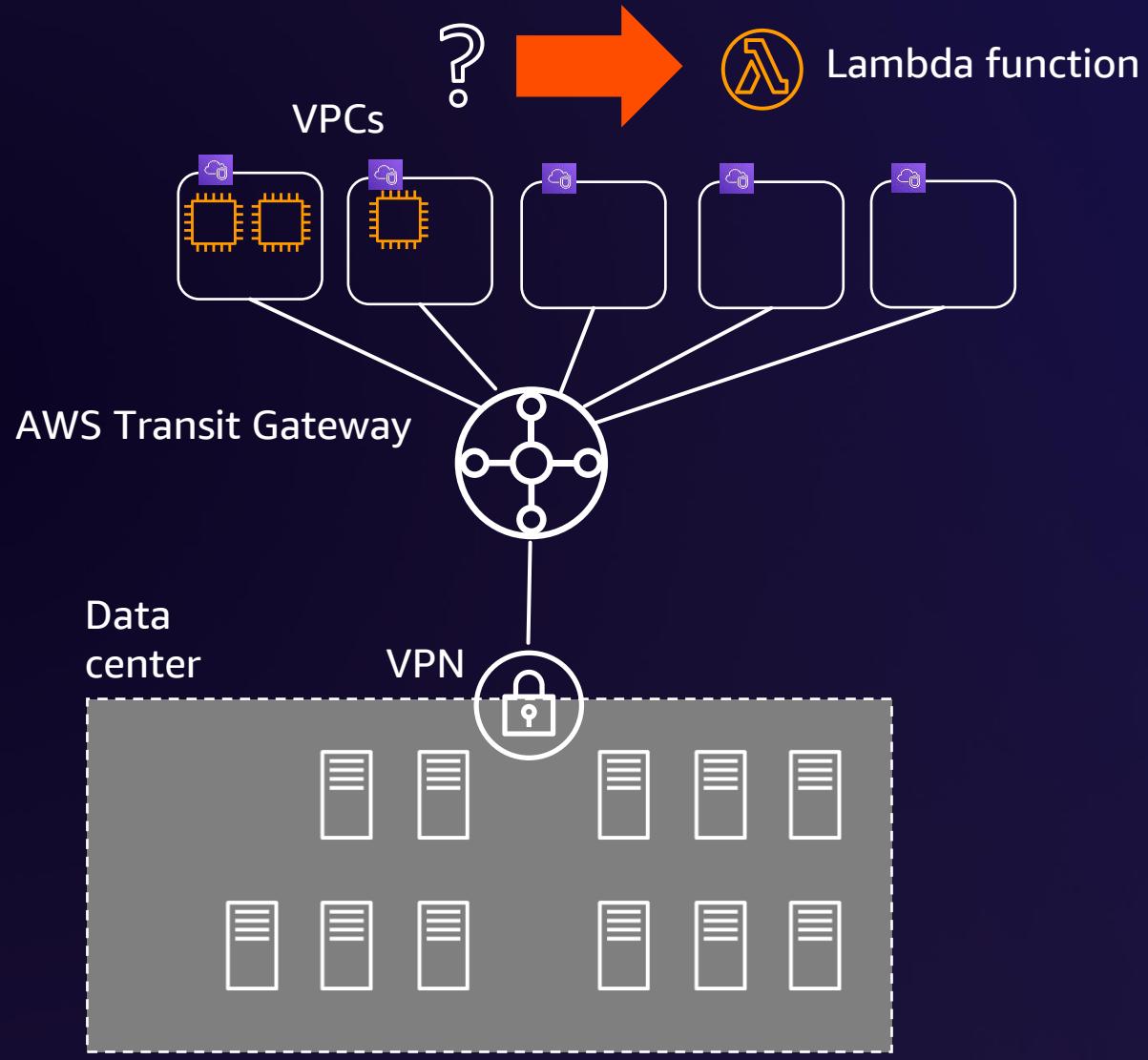
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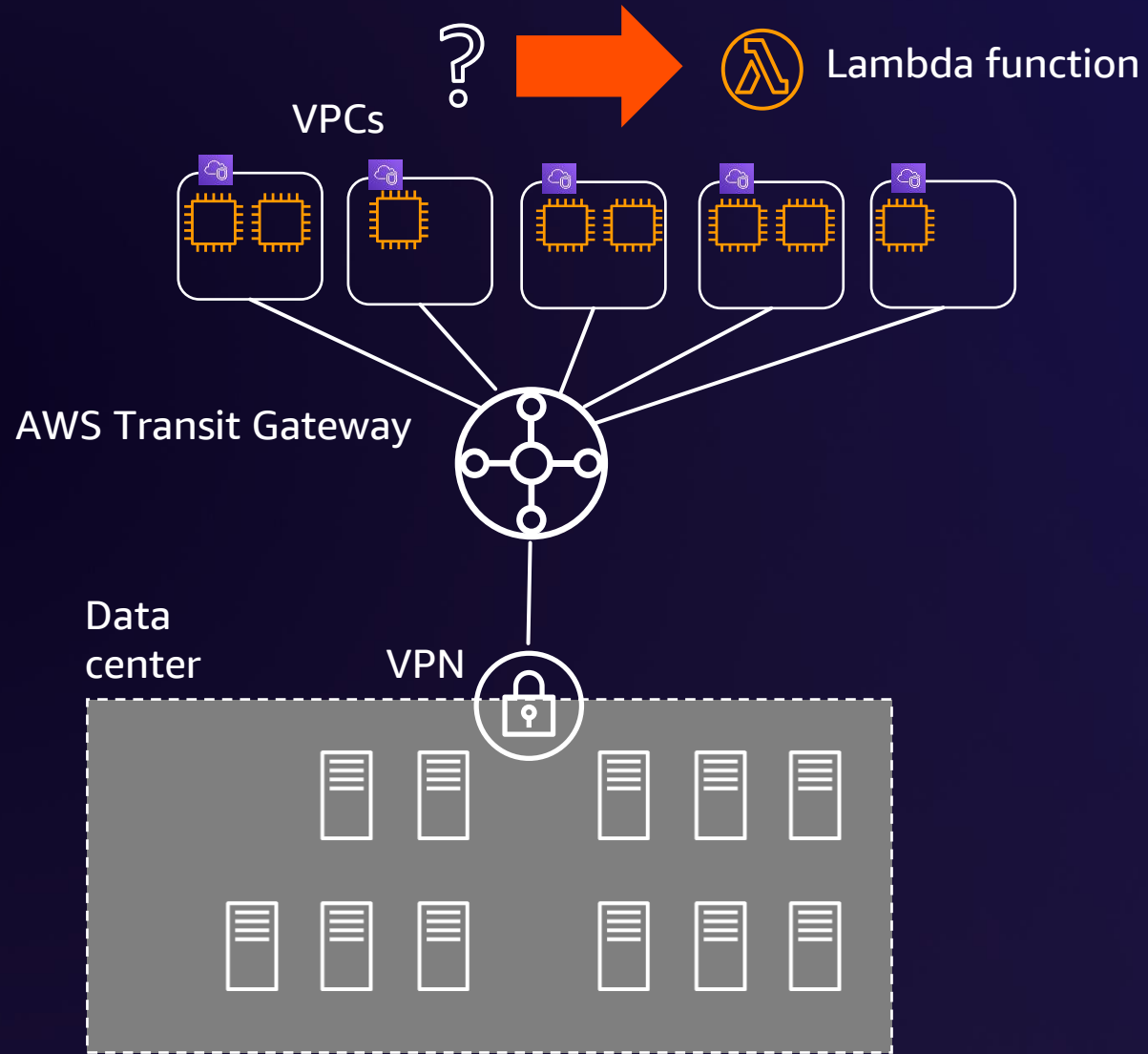
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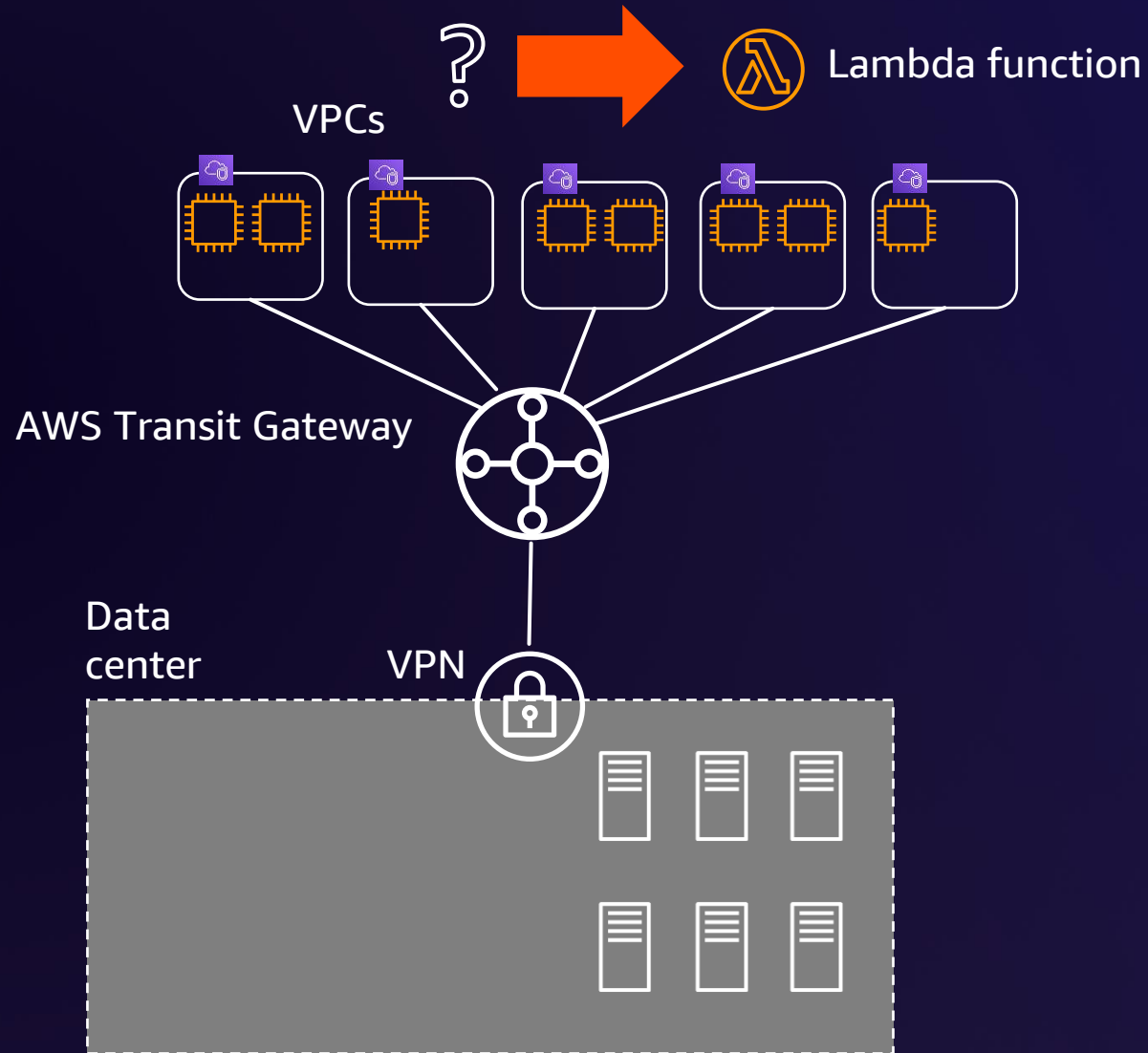
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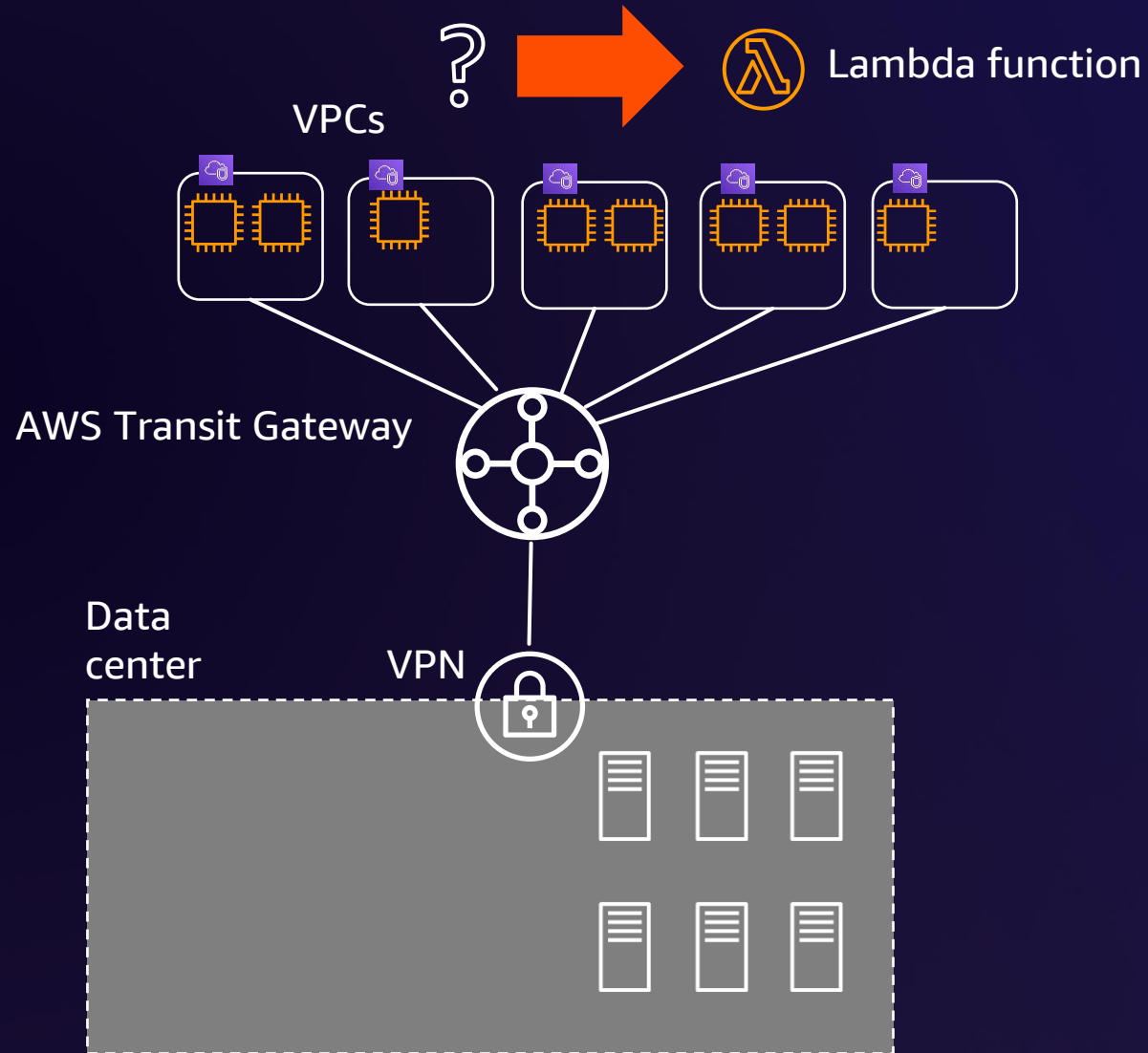
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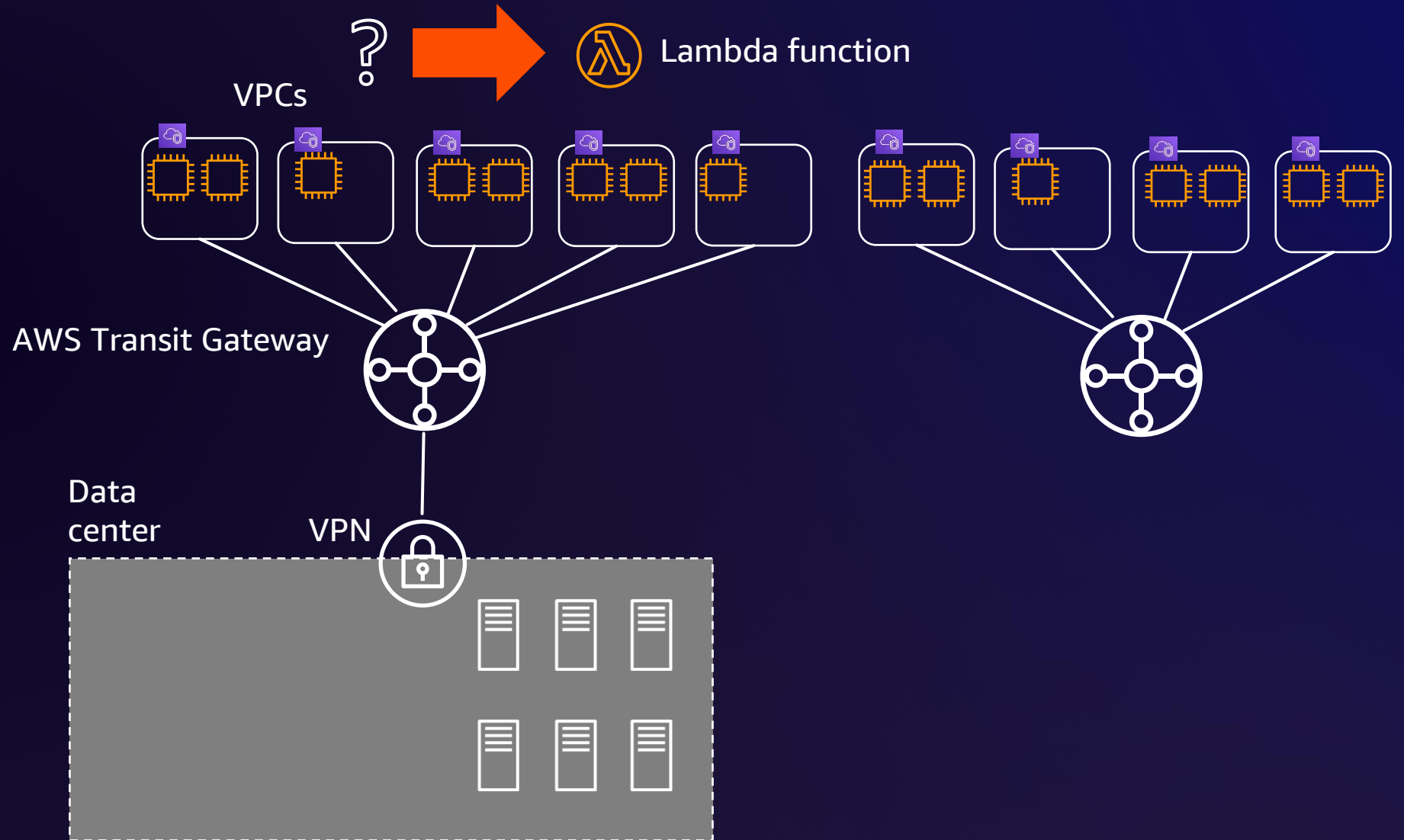
- Automation
- Multi-Region



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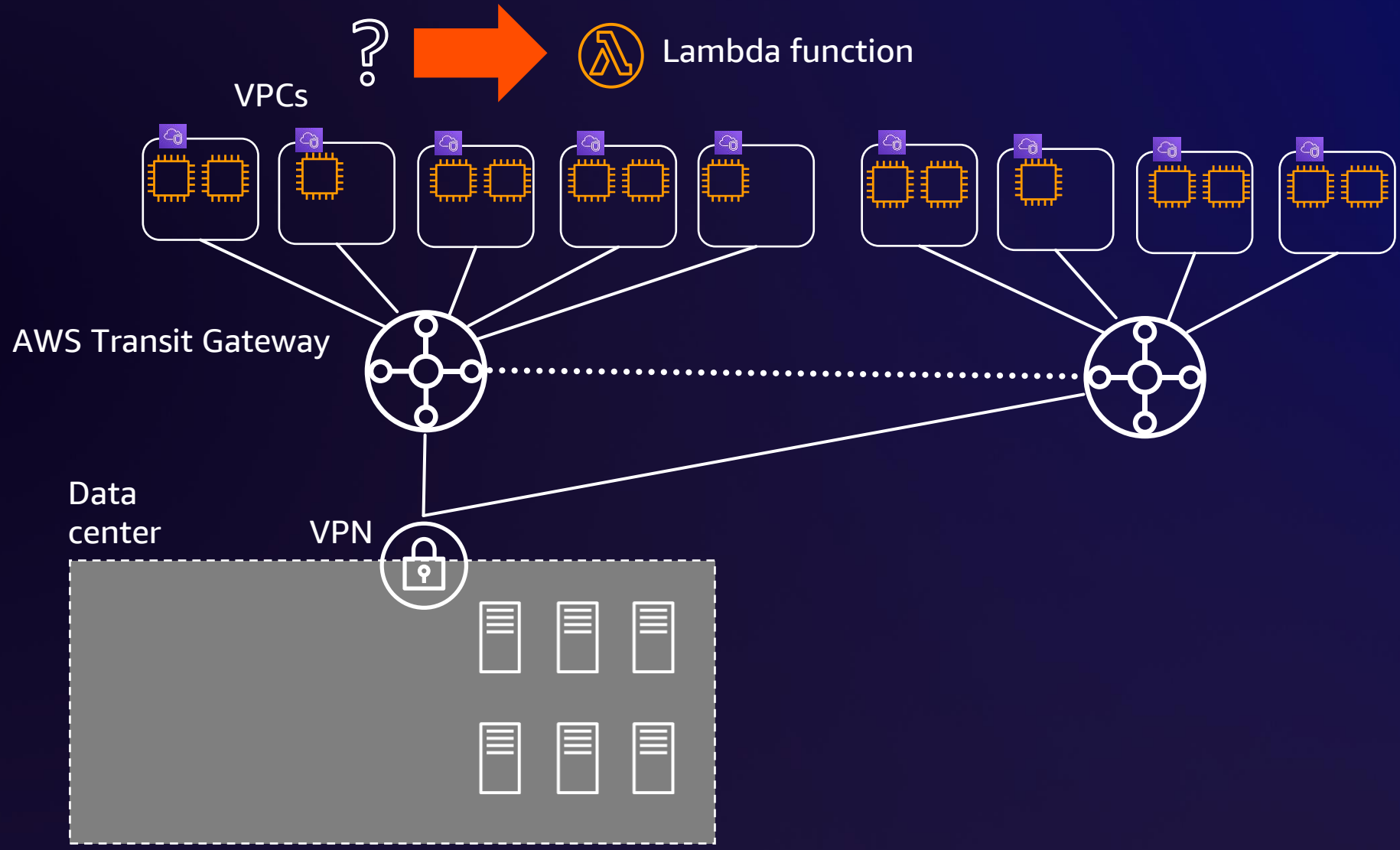
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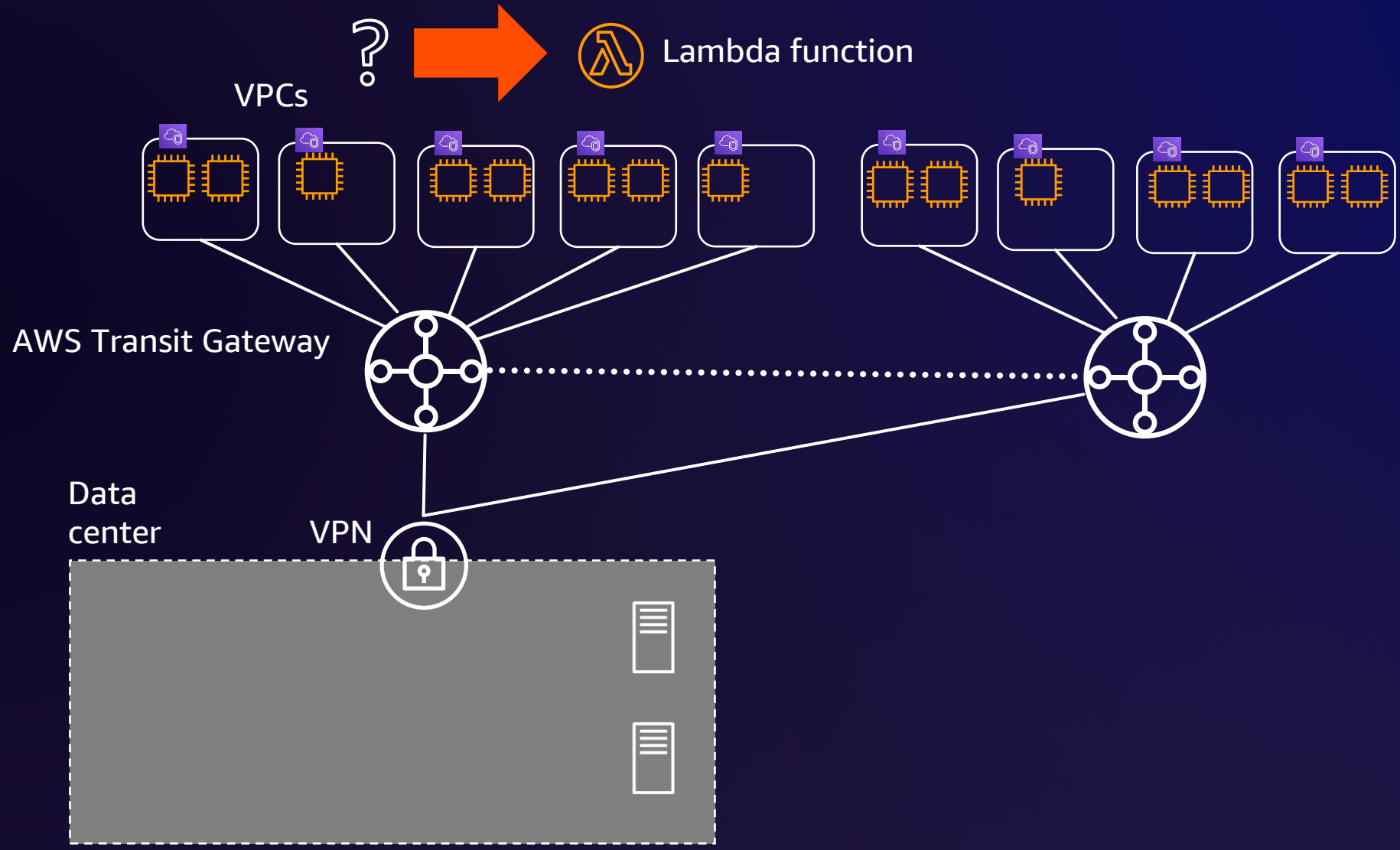
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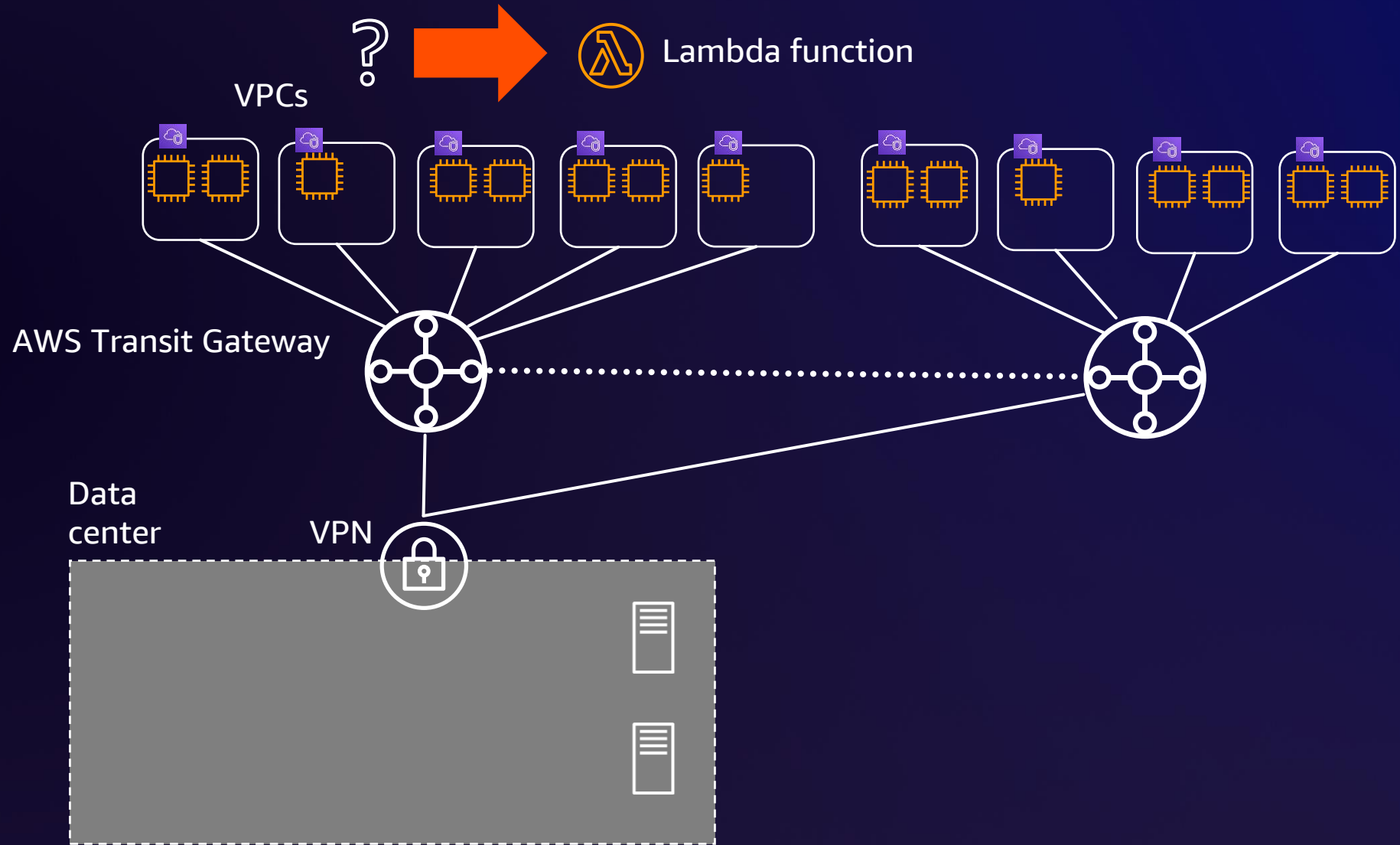
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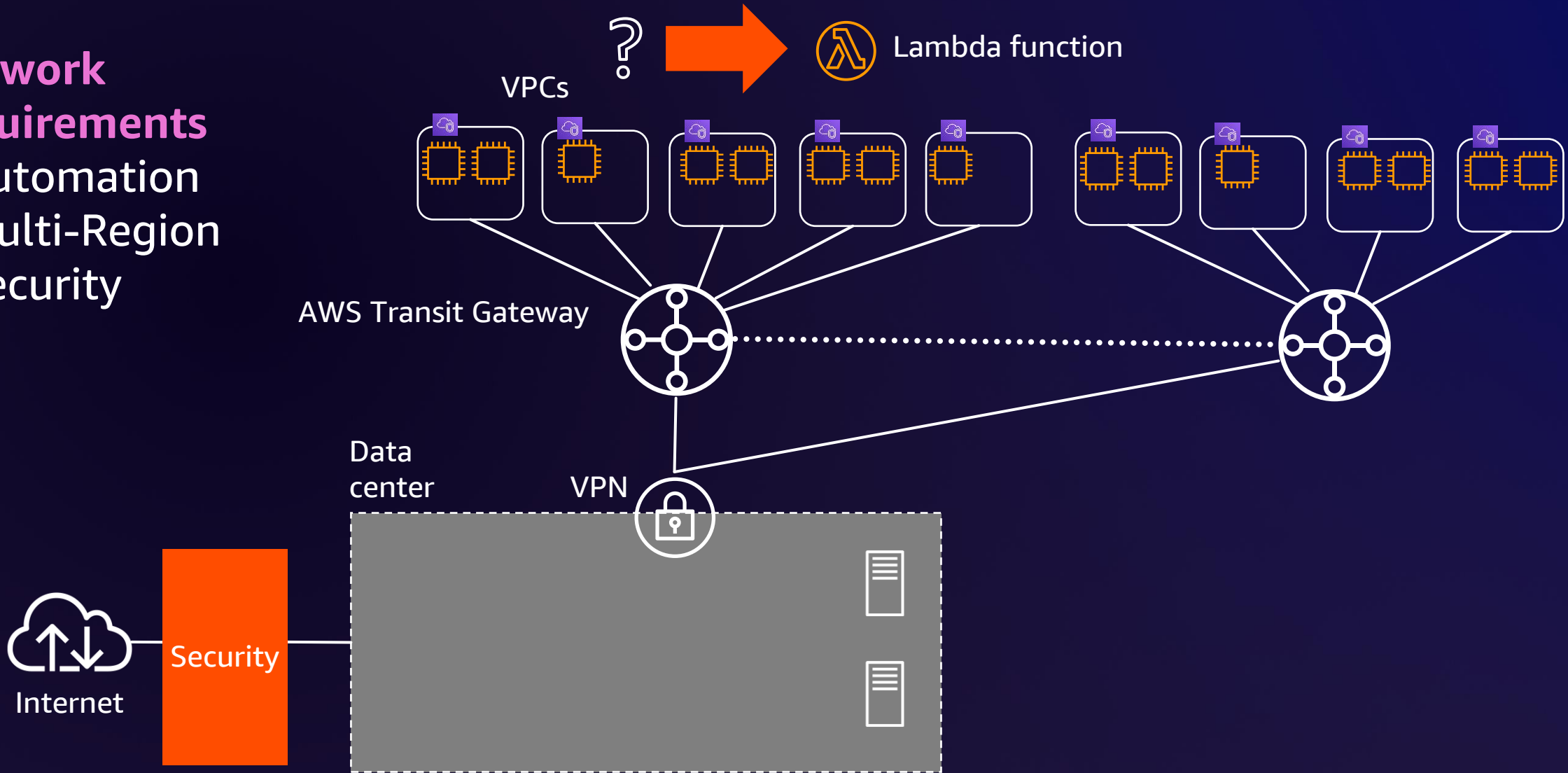
- Automation
- Multi-Region
- Security



# Challenges in building a secure global network

## Network requirements

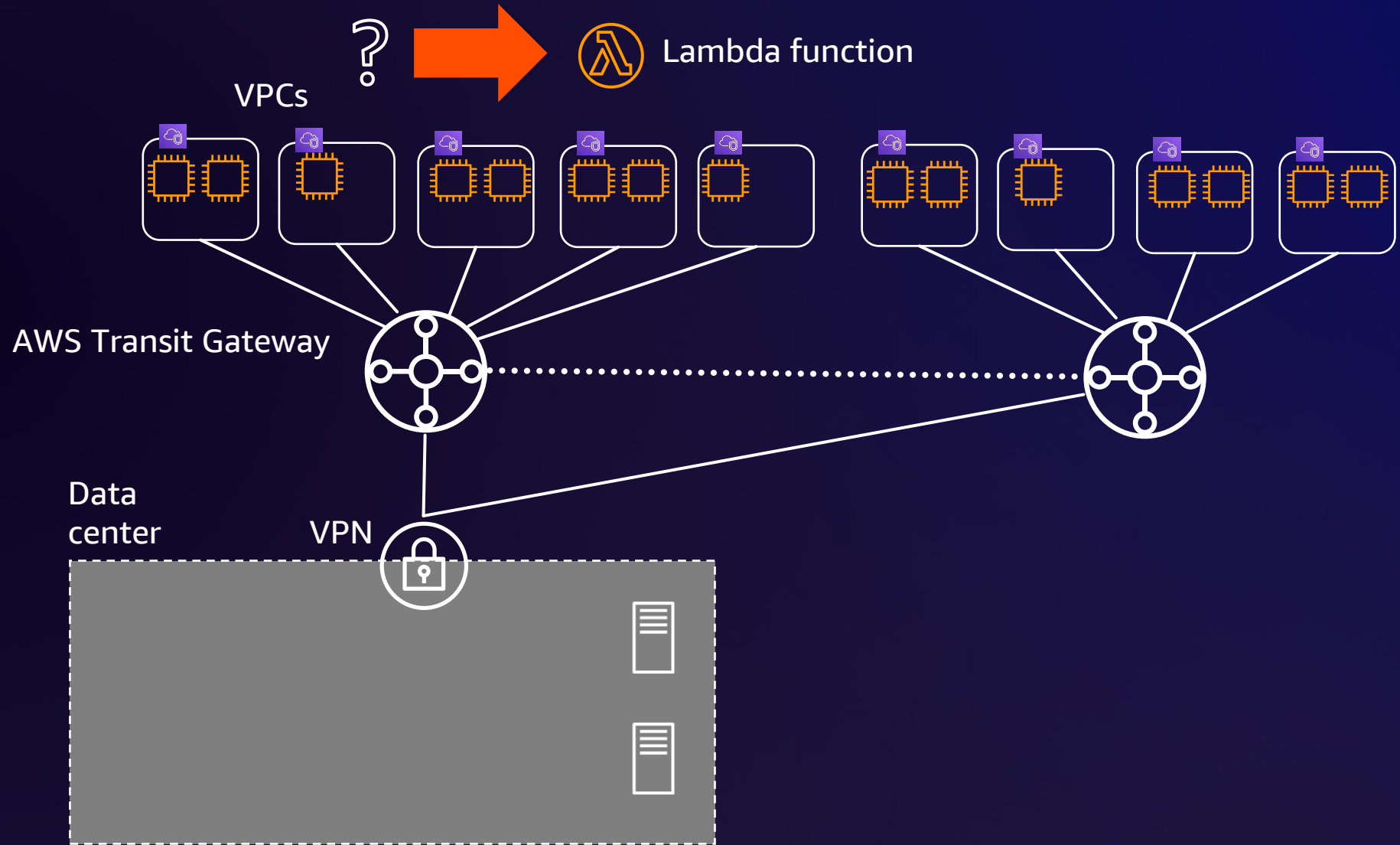
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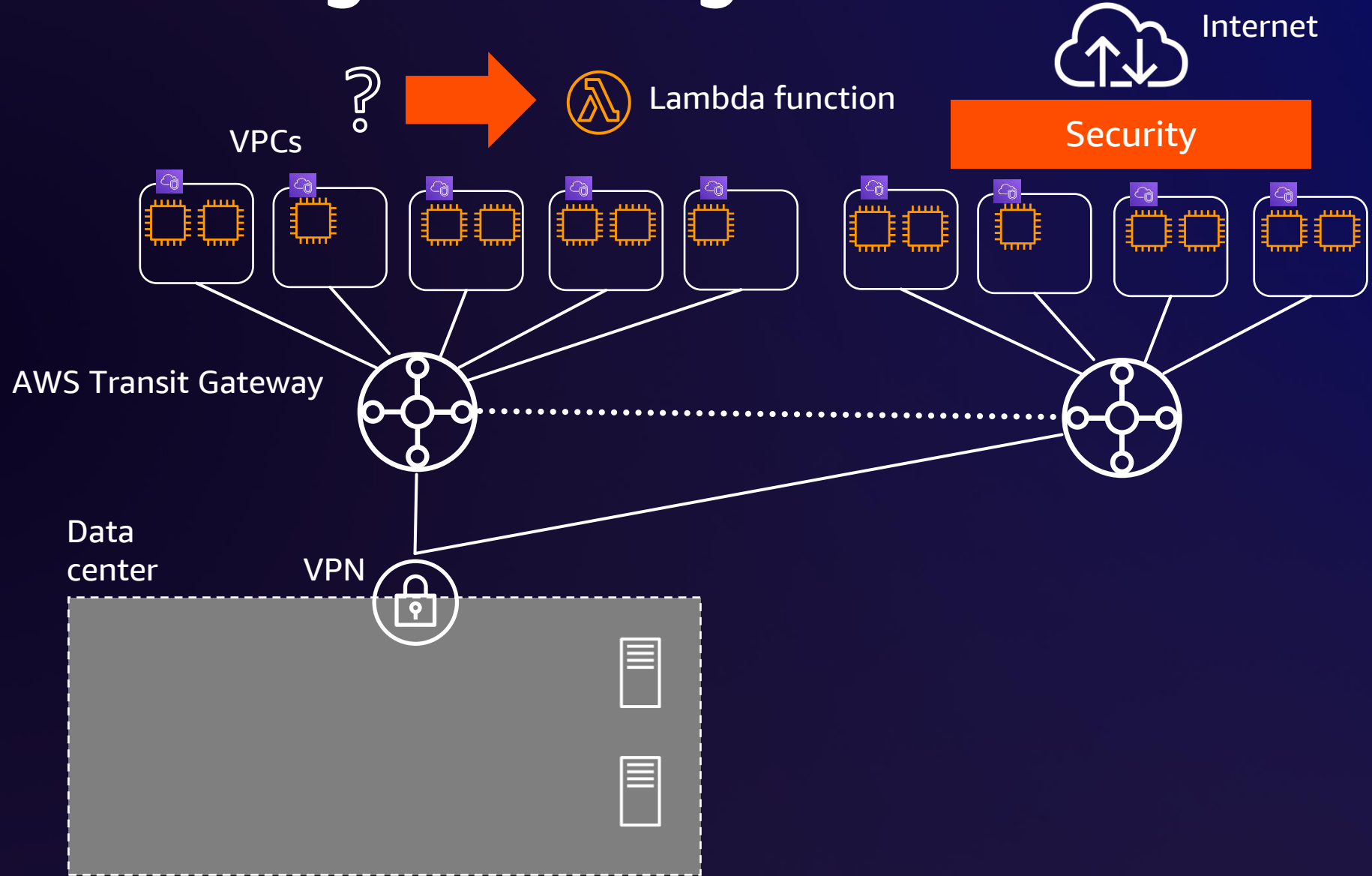
- Automation
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## Network requirements

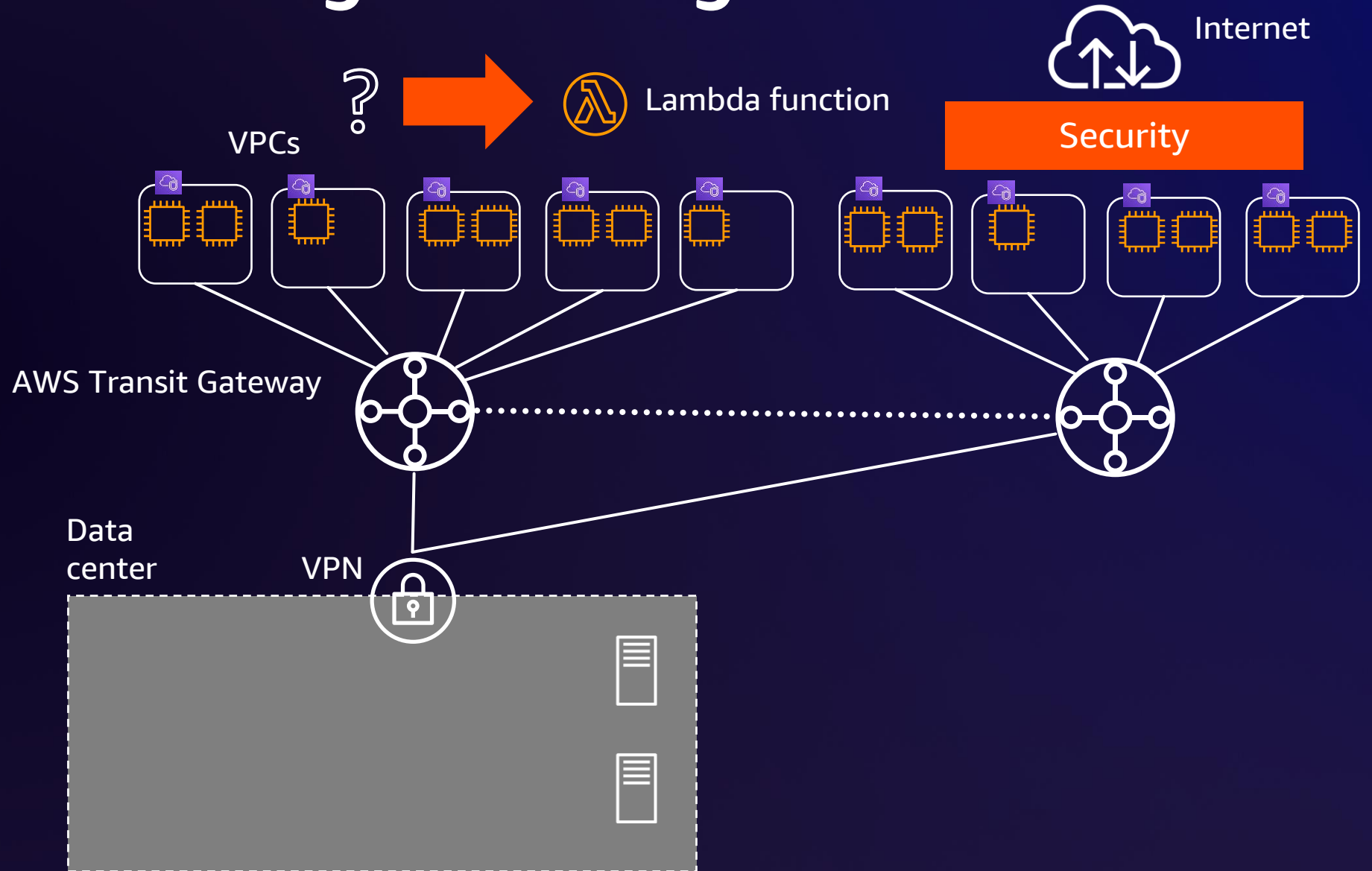
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## Network requirements

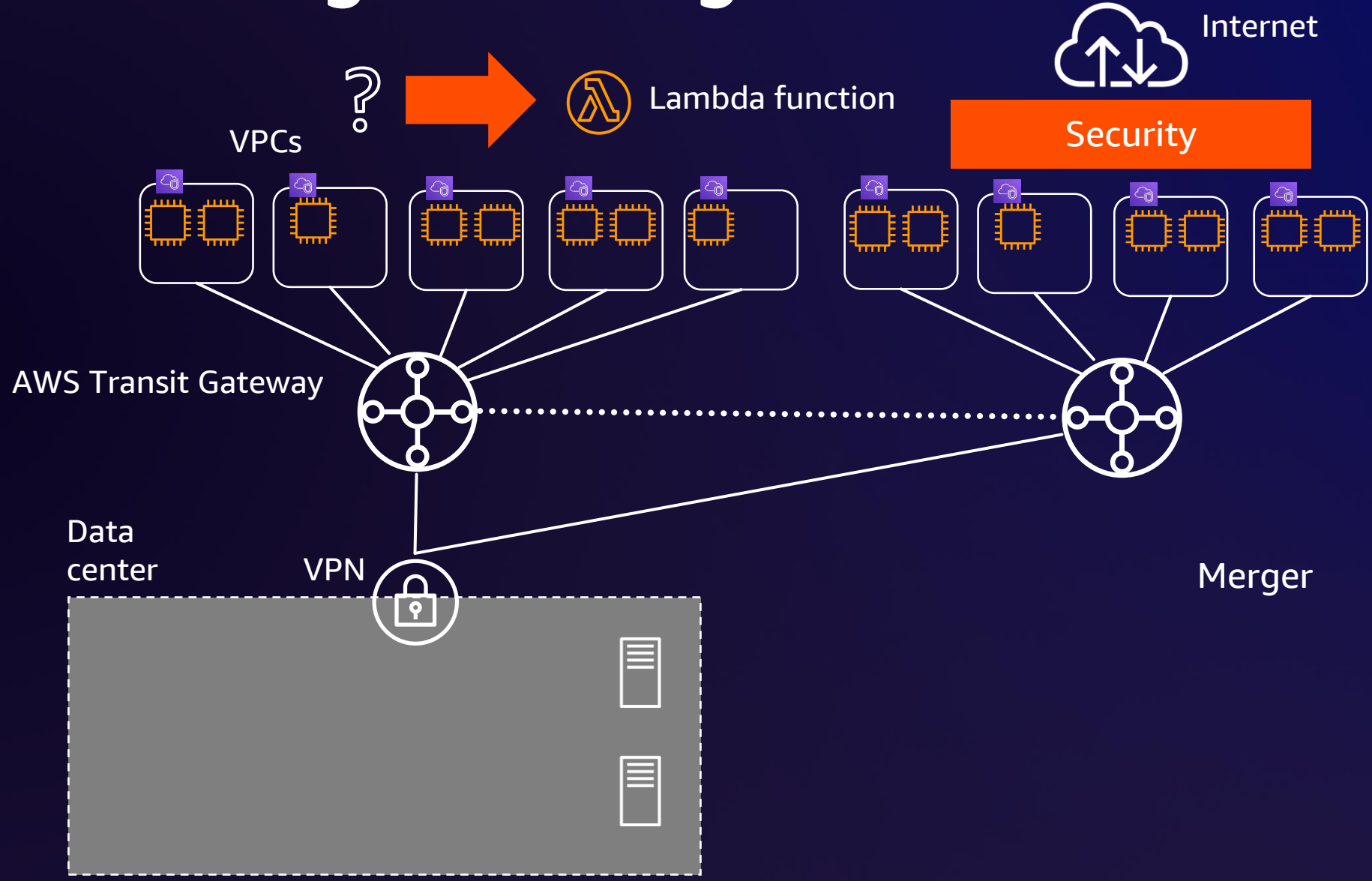
- Automation
- Multi-Region
- Security
- Extensibility



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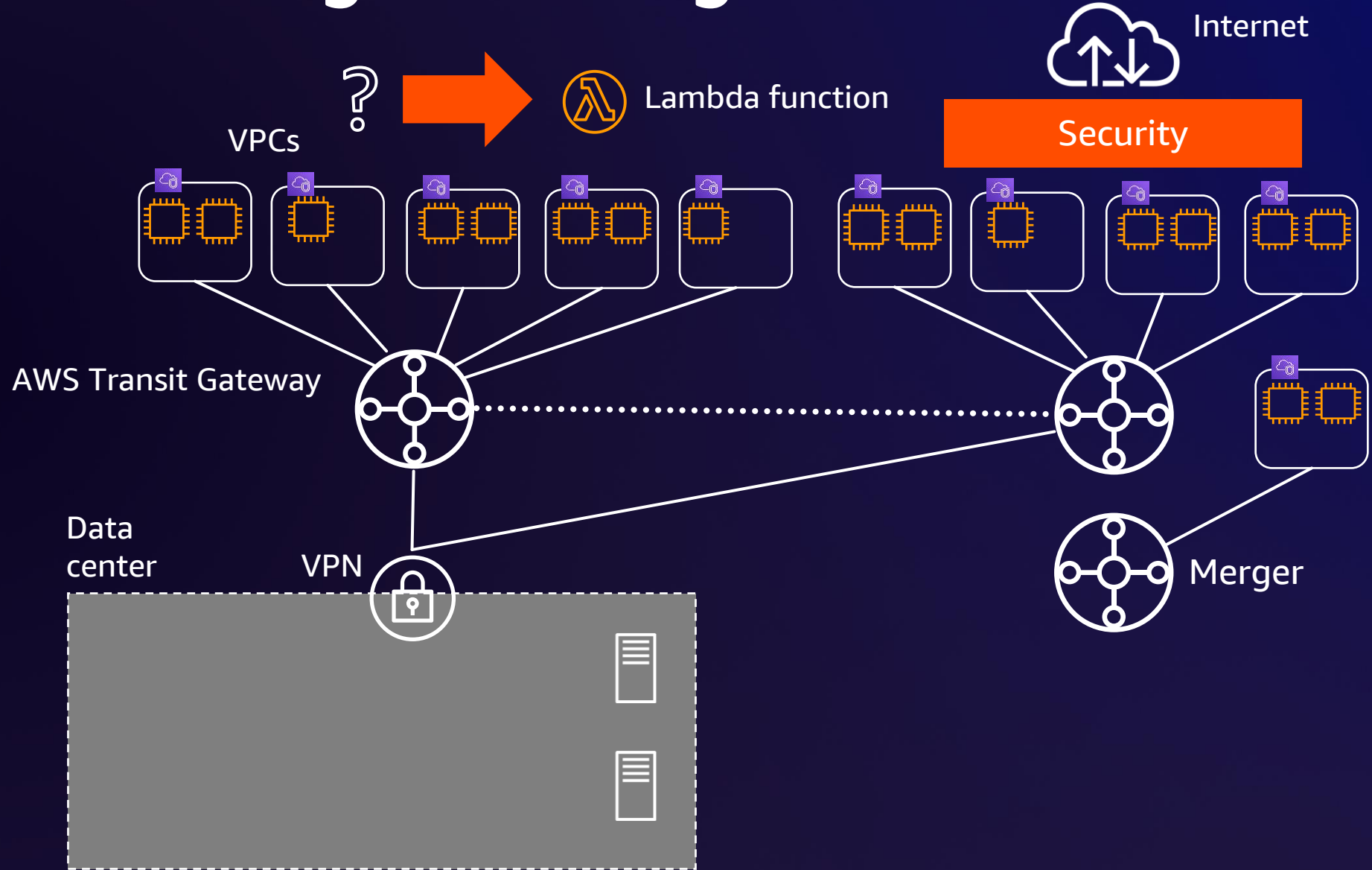
- Automation
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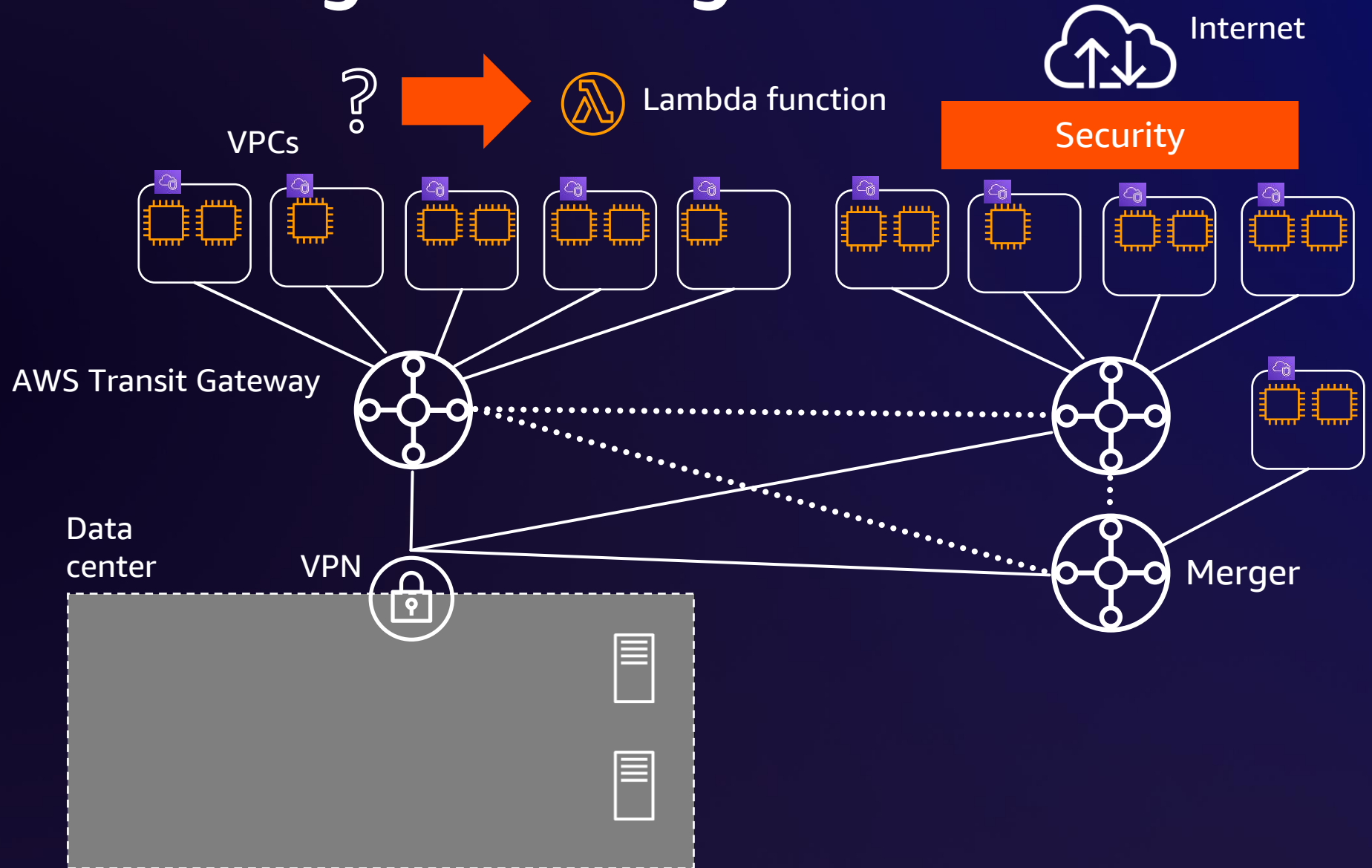
- Automation
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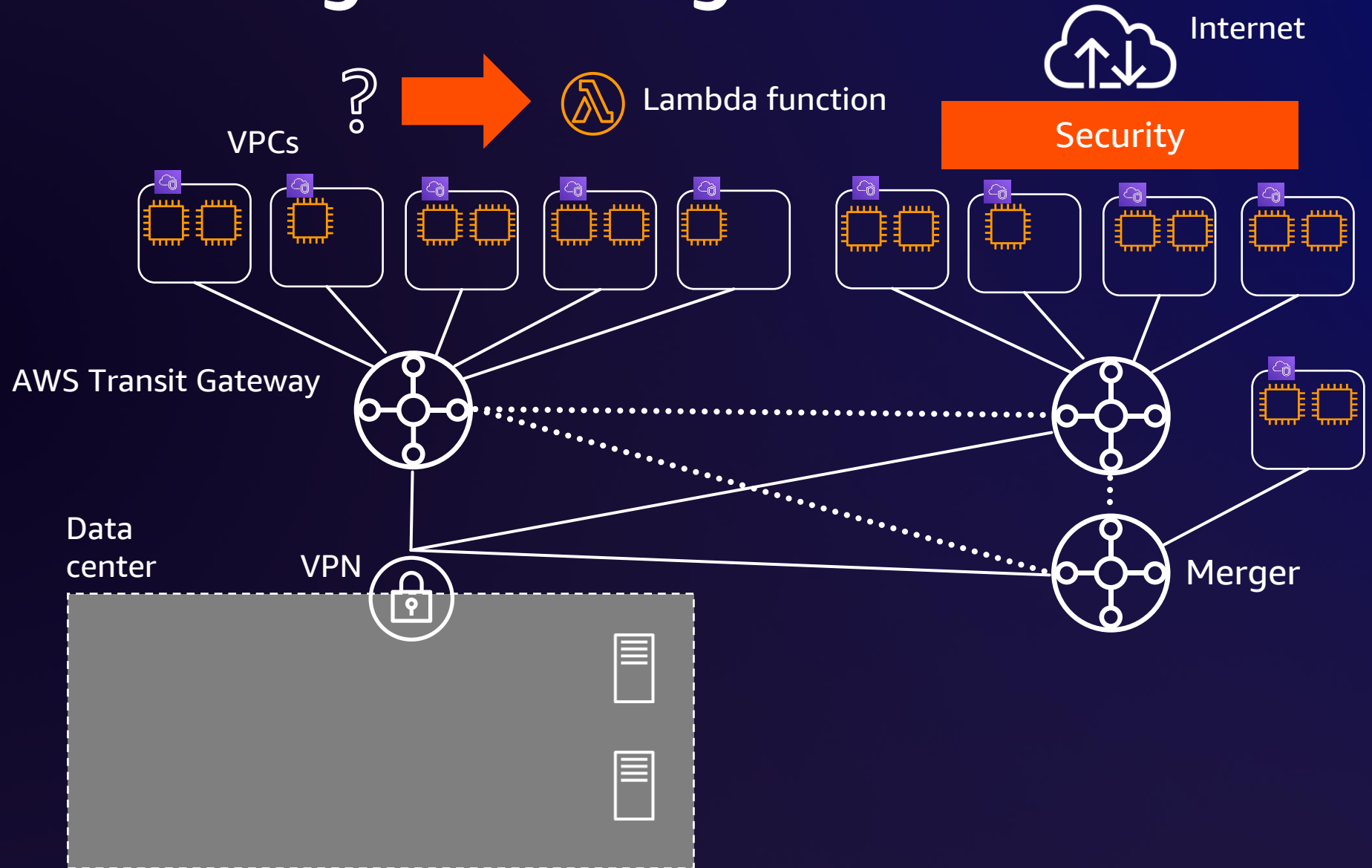
- Automation
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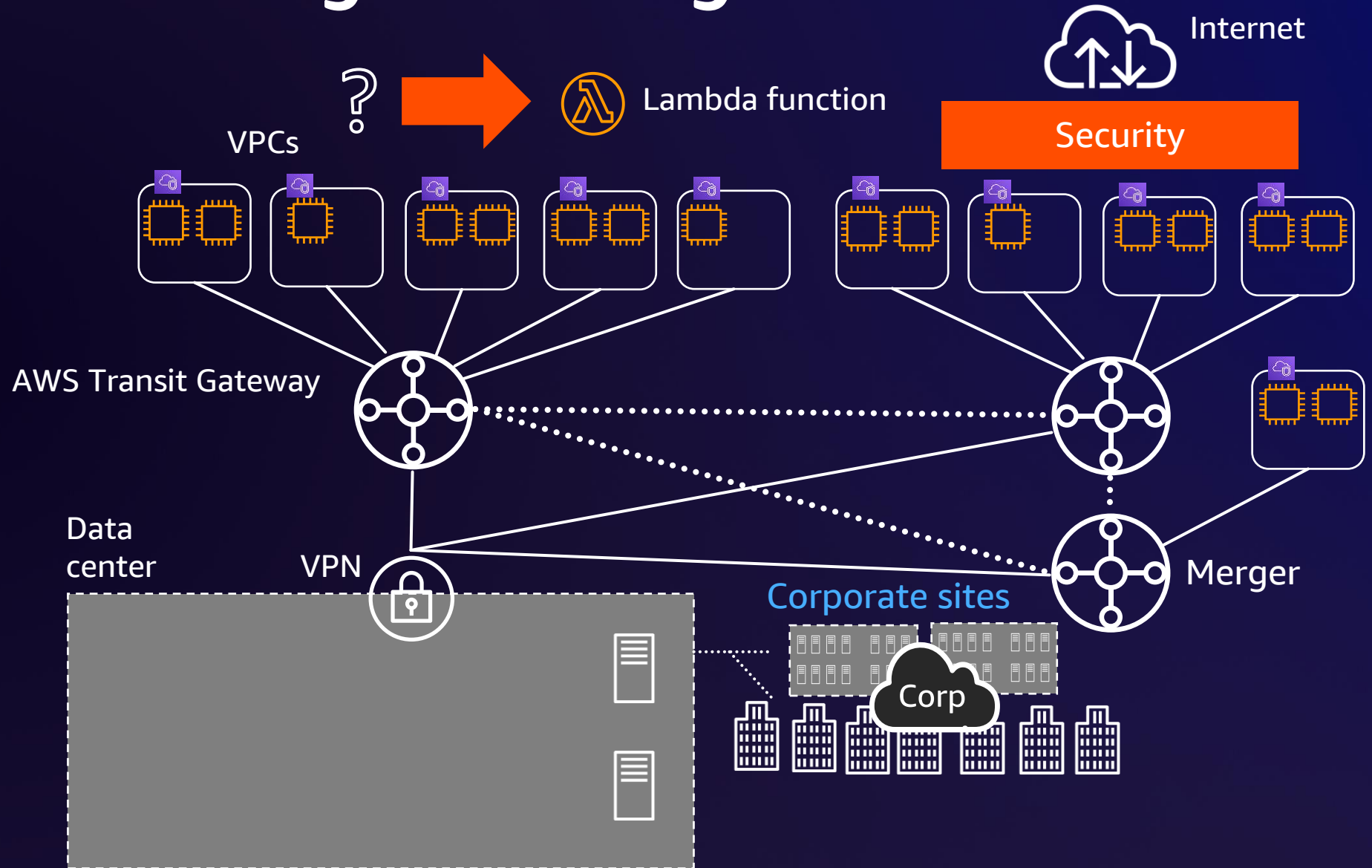
- Automation
- Multi-Region
- Security
- Extensibility
- WAN



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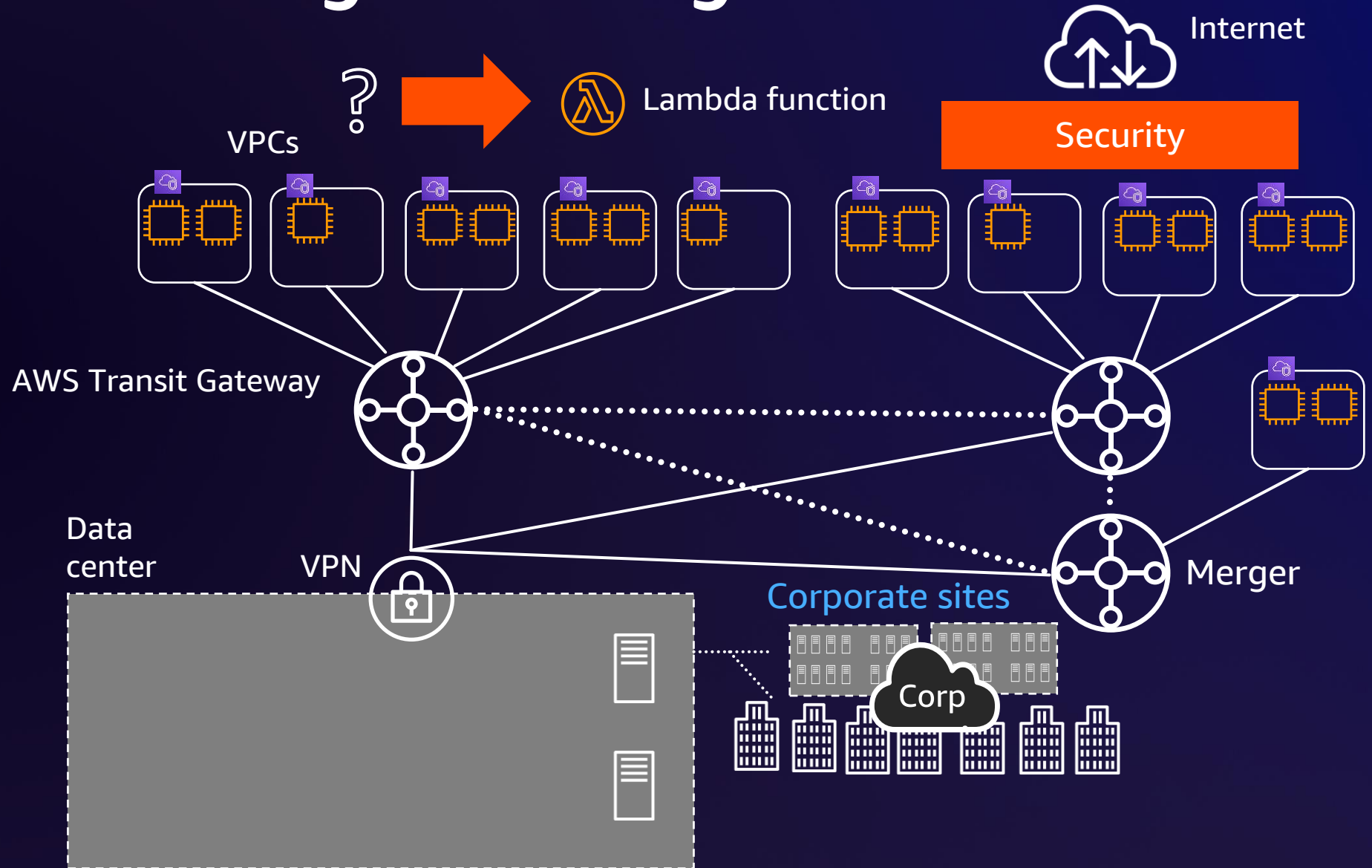
- Automation
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# Challenges in building a secure global network

## Network requirements

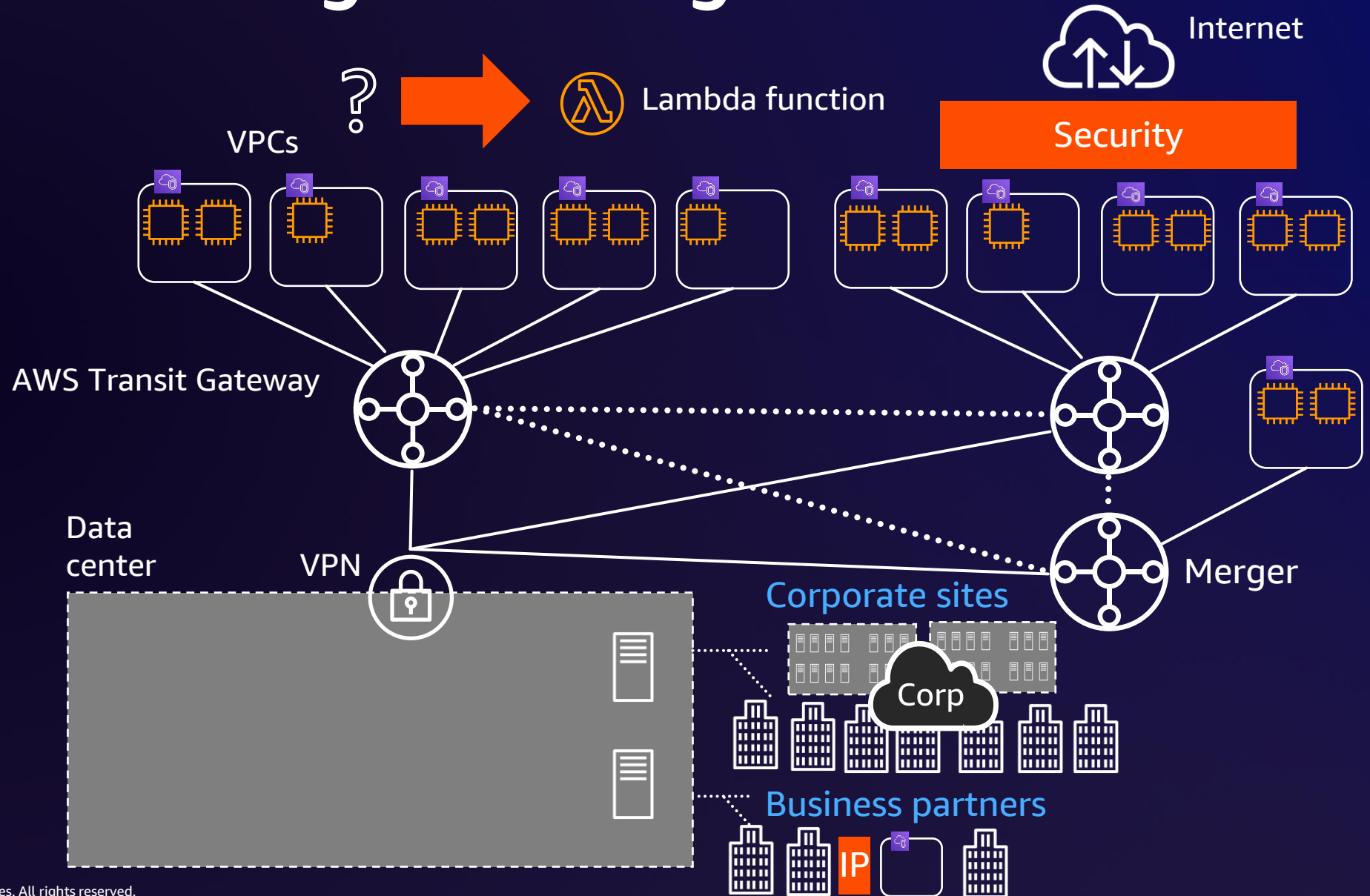
- Automation
- Multi-Region
- Security
- Extensibility
- WAN
- Extranets



# Challenges in building a secure global network

## Network requirements

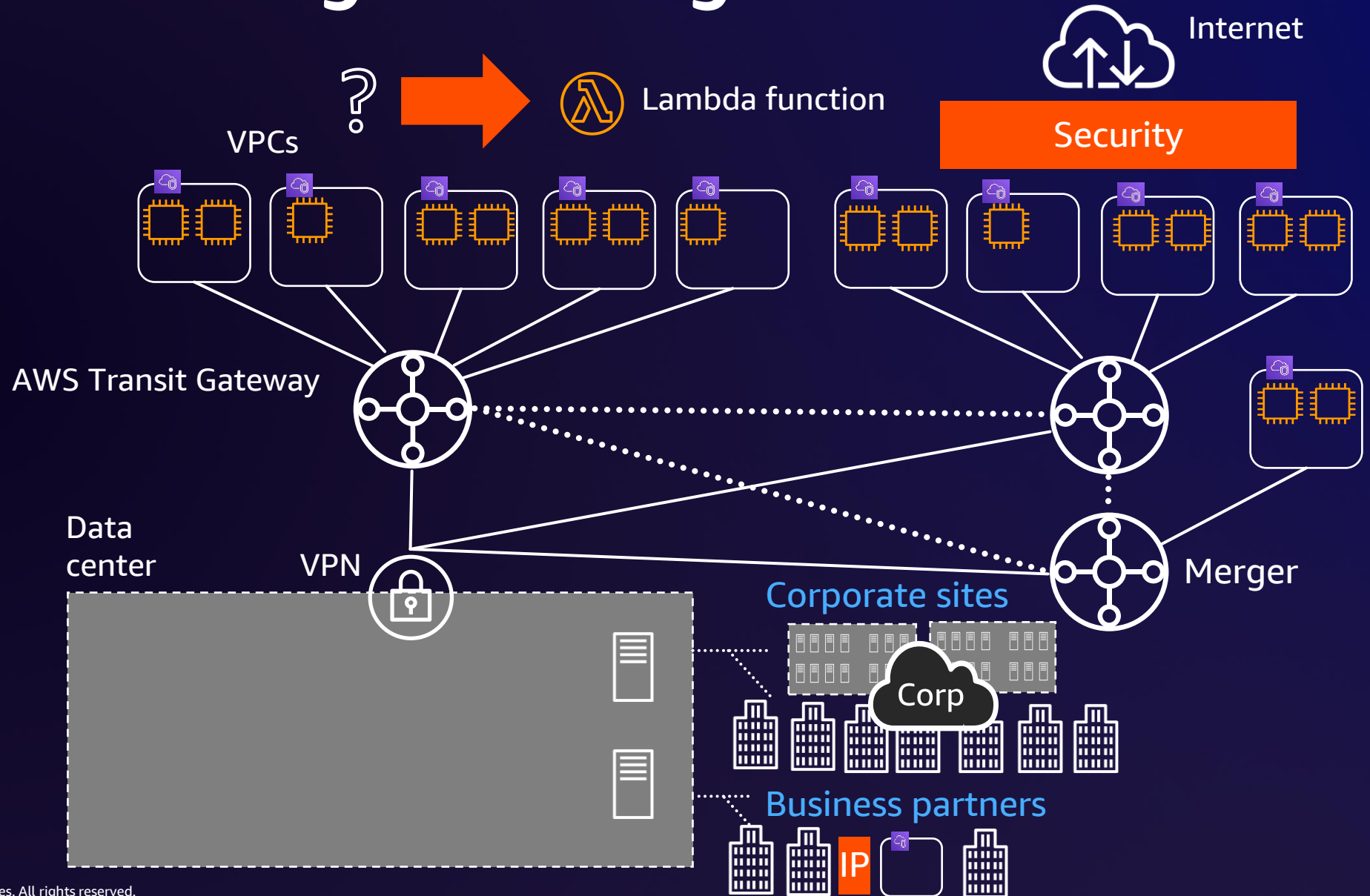
- Automation
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- Security
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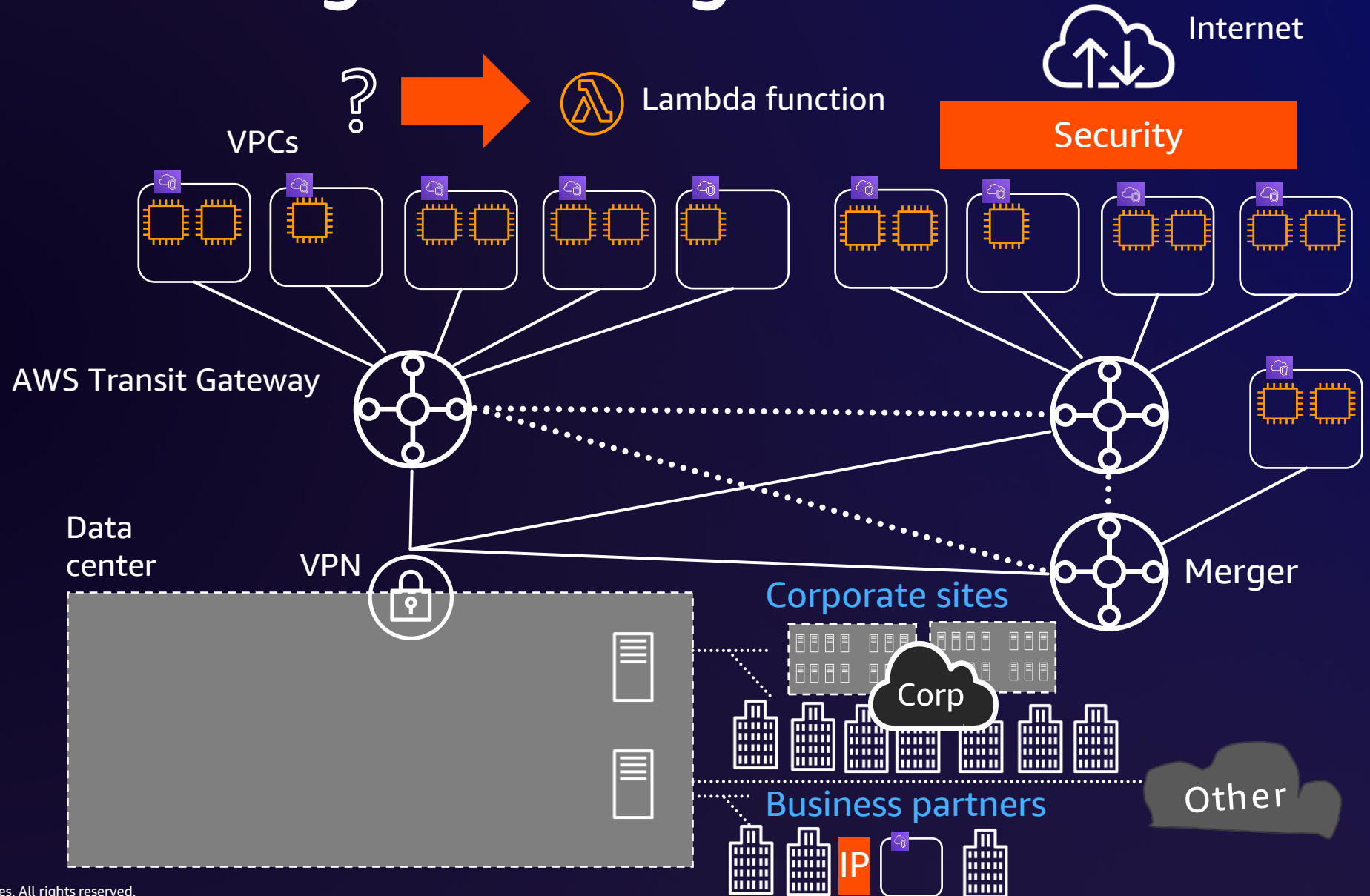
- Automation
- Multi-Region
- Security
- Extensibility
- WAN
- Extranets
- Other



# Challenges in building a secure global network

## Network requirements

- Automation
- Multi-Region
- Security
- Extensibility
- WAN
- Extranets
- Other

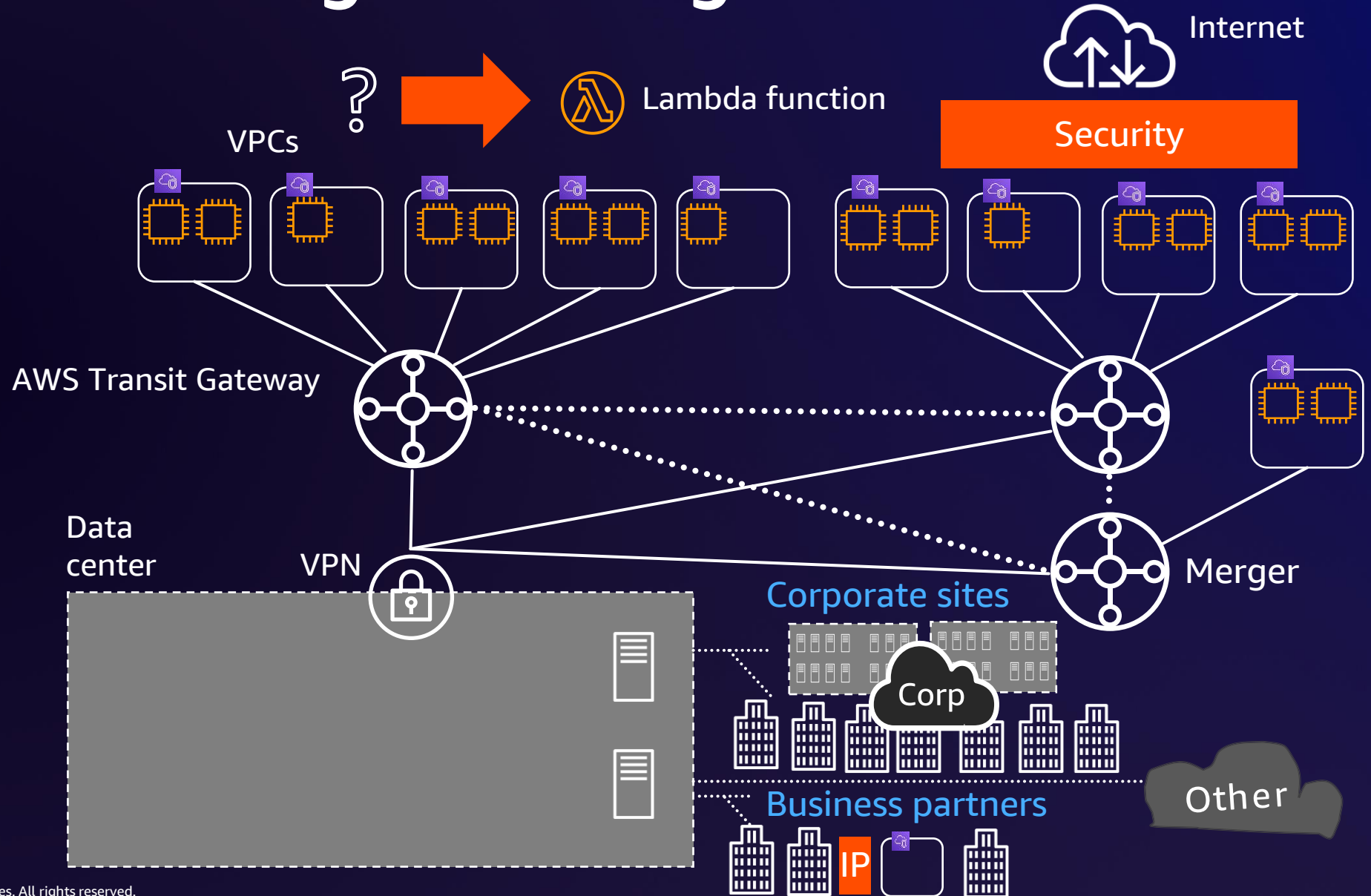


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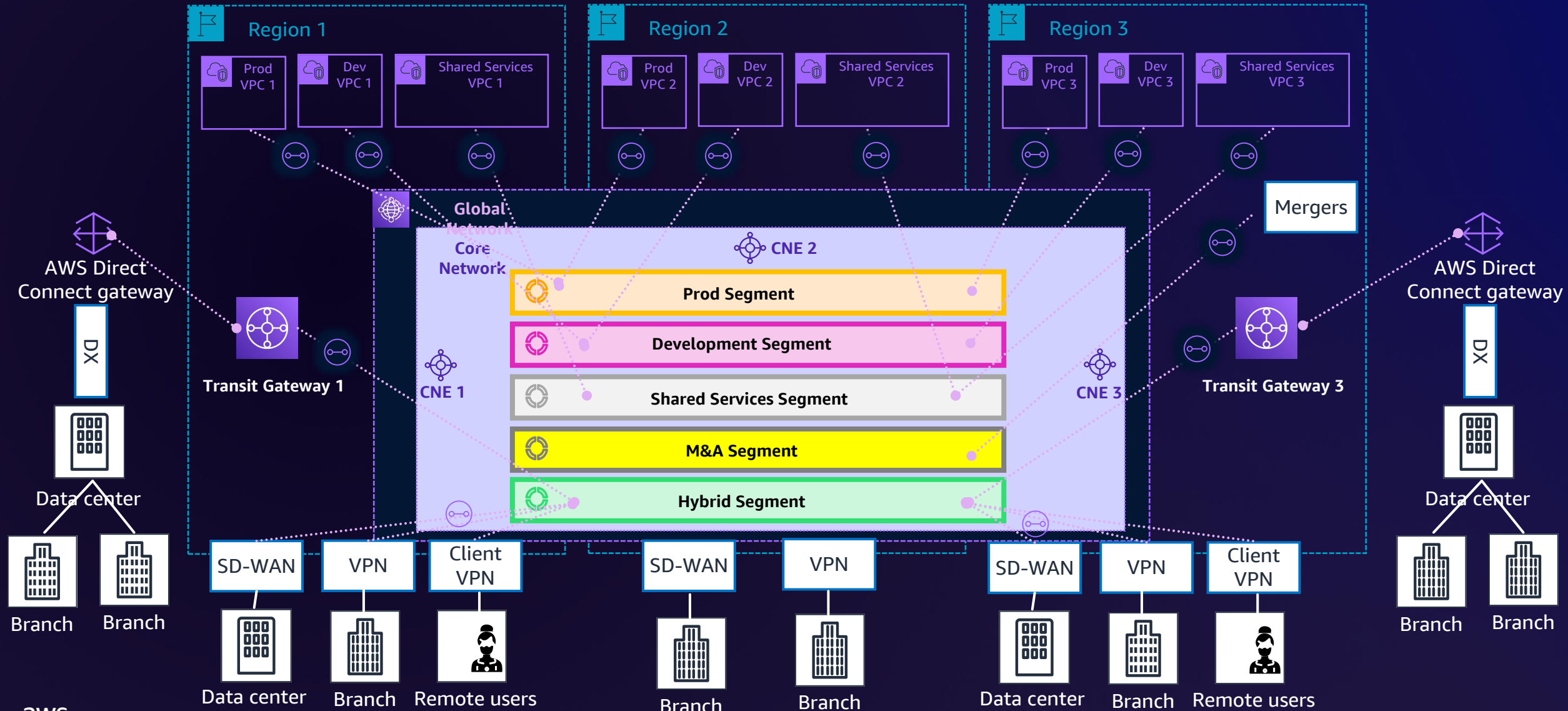


## Network requirements

- Automation
- Multi-Region
- Security
- Extensibility
- WAN
- Extranets
- Other



# Building with AWS Cloud WAN

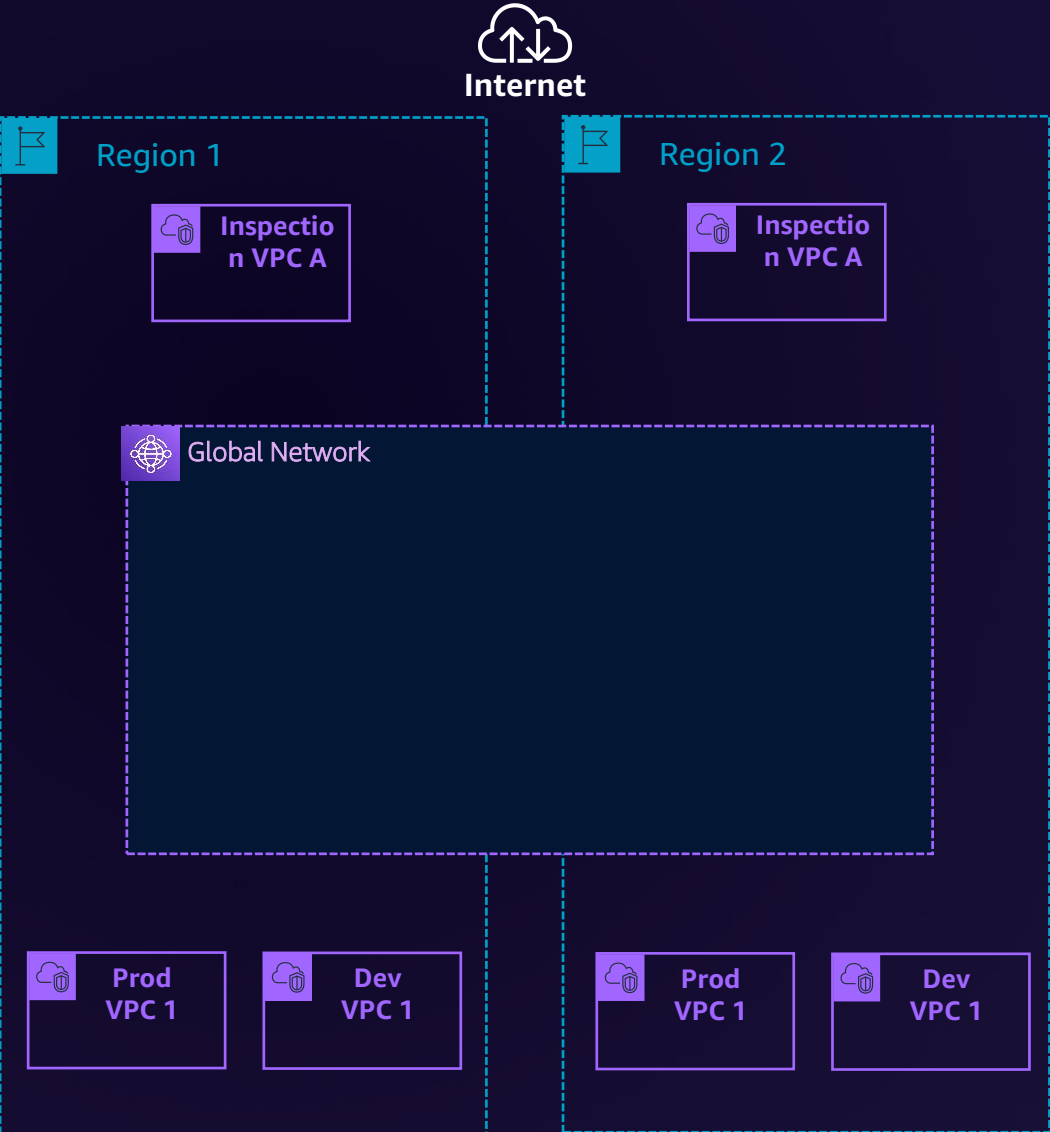


# Egress inspection architecture

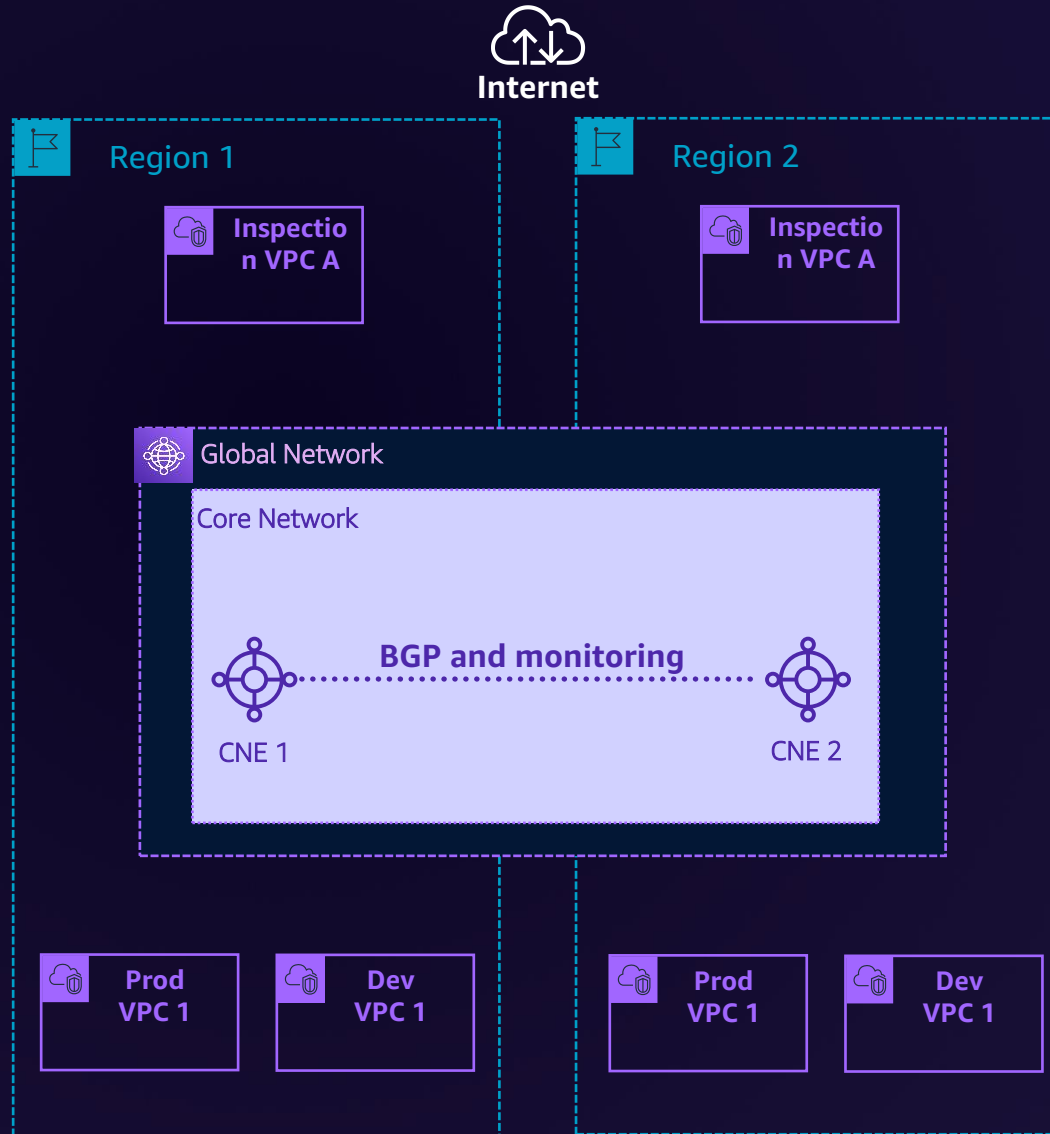
# Egress inspection architecture



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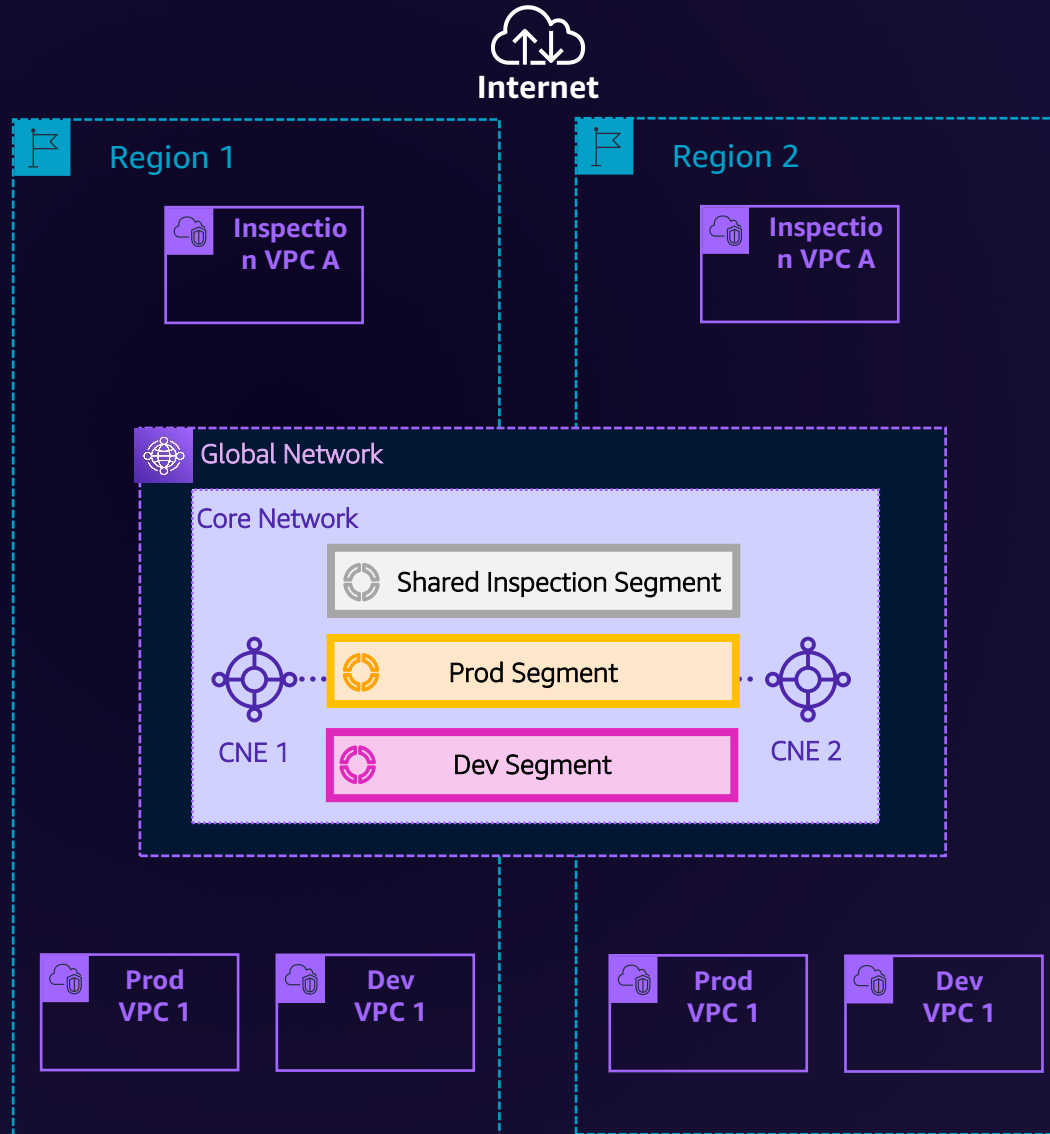


# Egress inspection architecture



```
"core-network-configuration": {  
  "vpn-ecmp-support": true,  
  "asn-ranges": [  
    "64512-65534"  
  ],  
  "edge-locations": [  
    {  
      "location": "us-east-1"  
    },  
    {  
      "location": "us-west-2"  
    }  
  ]  
}
```

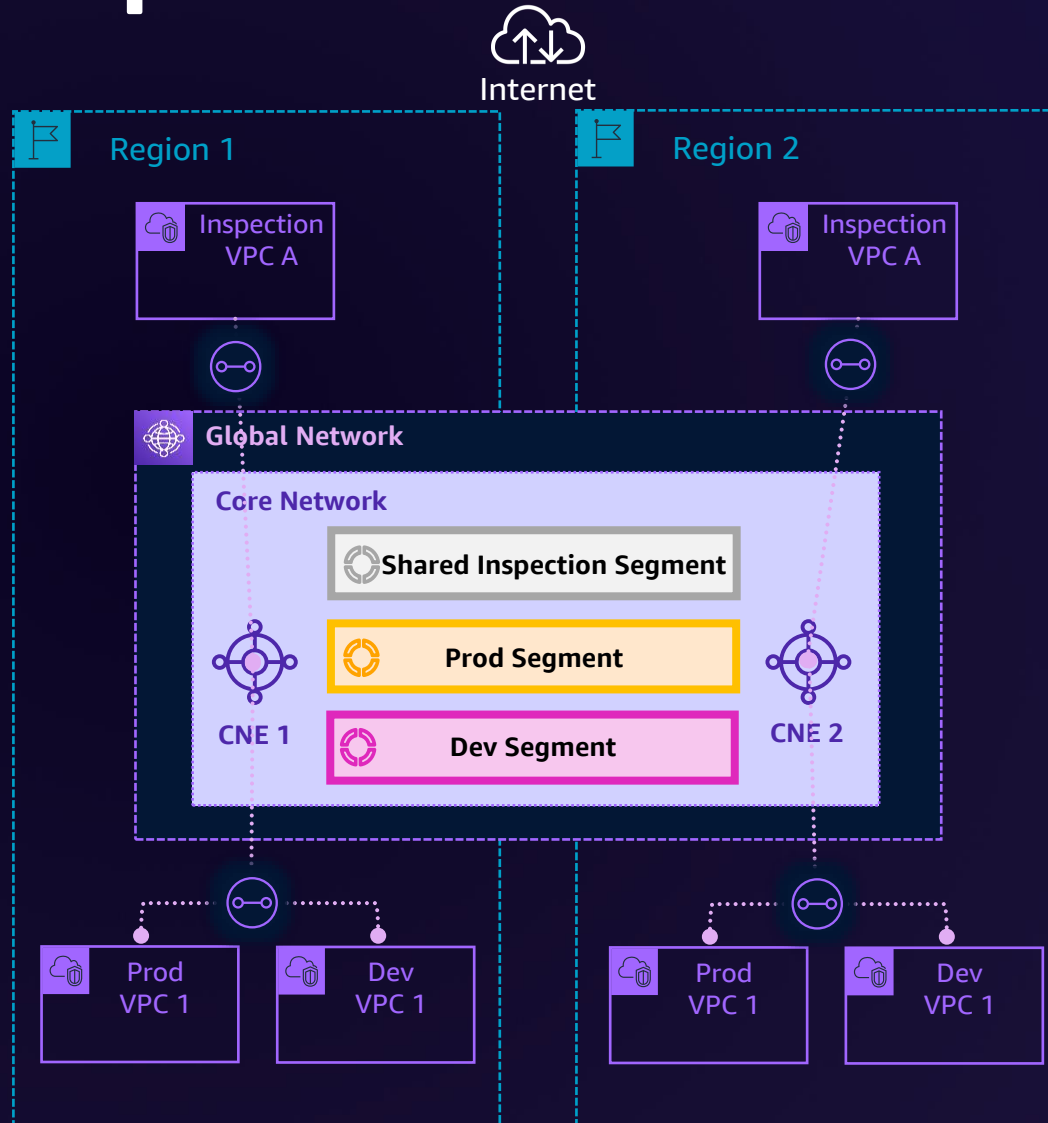
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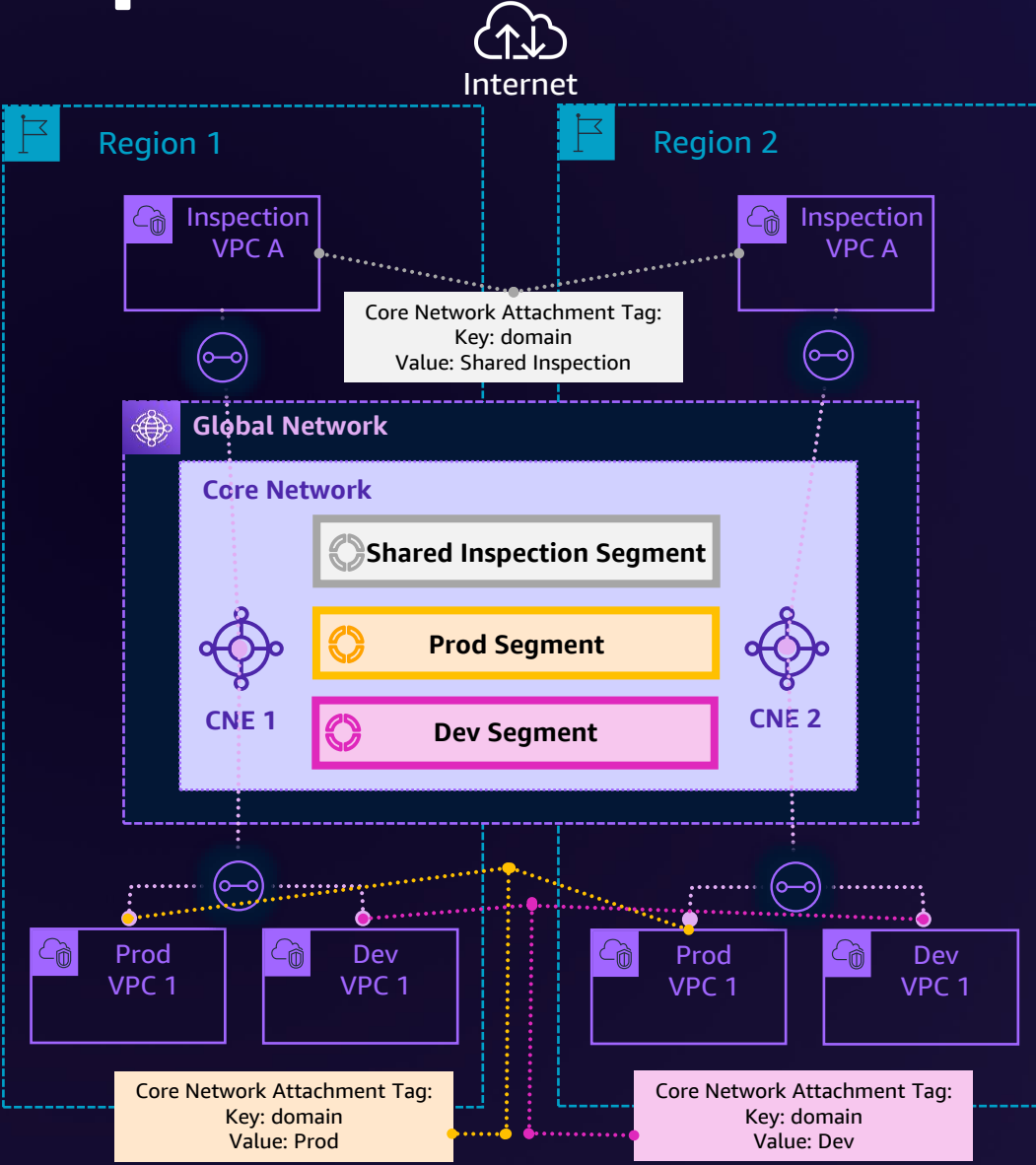
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    {  
      "location": "us-west-2"  
    }  
  ]  
},
```

```
"segments": [  
  {  
    "name": "Prod",  
    "require-attachment-acceptance": false,  
  },  
  {  
    "name": "Dev",  
    "require-attachment-acceptance": false,  
  },  
  {  
    "name": "Shared Inspection",  
    "require-attachment-acceptance": false,  
  }  
]
```

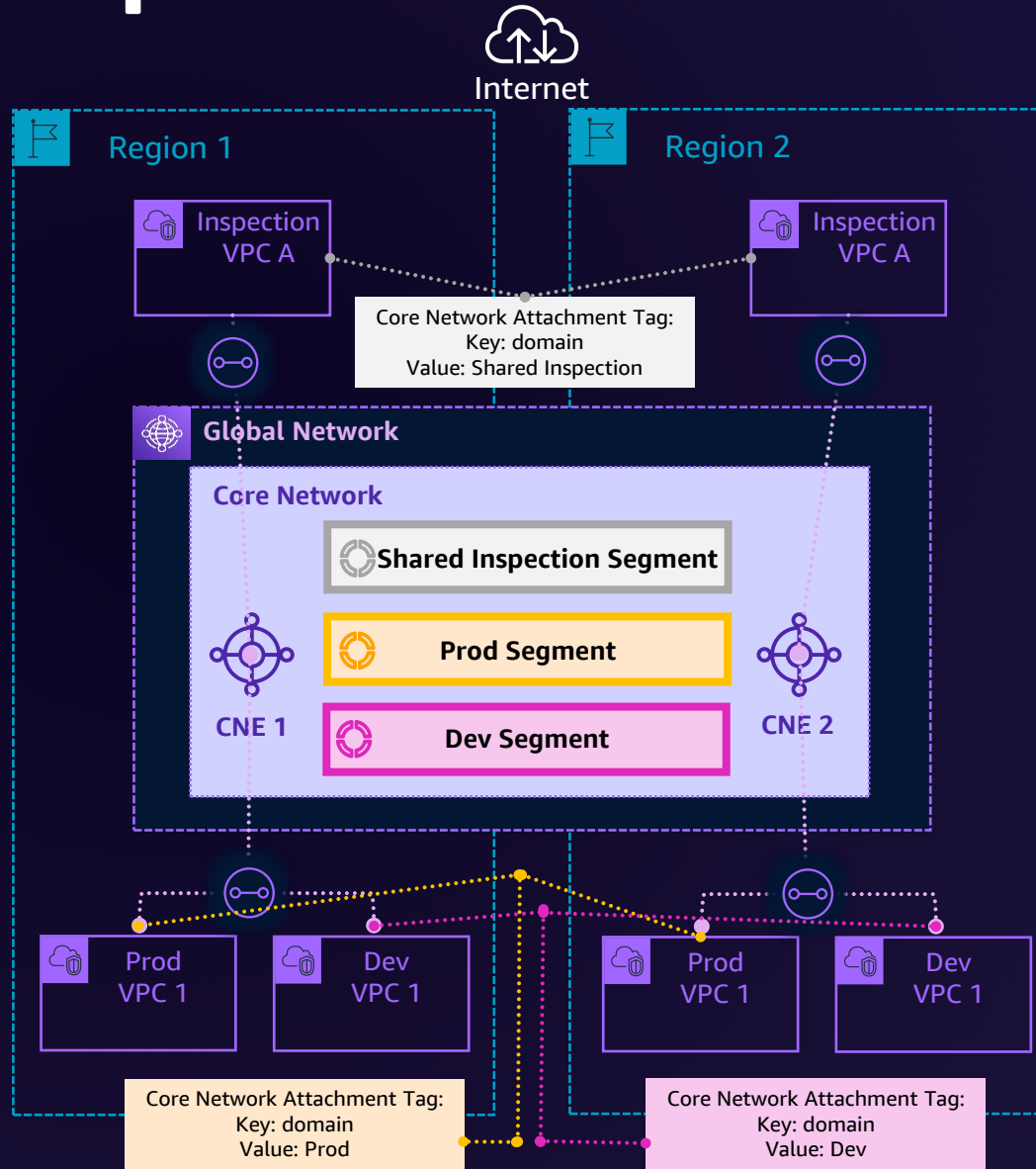
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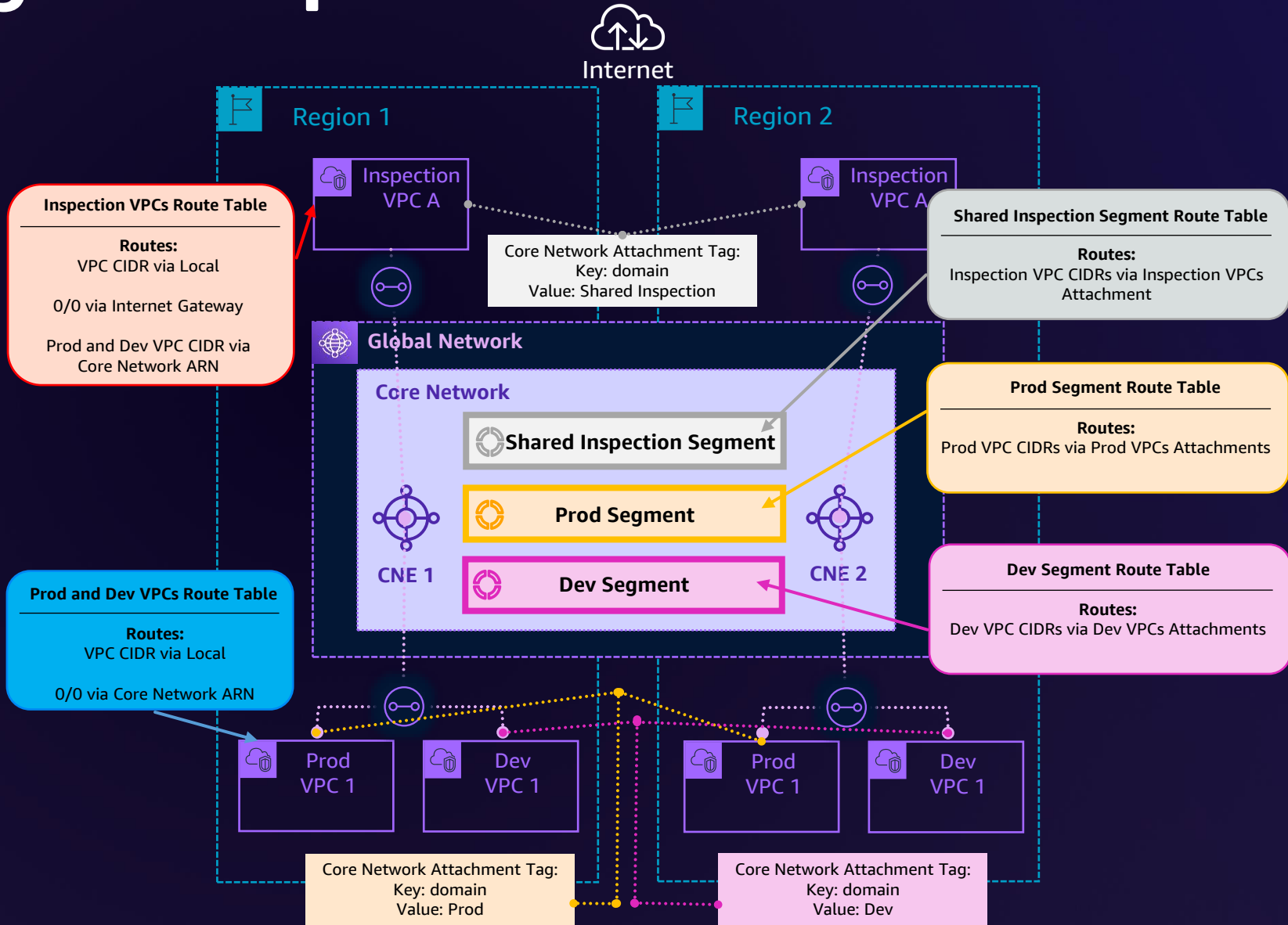
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"attachment-policies": [ ←
  {
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    "condition-logic": "or",
    "conditions": [ ←
      {
        "type": "tag-exists",
        "key": "Segment",
      }
    ],
    "action": { ←
      "association-method": "tag",
      "tag-value-of-key": "Segment"
    }
  }
]
  
```

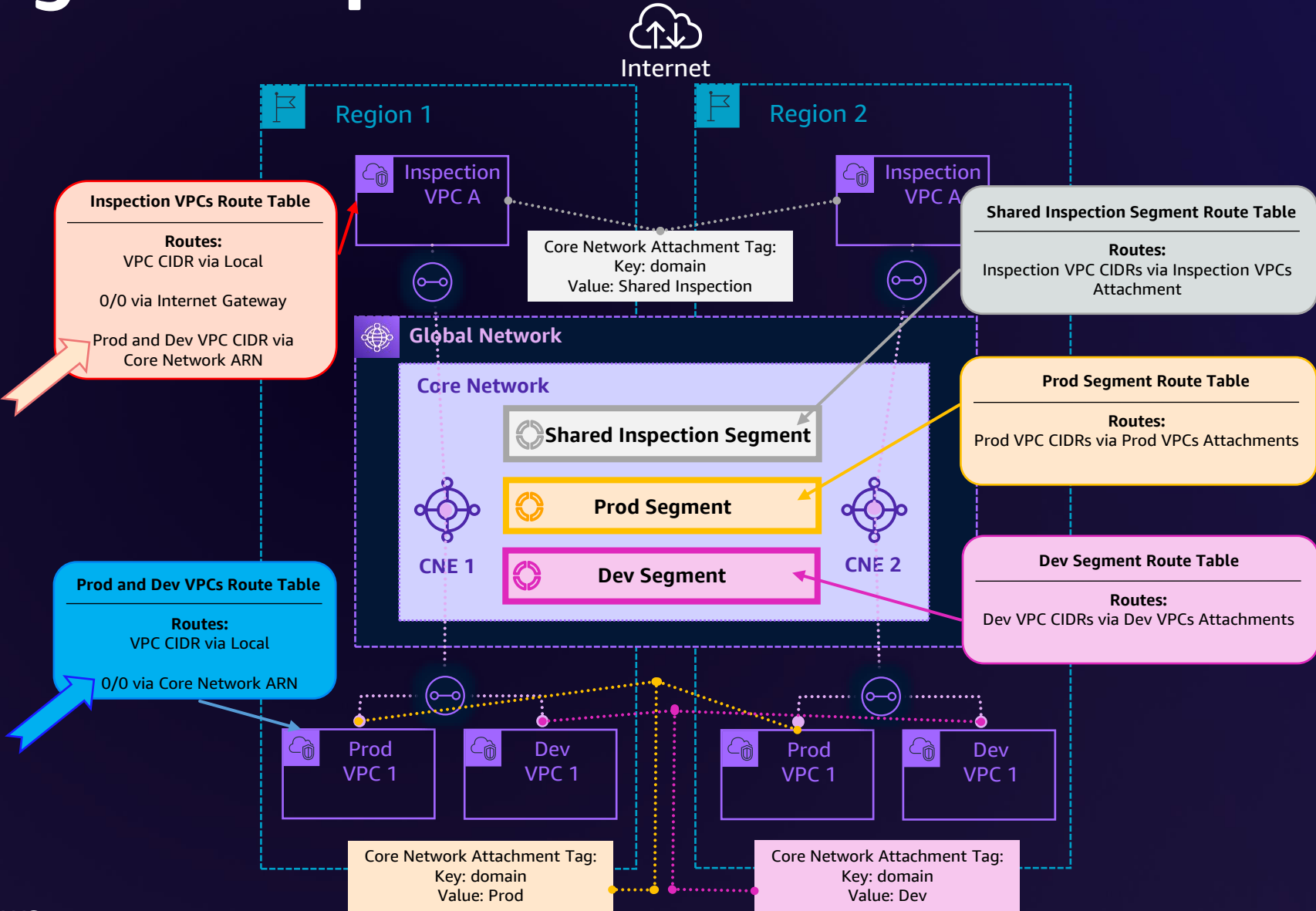
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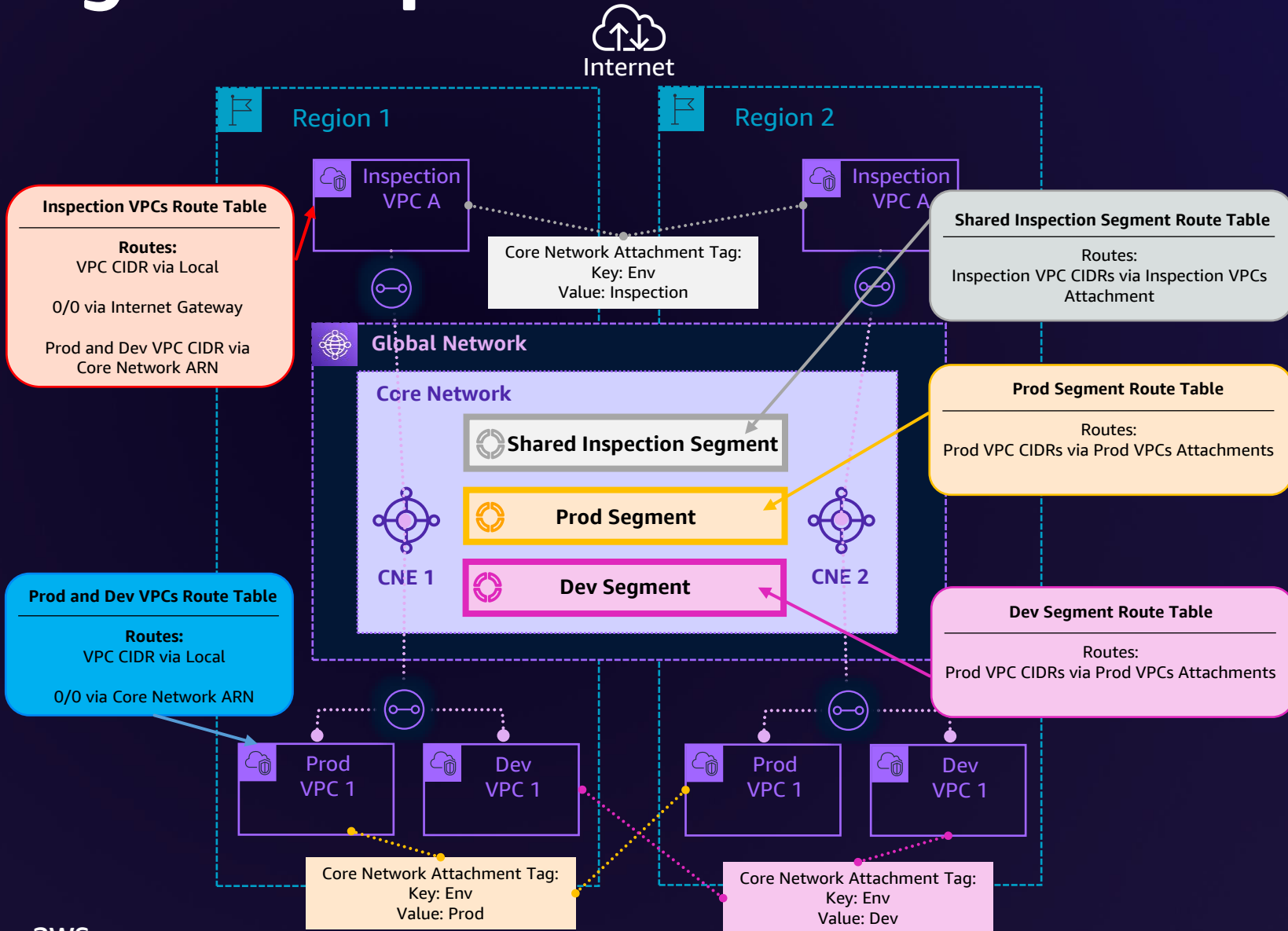
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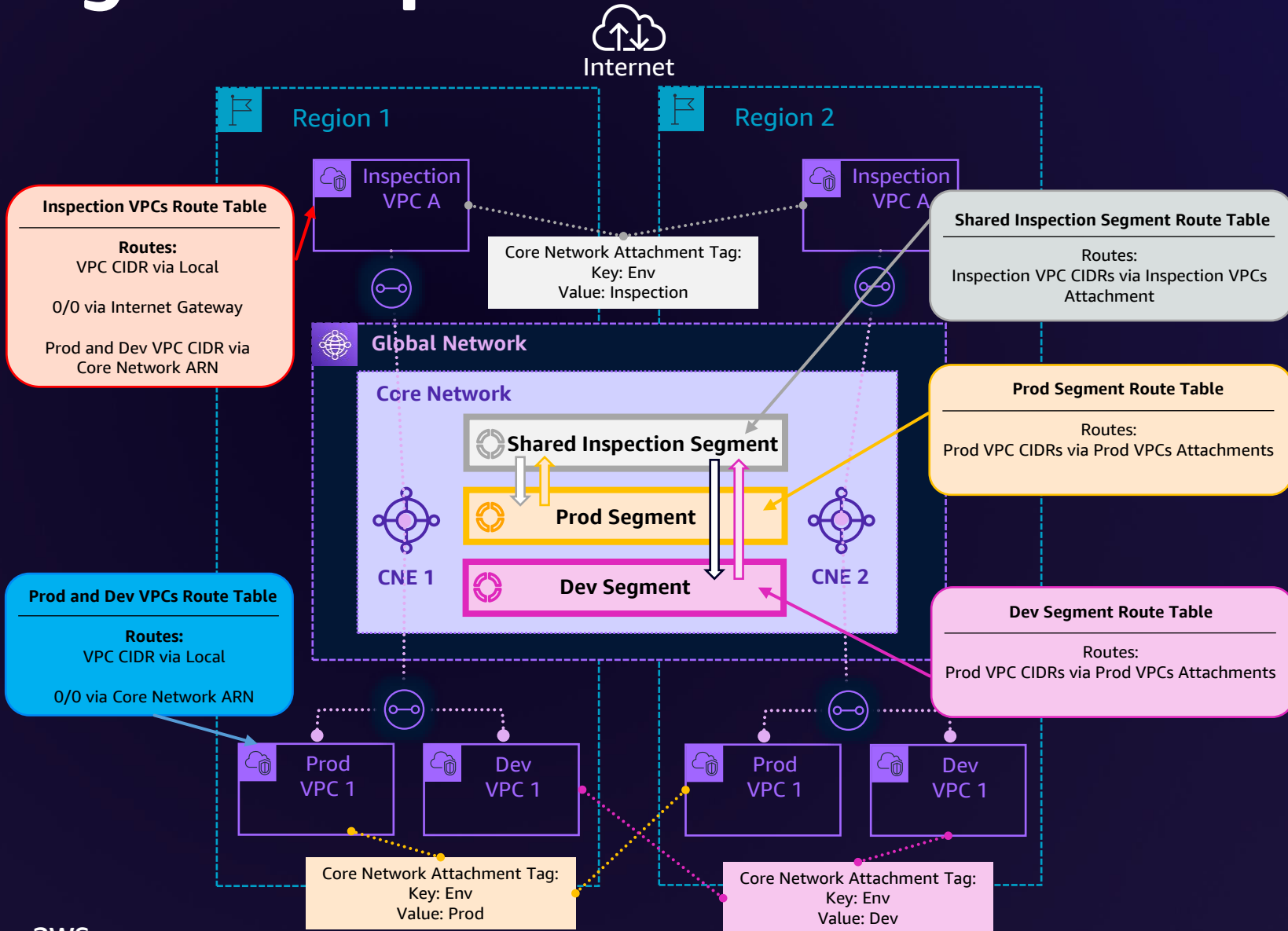


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"attachment-policies": [
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        "key": "Segment",
      }
    ],
    "action": {
      "association-method": "tag",
      "tag-value-of-key": "Segment"
    }
  },
],
"segment-actions": [
  {
    "action": "share",
    "mode": "attachment-route",
    "segment": "Shared Inspection",
    "share-with": "*"
  }
]
  
```



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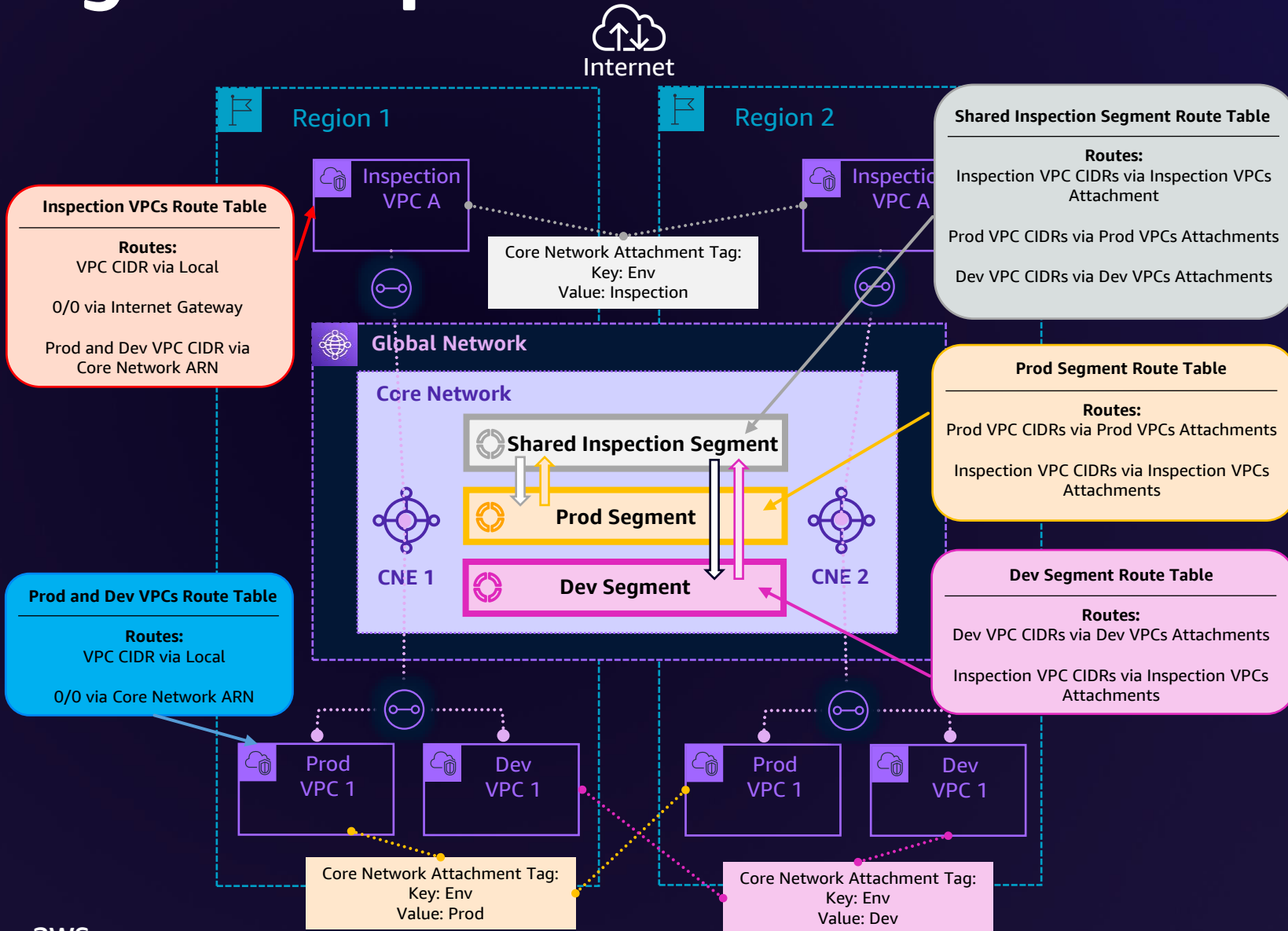
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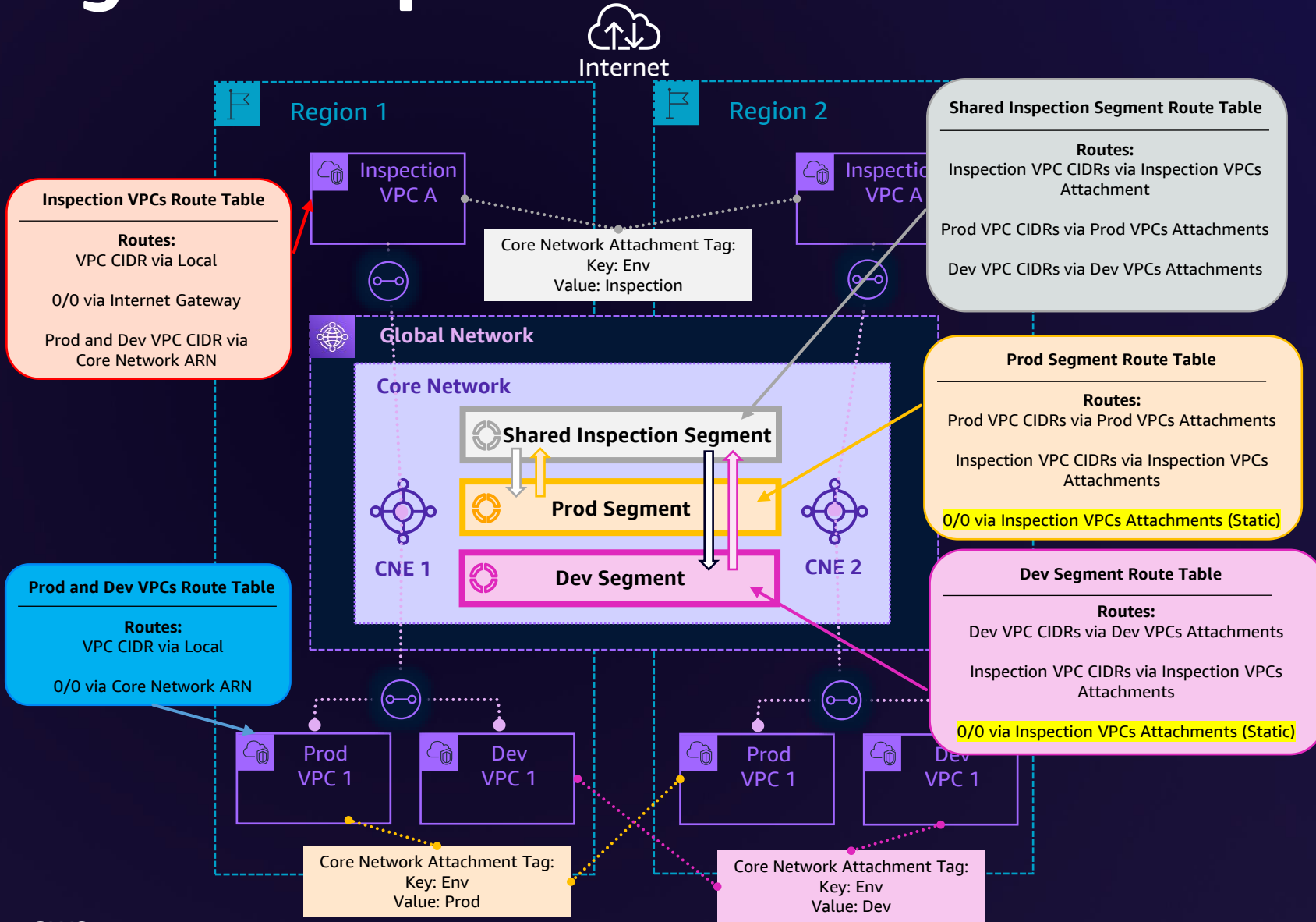
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# Egress inspection architecture



"segment-actions": [

{

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"mode": "attachment-route",

"segment": "Shared Inspection",

"share-with": "\*"

},

{

"action": "create-route",

"segment": "Prod",

"destination-cidr-blocks": [

"0.0.0.0/0"

],

"destinations": [

"inspection-vpc-a-attachment-aaaa",

"inspection-vpc-b-attachment-bbbb "

]

},

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"action": "create-route",

"segment": "Dev"

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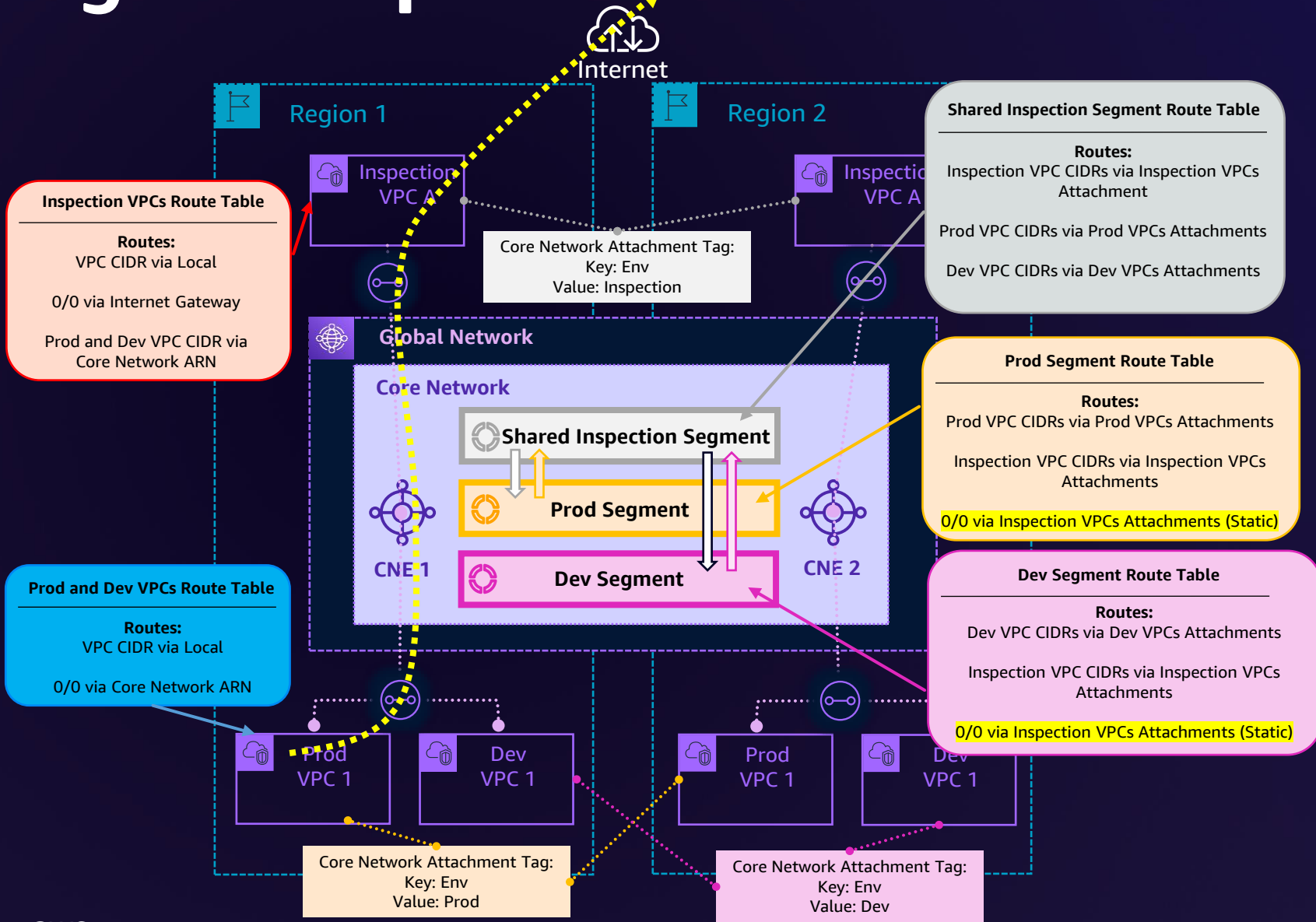
"inspection-vpc-b-attachment-bbbb "

]

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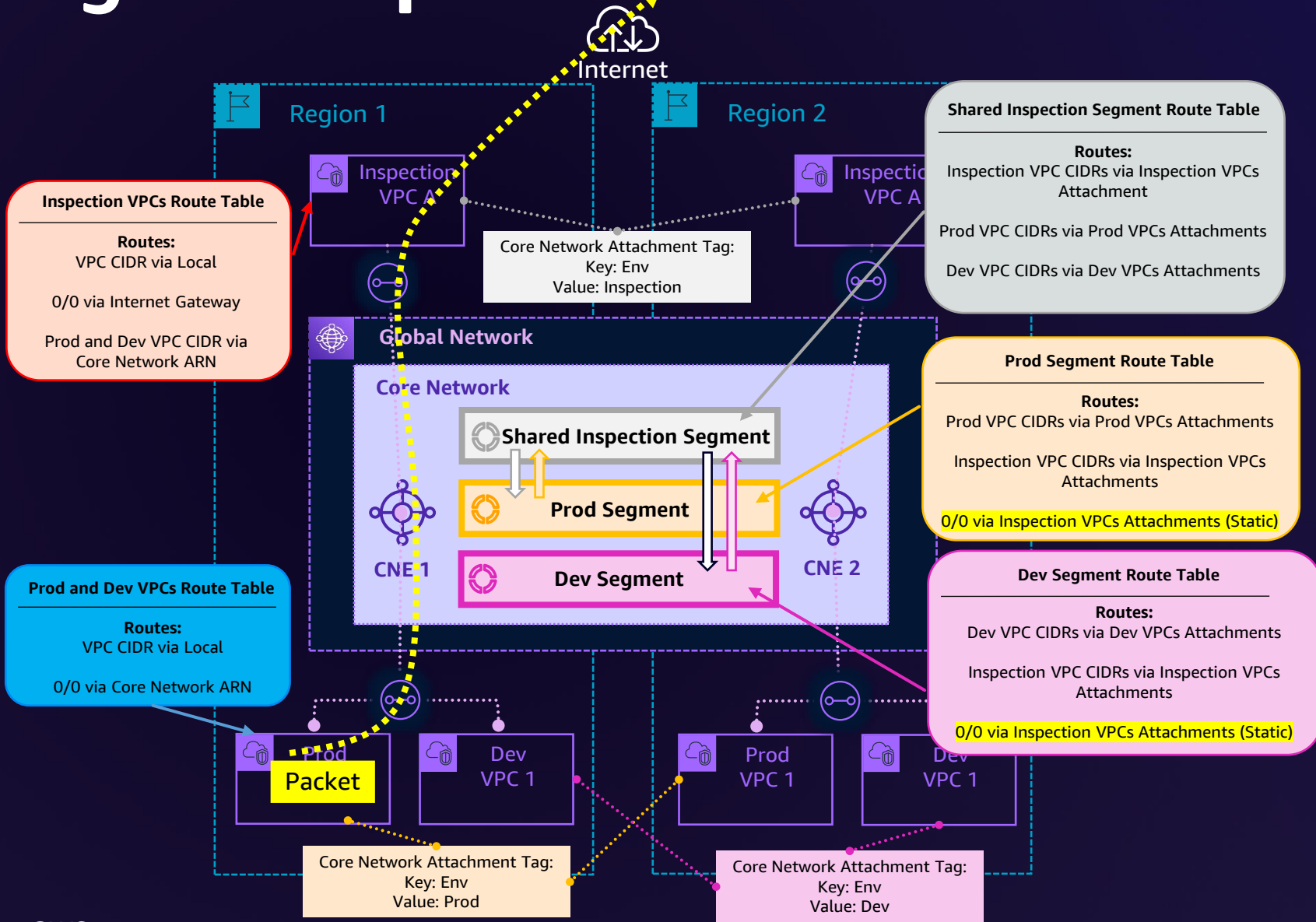


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```



# Egress inspection architecture

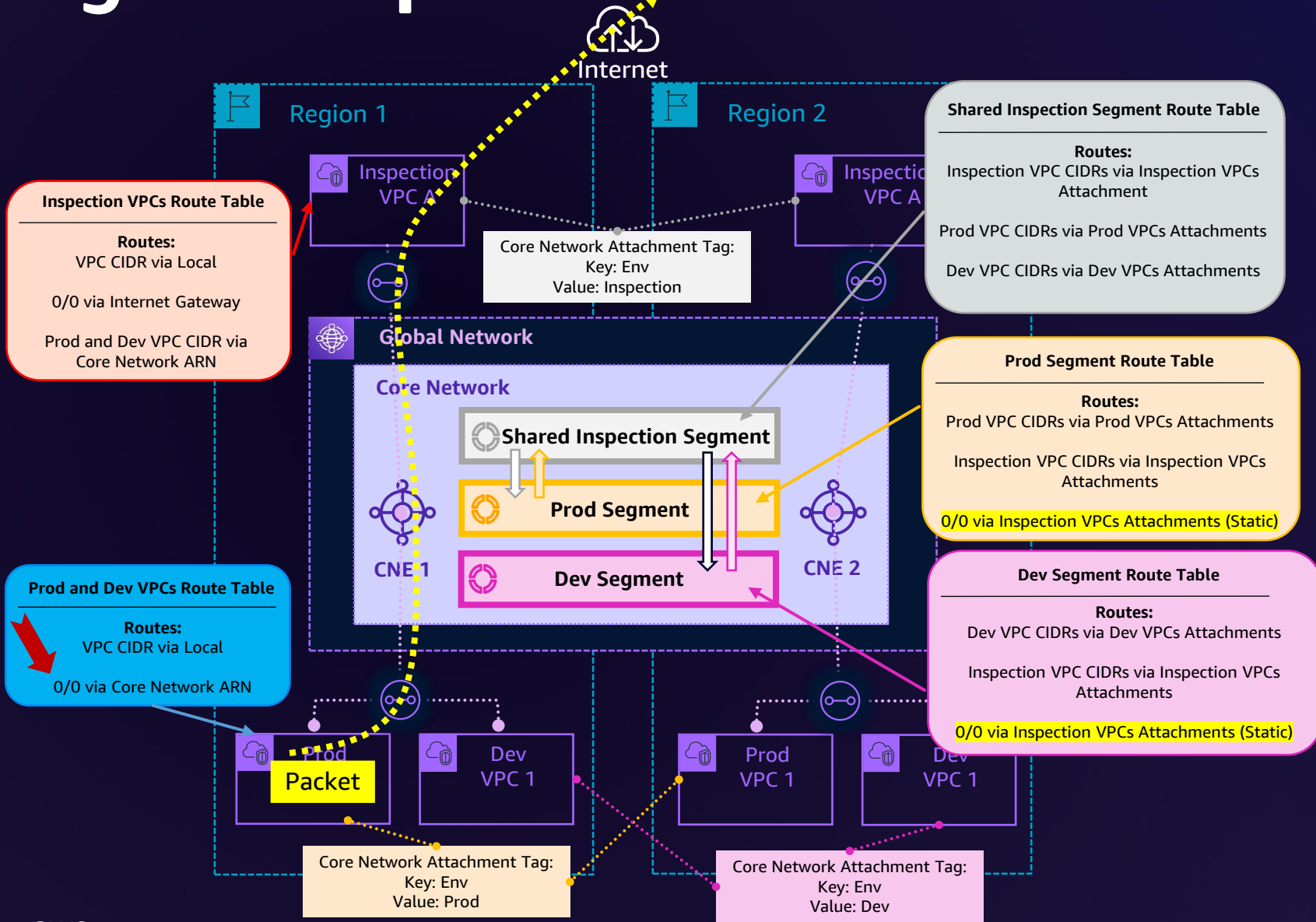


```

"segment-actions": [
  {
    "action": "share",
    "mode": "attachment-route",
    "segment": "Shared Inspection",
    "share-with": "*"
  },
  {
    "action": "create-route",
    "segment": "Prod",
    "destination-cidr-blocks": [
      "0.0.0.0/0"
    ],
    "destinations": [
      "inspection-vpc-a-attachment-aaaa",
      "inspection-vpc-b-attachment-bbbb "
    ]
  },
  {
    "action": "create-route",
    "segment": "Dev",
    "destination-cidr-blocks": [
      "0.0.0.0/0"
    ],
    "destinations": [
      "inspection-vpc-a-attachment-aaaa",
      "inspection-vpc-b-attachment-bbbb "
    ]
  }
]
  
```



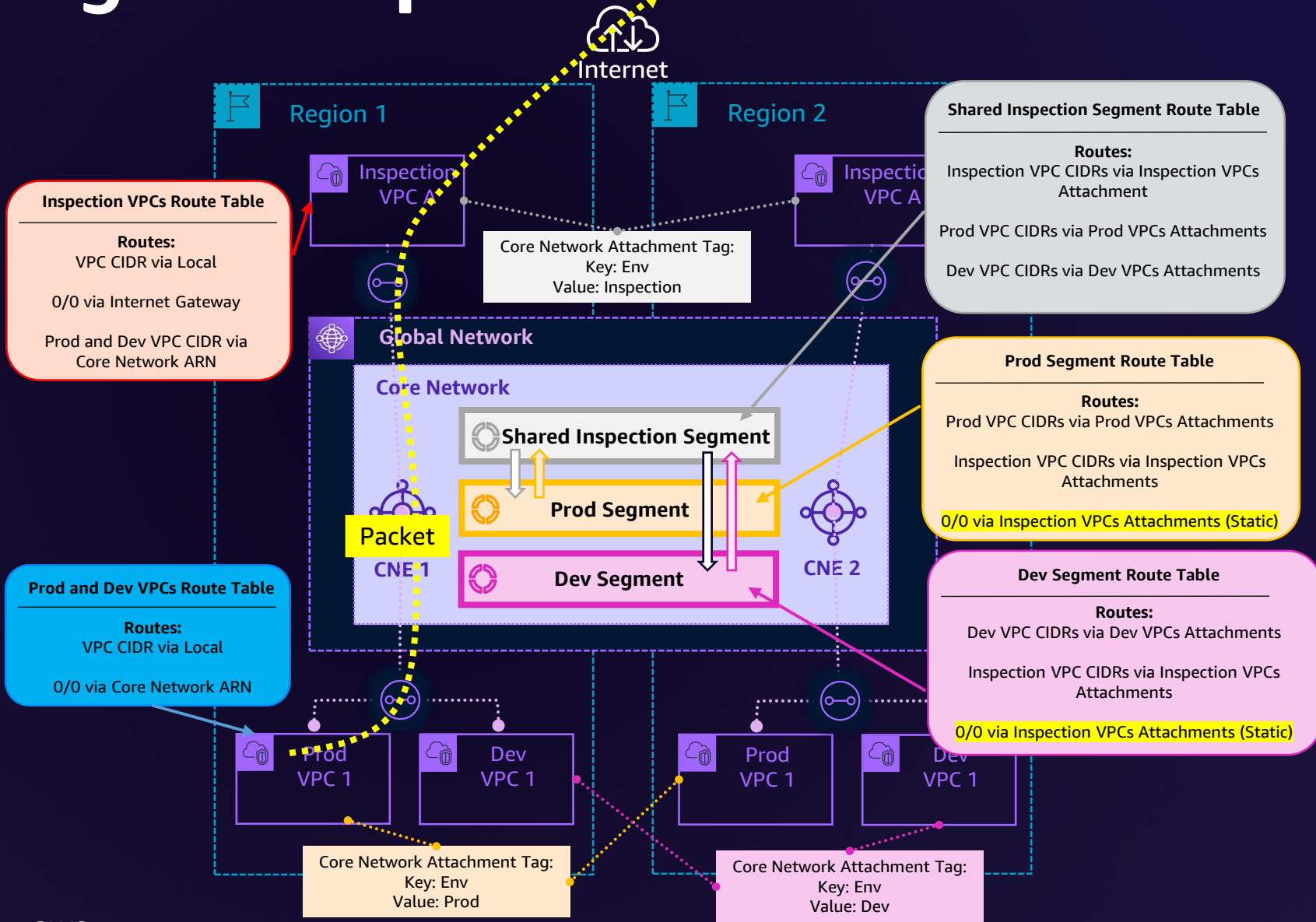
# Egress inspection architecture



```

"segment-actions": [
  {
    "action": "share",
    "mode": "attachment-route",
    "segment": "Shared Inspection",
    "share-with": "*"
  },
  {
    "action": "create-route",
    "segment": "Prod",
    "destination-cidr-blocks": [
      "0.0.0.0/0"
    ],
    "destinations": [
      "inspection-vpc-a-attachment-aaaa",
      "inspection-vpc-b-attachment-bbbb "
    ]
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  {
    "action": "create-route",
    "segment": "Dev",
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      "0.0.0.0/0"
    ],
    "destinations": [
      "inspection-vpc-a-attachment-aaaa",
      "inspection-vpc-b-attachment-bbbb "
    ]
  }
]
  
```

# Egress inspection architecture

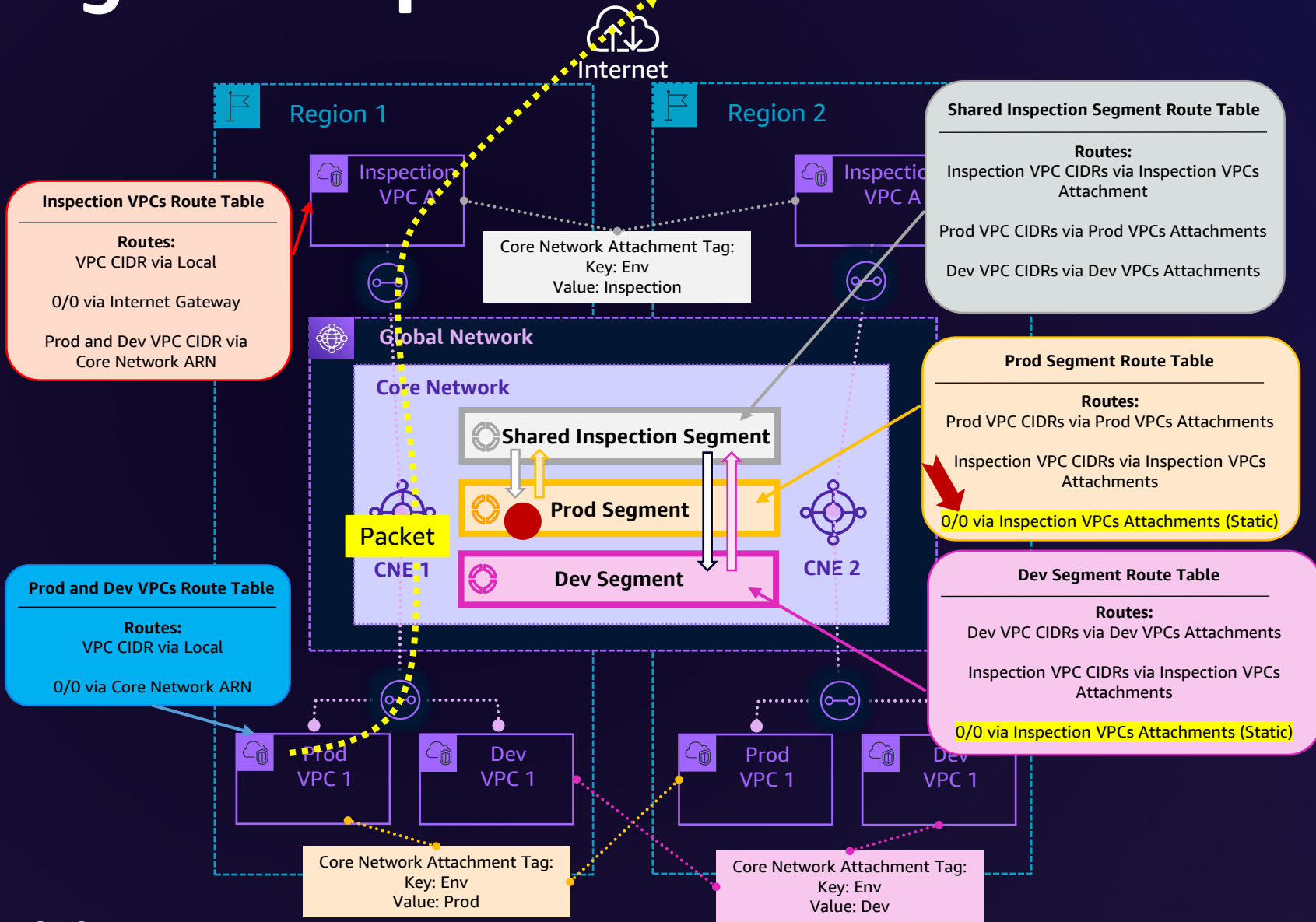


```

"segment-actions": [
  {
    "action": "share",
    "mode": "attachment-route",
    "segment": "Shared Inspection",
    "share-with": "*"
  },
  {
    "action": "create-route",
    "segment": "Prod",
    "destination-cidr-blocks": [
      "0.0.0.0/0"
    ],
    "destinations": [
      "inspection-vpc-a-attachment-aaaa",
      "inspection-vpc-b-attachment-bbbb "
    ]
  },
  {
    "action": "create-route",
    "segment": "Dev",
    "destination-cidr-blocks": [
      "0.0.0.0/0"
    ],
    "destinations": [
      "inspection-vpc-a-attachment-aaaa",
      "inspection-vpc-b-attachment-bbbb "
    ]
  }
]
  
```



# Egress inspection architecture



"segment-actions": [

{

"action": "share",

"mode": "attachment-route",

"segment": "Shared Inspection",

"share-with": "\*"

},

{

"action": "create-route",

"segment": "Prod",

"destination-cidr-blocks": [

"0.0.0.0/0"

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"destinations": [

"inspection-vpc-a-attachment-aaaa",

"inspection-vpc-b-attachment-bbbb "

]

},

{

"action": "create-route",

"segment": "Dev"

"destination-cidr-blocks": [

"0.0.0.0/0"

],

"destinations": [

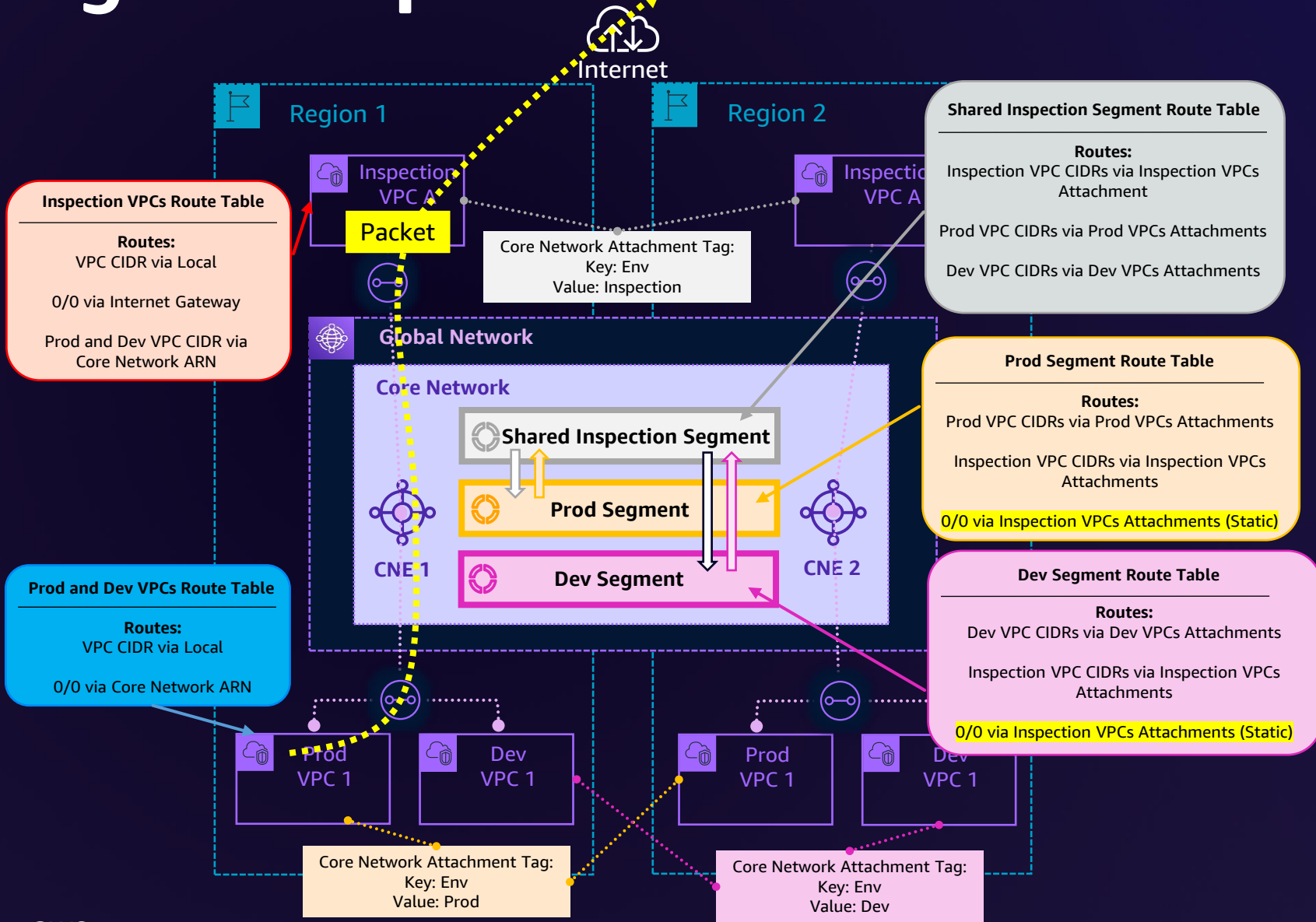
"inspection-vpc-a-attachment-aaaa",

"inspection-vpc-b-attachment-bbbb "

]

}

# Egress inspection architecture



"segment-actions": [

{

"action": "share",

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"segment": "Shared Inspection",

"share-with": "\*"

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"action": "create-route",

"segment": "Prod",

"destination-cidr-blocks": [

"0.0.0.0/0"

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"destinations": [

"inspection-vpc-a-attachment-aaaa",

"inspection-vpc-b-attachment-bbbb "

]

},

{

"action": "create-route",

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],

"destinations": [

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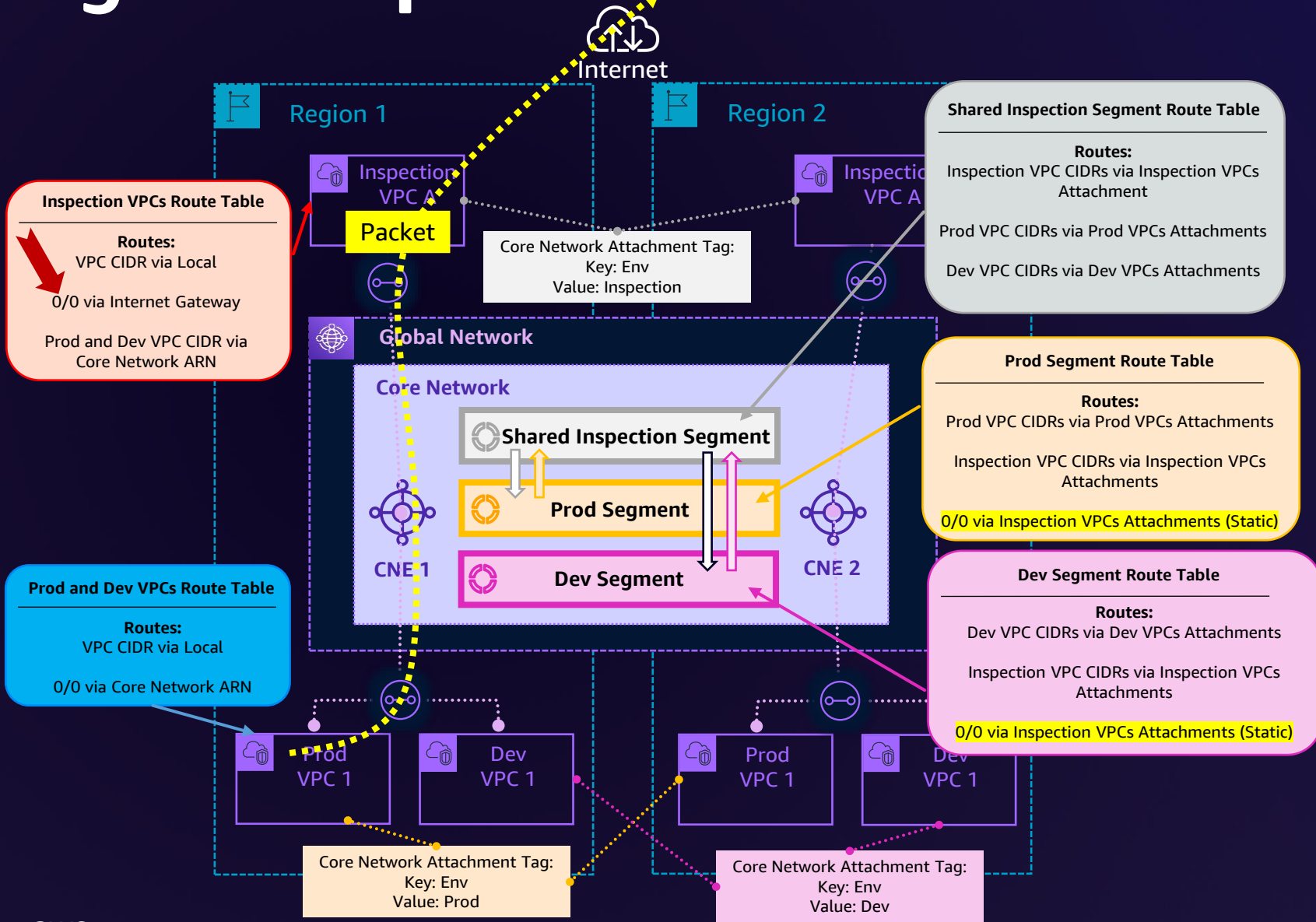
"inspection-vpc-b-attachment-bbbb "

]

}

]

# Egress inspection architecture



"segment-actions": [

{

"action": "share",

"mode": "attachment-route",

"segment": "Shared Inspection",

"share-with": "\*"

},

{

"action": "create-route",

"segment": "Prod",

"destination-cidr-blocks": [

"0.0.0.0/0"

],

"destinations": [

"inspection-vpc-a-attachment-aaaa",

"inspection-vpc-b-attachment-bbbb "

]

},

{

"action": "create-route",

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"0.0.0.0/0"

],

"destinations": [

"inspection-vpc-a-attachment-aaaa",

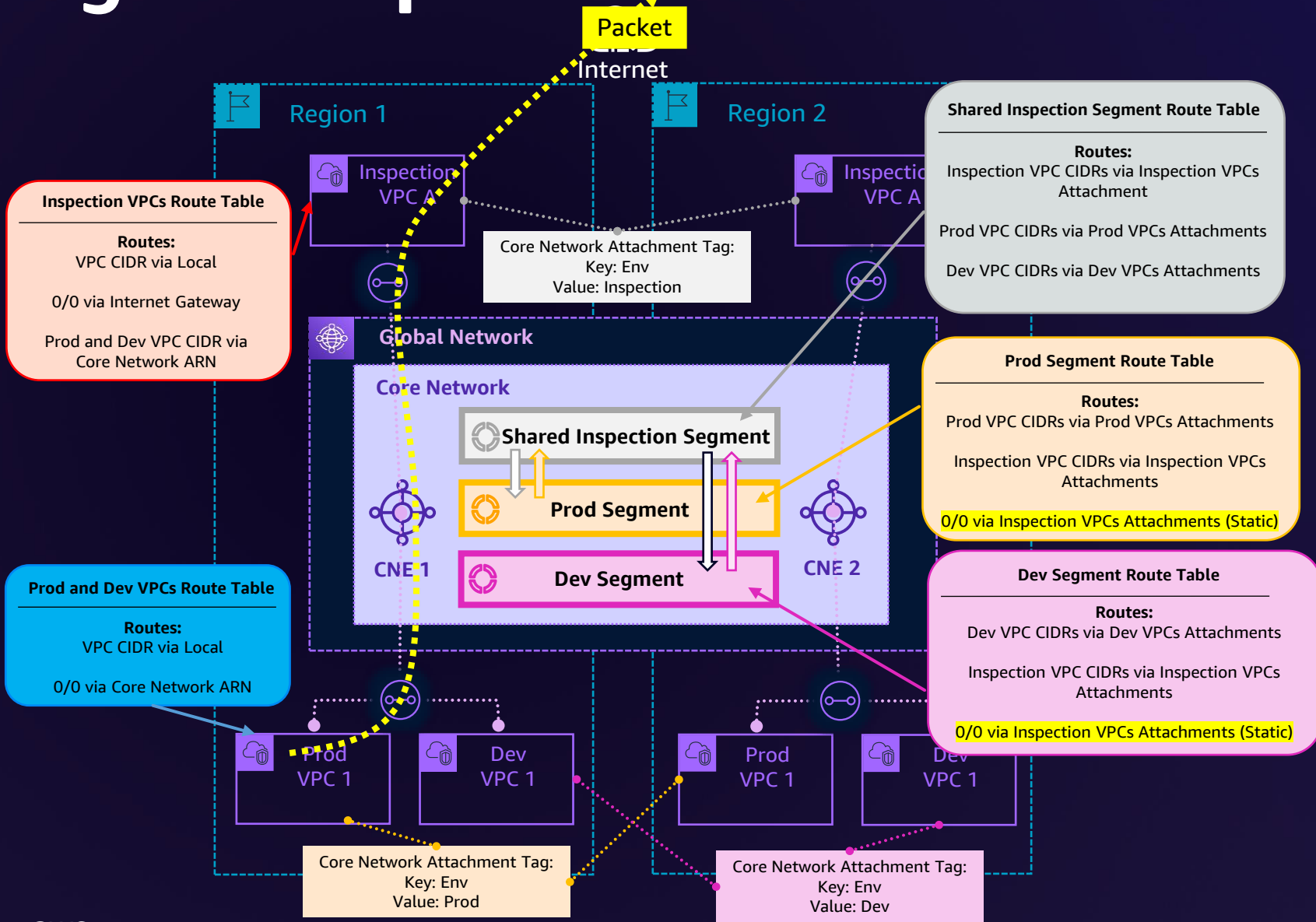
"inspection-vpc-b-attachment-bbbb "

]

}

]

# Egress inspection architecture



"segment-actions": [

{

"action": "share",

"mode": "attachment-route",

"segment": "Shared Inspection",

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},

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"action": "create-route",

"segment": "Prod",

"destination-cidr-blocks": [

"0.0.0.0/0"

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"destinations": [

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"action": "create-route",

"segment": "Dev"

"destination-cidr-blocks": [

"0.0.0.0/0"

],

"destinations": [

"inspection-vpc-a-attachment-aaaa",

"inspection-vpc-b-attachment-bbbb "

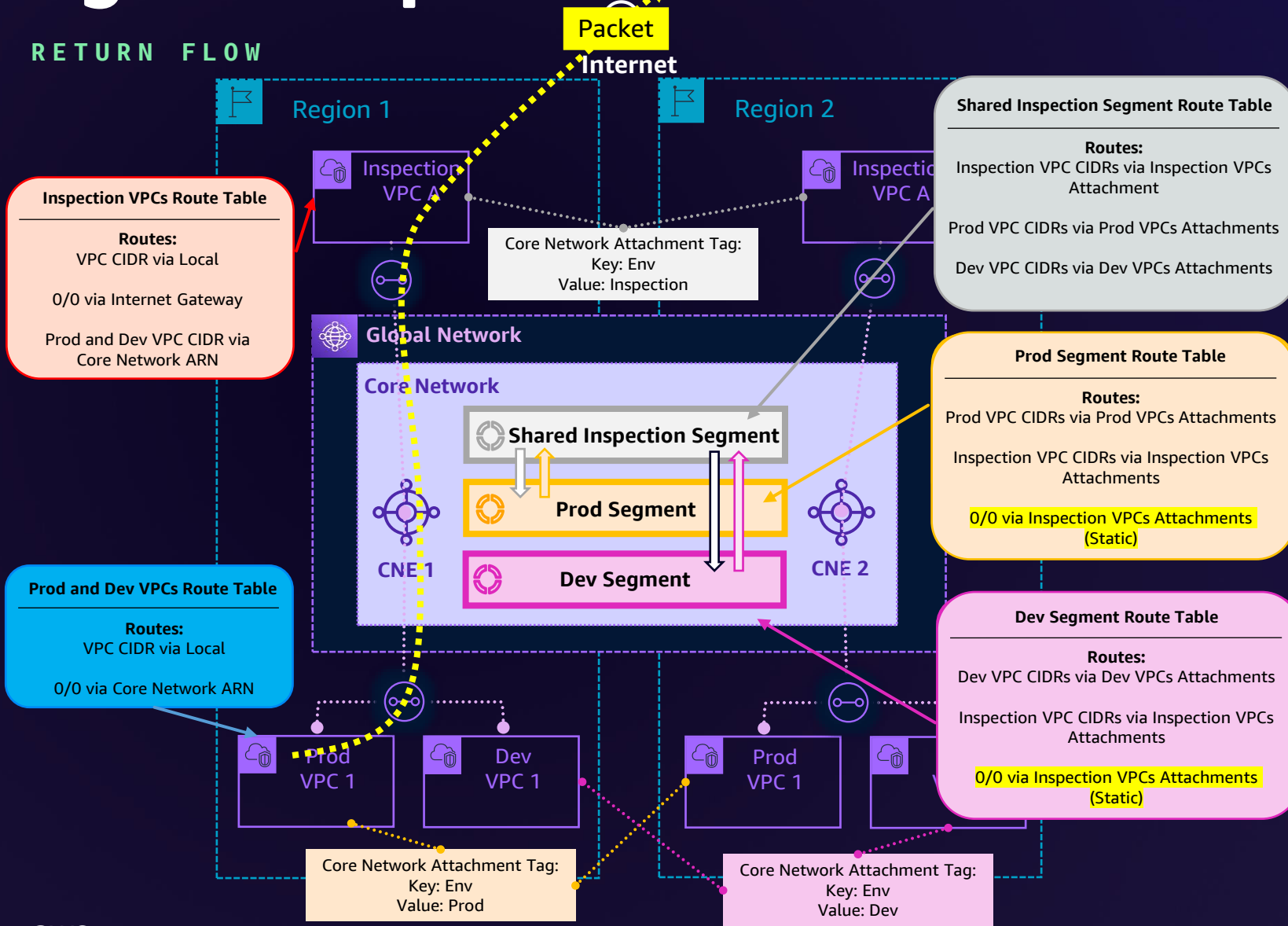
]

}

]

# Egress inspection architecture

RETURN FLOW



"segment-actions": [

{

"action": "share",

"mode": "attachment-route",

"segment": "Shared Inspection",

"share-with": "\*"

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"action": "create-route",

"segment": "Prod",

"destination-cidr-blocks": [

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"destinations": [

"inspection-vpc-a-attachment-aaaa",

"inspection-vpc-b-attachment-bbbb "

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{

"action": "create-route",

"segment": "Dev"

"destination-cidr-blocks": [

"0.0.0.0/0"

],

"destinations": [

"inspection-vpc-a-attachment-aaaa",

"inspection-vpc-b-attachment-bbbb "

]

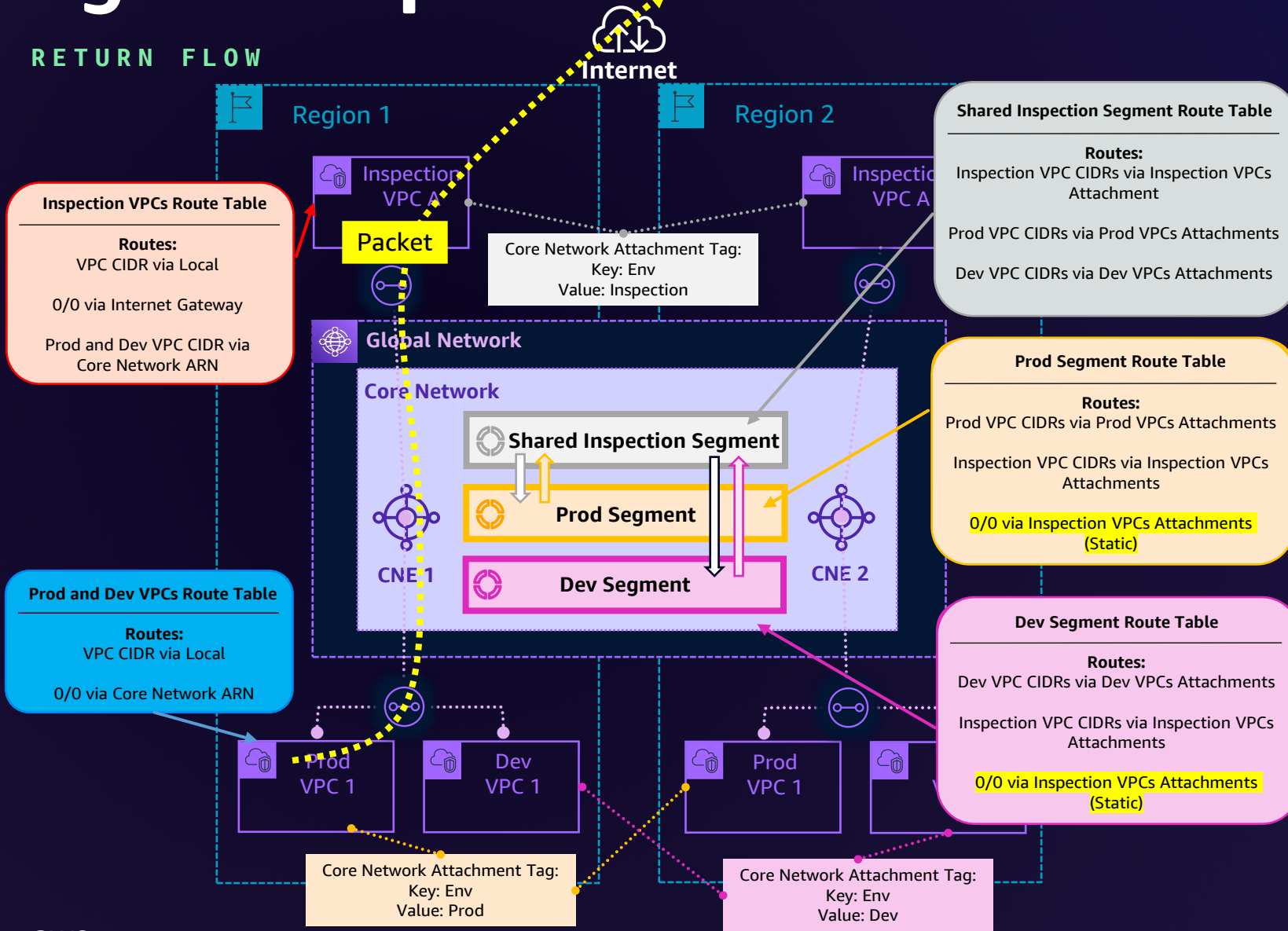
}

]



# Egress inspection architecture

RETURN FLOW



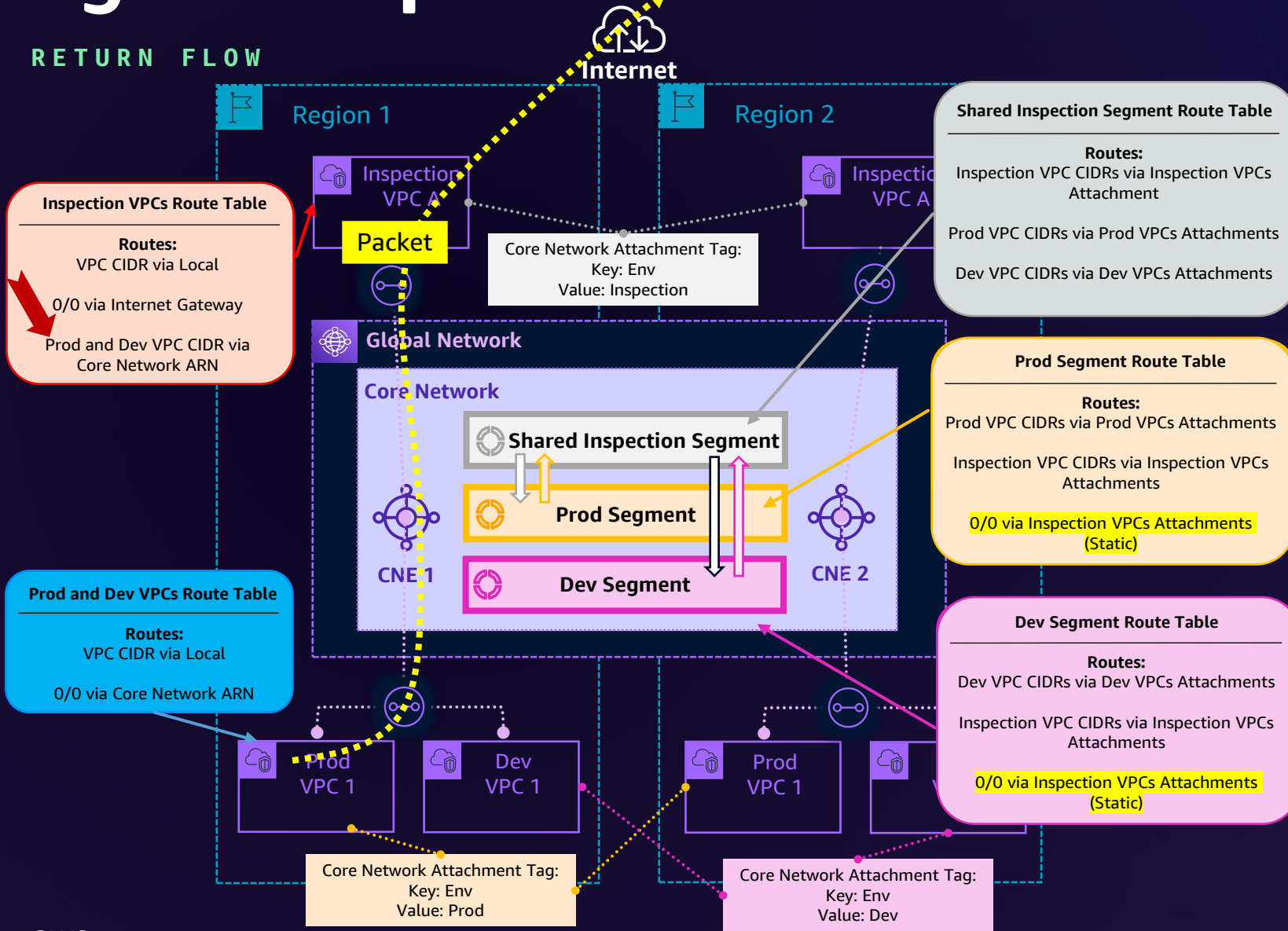
```

"segment-actions": [
  {
    "action": "share",
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  },
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      "inspection-vpc-a-attachment-aaaa",
      "inspection-vpc-b-attachment-bbbb "
    ]
  }
]
  
```



# Egress inspection architecture

RETURN FLOW



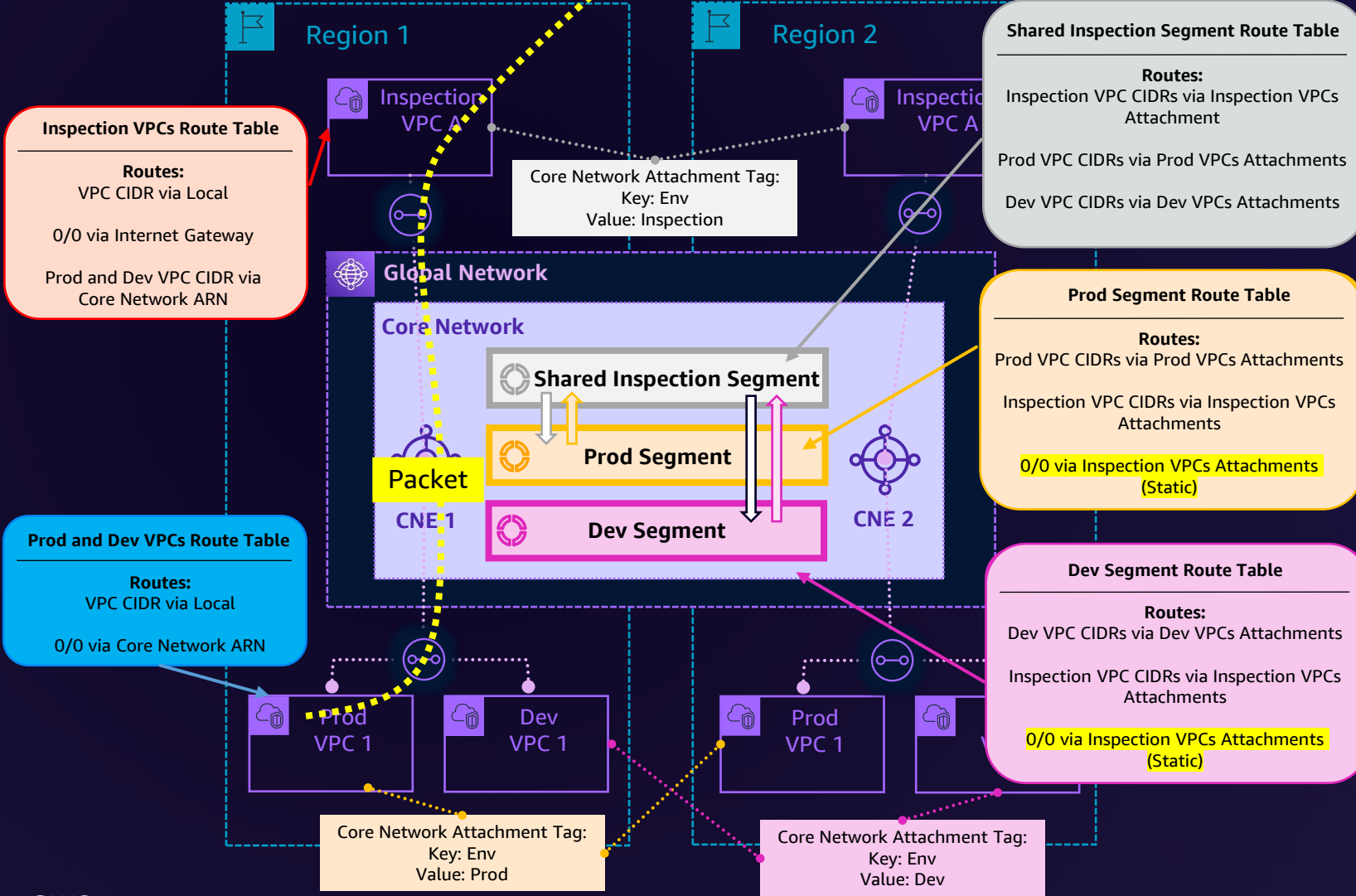
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  {
    "action": "share",
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      "inspection-vpc-a-attachment-aaaa",
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    ]
  }
]
  
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# Egress inspection architecture

RETURN FLOW



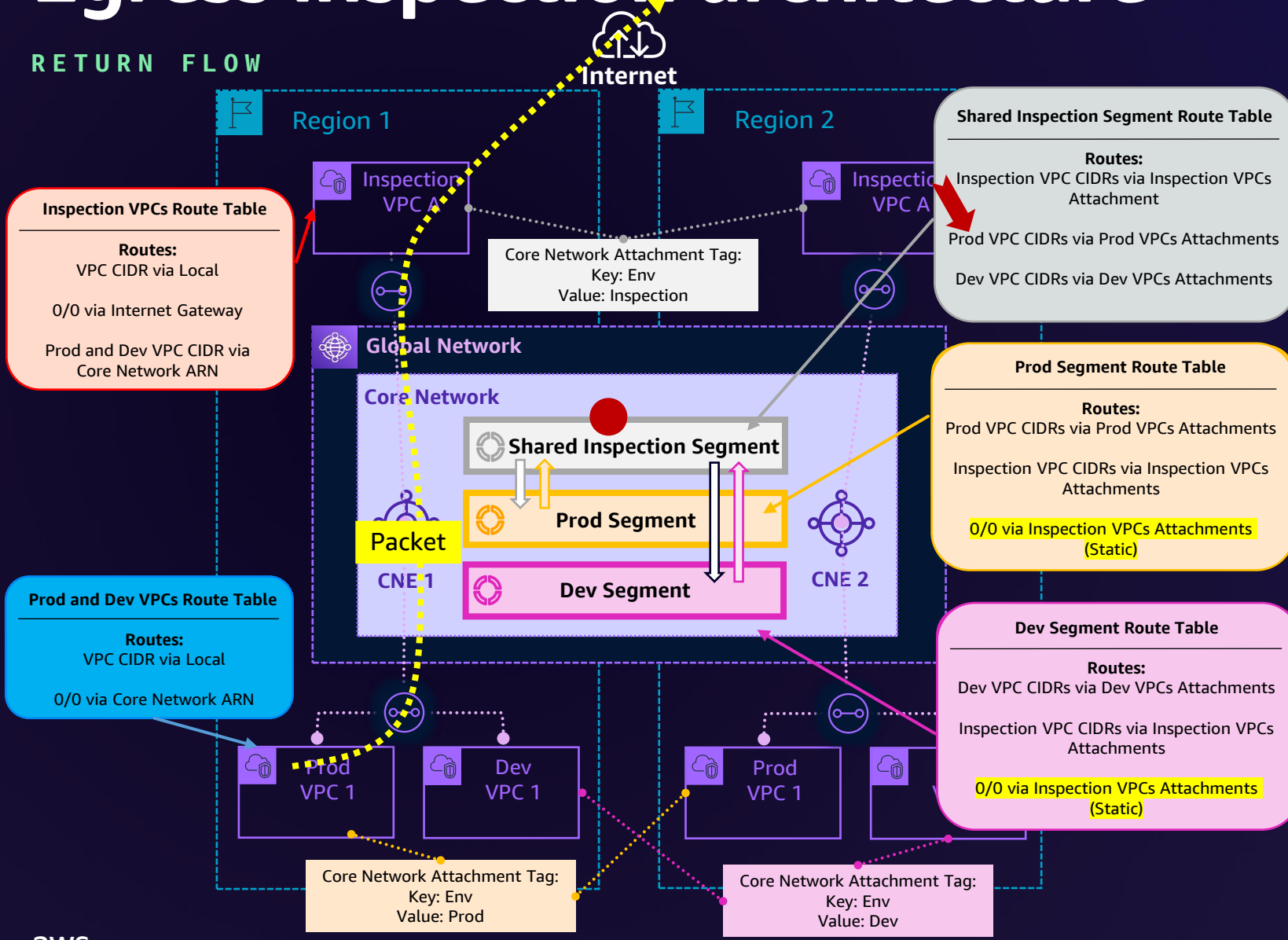
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    "action": "share",
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      "inspection-vpc-a-attachment-aaaa",
      "inspection-vpc-b-attachment-bbbb "
    ]
  }
]
  
```



# Egress inspection architecture

RETURN FLOW



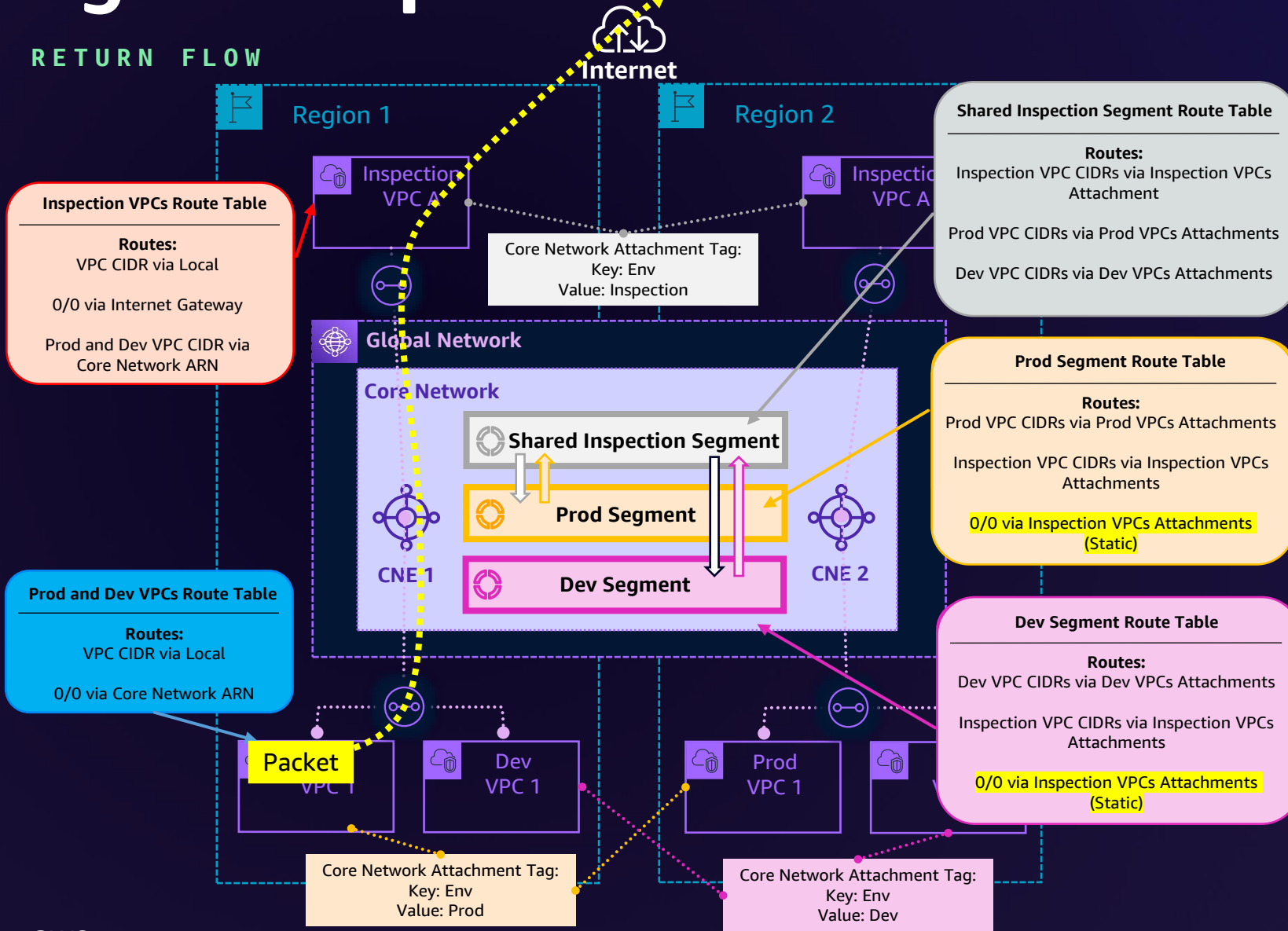
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"segment-actions": [
  {
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  },
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    "destination-cidr-blocks": [
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    ],
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      "inspection-vpc-a-attachment-aaaa",
      "inspection-vpc-b-attachment-bbbb "
    ]
  }
]
  
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# Egress inspection architecture

RETURN FLOW



```

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  {
    "action": "share",
    "mode": "attachment-route",
    "segment": "Shared Inspection",
    "share-with": "*"
  },
  {
    "action": "create-route",
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      "inspection-vpc-a-attachment-aaaa",
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    ]
  },
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    "action": "create-route",
    "segment": "Dev",
    "destination-cidr-blocks": [
      "0.0.0.0/0"
    ],
    "destinations": [
      "inspection-vpc-a-attachment-aaaa",
      "inspection-vpc-b-attachment-bbbb "
    ]
  }
]
  
```





Happy Alice

# A story of meeting needs





**Happy Alice**

# A story of meeting needs

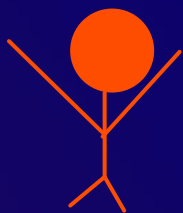


**People got what  
they wanted**



Happy Alice

# A story of meeting needs

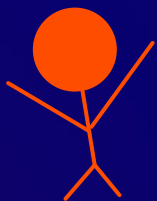
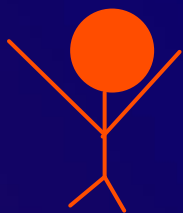


People got what they wanted



Happy Alice

# A story of meeting needs

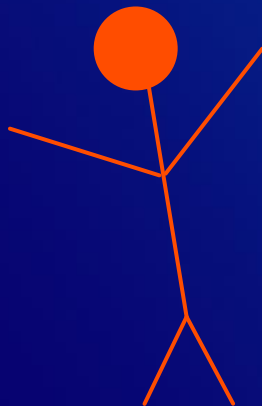
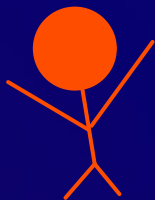
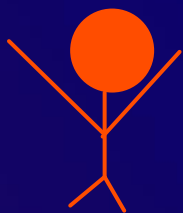


People got what they wanted



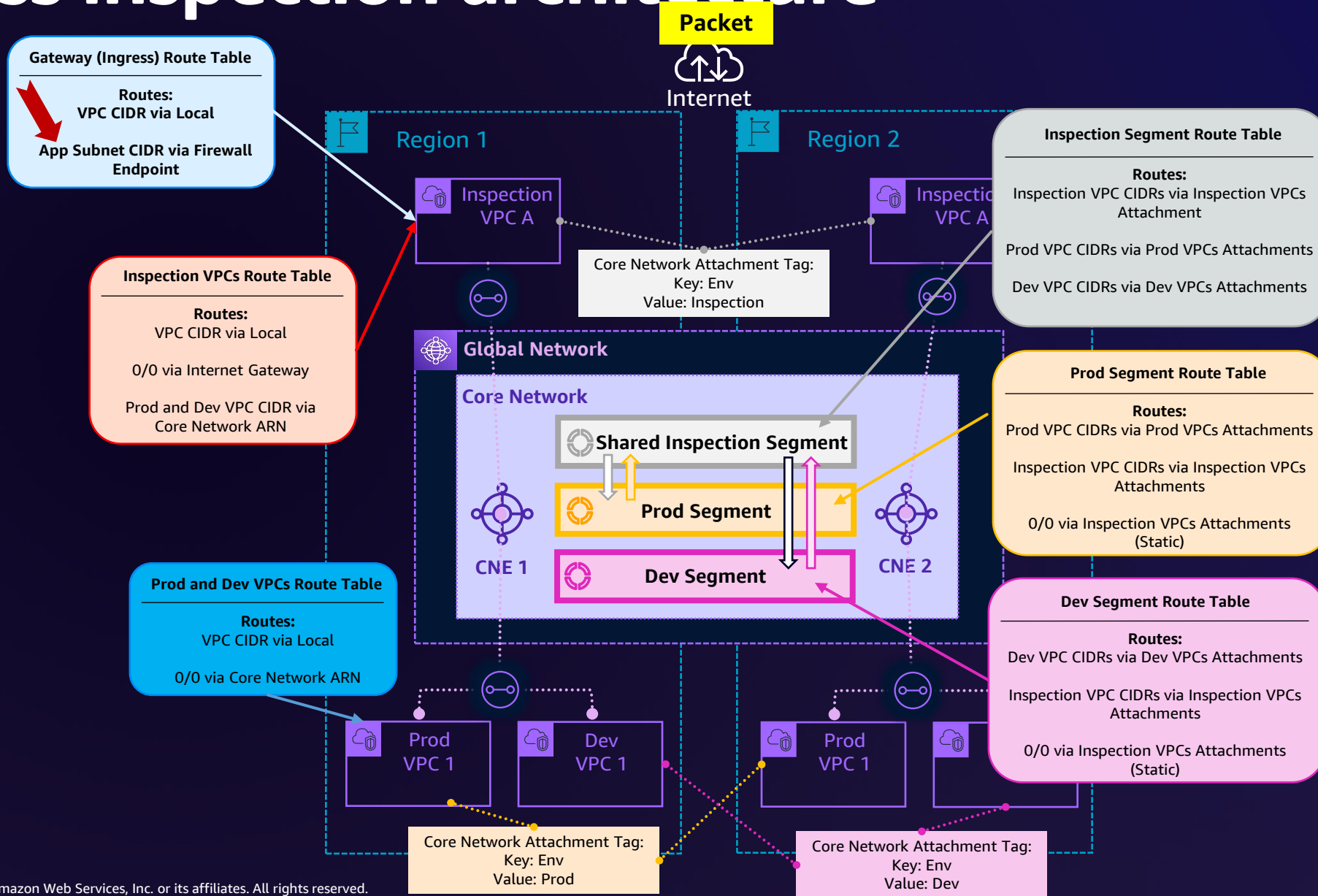
Happy Alice

# A story of meeting needs

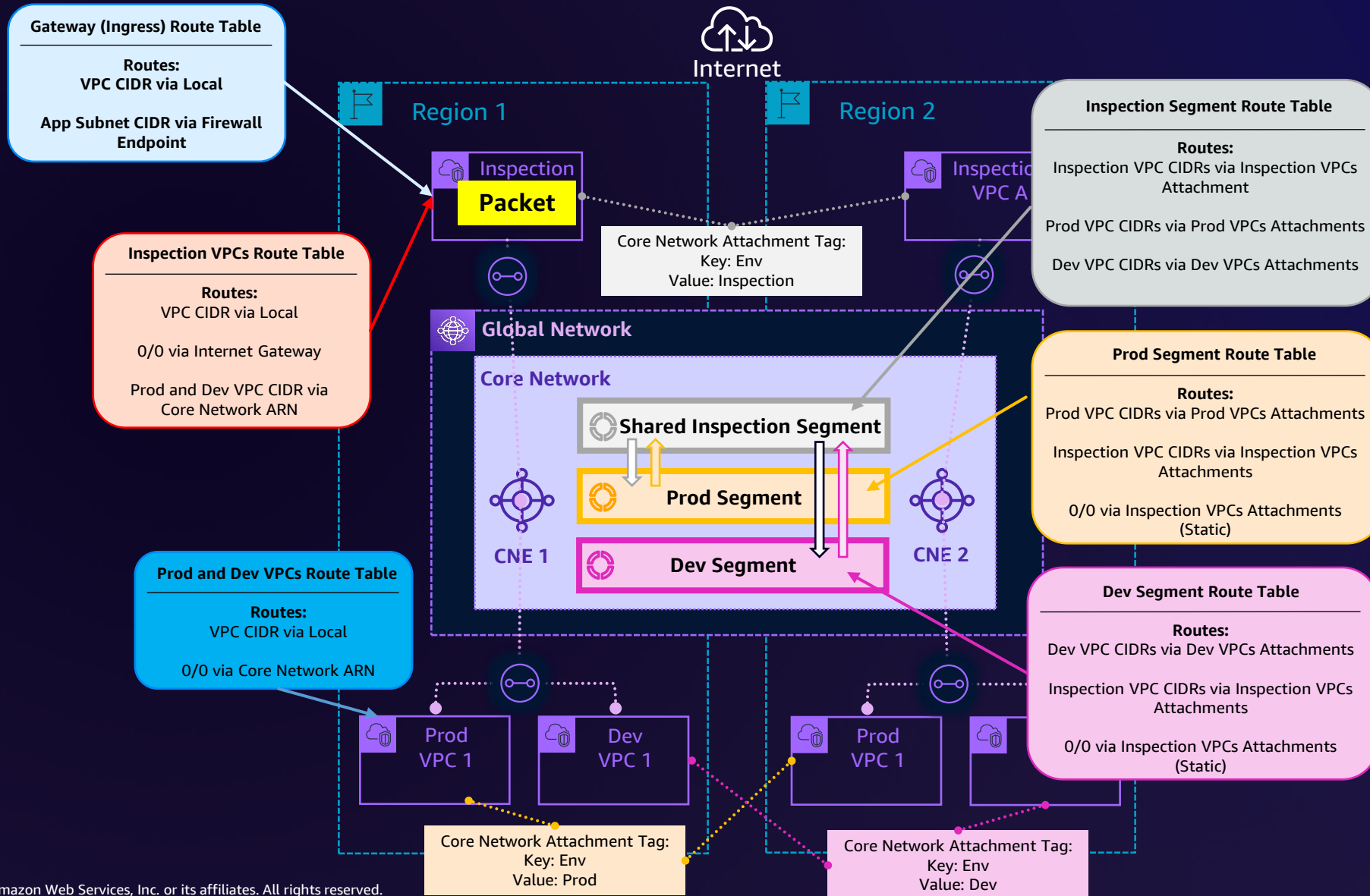


People got what they wanted

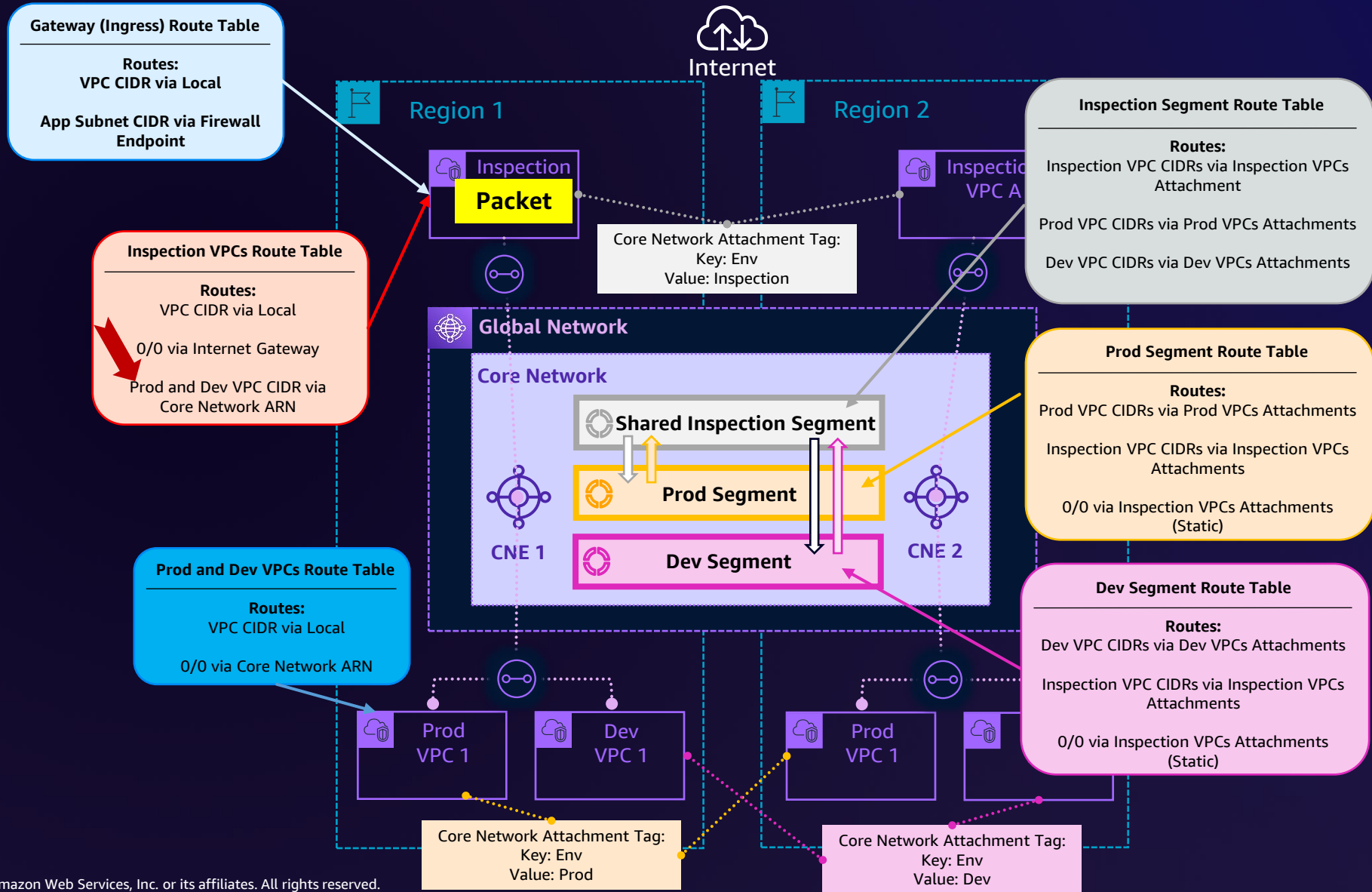
# Ingress inspection architecture



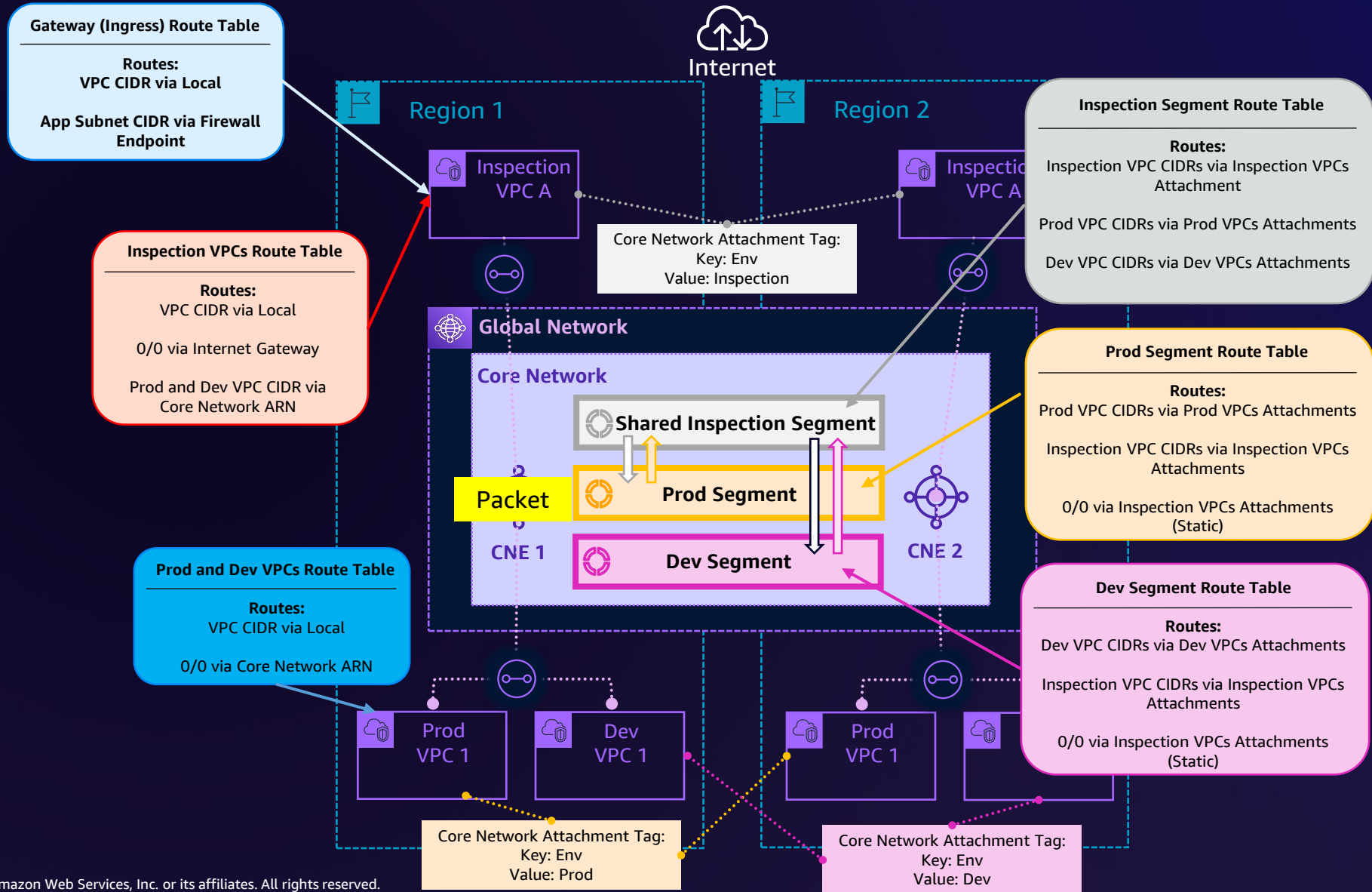
# Ingress inspection architecture



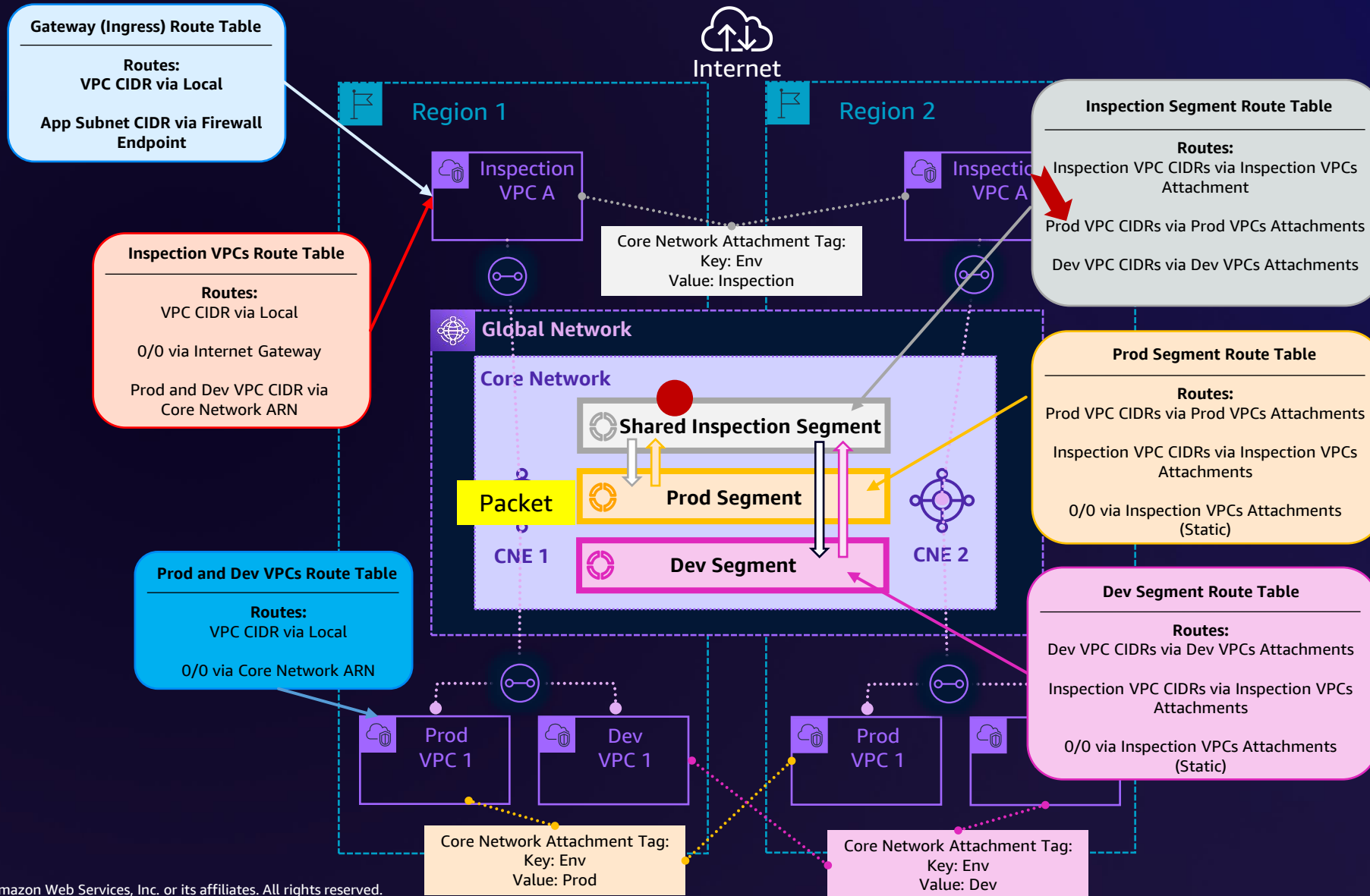
# Ingress inspection architecture



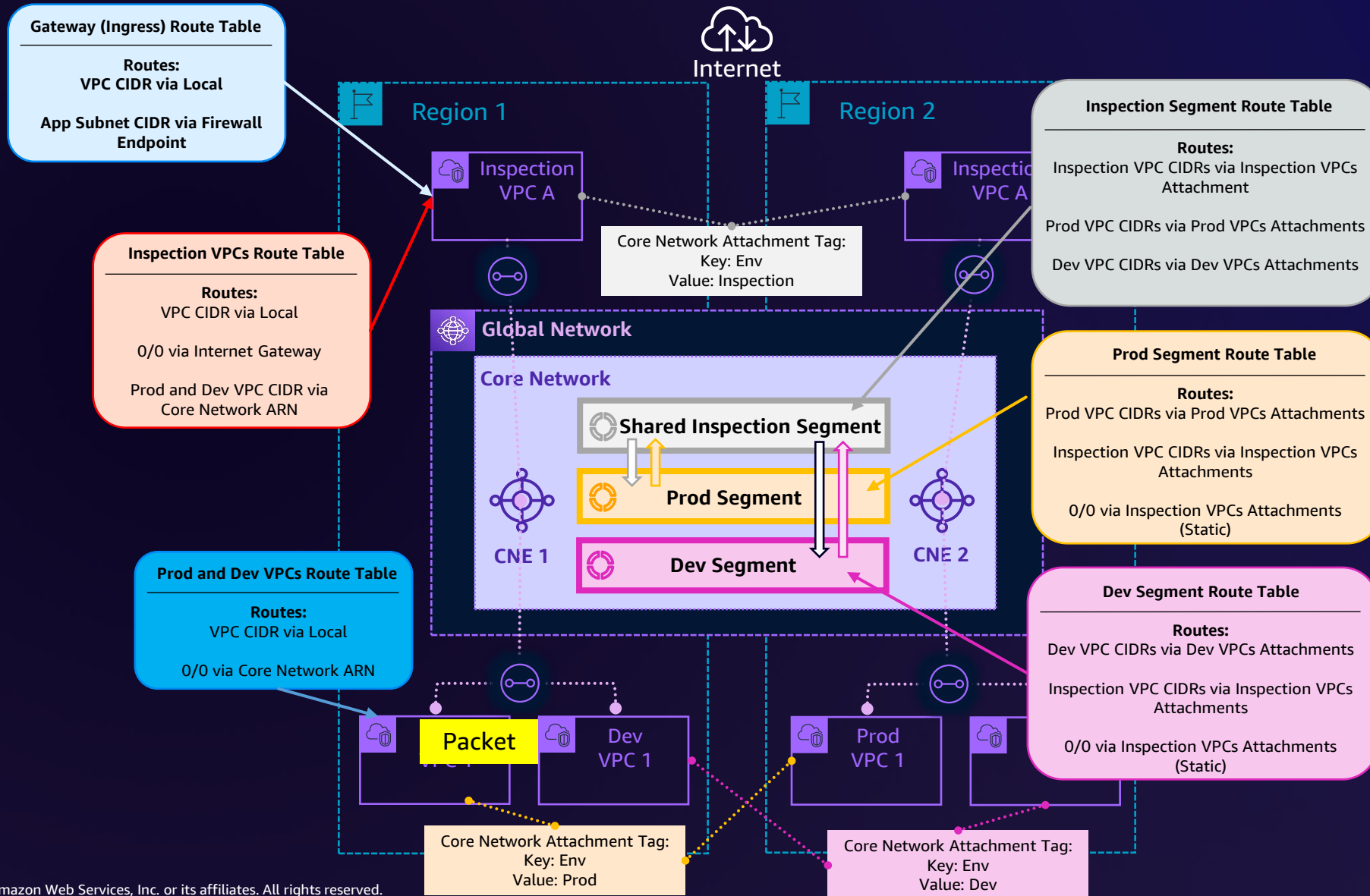
# Ingress inspection architecture



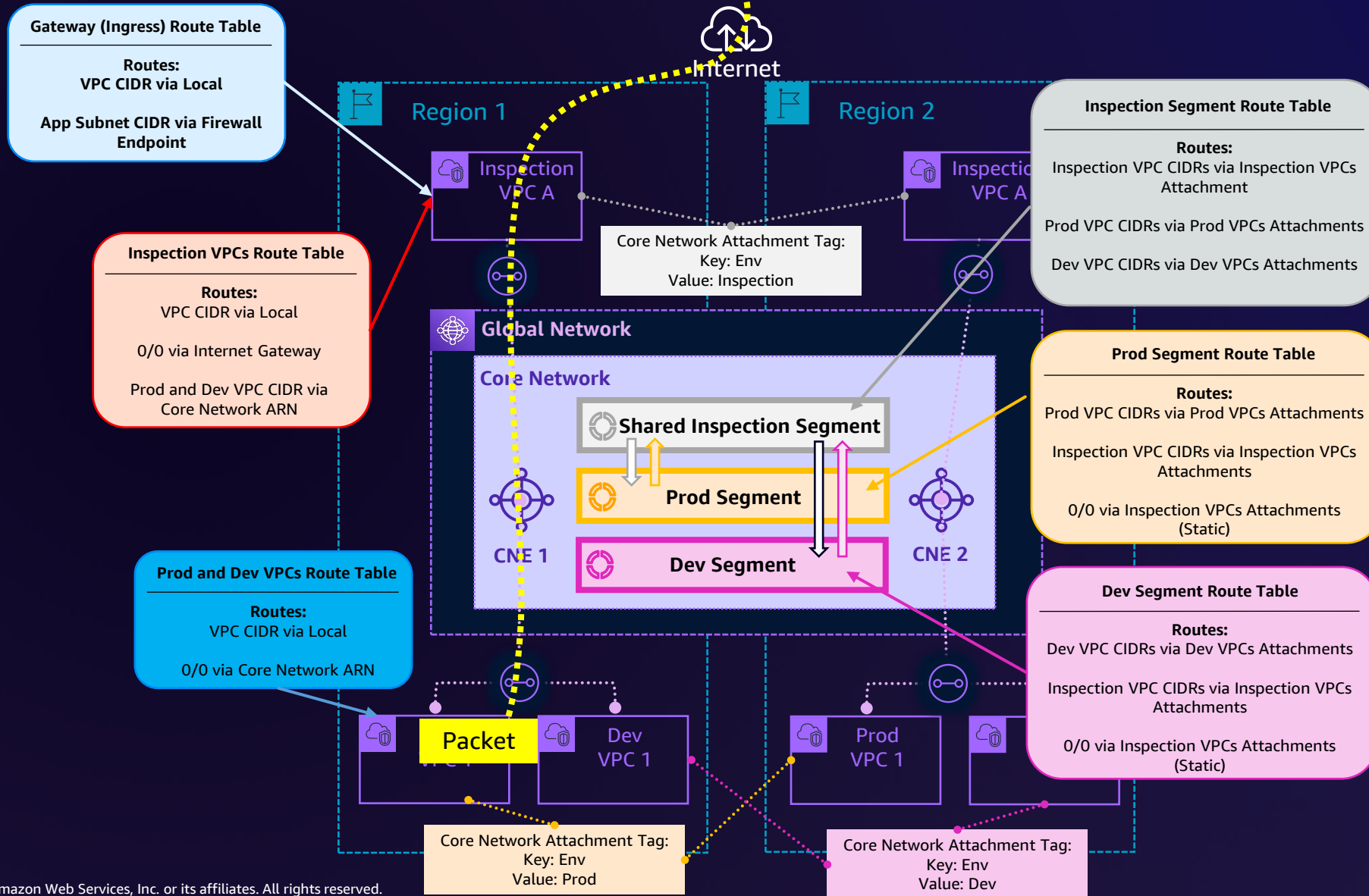
# Ingress inspection architecture



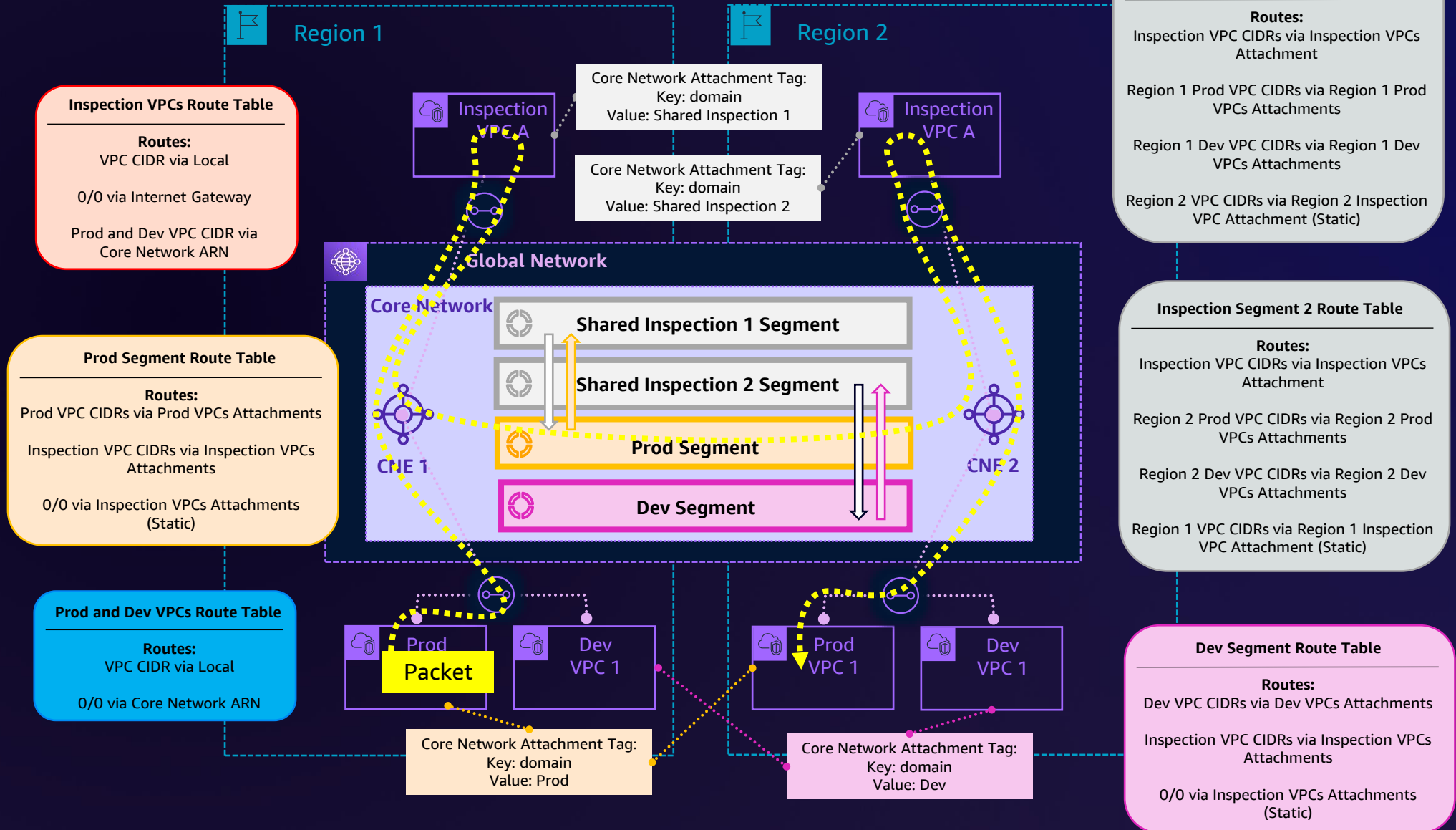
# Ingress inspection architecture



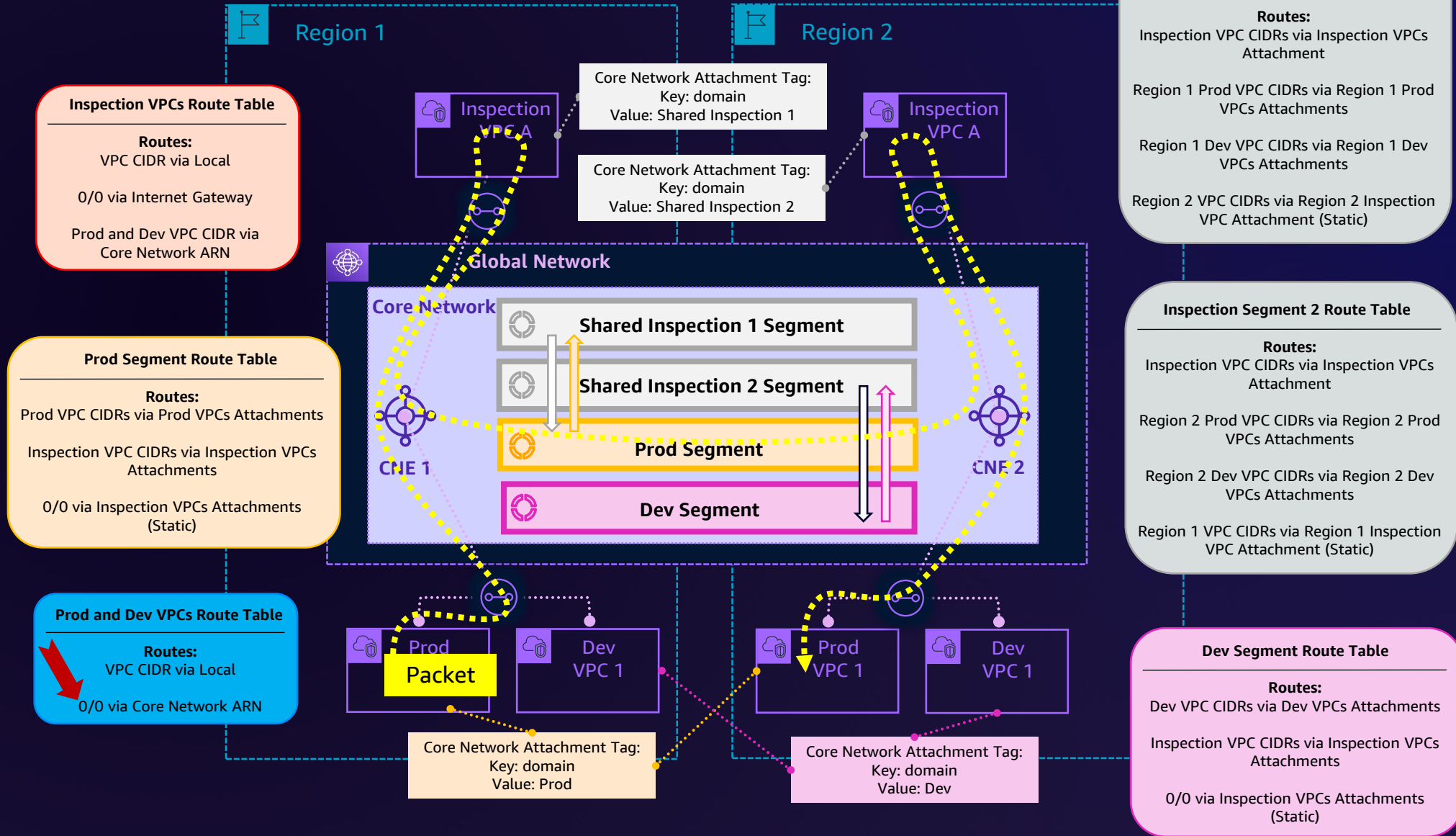
# Ingress inspection architecture



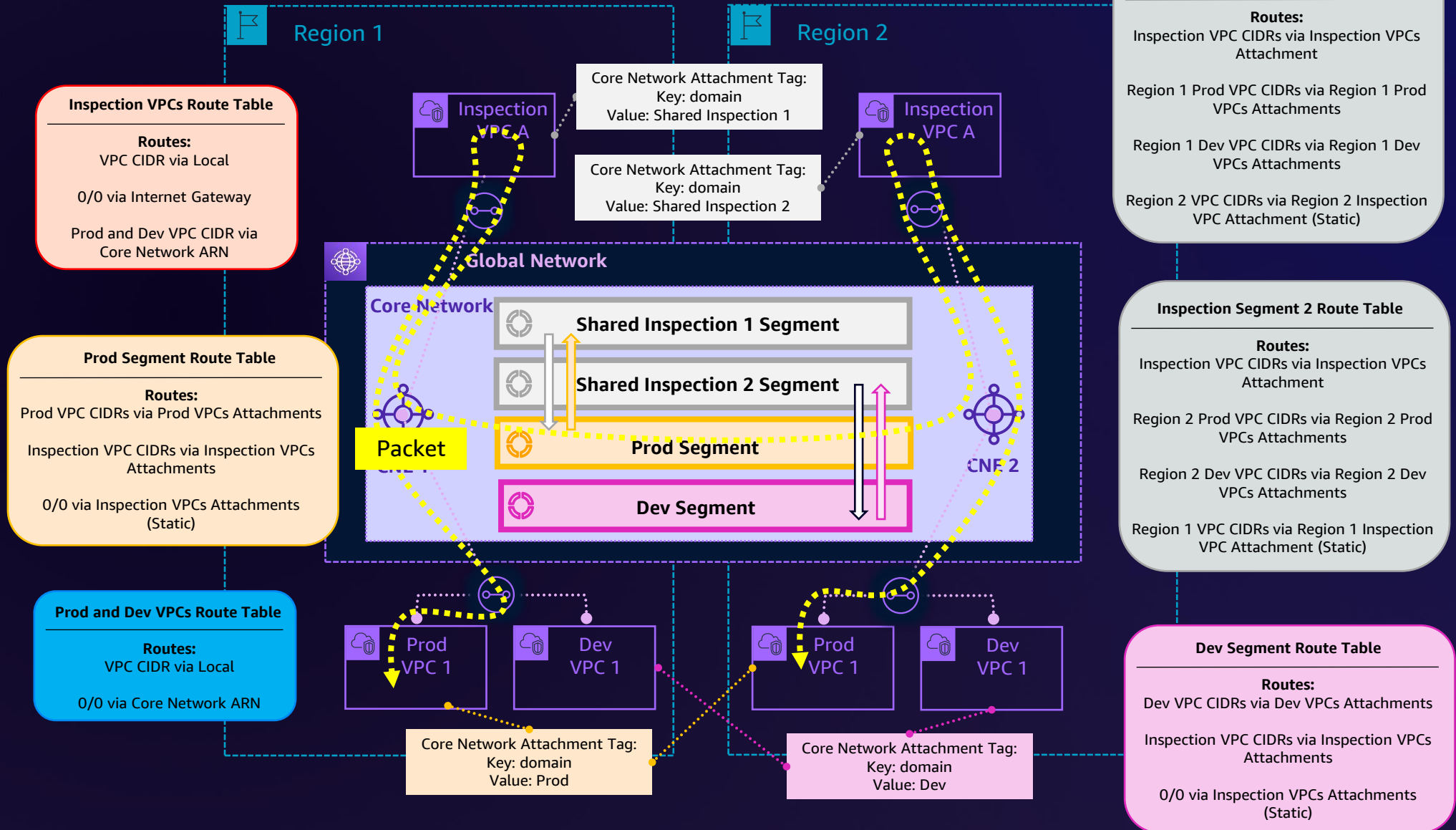
# VPC-to-VPC inspection architecture



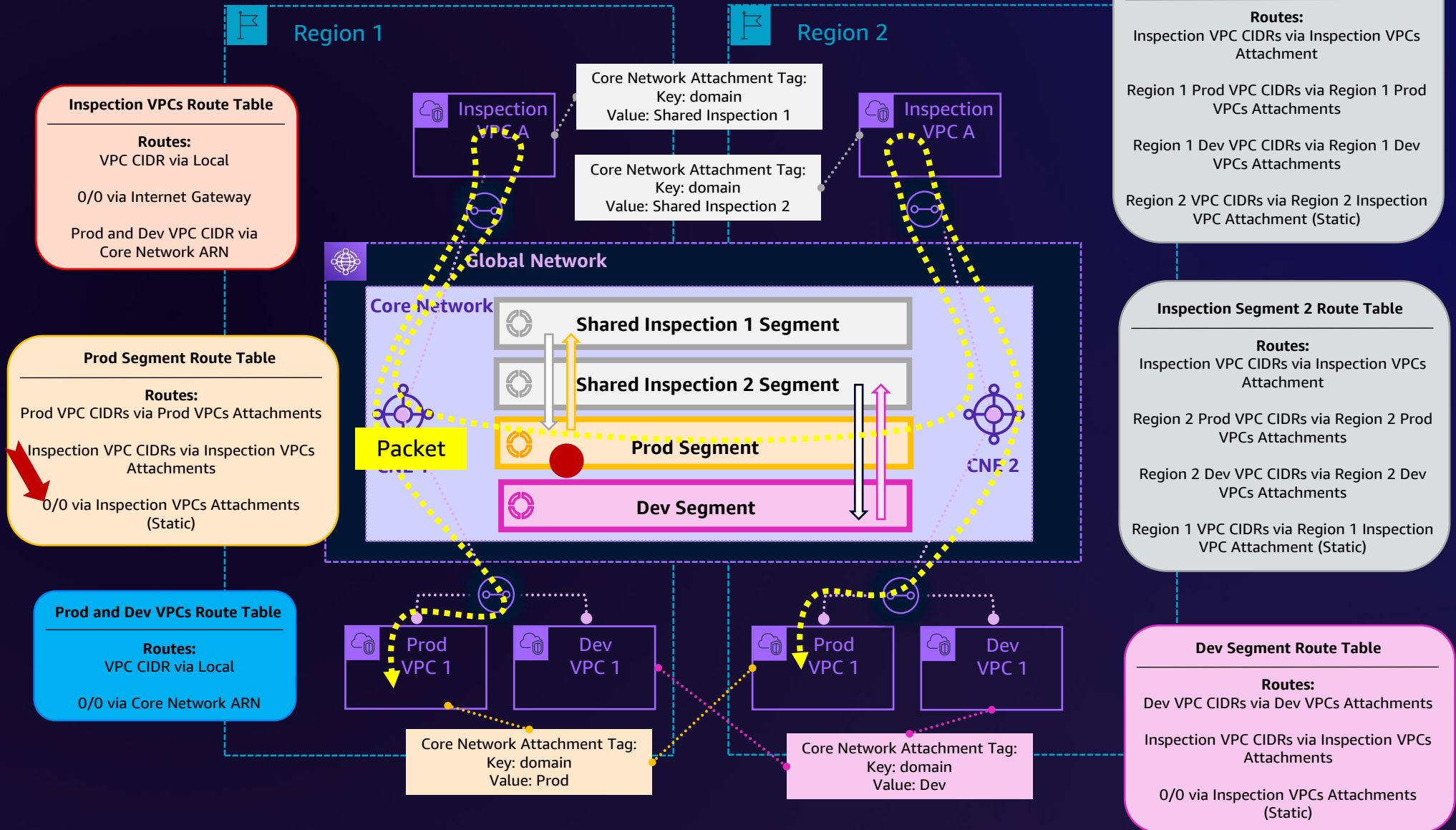
# VPC-to-VPC inspection architecture



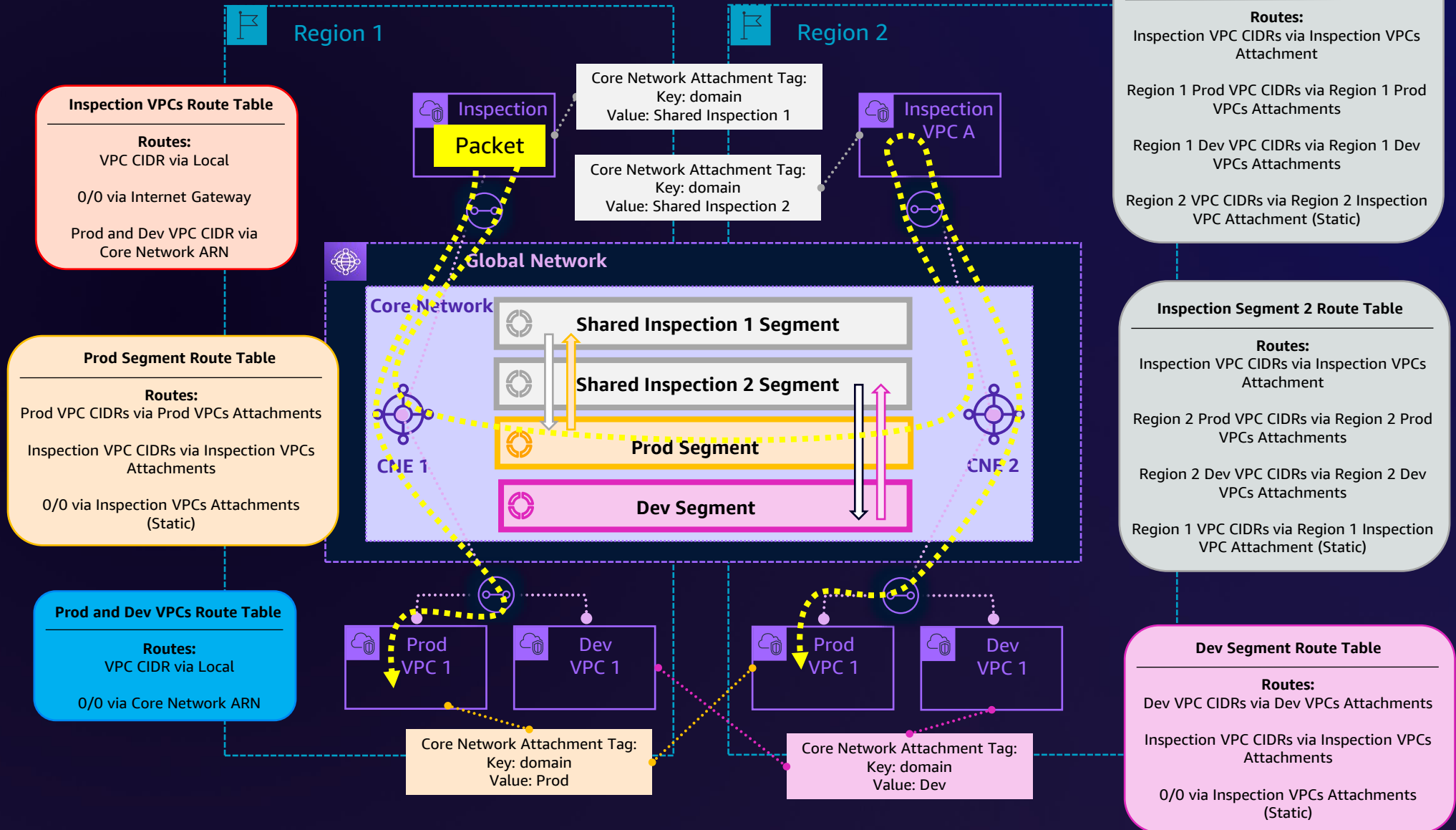
# VPC-to-VPC inspection architecture



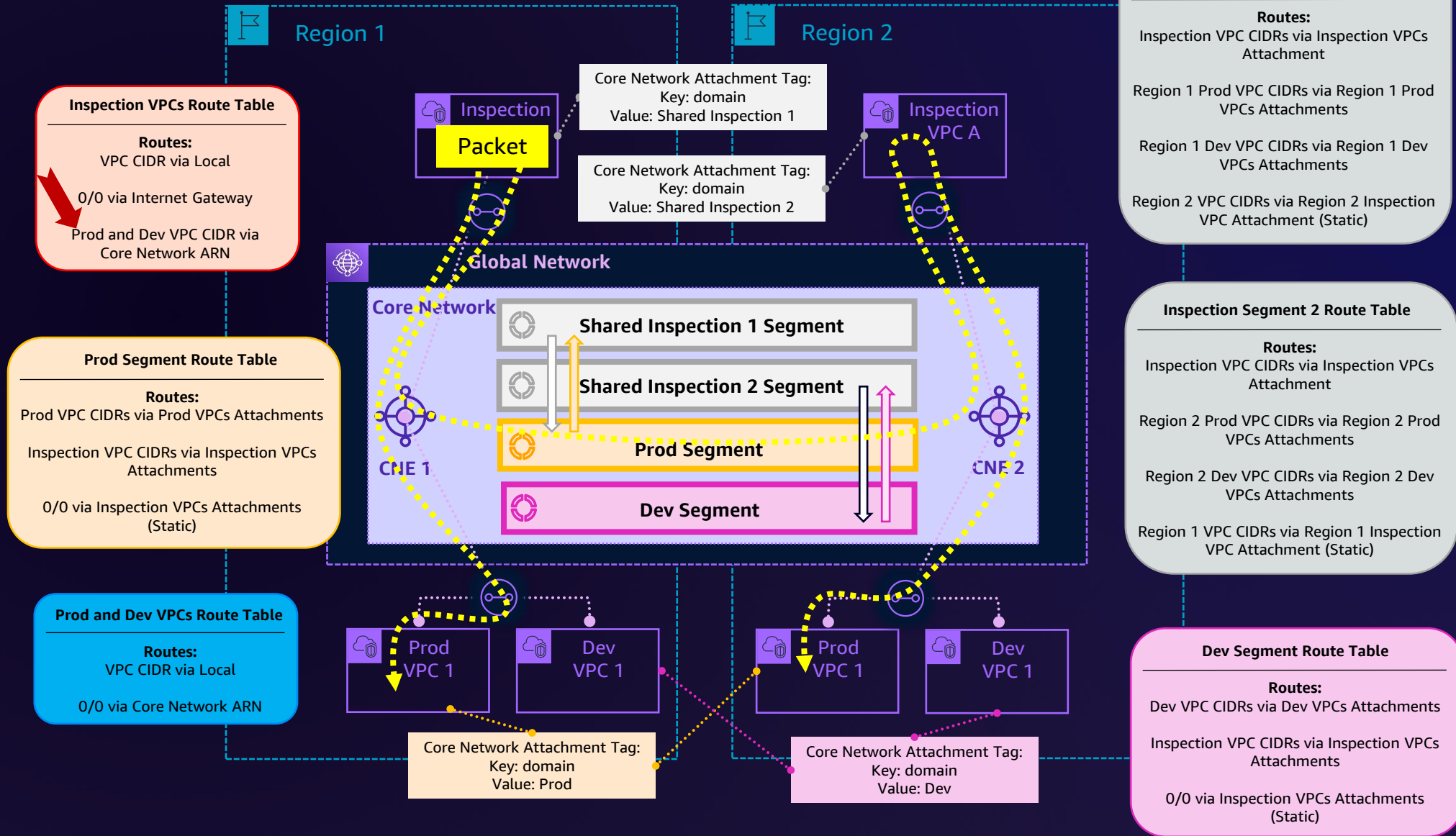
# VPC-to-VPC inspection architecture



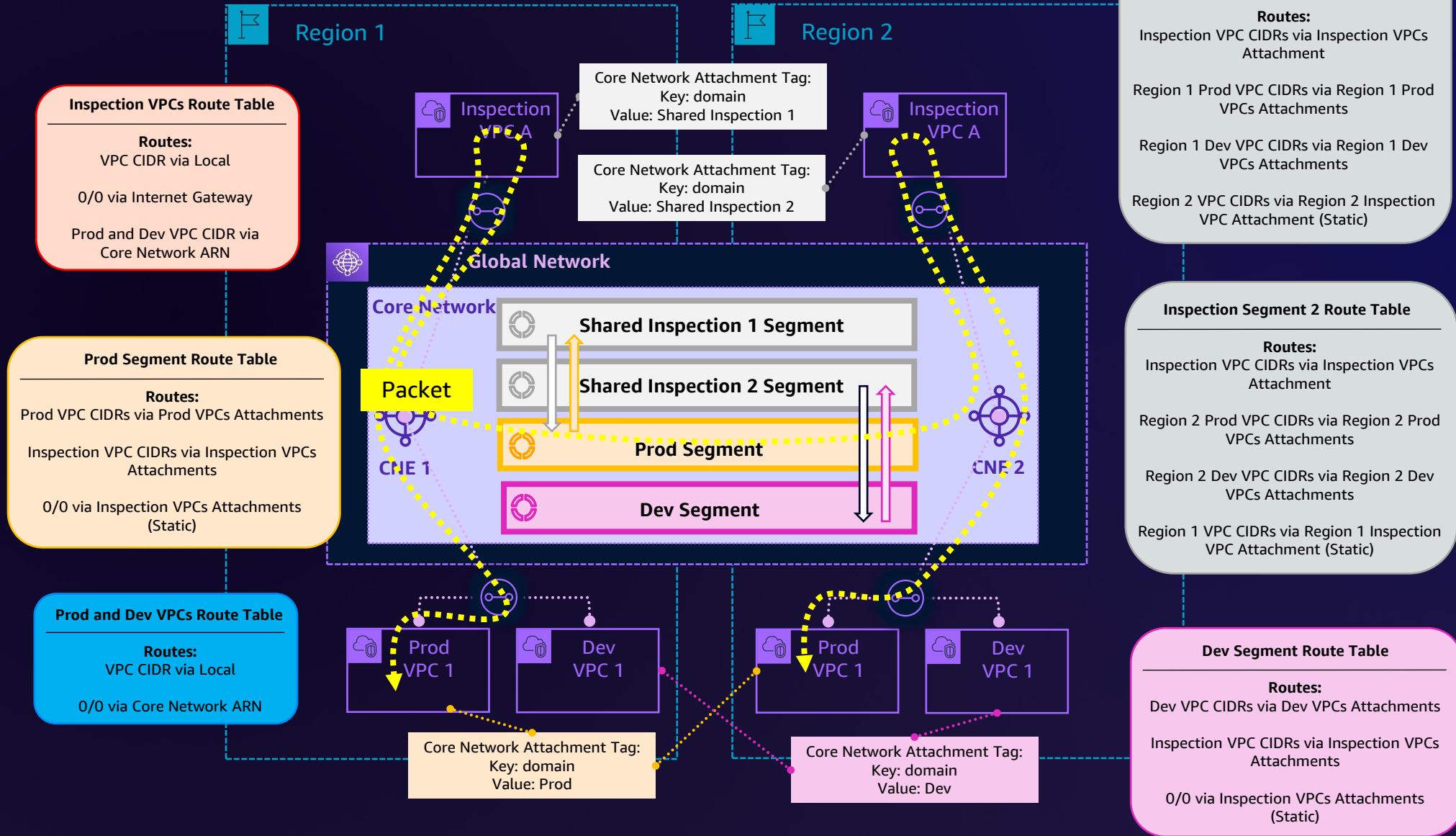
# VPC-to-VPC inspection architecture



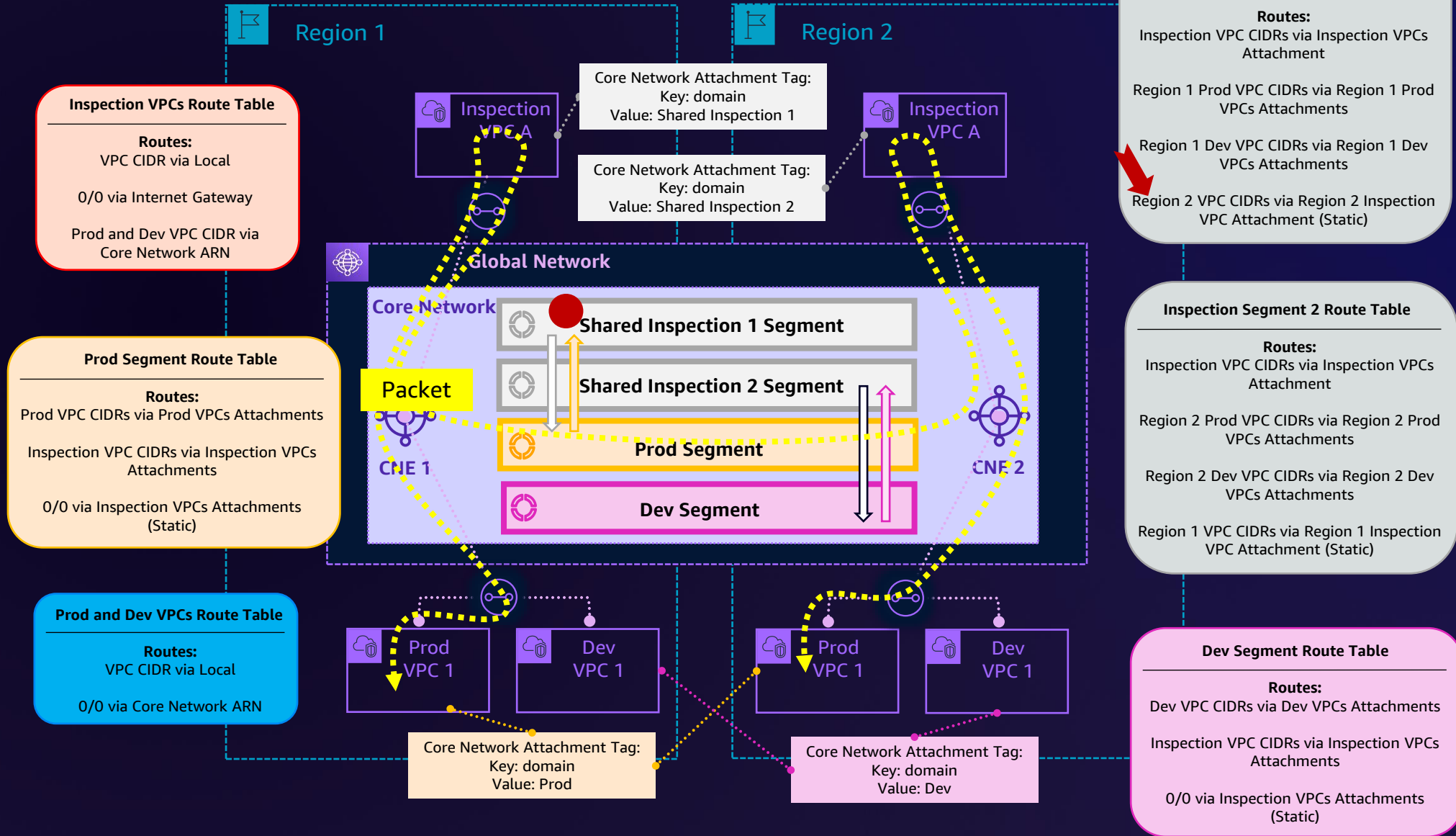
# VPC-to-VPC inspection architecture



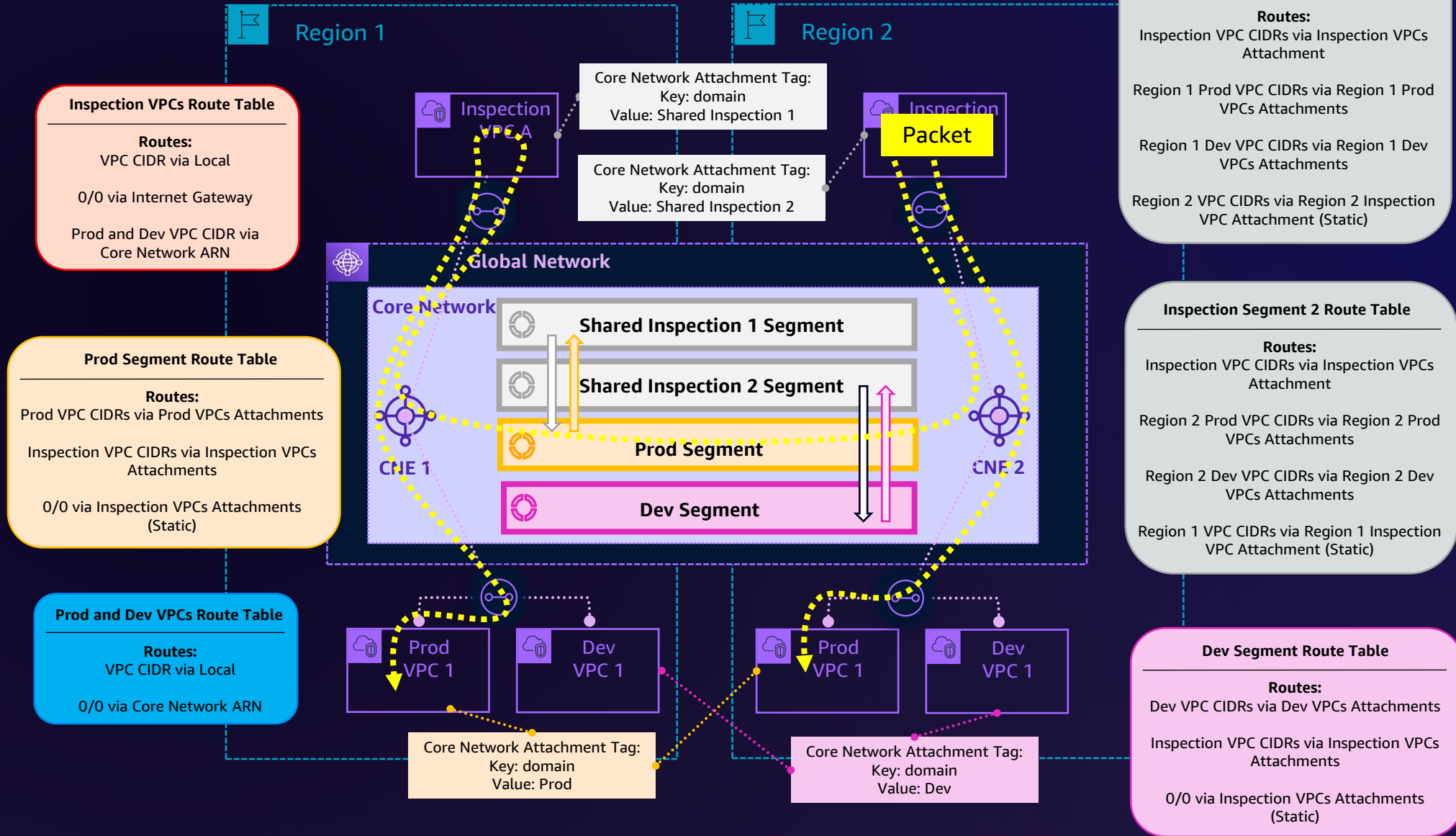
# VPC-to-VPC inspection architecture



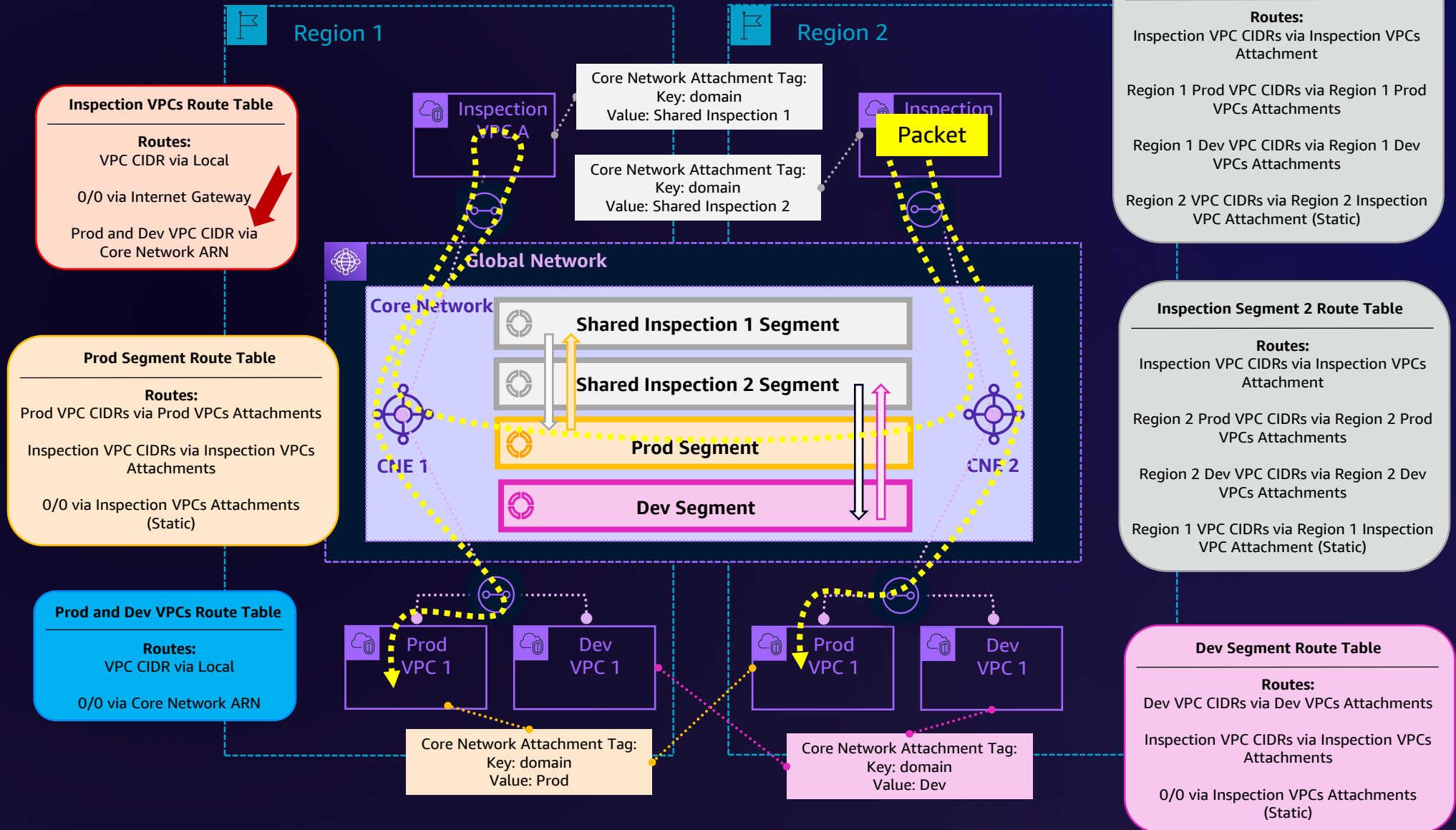
# VPC-to-VPC inspection architecture



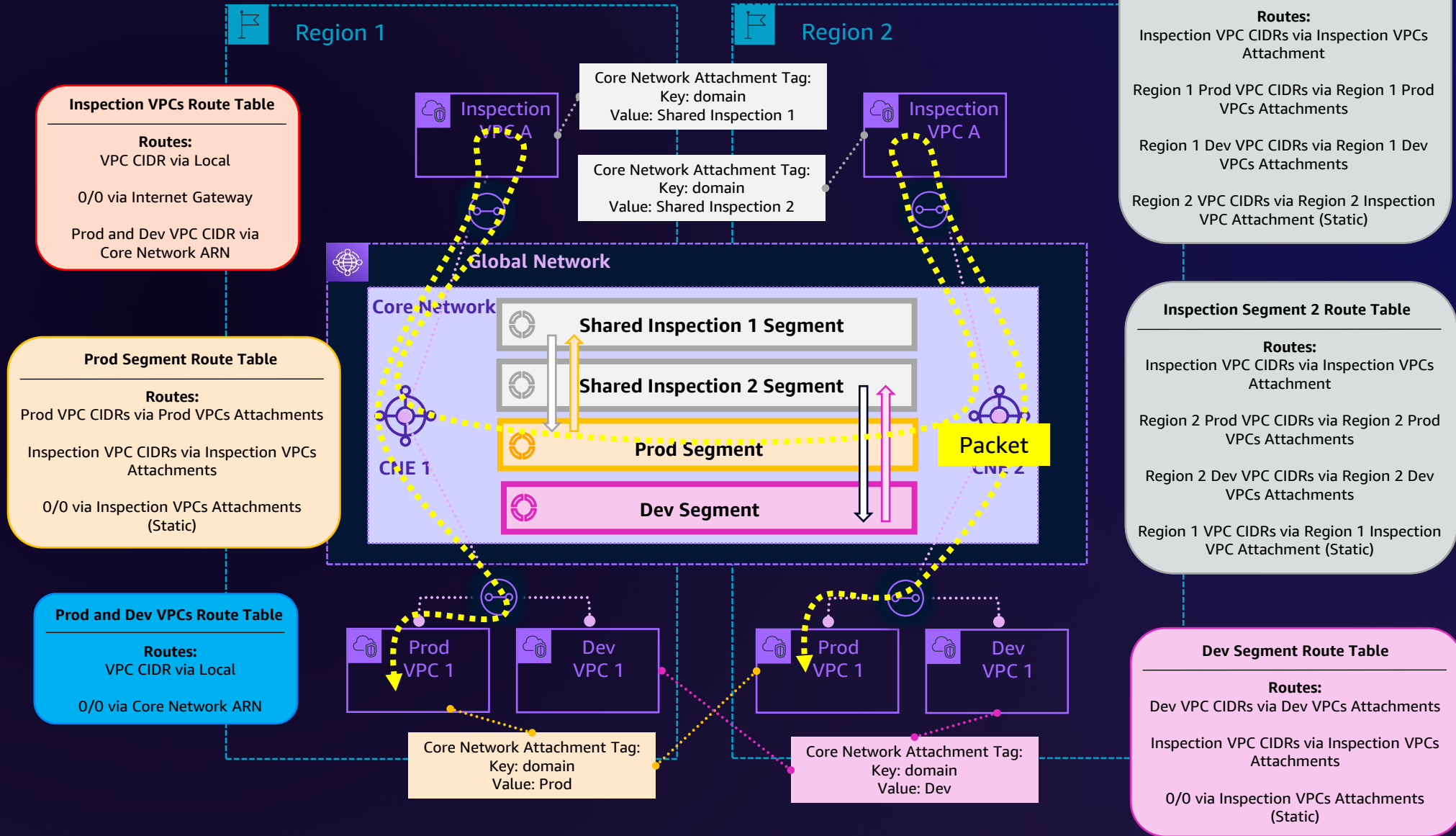
# VPC-to-VPC inspection architecture



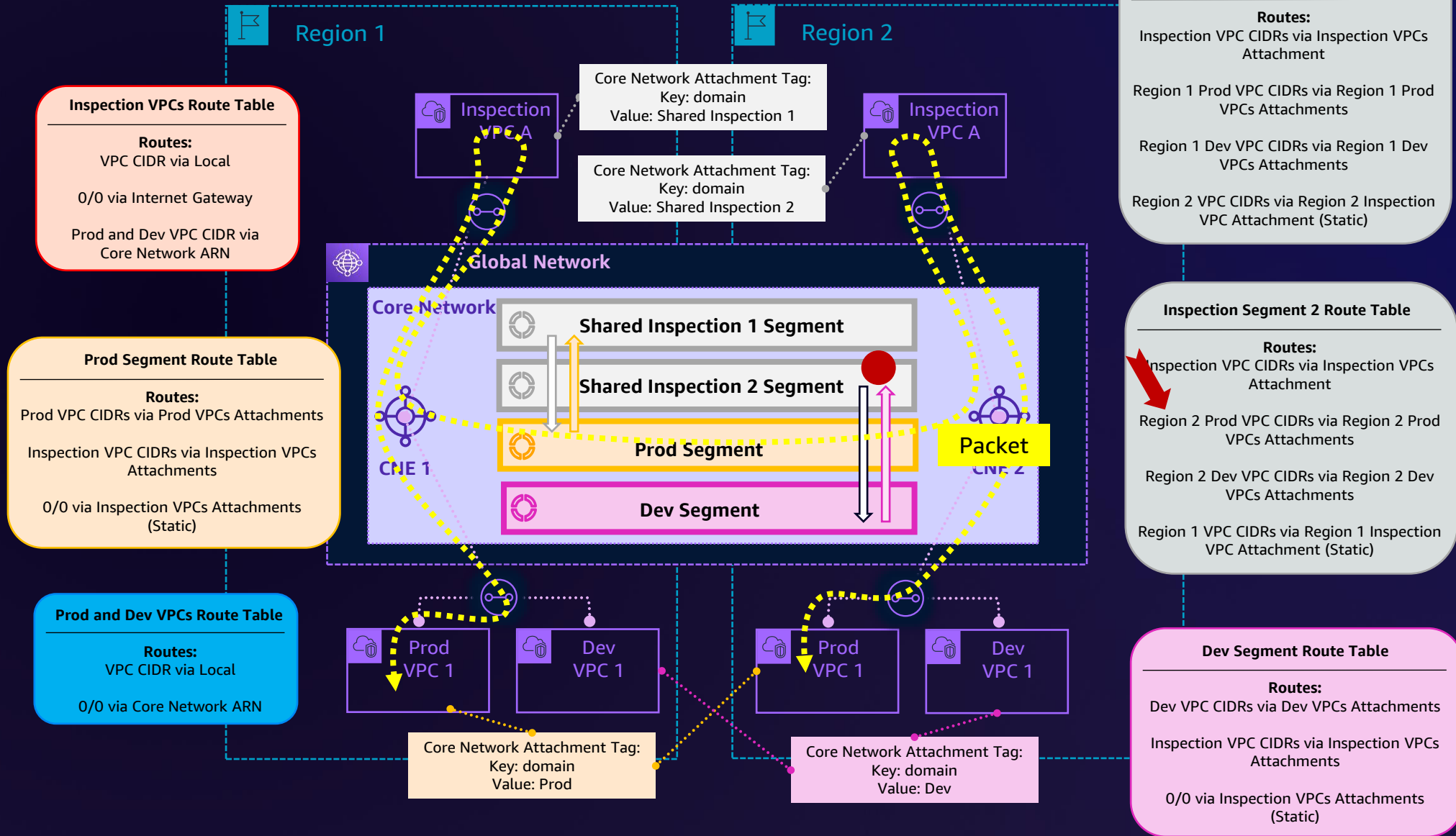
# VPC-to-VPC inspection architecture



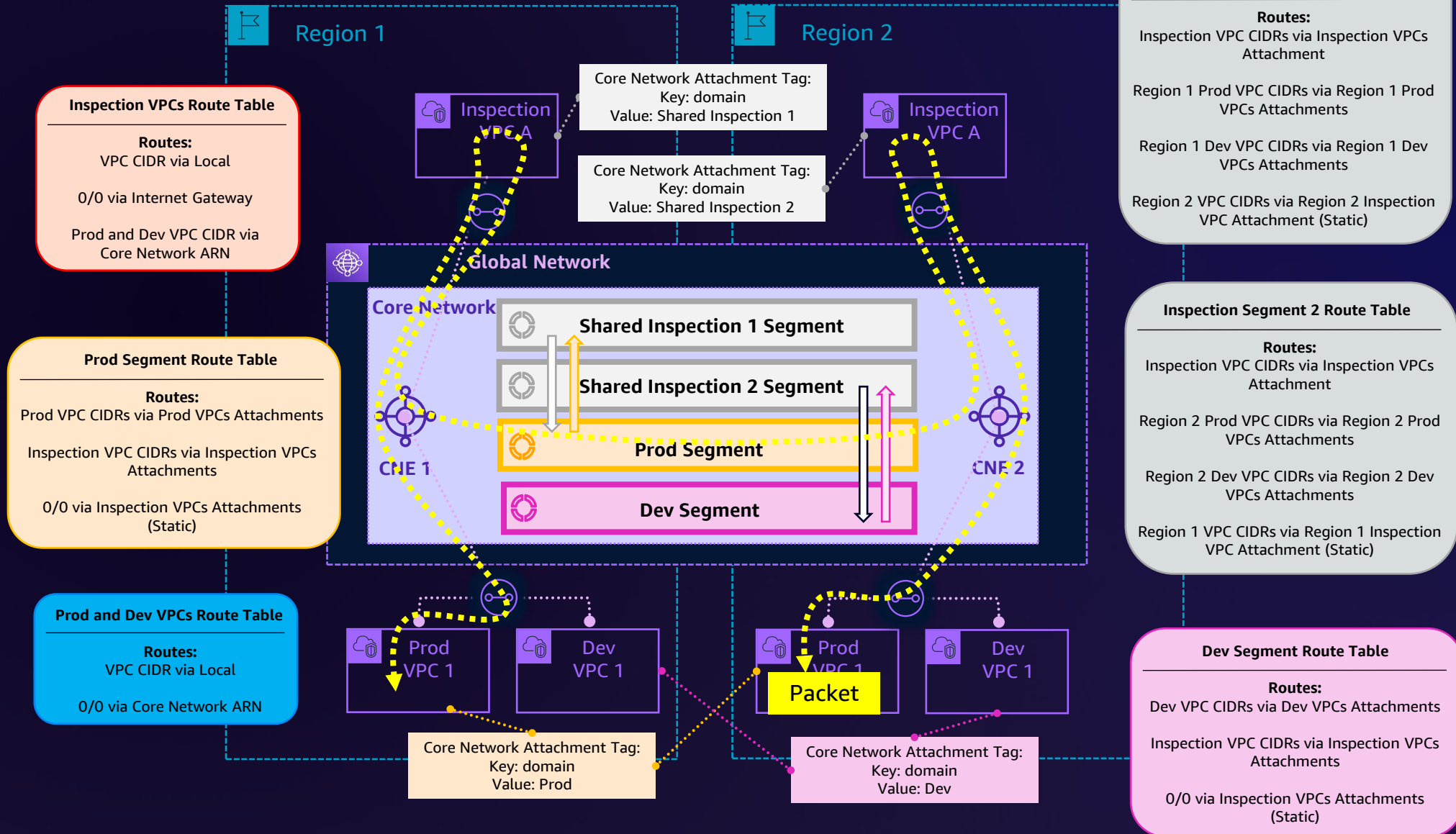
# VPC-to-VPC inspection architecture



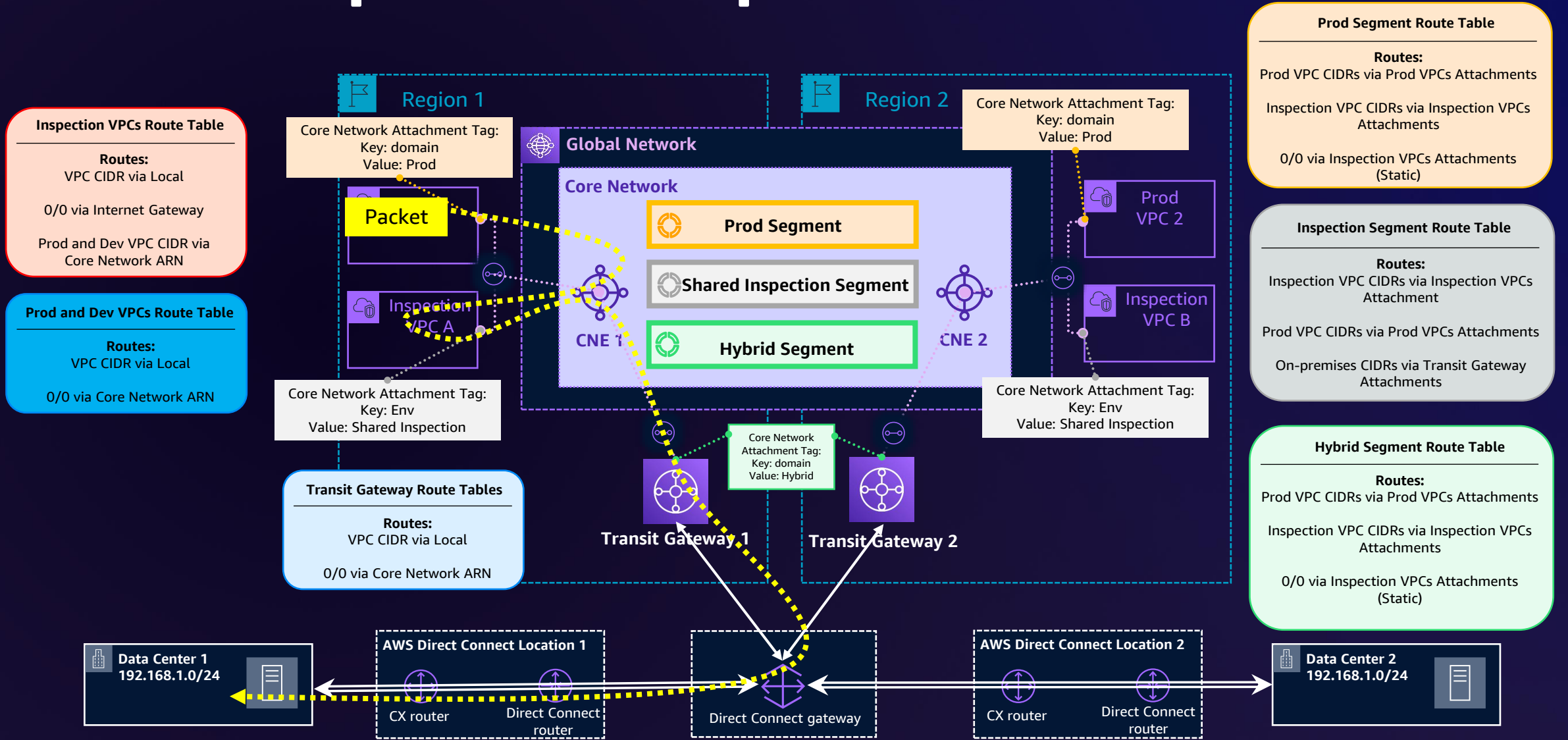
# VPC-to-VPC inspection architecture



# VPC-to-VPC inspection architecture



# VPC-to-on-premises inspection architecture



**Inspection VPCs Route Table**

**Routes:**  
 VPC CIDR via Local  
 0/0 via Internet Gateway  
 Prod and Dev VPC CIDR via Core Network ARN

**Prod and Dev VPCs Route Table**

**Routes:**  
 VPC CIDR via Local  
 0/0 via Core Network ARN

**Region 1**

Core Network Attachment Tag:  
 Key: domain  
 Value: Prod

Core Network Attachment Tag:  
 Key: Env  
 Value: Shared Inspection

**Transit Gateway Route Tables**

**Routes:**  
 VPC CIDR via Local  
 0/0 via Core Network ARN

**Global Network**

**Core Network**

- Prod Segment
- Shared Inspection Segment
- Hybrid Segment

CNE 1      CNE 2

Core Network Attachment Tag:  
 Key: domain  
 Value: Prod

Core Network Attachment Tag:  
 Key: Env  
 Value: Shared Inspection

Core Network Attachment Tag:  
 Key: domain  
 Value: Hybrid

**Prod Segment Route Table**

**Routes:**  
 Prod VPC CIDRs via Prod VPCs Attachments  
 Inspection VPC CIDRs via Inspection VPCs Attachments  
 0/0 via Inspection VPCs Attachments (Static)

**Inspection Segment Route Table**

**Routes:**  
 Inspection VPC CIDRs via Inspection VPCs Attachment  
 Prod VPC CIDRs via Prod VPCs Attachments  
 On-premises CIDRs via Transit Gateway Attachments

**Hybrid Segment Route Table**

**Routes:**  
 Prod VPC CIDRs via Prod VPCs Attachments  
 Inspection VPC CIDRs via Inspection VPCs Attachments  
 0/0 via Inspection VPCs Attachments (Static)

**Data Center 1**  
 192.168.1.0/24

**AWS Direct Connect Location 1**

CX router      Direct Connect router

**Direct Connect gateway**

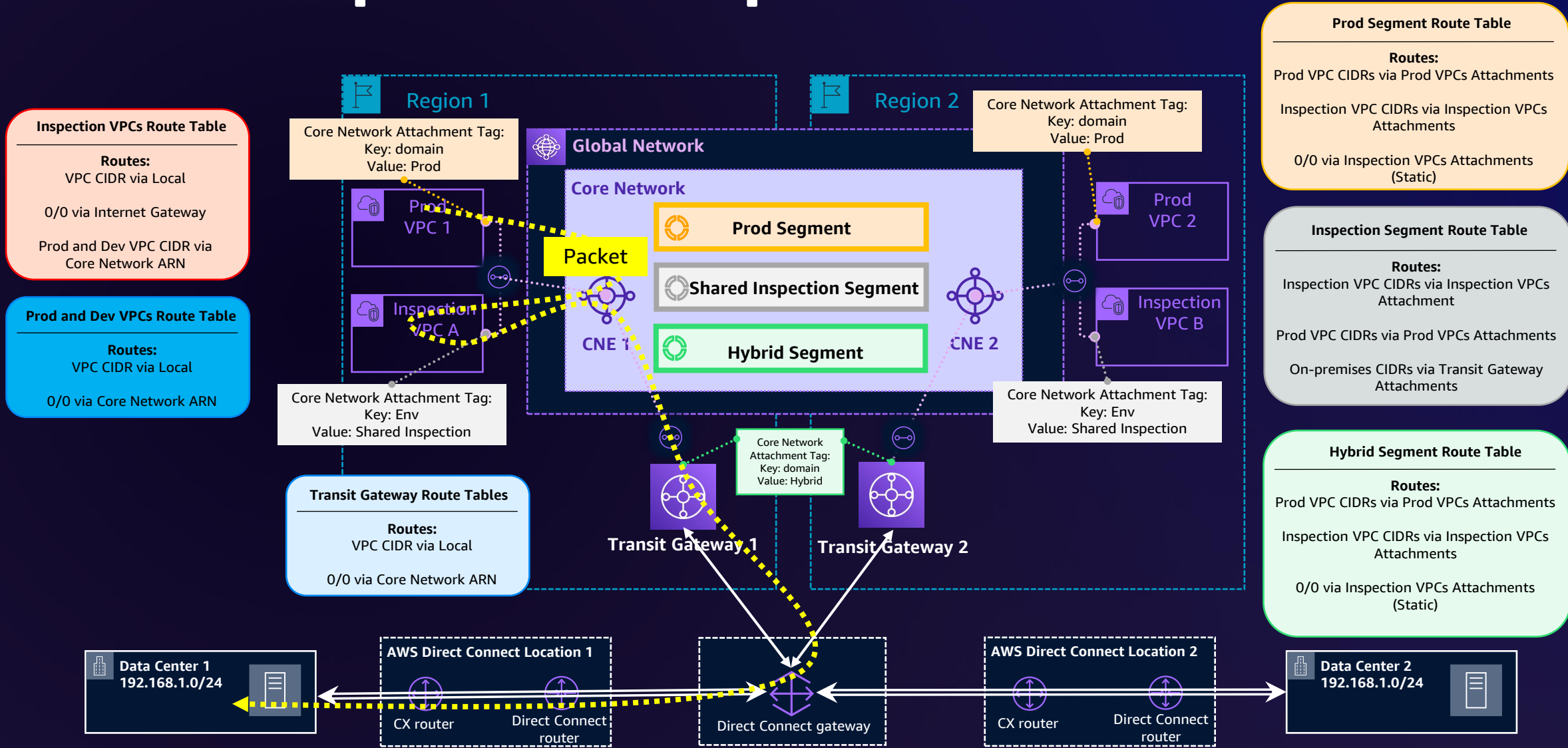
**AWS Direct Connect Location 2**

CX router      Direct Connect router

**Data Center 2**  
 192.168.1.0/24



# VPC-to-on-premises inspection architecture



**Inspection VPCs Route Table**

**Routes:**  
 VPC CIDR via Local  
 0/0 via Internet Gateway  
 Prod and Dev VPC CIDR via Core Network ARN

**Prod and Dev VPCs Route Table**

**Routes:**  
 VPC CIDR via Local  
 0/0 via Core Network ARN

**Core Network Attachment Tag:**  
 Key: Env  
 Value: Shared Inspection

**Transit Gateway Route Tables**

**Routes:**  
 VPC CIDR via Local  
 0/0 via Core Network ARN

**Core Network Attachment Tag:**  
 Key: domain  
 Value: Prod

**Global Network**

**Core Network**

- Prod Segment
- Shared Inspection Segment
- Hybrid Segment

CNE 1, CNE 2

**Core Network Attachment Tag:**  
 Key: domain  
 Value: Prod

**Core Network Attachment Tag:**  
 Key: Env  
 Value: Shared Inspection

**Prod Segment Route Table**

**Routes:**  
 Prod VPC CIDRs via Prod VPCs Attachments  
 Inspection VPC CIDRs via Inspection VPCs Attachments  
 0/0 via Inspection VPCs Attachments (Static)

**Inspection Segment Route Table**

**Routes:**  
 Inspection VPC CIDRs via Inspection VPCs Attachment  
 Prod VPC CIDRs via Prod VPCs Attachments  
 On-premises CIDRs via Transit Gateway Attachments

**Hybrid Segment Route Table**

**Routes:**  
 Prod VPC CIDRs via Prod VPCs Attachments  
 Inspection VPC CIDRs via Inspection VPCs Attachments  
 0/0 via Inspection VPCs Attachments (Static)

**Data Center 1**  
 192.168.1.0/24

**AWS Direct Connect Location 1**

CX router, Direct Connect router

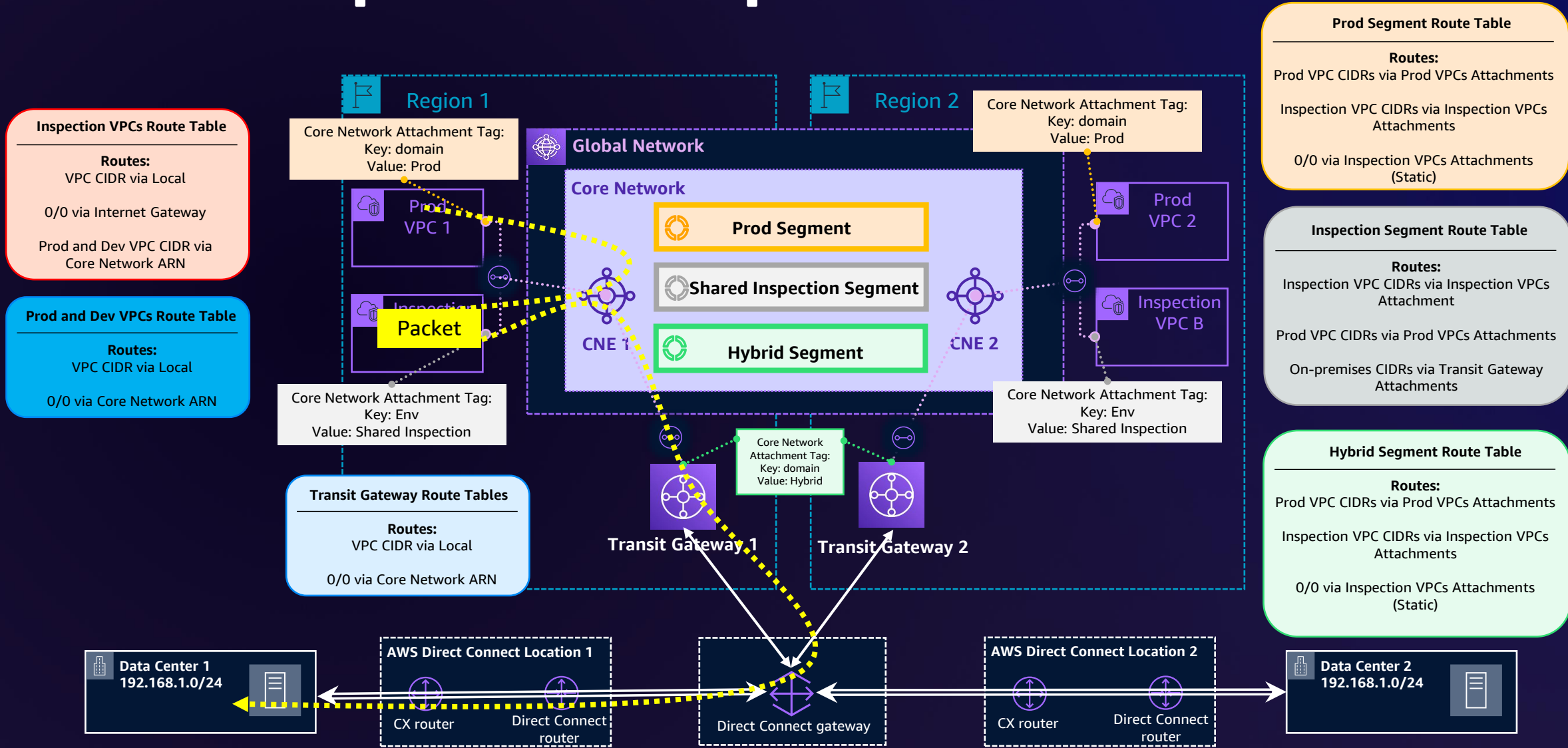
**Direct Connect gateway**

**AWS Direct Connect Location 2**

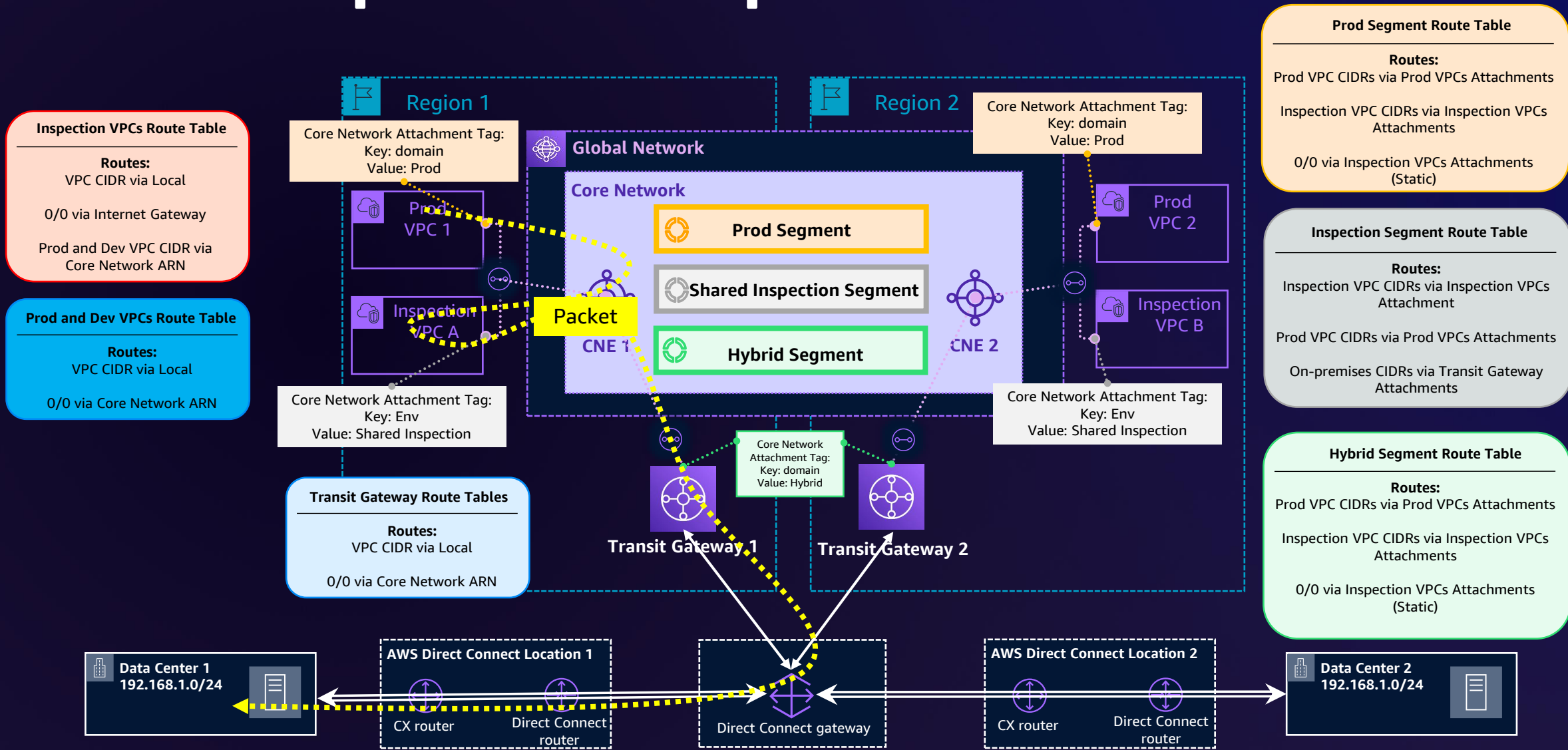
CX router, Direct Connect router

**Data Center 2**  
 192.168.1.0/24

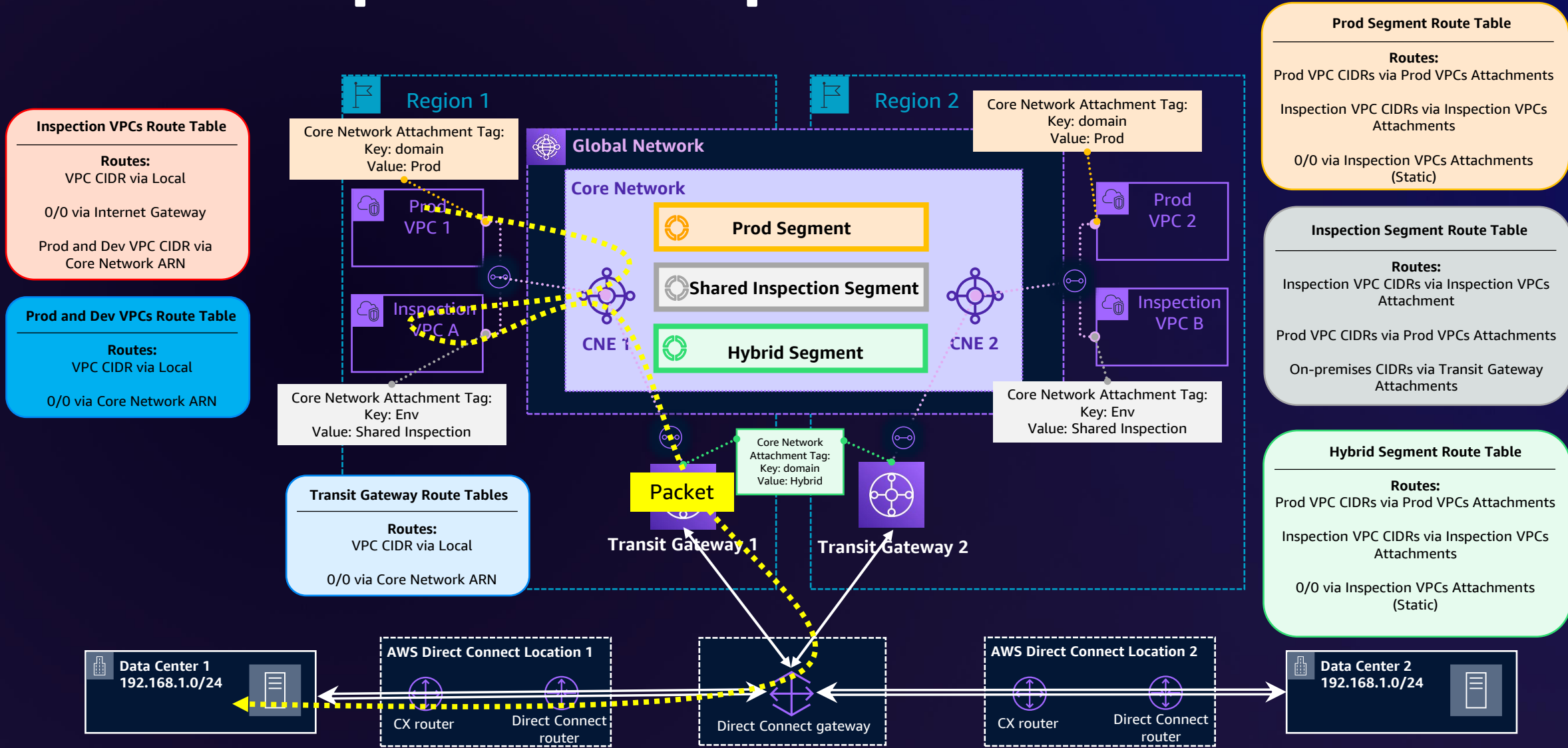
# VPC-to-on-premises inspection architecture



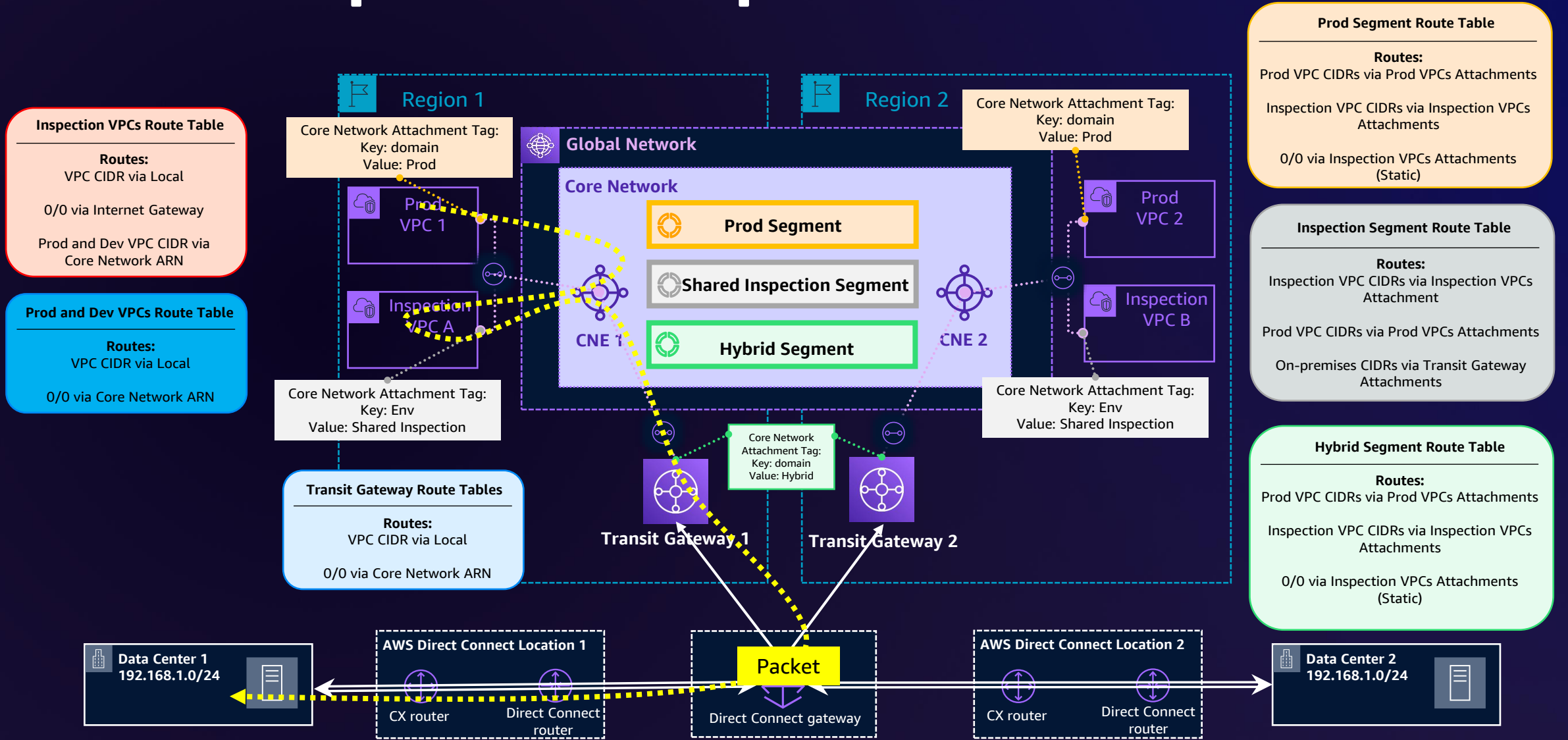
# VPC-to-on-premises inspection architecture



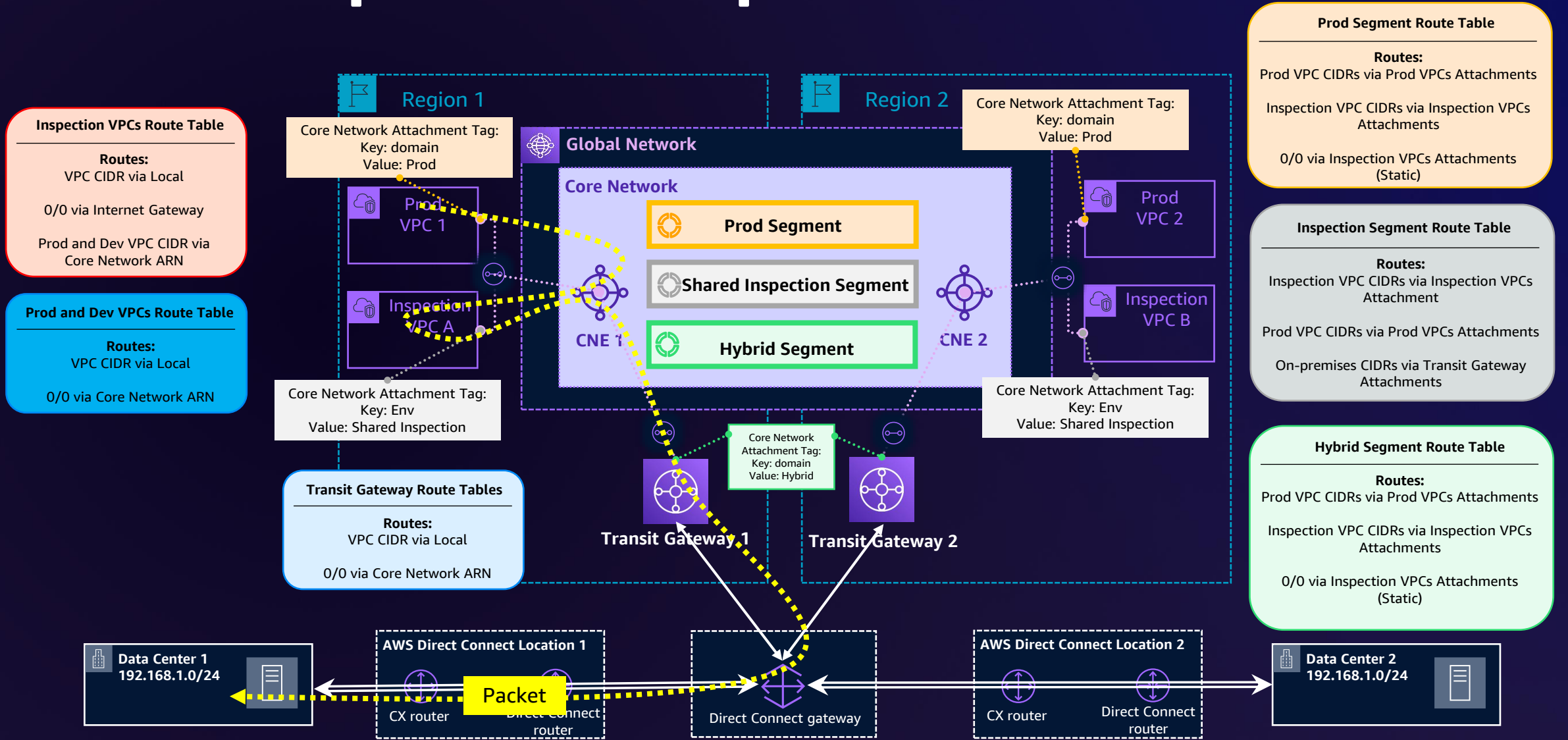
# VPC-to-on-premises inspection architecture



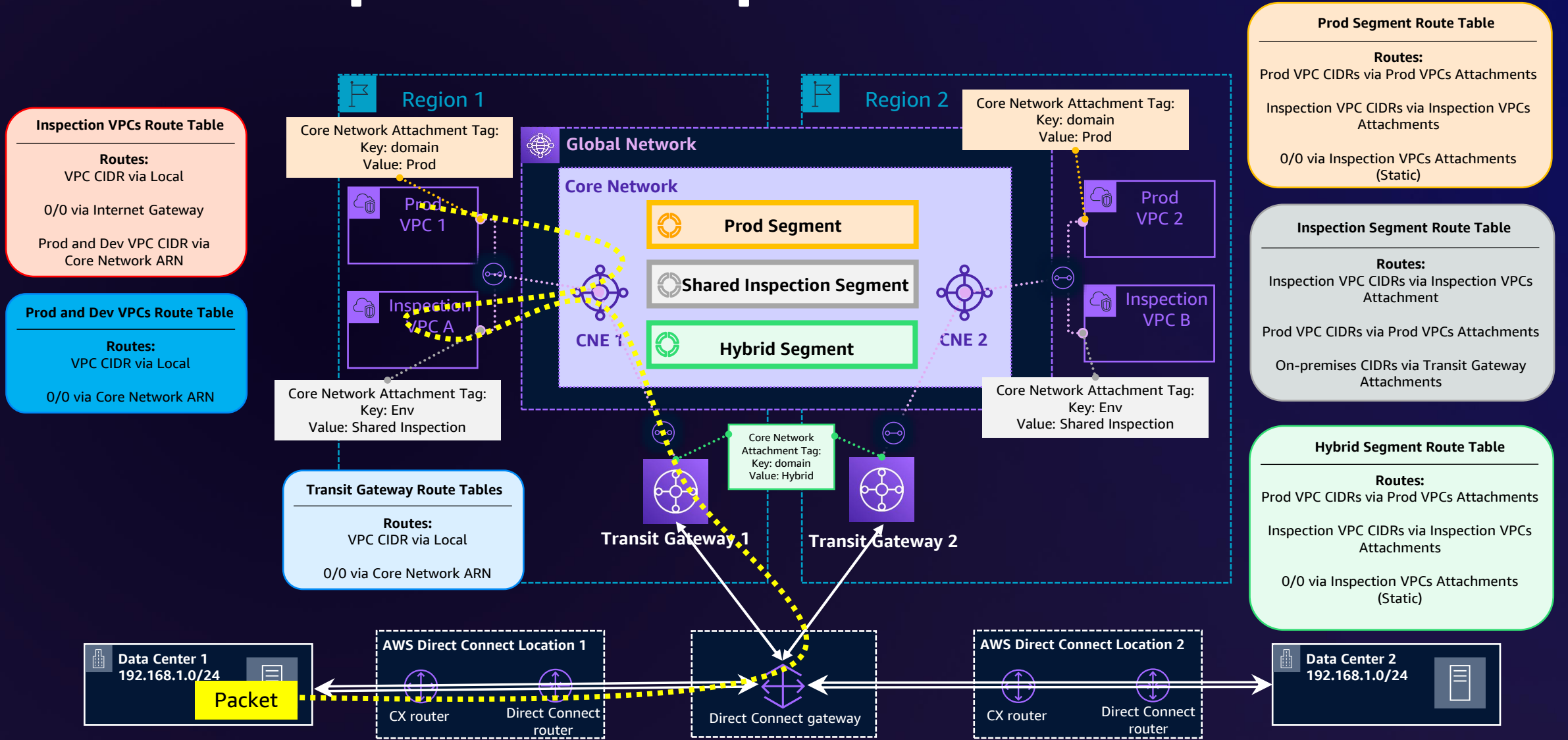
# VPC-to-on-premises inspection architecture



# VPC-to-on-premises inspection architecture



# VPC-to-on-premises inspection architecture



# Thank you!

**Mehar Swarup**

[linkedin.com/in/mehar-swarup/](https://www.linkedin.com/in/mehar-swarup/)

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Please complete  
the session survey  
in the mobile app

# Appendix

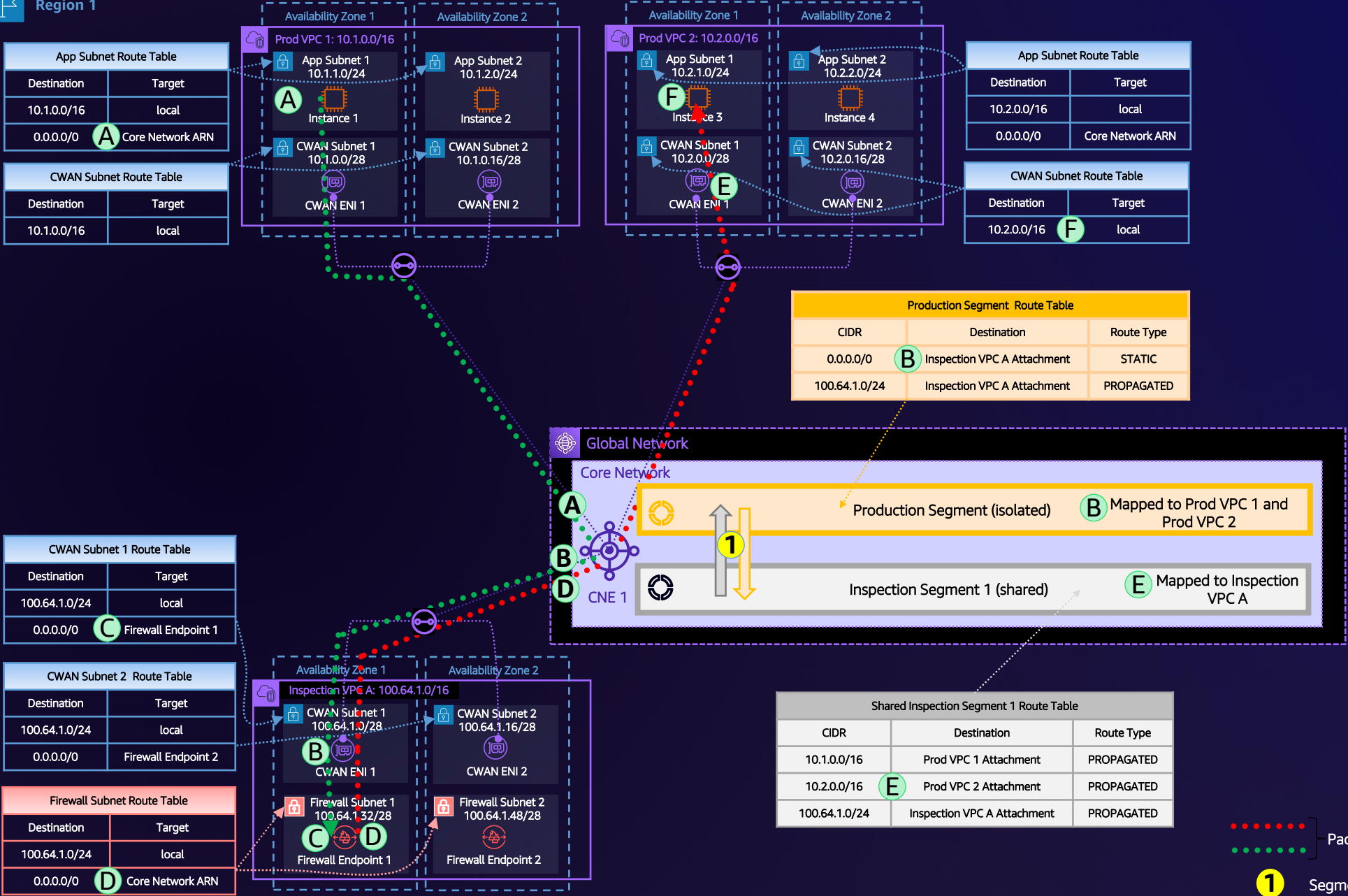


# Inspection architectures

# East-west scenario



Region 1



**App Subnet Route Table**

Destination	Target
10.1.0.0/16	local
0.0.0.0/0	<b>A</b> Core Network ARN

**CWAN Subnet Route Table**

Destination	Target
10.1.0.0/16	local

**CWAN Subnet 1 Route Table**

Destination	Target
100.64.1.0/24	local
0.0.0.0/0	<b>C</b> Firewall Endpoint 1

**CWAN Subnet 2 Route Table**

Destination	Target
100.64.1.0/24	local
0.0.0.0/0	Firewall Endpoint 2

**Firewall Subnet Route Table**

Destination	Target
100.64.1.0/24	local
0.0.0.0/0	<b>D</b> Core Network ARN

**Production Segment Route Table**

CIDR	Destination	Route Type
0.0.0.0/0	<b>B</b> Inspection VPC A Attachment	STATIC
100.64.1.0/24	Inspection VPC A Attachment	PROPAGATED

**App Subnet Route Table**

Destination	Target
10.2.0.0/16	local
0.0.0.0/0	Core Network ARN

**CWAN Subnet Route Table**

Destination	Target
10.2.0.0/16	<b>F</b> local

**Shared Inspection Segment 1 Route Table**

CIDR	Destination	Route Type
10.1.0.0/16	Prod VPC 1 Attachment	PROPAGATED
10.2.0.0/16	<b>E</b> Prod VPC 2 Attachment	PROPAGATED
100.64.1.0/24	Inspection VPC A Attachment	PROPAGATED

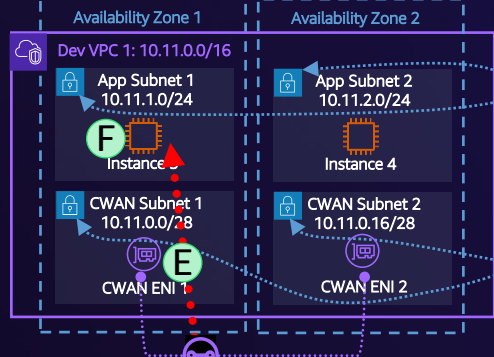
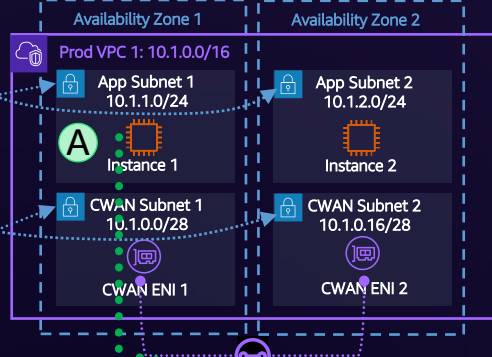
- Packet Flow
- Segment Sharing
- CNE - VPC Attachment



Region 1

App Subnet Route Table	
Destination	Target
10.1.0.0/16	local
0.0.0.0/0	<b>A</b> Core Network ARN

CWAN Subnet Route Table	
Destination	Target
10.1.0.0/16	local



App Subnet Route Table	
Destination	Target
10.11.0.0/16	local
0.0.0.0/0	Core Network ARN

CWAN Subnet Route Table	
Destination	Target
10.11.0.0/16	<b>F</b> local

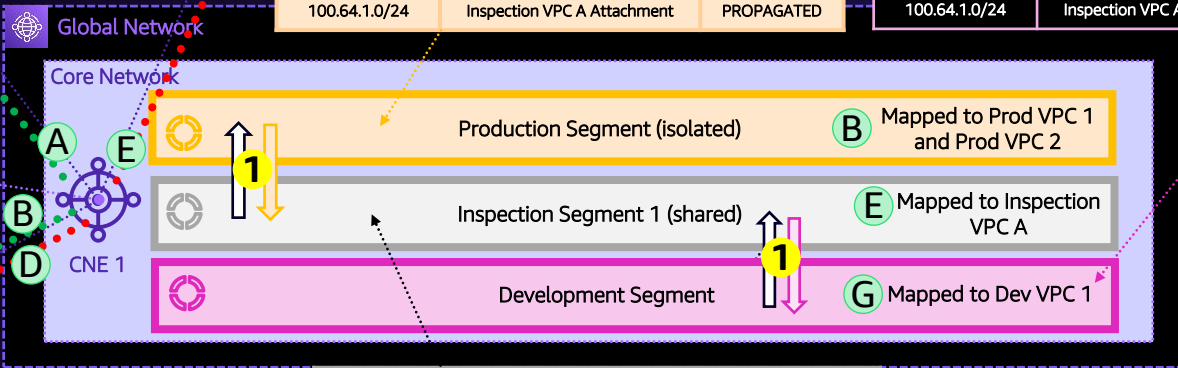
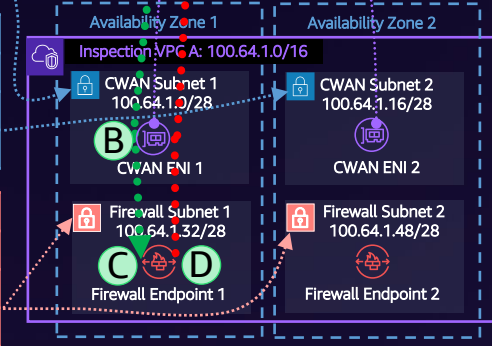
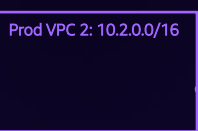
Production Segment Route Table		
CIDR	Destination	Route Type
0.0.0.0/0	<b>B</b> Inspection VPC A Attachment	STATIC
100.64.1.0/24	Inspection VPC A Attachment	PROPAGATED

Development Segment Route Table		
CIDR	Destination	Route Type
0.0.0.0/0	<b>G</b> Inspection VPC A Attachment	STATIC
100.64.1.0/24	Inspection VPC A Attachment	PROPAGATED

CWAN Subnet 1 Route Table	
Destination	Target
100.64.1.0/24	local
0.0.0.0/0	<b>C</b> Firewall Endpoint 1

CWAN Subnet 2 Route Table	
Destination	Target
100.64.1.0/24	local
0.0.0.0/0	Firewall Endpoint 2

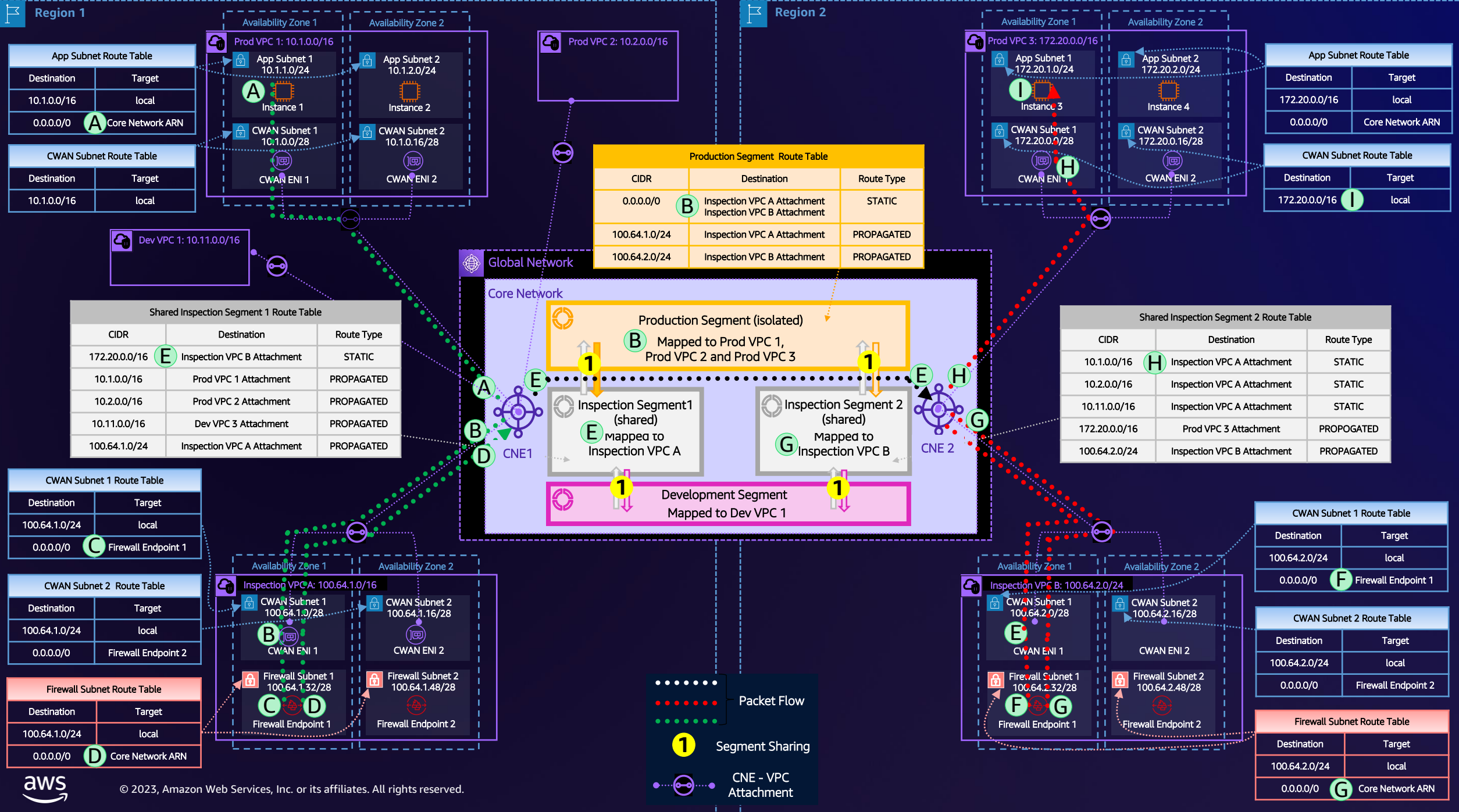
Firewall Subnet Route Table	
Destination	Target
100.64.1.0/24	local
0.0.0.0/0	<b>D</b> Core Network ARN



Shared Inspection Segment 1 Route Table		
CIDR	Destination	Route Type
10.1.0.0/16	Prod VPC 1 Attachment	PROPAGATED
10.2.0.0/16	Prod VPC 2 Attachment	PROPAGATED
10.11.0.0/16	<b>E</b> Dev VPC 1 Attachment	PROPAGATED
100.64.1.0/24	Inspection VPC A Attachment	PROPAGATED

- Packet Flow
- Segment Sharing
- CNE - VPC Attachment





**Region 1**

**App Subnet Route Table**

Destination	Target
10.1.0.0/16	local
0.0.0.0/0	A Core Network ARN

**CWAN Subnet Route Table**

Destination	Target
10.1.0.0/16	local

**Dev VPC 1: 10.11.0.0/16**

**Shared Inspection Segment 1 Route Table**

CIDR	Destination	Route Type
172.20.0.0/16	E Inspection VPC B Attachment	STATIC
10.1.0.0/16	Prod VPC 1 Attachment	PROPAGATED
10.2.0.0/16	Prod VPC 2 Attachment	PROPAGATED
10.11.0.0/16	Dev VPC 3 Attachment	PROPAGATED
100.64.1.0/24	Inspection VPC A Attachment	PROPAGATED

**CWAN Subnet 1 Route Table**

Destination	Target
100.64.1.0/24	local
0.0.0.0/0	C Firewall Endpoint 1

**CWAN Subnet 2 Route Table**

Destination	Target
100.64.1.0/24	local
0.0.0.0/0	Firewall Endpoint 2

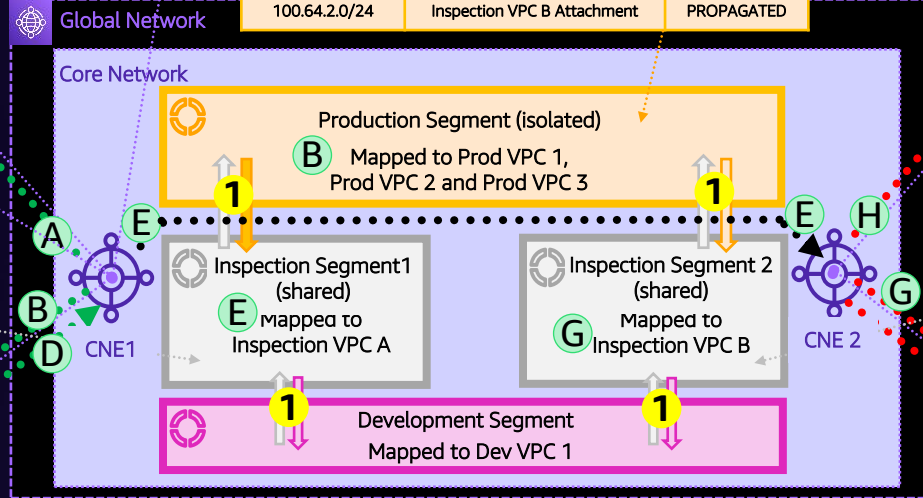
**Firewall Subnet Route Table**

Destination	Target
100.64.1.0/24	local
0.0.0.0/0	D Core Network ARN

**Prod VPC 2: 10.2.0.0/16**

**Production Segment Route Table**

CIDR	Destination	Route Type
0.0.0.0/0	B Inspection VPC A Attachment Inspection VPC B Attachment	STATIC
100.64.1.0/24	Inspection VPC A Attachment	PROPAGATED
100.64.2.0/24	Inspection VPC B Attachment	PROPAGATED



**Region 2**

**App Subnet Route Table**

Destination	Target
172.20.0.0/16	local
0.0.0.0/0	I Core Network ARN

**CWAN Subnet Route Table**

Destination	Target
172.20.0.0/16	local

**Shared Inspection Segment 2 Route Table**

CIDR	Destination	Route Type
10.1.0.0/16	H Inspection VPC A Attachment	STATIC
10.2.0.0/16	Inspection VPC A Attachment	STATIC
10.11.0.0/16	Inspection VPC A Attachment	STATIC
172.20.0.0/16	Prod VPC 3 Attachment	PROPAGATED
100.64.2.0/24	Inspection VPC B Attachment	PROPAGATED

**CWAN Subnet 1 Route Table**

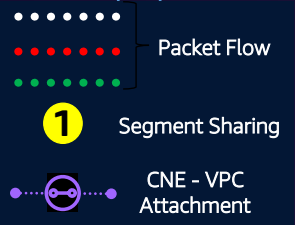
Destination	Target
100.64.2.0/24	local
0.0.0.0/0	F Firewall Endpoint 1

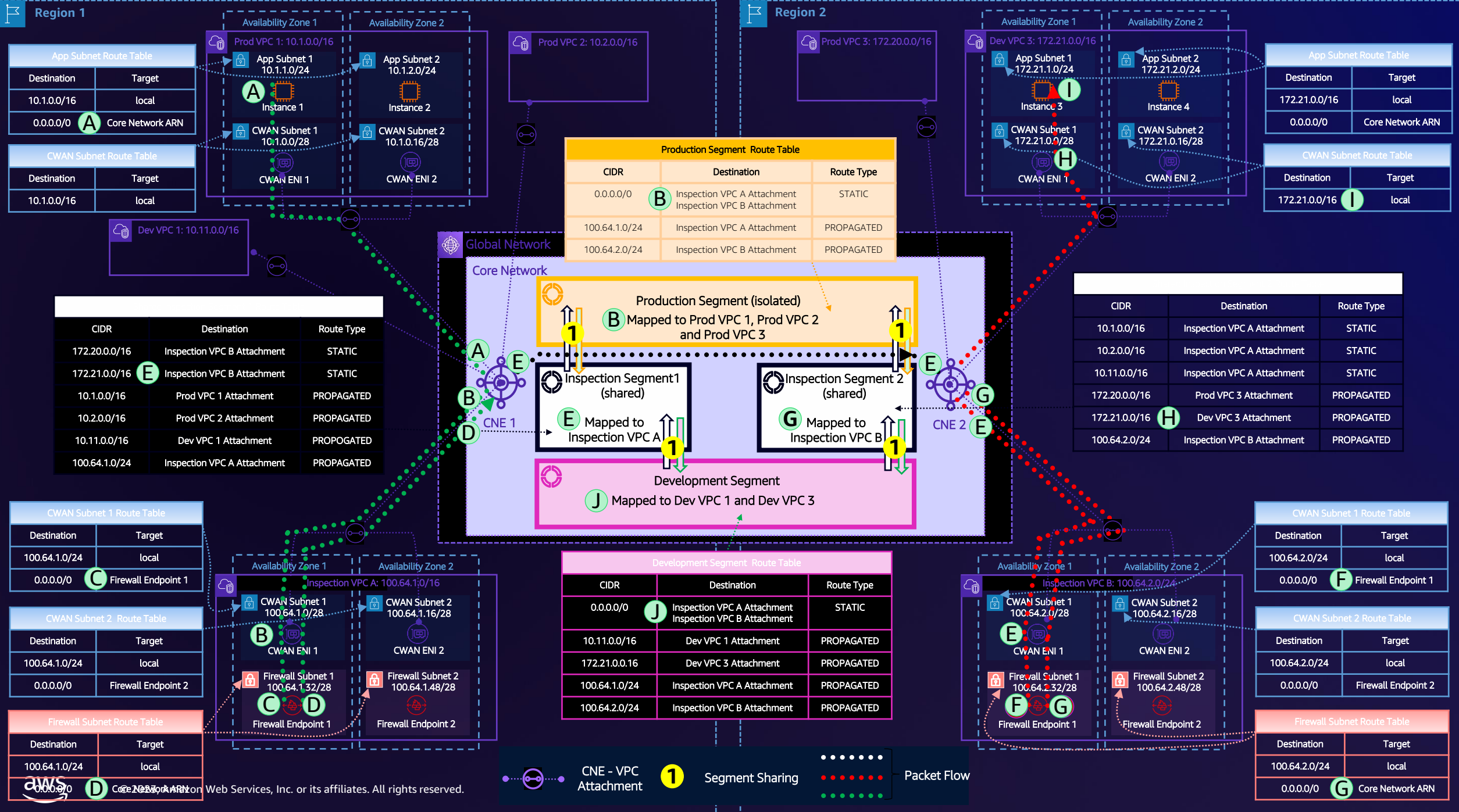
**CWAN Subnet 2 Route Table**

Destination	Target
100.64.2.0/24	local
0.0.0.0/0	Firewall Endpoint 2

**Firewall Subnet Route Table**

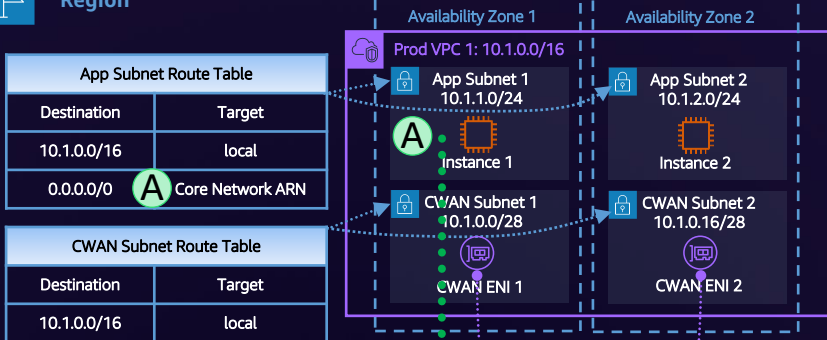
Destination	Target
100.64.2.0/24	local
0.0.0.0/0	G Core Network ARN





# Hybrid scenario



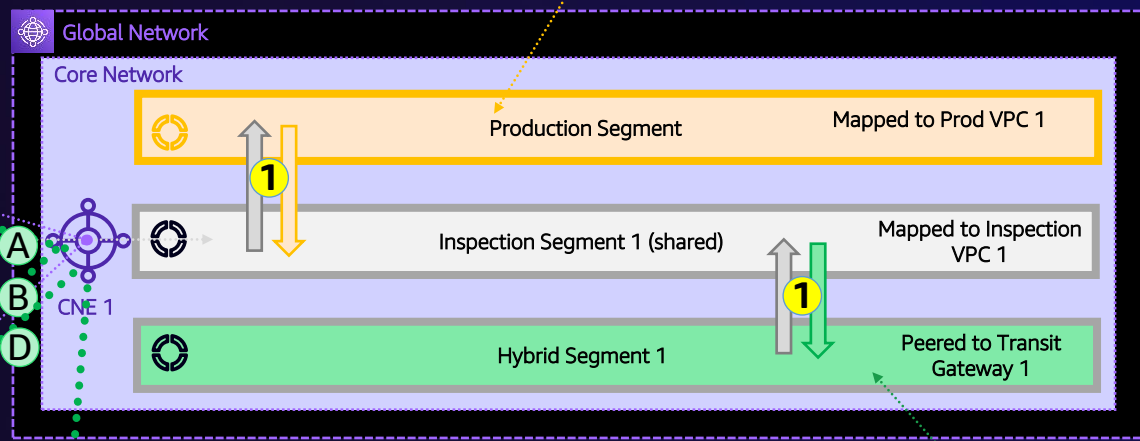


Destination	Target
10.1.0.0/16	local
0.0.0.0/0	<b>A</b> Core Network ARN

Destination	Target
10.1.0.0/16	local

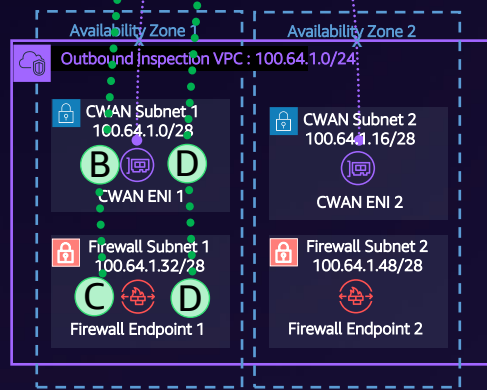
CIDR	Destination	Route Type
0.0.0.0/0	<b>B</b> Inspection VPC 1 Attachment	STATIC
10.1.0.0/16	Prod VPC 1 Attachment	PROPAGATED
100.64.1.0/24	Inspection VPC 1 Attachment	PROPAGATED

CIDR	Destination	Route Type
192.168.1.0/24	<b>E</b> Transit Gateway 1 Attachment	PROPAGATED
10.1.0.0/16	Prod VPC 1 Attachment	PROPAGATED
100.64.1.0/24	Inspection VPC 1 Attachment	PROPAGATED



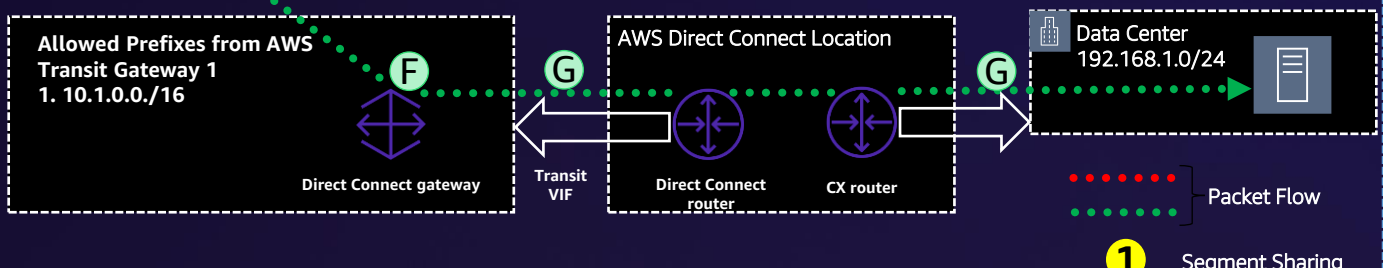
Destination	Target
100.2.0.0/16	local
0.0.0.0/0	<b>C</b> Firewall Endpoint 1

Destination	Target
10.2.0.0/16	local
10.1.0.0/16	<b>D</b> Core Network ARN



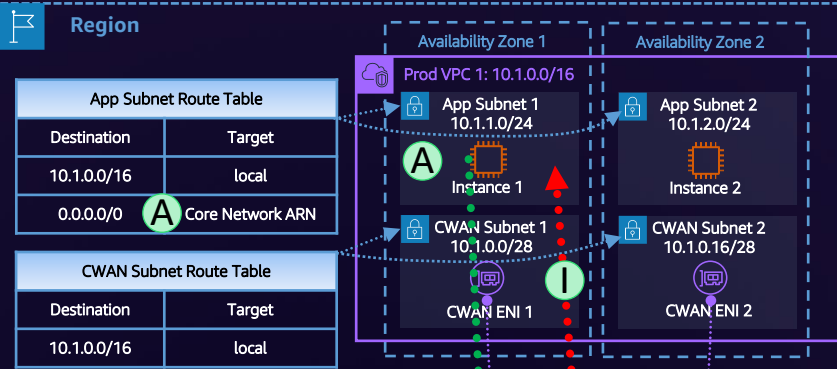
Destination	Destination	Route Type
192.168.1.0/24	<b>F</b> DX Gateway Attachment	Direct Connect Gateway
10.1.0.0/16	Core Network Attachment	Peering
100.64.1.0/24	Core Network Attachment	Peering

Destination	Destination	Route Type
10.1.0.0/16	Inspection VPC 1 Attachment	STATIC
100.64.1.0/24	Inspection VPC 1 Attachment	PROPAGATED
192.168.1.0/24	Transit Gateway 1 Attachment	PROPAGATED



- Packet Flow
- Packet Flow
- Segment Sharing
- CNE - VPC Attachment

# Egress scenario



**App Subnet Route Table**

Destination	Target
10.1.0.0/16	local
0.0.0.0/0	<b>A</b> Core Network ARN

**CWAN Subnet Route Table**

Destination	Target
10.1.0.0/16	local

**Production Segment Route Table**

CIDR	Destination	Route Type
10.1.0.0/16	Prod VPC 1 Attachment	PROPAGATED
10.2.0.0/16	Outbound Inspection VPC Attachment	PROPAGATED
0.0.0.0/0	<b>B</b> Outbound Inspection VPC A Attachment	STATIC

**CWAN Subnet 1 Route Table**

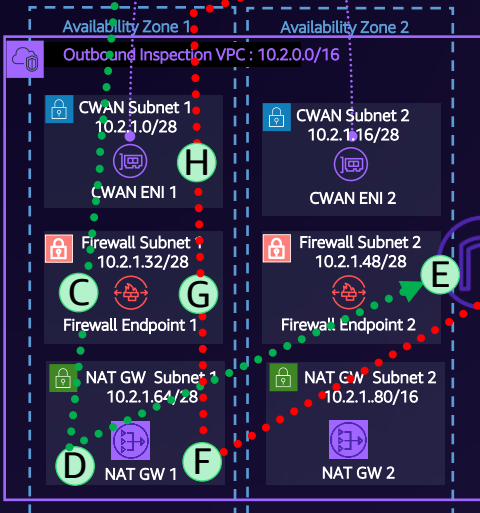
Destination	Target
100.2.0.0/16	local
0.0.0.0/0	<b>C</b> Firewall Endpoint 1

**Firewall Subnet Route Table**

Destination	Target
10.2.0.0/16	local
10.1.0.0/16	<b>G</b> Core Network ARN
0.0.0.0/0	<b>D</b> NAT GW 1

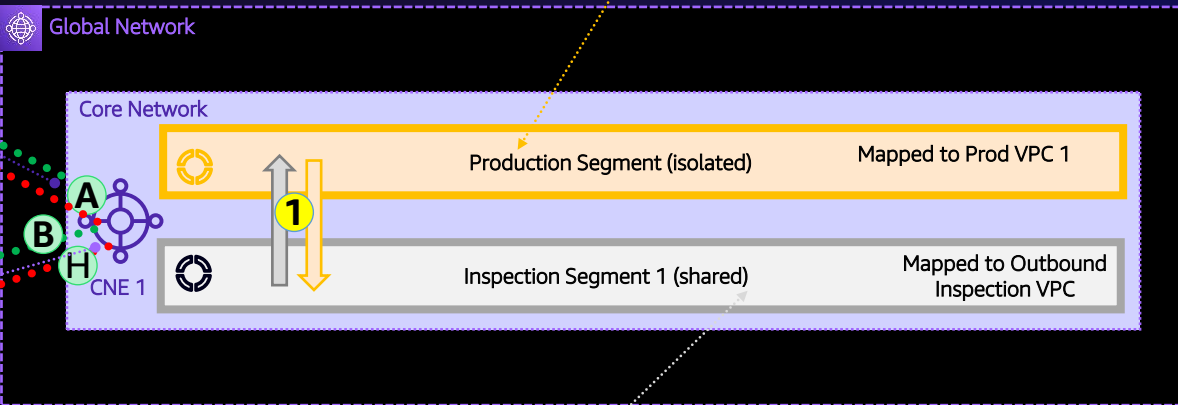
**NAT GW Subnet Route Table**

Destination	Target
10.2.0.0/16	local
10.1.0.0/16	<b>F</b> Firewall Endpoint 1
0.0.0.0/0	<b>E</b> IGW



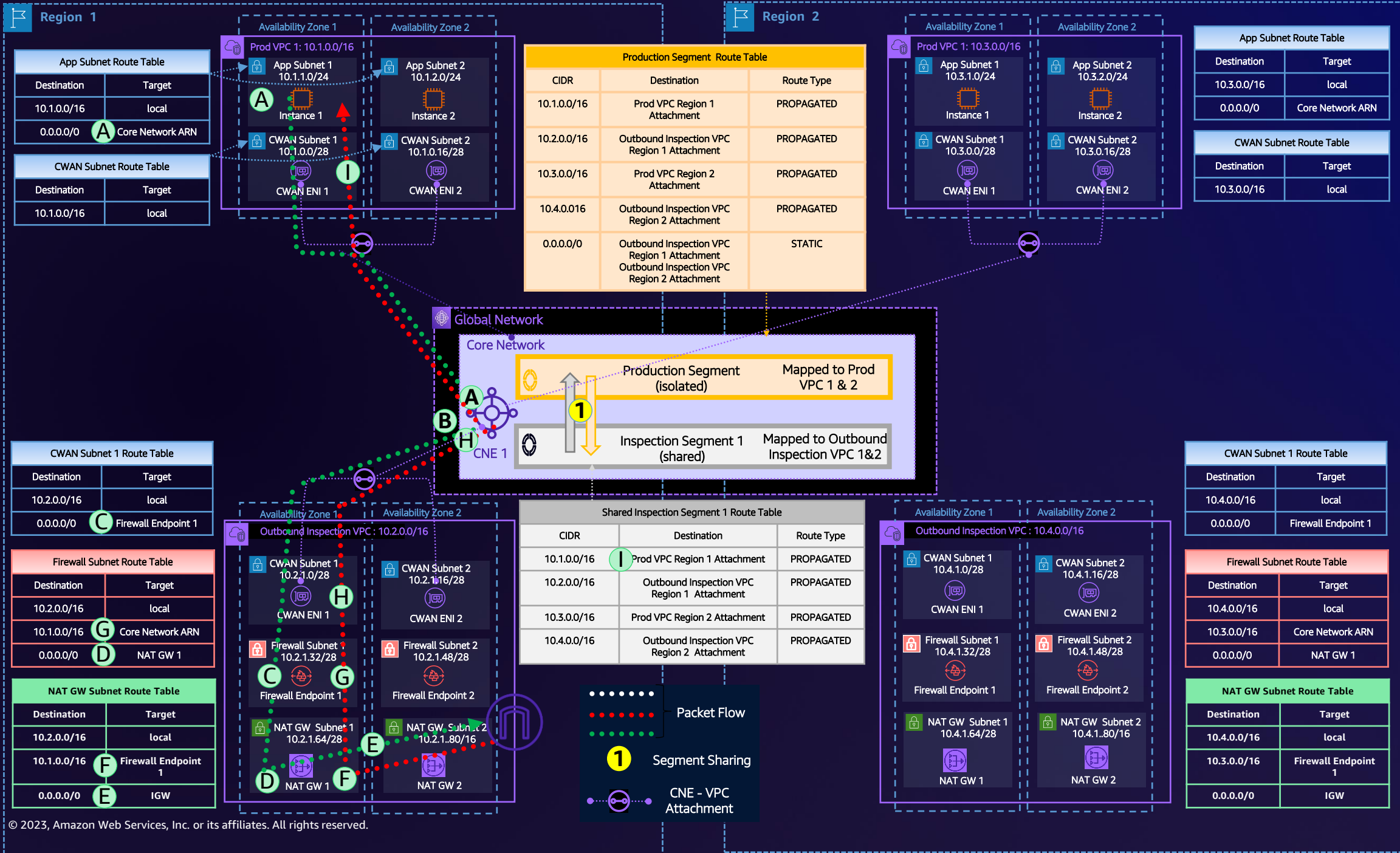
**Shared Inspection Segment 1 Route Table**

CIDR	Destination	Route Type
10.1.0.0/16	<b>I</b> Prod VPC 1 Attachment	PROPAGATED
10.2.0.0/16	Outbound Inspection VPC Attachment	PROPAGATED



- Packet Flow
- Segment Sharing
- CNE - VPC Attachment



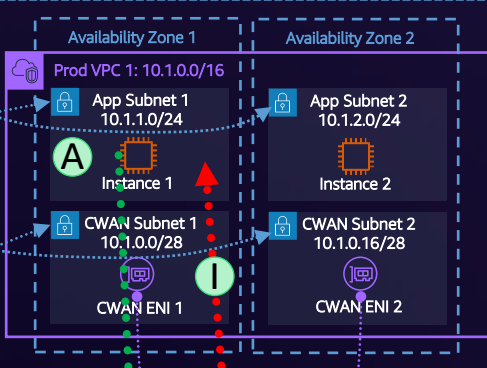


**Region 1**

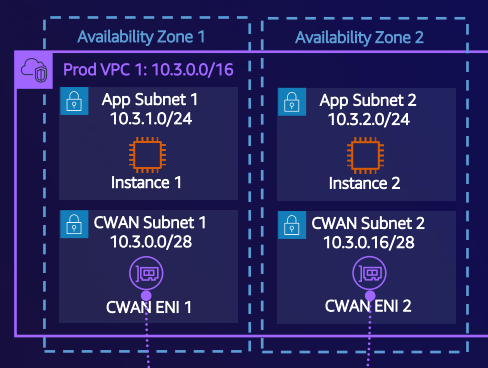
App Subnet Route Table	
Destination	Target
10.1.0.0/16	local
0.0.0.0/0	Core Network ARN

CWAN Subnet Route Table	
Destination	Target
10.1.0.0/16	local



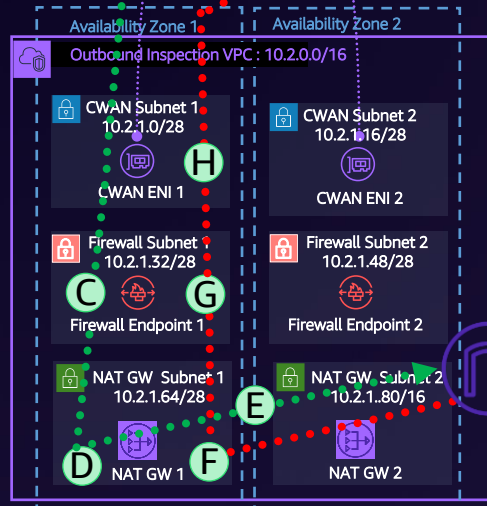
Production Segment Route Table		
CIDR	Destination	Route Type
10.1.0.0/16	Prod VPC Region 1 Attachment	PROPAGATED
10.2.0.0/16	Outbound Inspection VPC Region 1 Attachment	PROPAGATED
10.3.0.0/16	Prod VPC Region 2 Attachment	PROPAGATED
10.4.0.0/16	Outbound Inspection VPC Region 2 Attachment	PROPAGATED
0.0.0.0/0	Outbound Inspection VPC Region 1 Attachment Outbound Inspection VPC Region 2 Attachment	STATIC



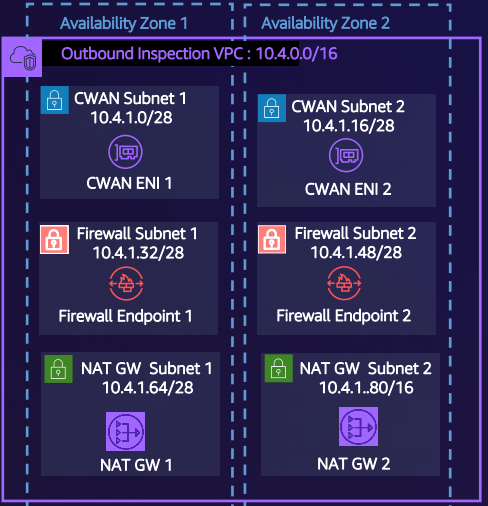
App Subnet Route Table	
Destination	Target
10.3.0.0/16	local
0.0.0.0/0	Core Network ARN

CWAN Subnet Route Table	
Destination	Target
10.3.0.0/16	local

CWAN Subnet 1 Route Table	
Destination	Target
10.2.0.0/16	local
0.0.0.0/0	Firewall Endpoint 1



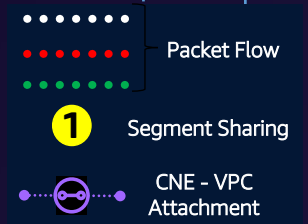
Shared Inspection Segment 1 Route Table		
CIDR	Destination	Route Type
10.1.0.0/16	Prod VPC Region 1 Attachment	PROPAGATED
10.2.0.0/16	Outbound Inspection VPC Region 1 Attachment	PROPAGATED
10.3.0.0/16	Prod VPC Region 2 Attachment	PROPAGATED
10.4.0.0/16	Outbound Inspection VPC Region 2 Attachment	PROPAGATED



CWAN Subnet 1 Route Table	
Destination	Target
10.4.0.0/16	local
0.0.0.0/0	Firewall Endpoint 1

Firewall Subnet Route Table	
Destination	Target
10.4.0.0/16	local
10.3.0.0/16	Core Network ARN
0.0.0.0/0	NAT GW 1

NAT GW Subnet Route Table	
Destination	Target
10.4.0.0/16	local
10.3.0.0/16	Firewall Endpoint 1
0.0.0.0/0	IGW

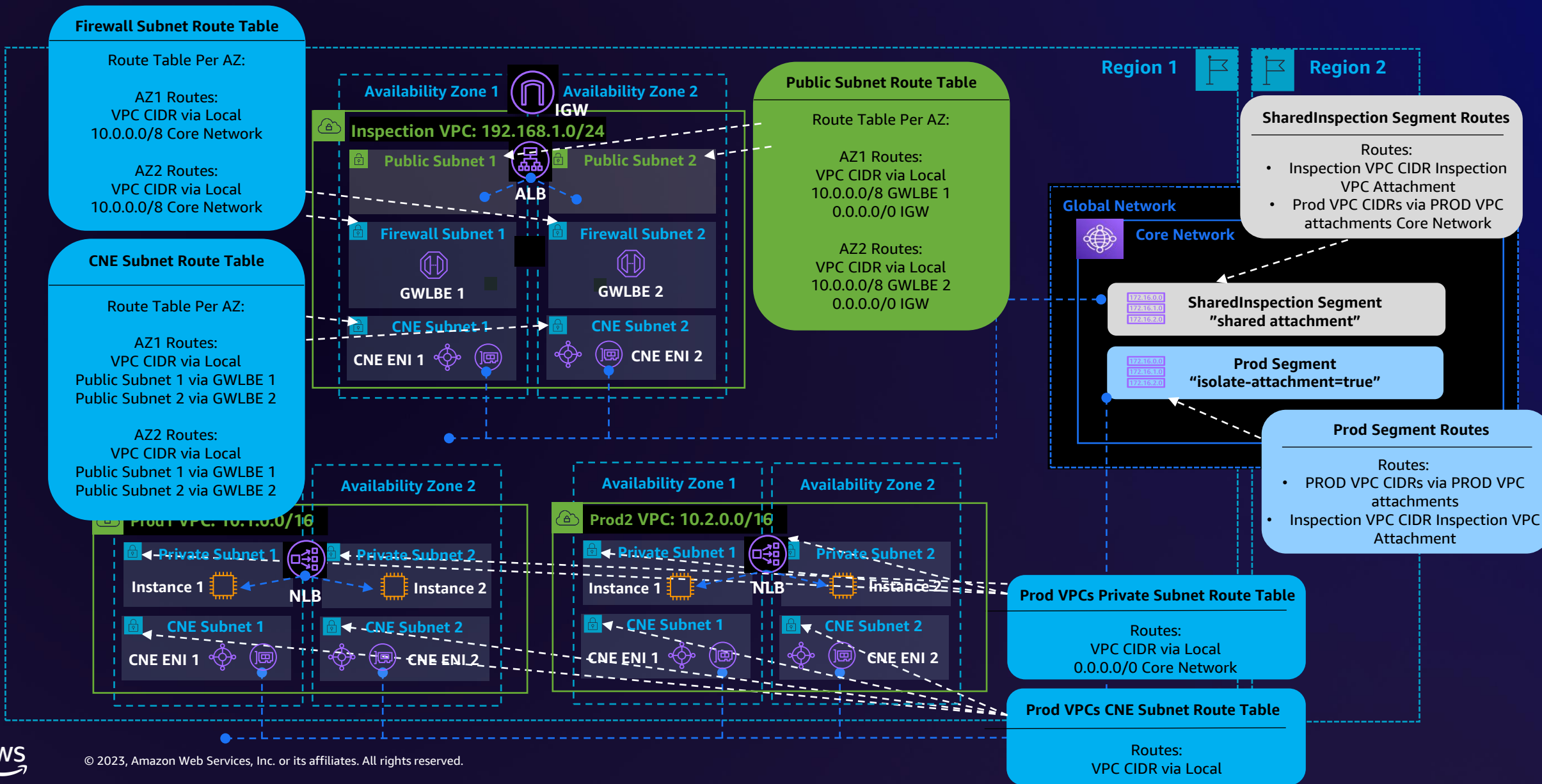


# Ingress scenario



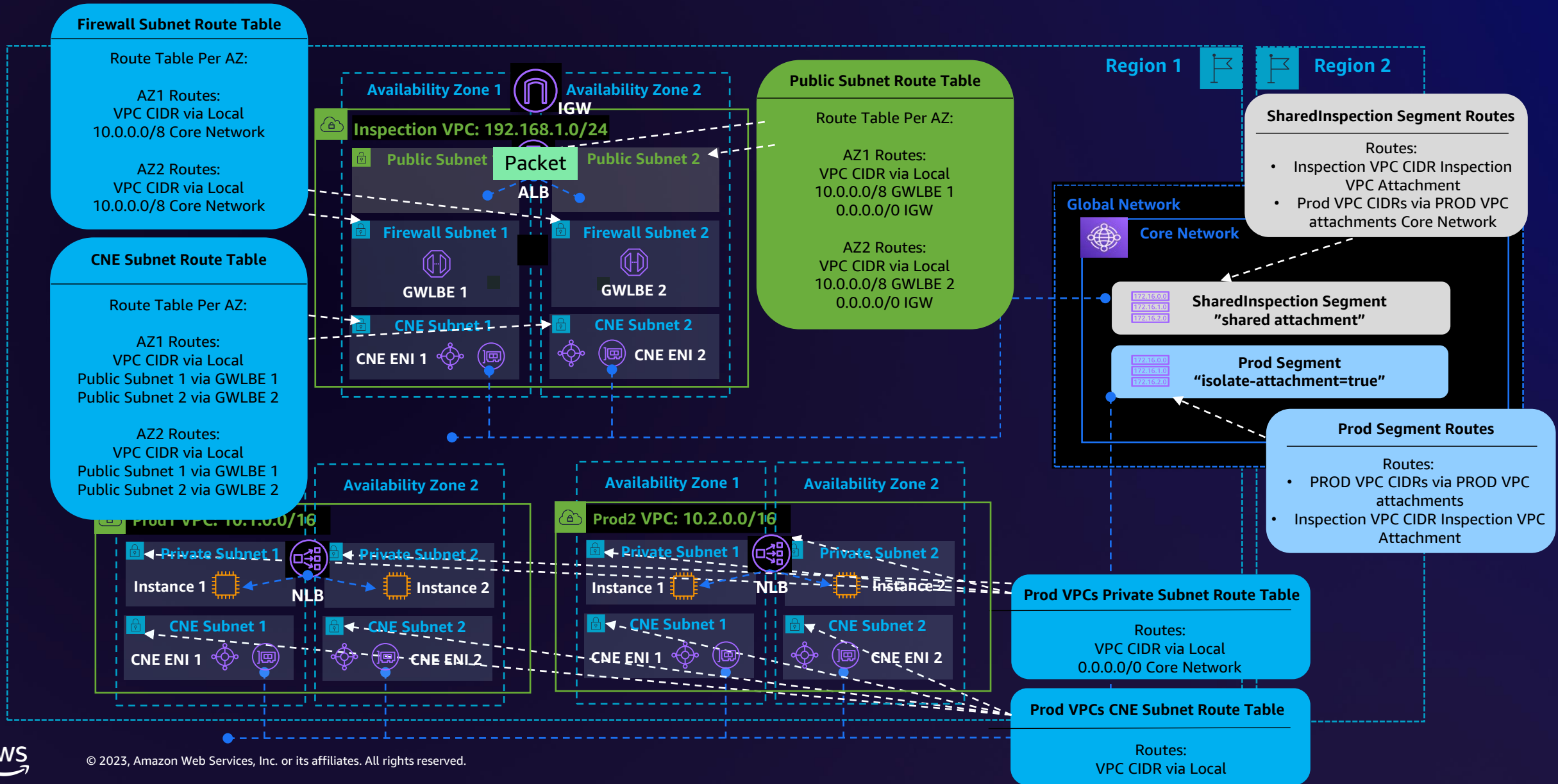
# Centralized

## MULTIPLE CLOUD WAN SEGMENTS WITH A SEPARATE SECURITY SEGMENT



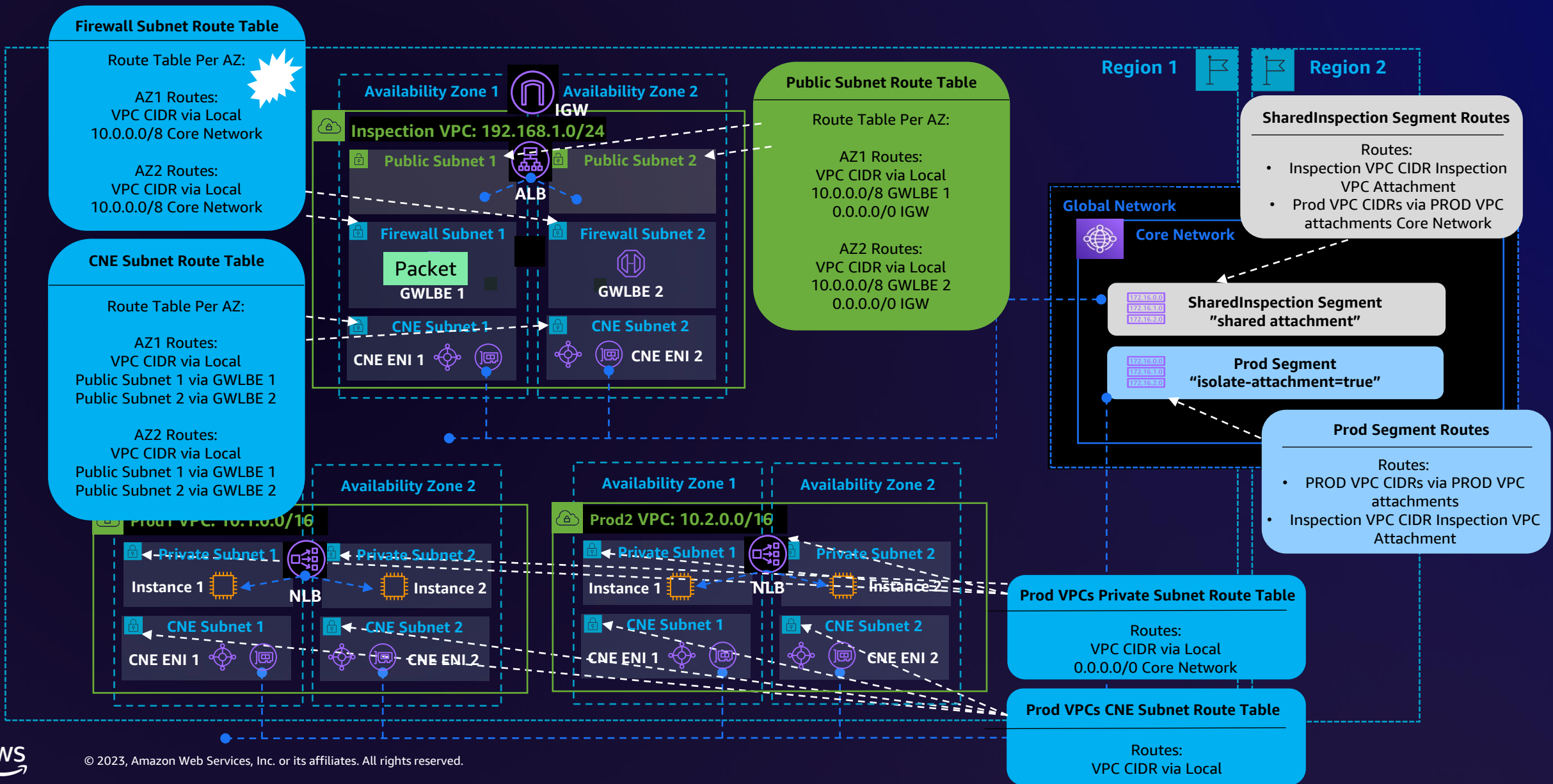
# Centralized

## MULTIPLE CLOUD WAN SEGMENTS WITH A SEPARATE SECURITY SEGMENT



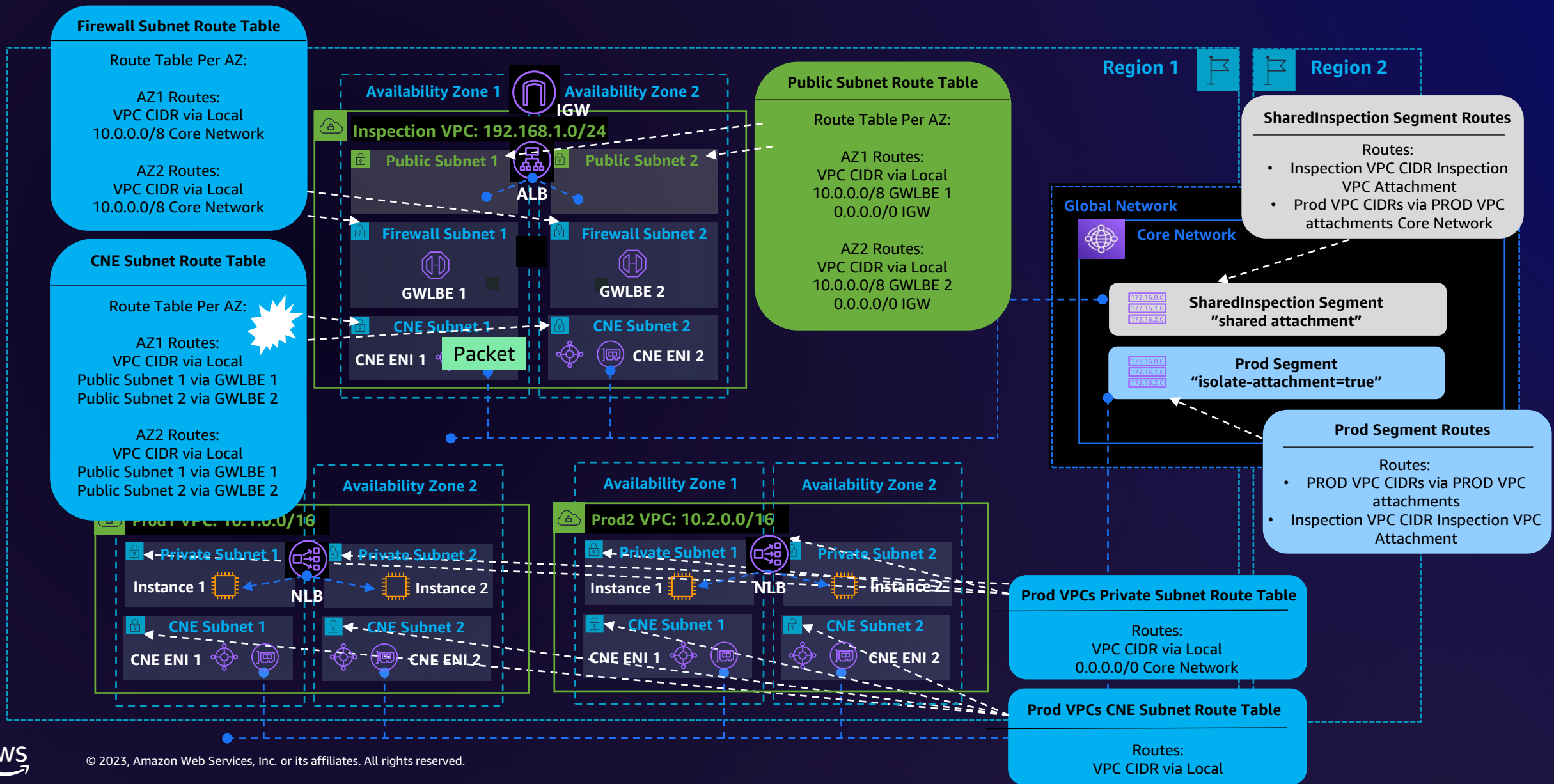
# Centralized

## MULTIPLE CLOUD WAN SEGMENTS WITH A SEPARATE SECURITY SEGMENT



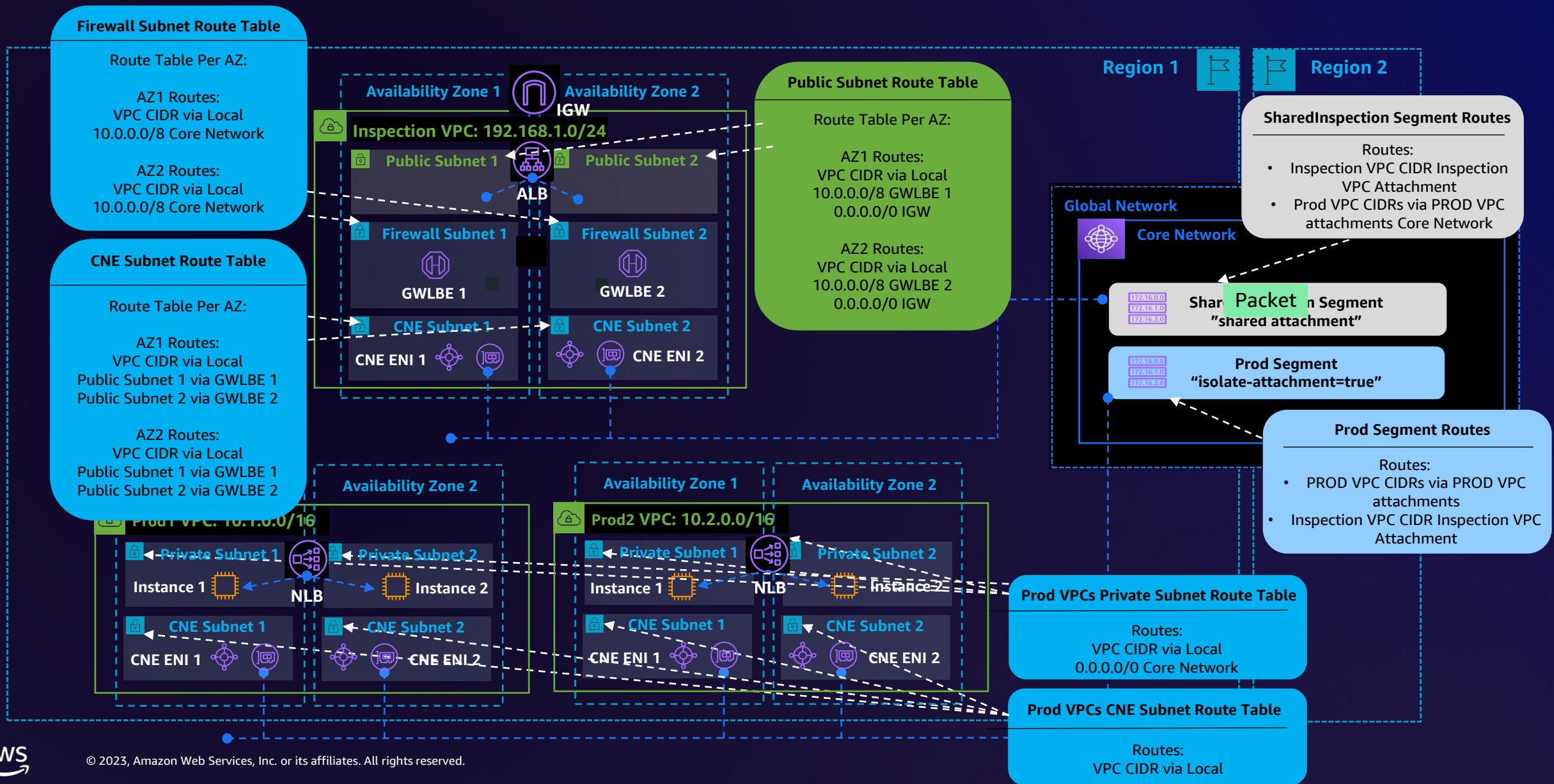
# Centralized

## MULTIPLE CLOUD WAN SEGMENTS WITH A SEPARATE SECURITY SEGMENT



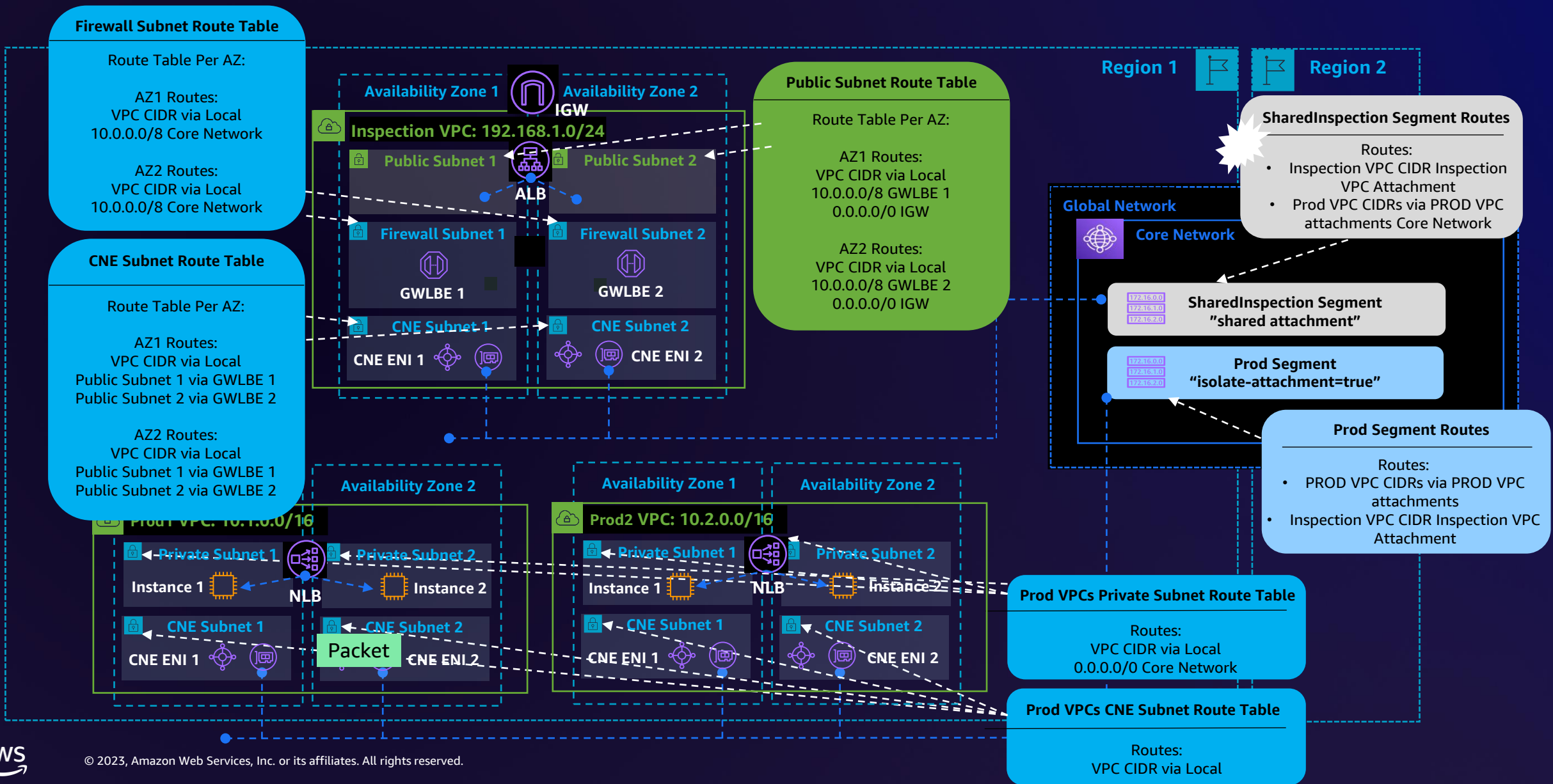
# Centralized

## MULTIPLE CLOUD WAN SEGMENTS WITH A SEPARATE SECURITY SEGMENT



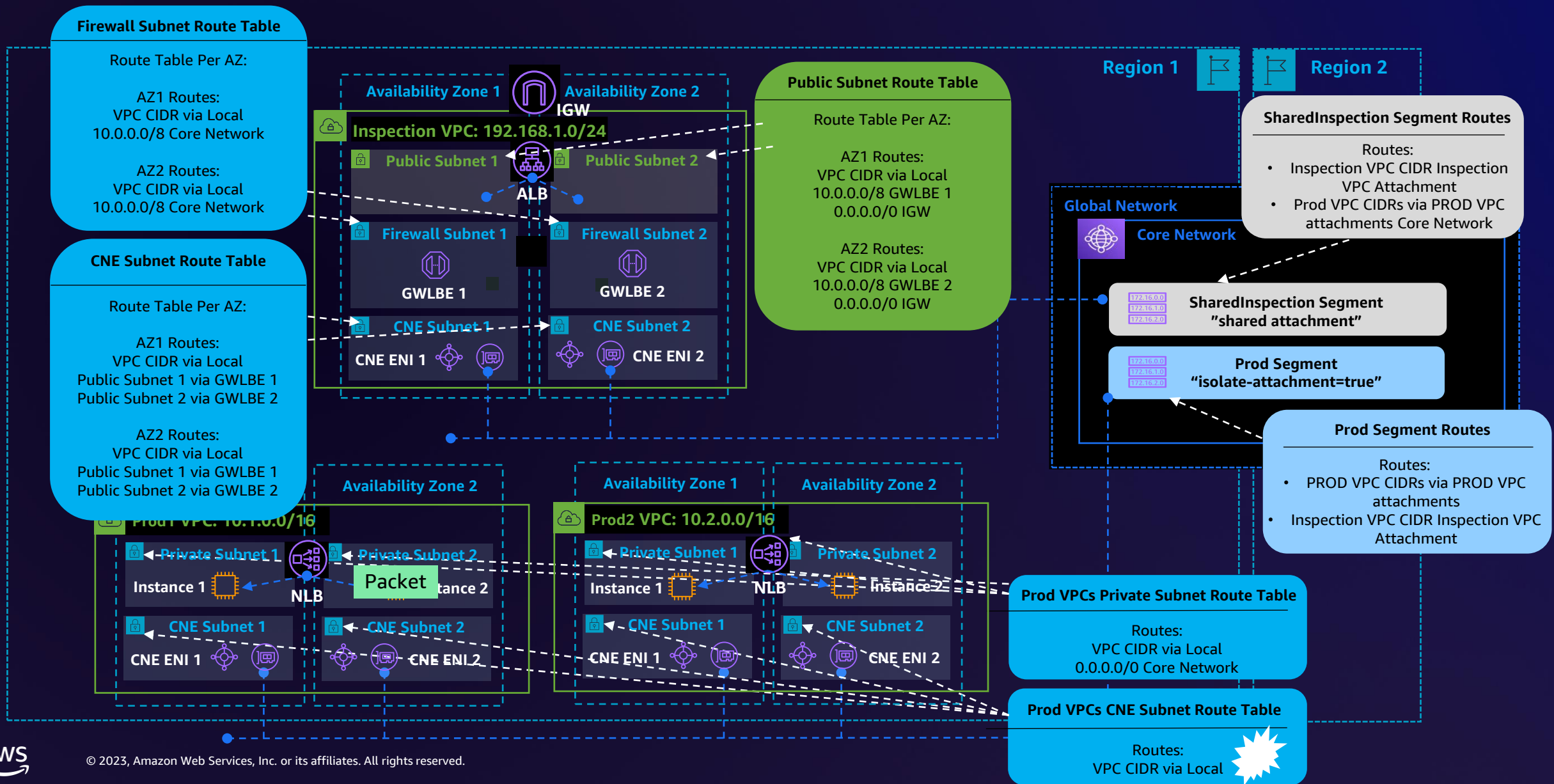
# Centralized

## MULTIPLE CLOUD WAN SEGMENTS WITH A SEPARATE SECURITY SEGMENT



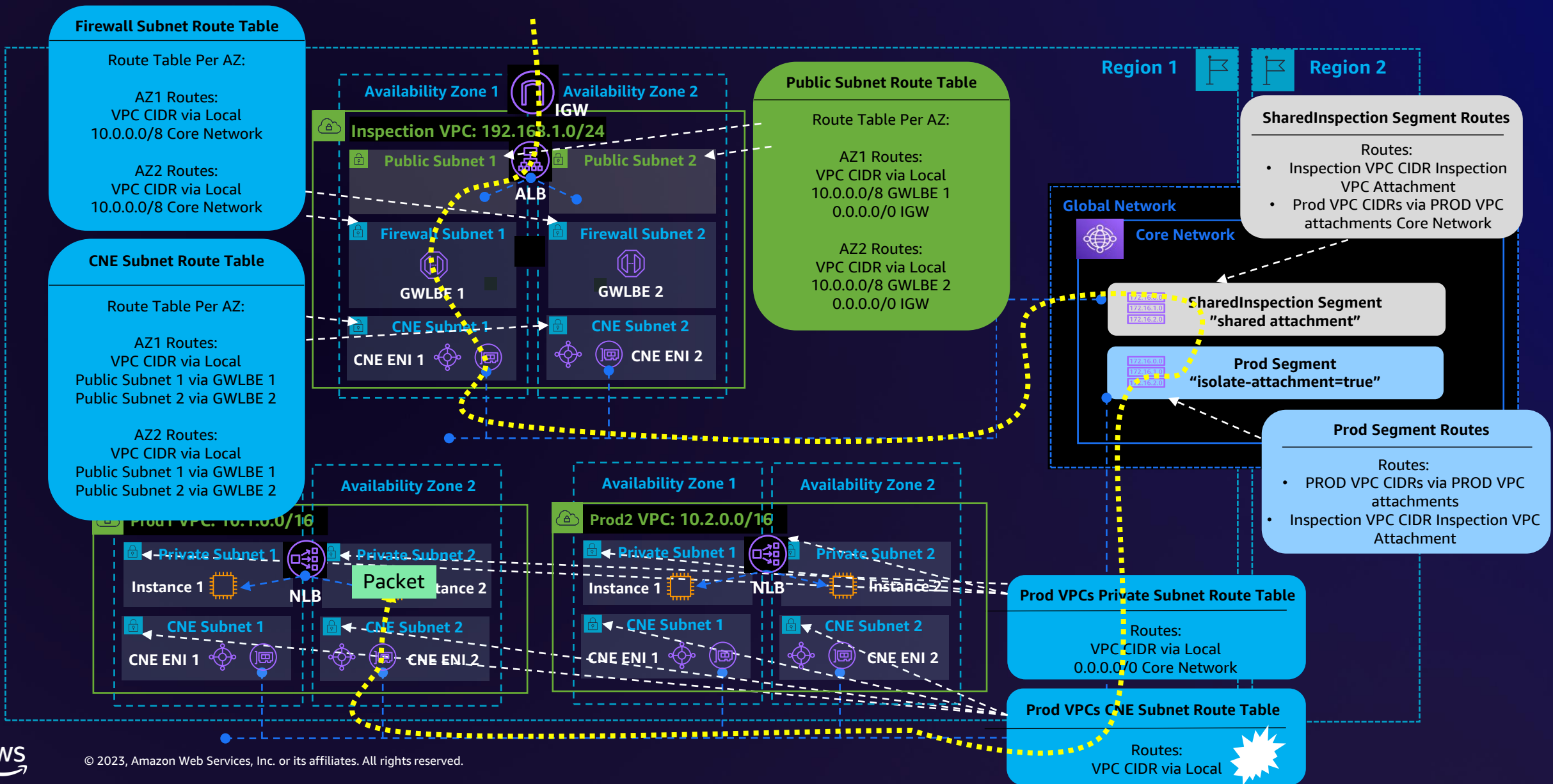
# Centralized

## MULTIPLE CLOUD WAN SEGMENTS WITH A SEPARATE SECURITY SEGMENT



# Centralized

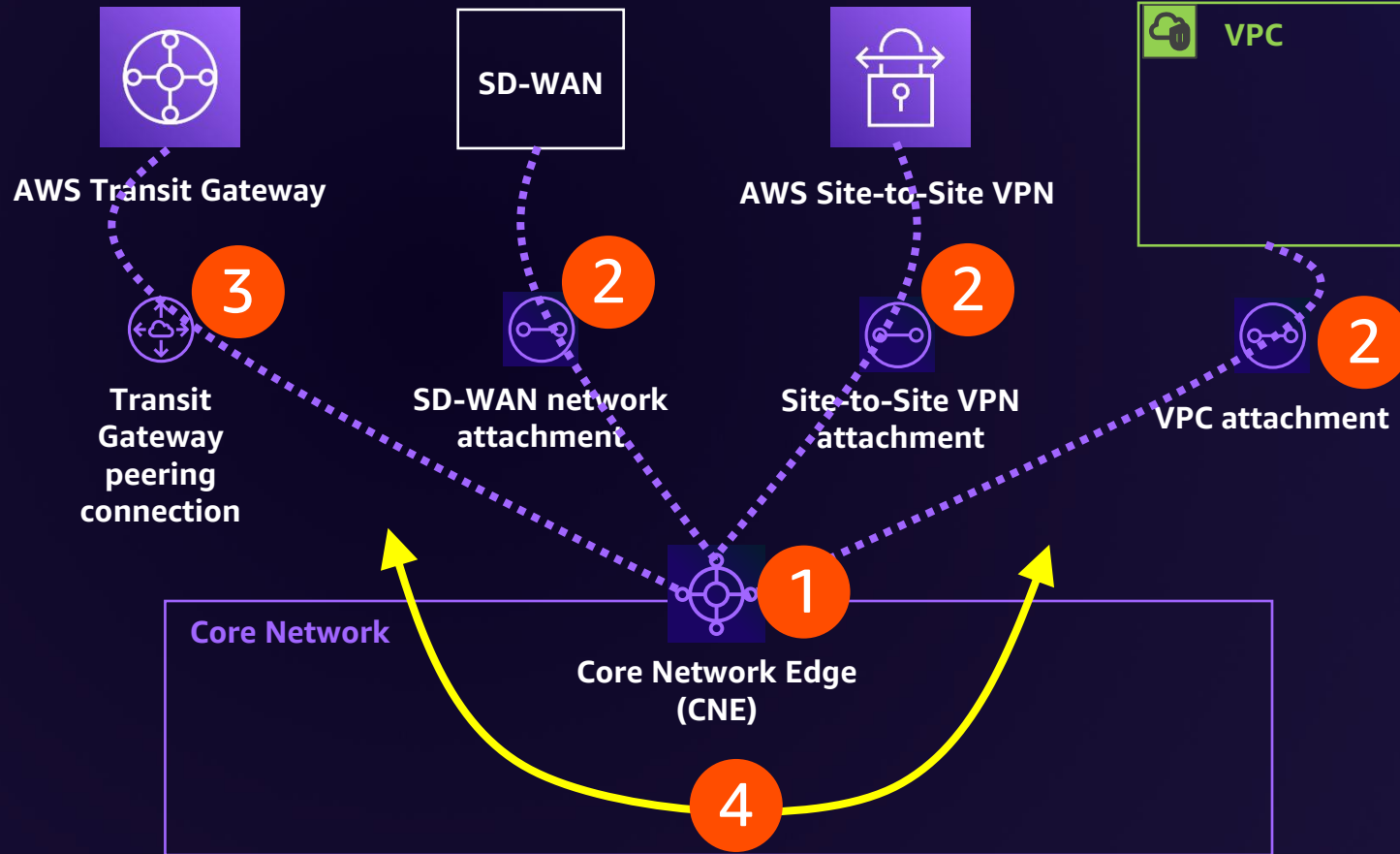
## MULTIPLE CLOUD WAN SEGMENTS WITH A SEPARATE SECURITY SEGMENT



# AWS Cloud WAN detailed pricing



# Pricing constructs

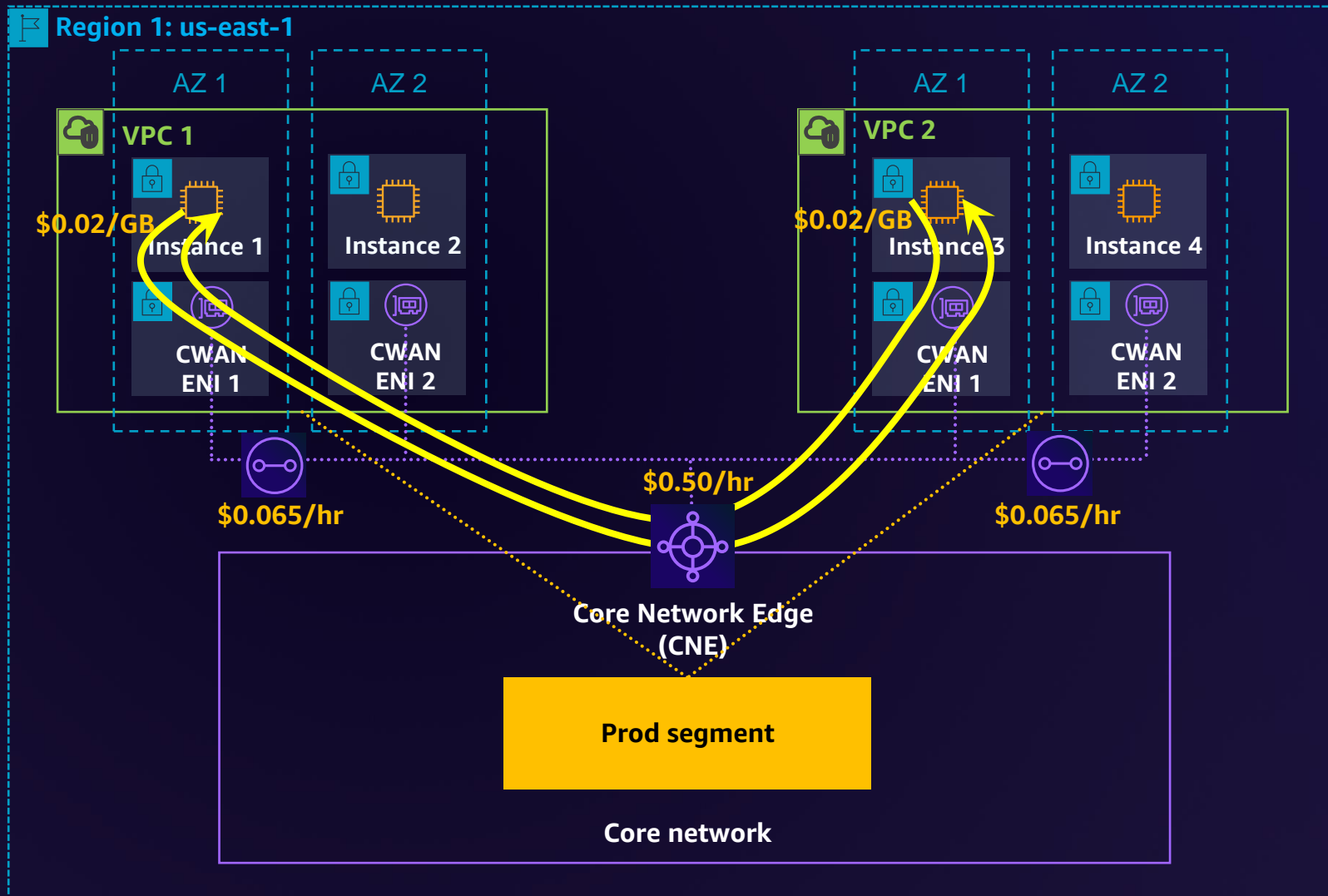


## Four components

1. Core network edge, hourly charge
2. Core network attachments, hourly charge
3. Peering connection, hourly charge
4. Data processing, per-gigabyte charge

<https://aws.amazon.com/cloud-wan/pricing/>

# AWS Cloud WAN – Data transfer same Region



Instance 1 sending 1 gigabyte of data to Instance 3 and Instance 3 responding back with 1 gigabyte

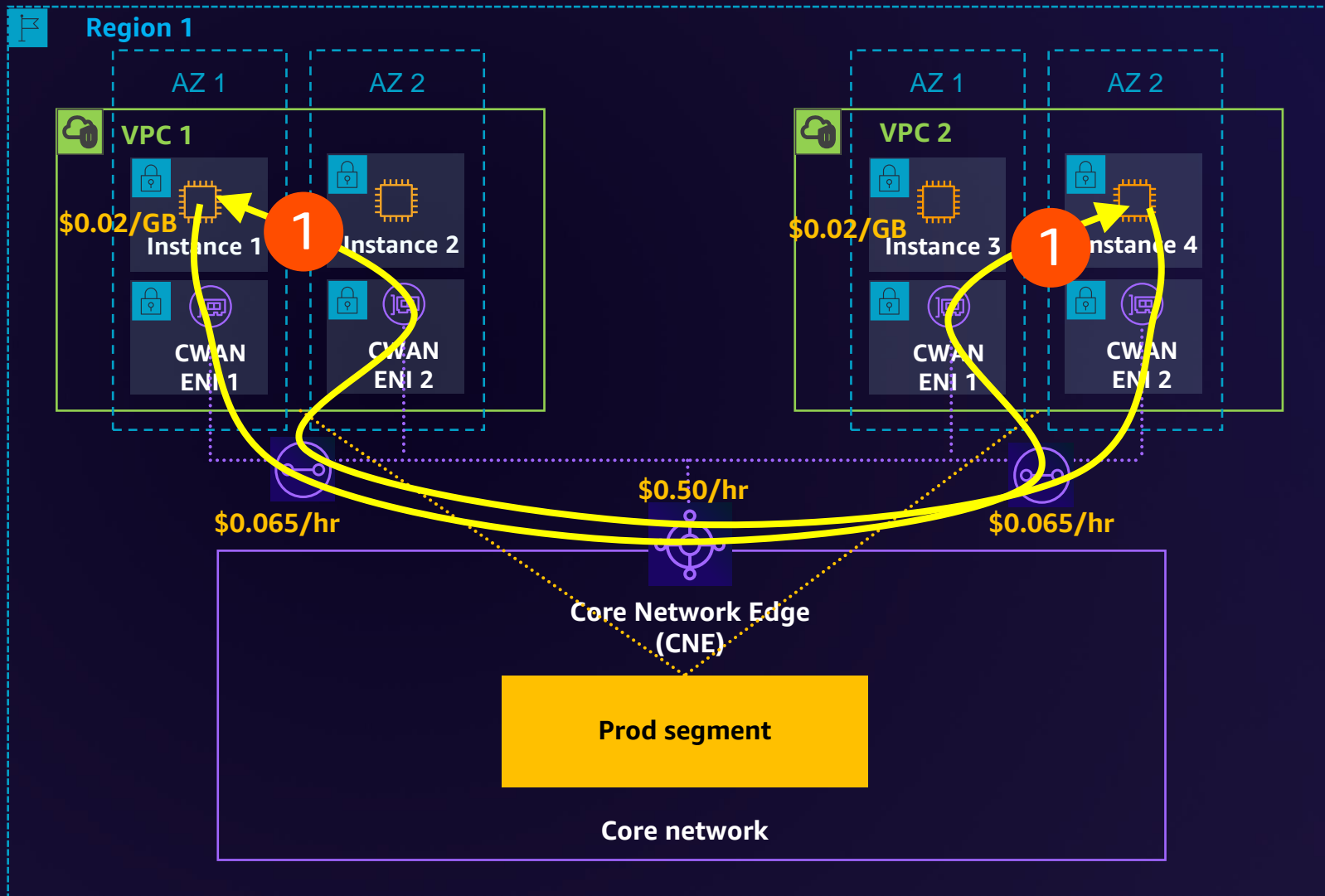
Data processing: \$0.04

- VPC 1 owner charged \$0.02/GB
- VPC 2 owner charged \$0.02/GB

Hourly charges: \$.63/hr

- VPC 1 owner charged \$0.065/hr
- VPC 2 owner charged \$0.065/hr
- AWS Cloud WAN owner charged \$0.50/hr

# AWS Cloud WAN – Data transfer same Region cross AZ



Instance 1 sending 1 gigabyte of data to Instance 3 and Instance 3 responding back with 1 gigabyte

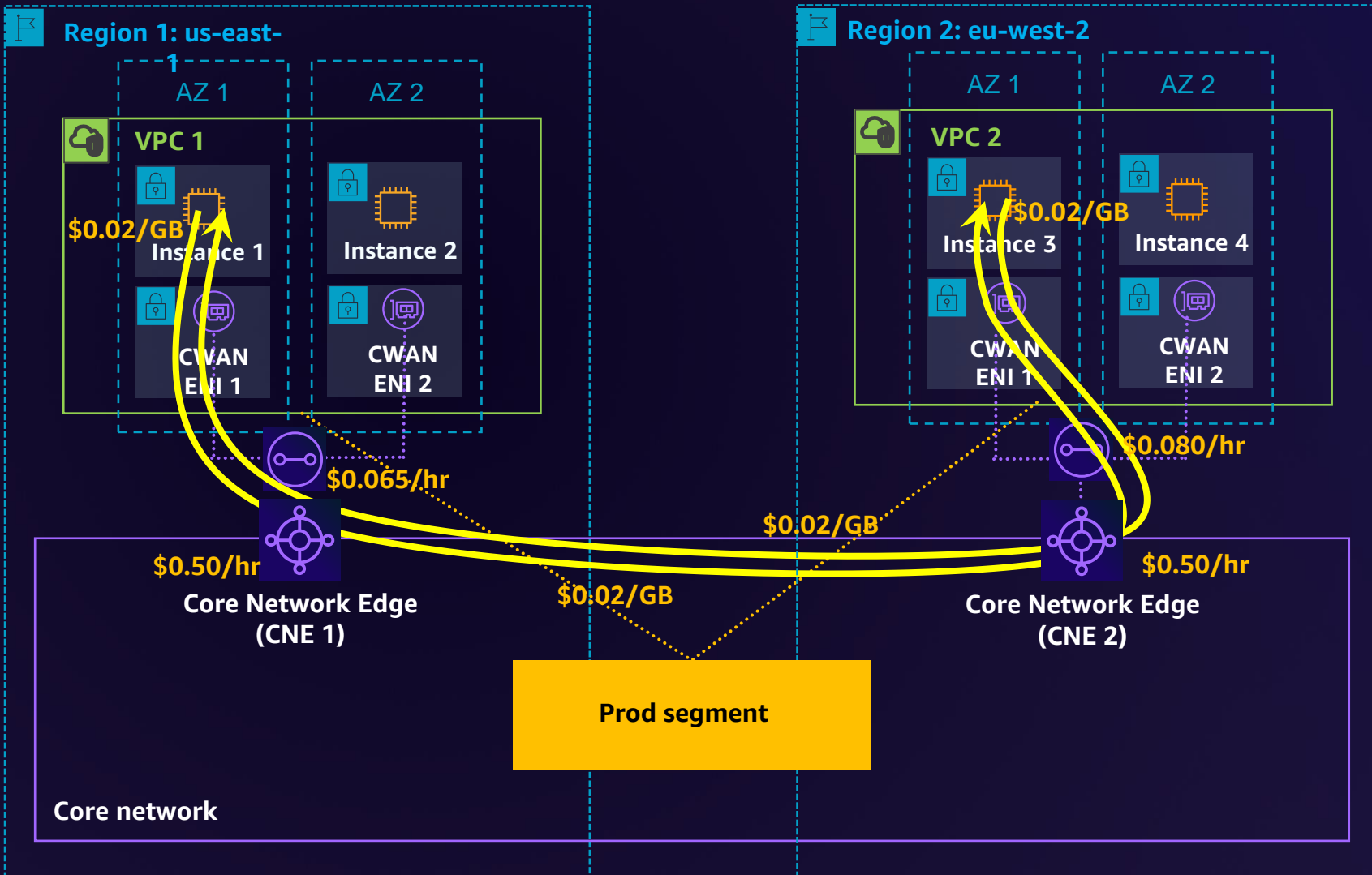
Data processing: \$0.04

- VPC 1 owner charged \$0.02/GB
- VPC 2 owner charged \$0.02/GB

Hourly charges: \$.63/hr

- VPC 1 owner charged \$0.065/hr
- VPC 2 owner charged \$0.065/hr
- AWS Cloud WAN owner charged \$0.50/hr

# AWS Cloud WAN – Data transfer cross-Region



Instance 1 sending 1 gigabyte of data to Instance 3 and Instance 3 responding back with 1 gigabyte

Data processing: \$0.04

- VPC 1 owner charged \$0.02/GB
- VPC 2 owner charged \$0.02/GB
- No data processing charge by CNE 2

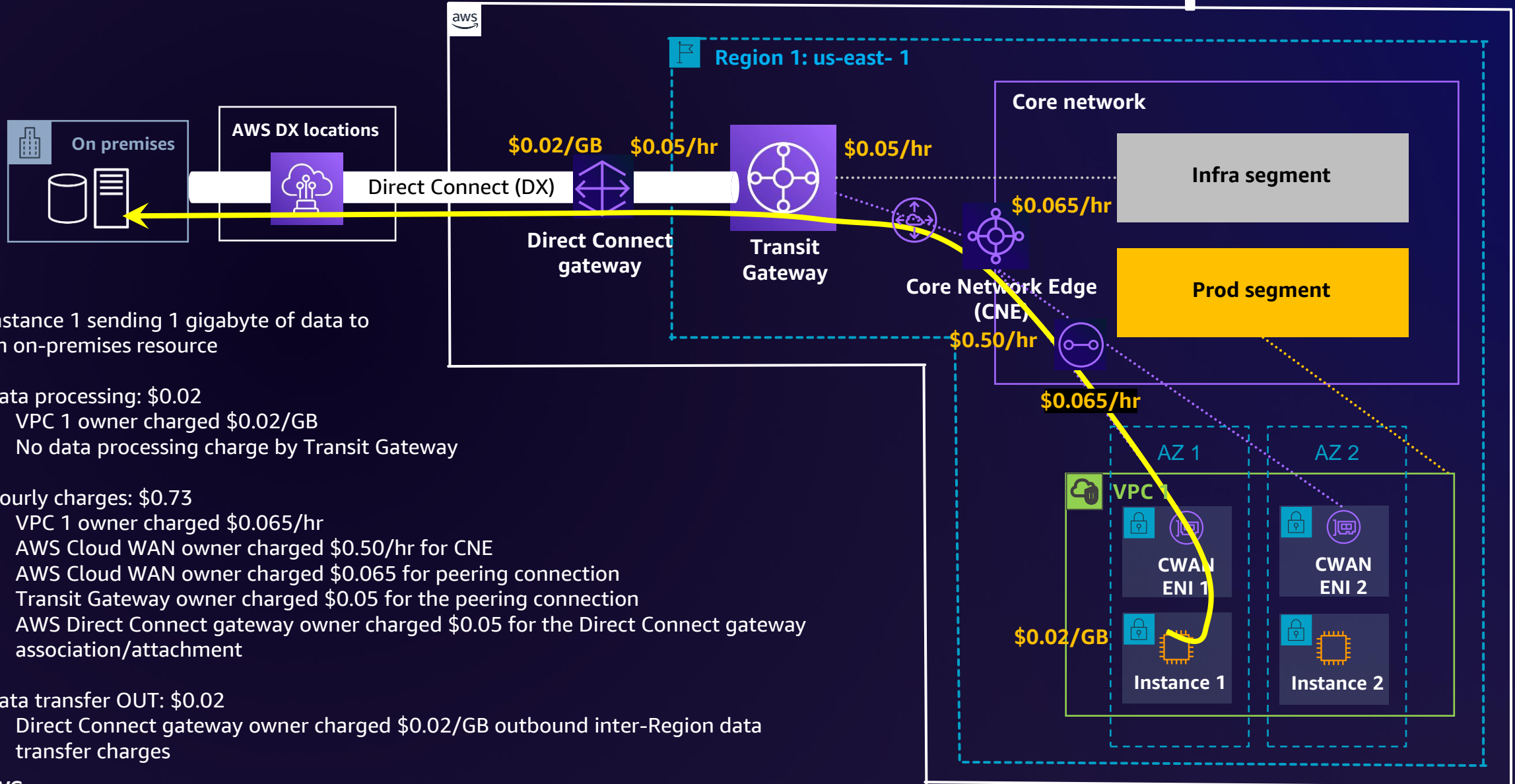
Hourly charges: \$1.145

- VPC 1 owner charged \$0.065/hr
- VPC 2 owner charged \$0.080/hr
- AWS Cloud WAN owner charged \$0.50/hr or each CNE (CNE 1 and CNE 2)

Cross-Region data transfer: \$0.04

- VPC 1: \$0.02/GB outbound inter-Region data transfer charges
- VPC 2: \$0.02/GB outbound inter-Region data transfer charges

# AWS Cloud WAN – Data transfer to on premises



Instance 1 sending 1 gigabyte of data to an on-premises resource

Data processing: \$0.02

- VPC 1 owner charged \$0.02/GB
- No data processing charge by Transit Gateway

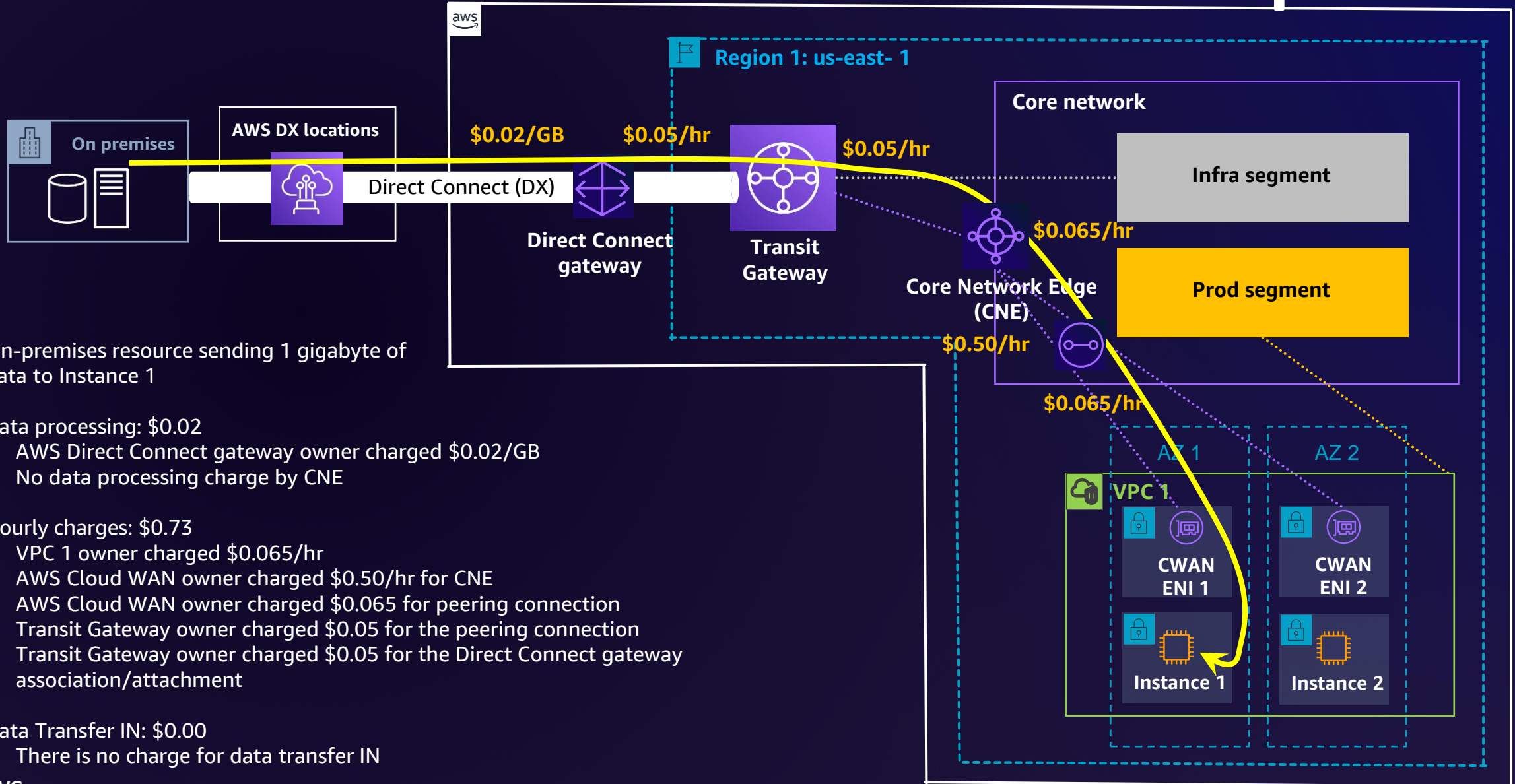
Hourly charges: \$0.73

- VPC 1 owner charged \$0.065/hr
- AWS Cloud WAN owner charged \$0.50/hr for CNE
- AWS Cloud WAN owner charged \$0.065 for peering connection
- Transit Gateway owner charged \$0.05 for the peering connection
- AWS Direct Connect gateway owner charged \$0.05 for the Direct Connect gateway association/attachment

Data transfer OUT: \$0.02

- Direct Connect gateway owner charged \$0.02/GB outbound inter-Region data transfer charges

# AWS Cloud WAN – Data transfer from on premises



On-premises resource sending 1 gigabyte of data to Instance 1

Data processing: \$0.02

- AWS Direct Connect gateway owner charged \$0.02/GB
- No data processing charge by CNE

Hourly charges: \$0.73

- VPC 1 owner charged \$0.065/hr
- AWS Cloud WAN owner charged \$0.50/hr for CNE
- AWS Cloud WAN owner charged \$0.065 for peering connection
- Transit Gateway owner charged \$0.05 for the peering connection
- Transit Gateway owner charged \$0.05 for the Direct Connect gateway association/attachment

Data Transfer IN: \$0.00

- There is no charge for data transfer IN

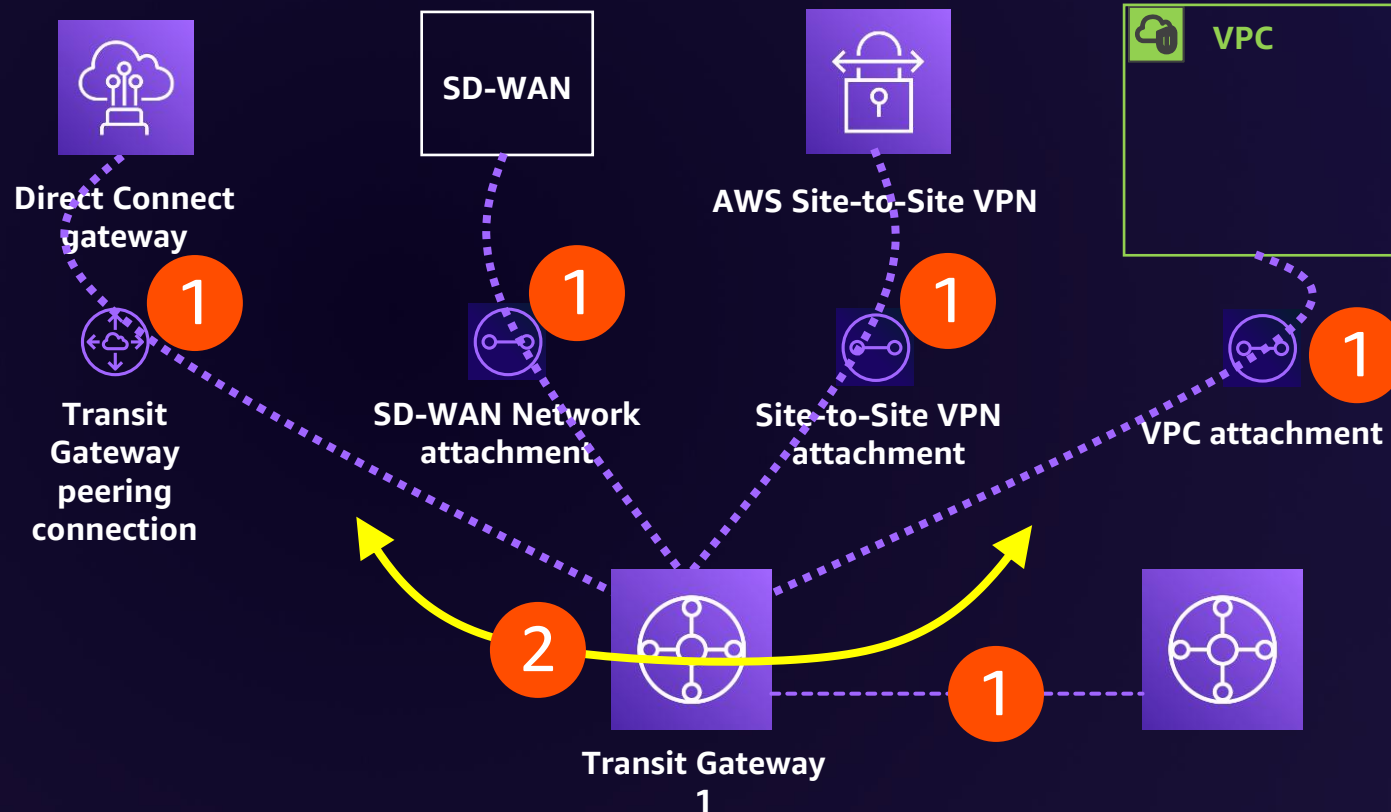
# AWS Transit Gateway pricing



# Transit Gateway pricing constructs

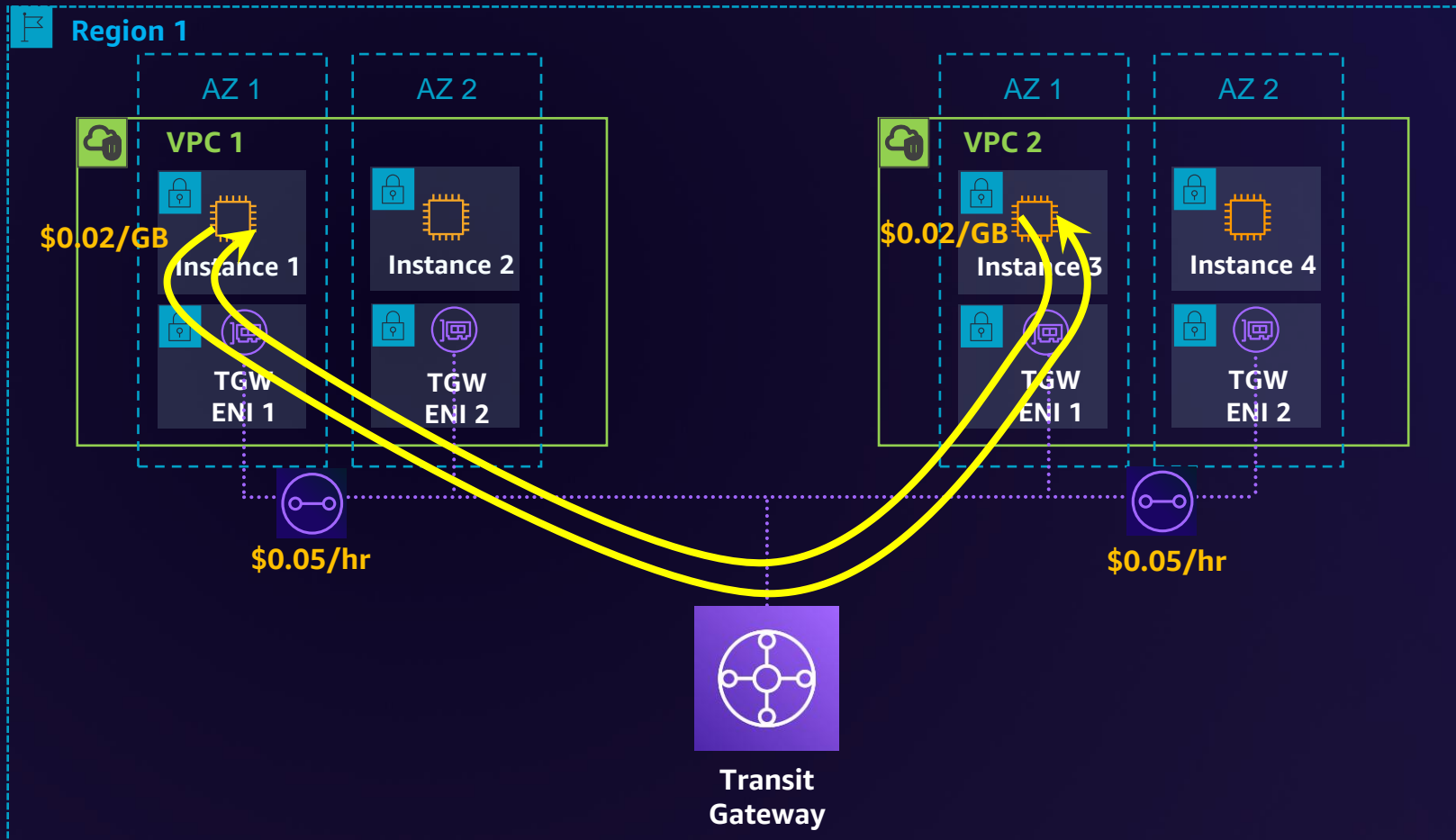
Two components

1. Transit Gateway, attachment hourly charge
2. Data processing, per-gigabyte charge



<https://aws.amazon.com/transit-gateway/pricing/>

# Transit Gateway data transfer same Region



Instance 1 sending 1 gigabyte of data to Instance 3 and Instance 3 responding back with 1 gigabyte

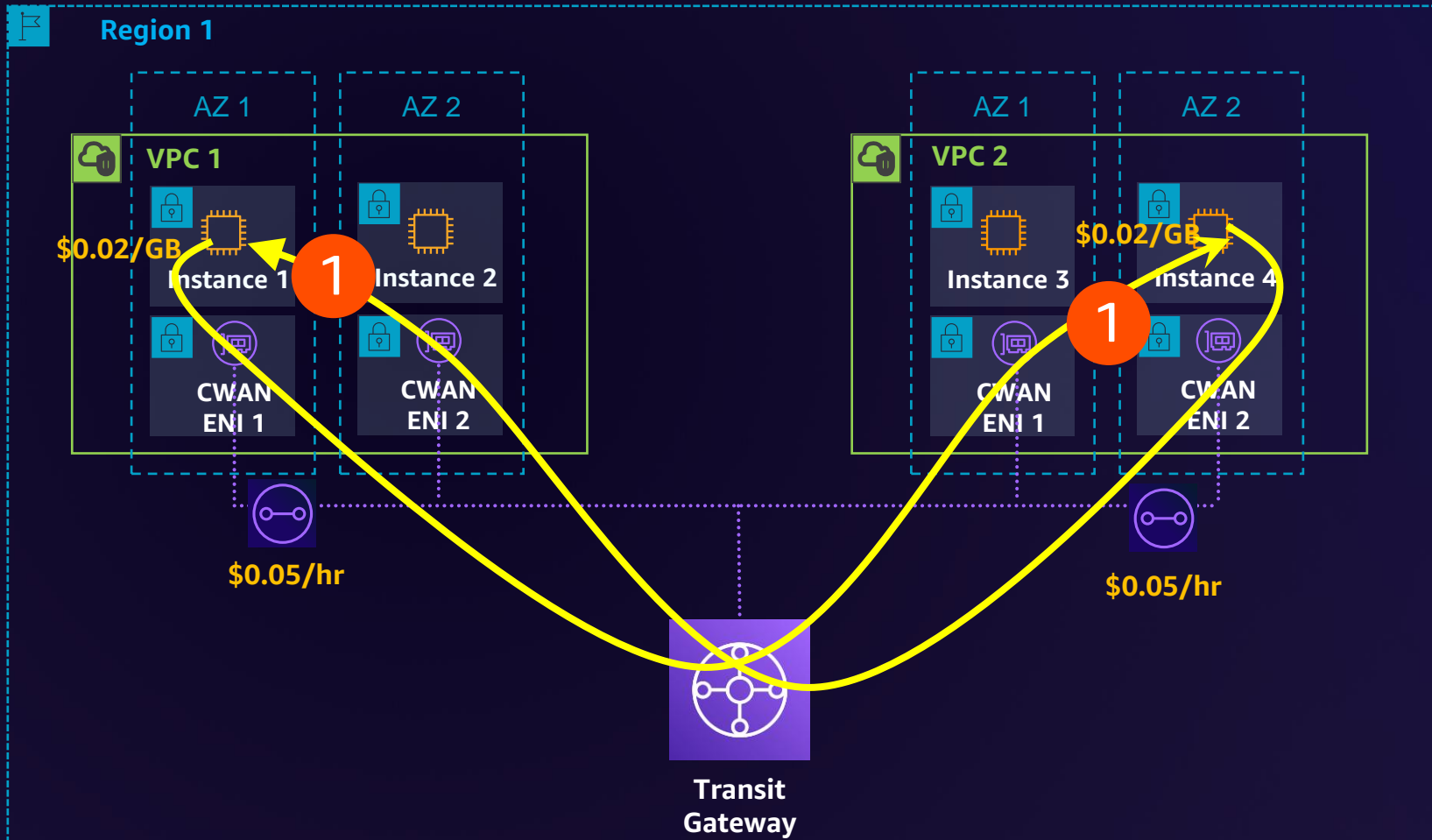
Data processing: \$0.04

- VPC 1 owner charged \$0.02/GB
- VPC 2 owner charged \$0.02/GB

Hourly charges: \$.10/hr

- VPC 1 owner charged \$0.05/hr
- VPC 2 owner charged \$0.05/hr

# Transit Gateway – Data transfer same Region cross-AZ



Instance 1 sending 1 gigabyte of data to Instance 3 and Instance 3 responding back with 1 gigabyte

Data processing: \$0.04

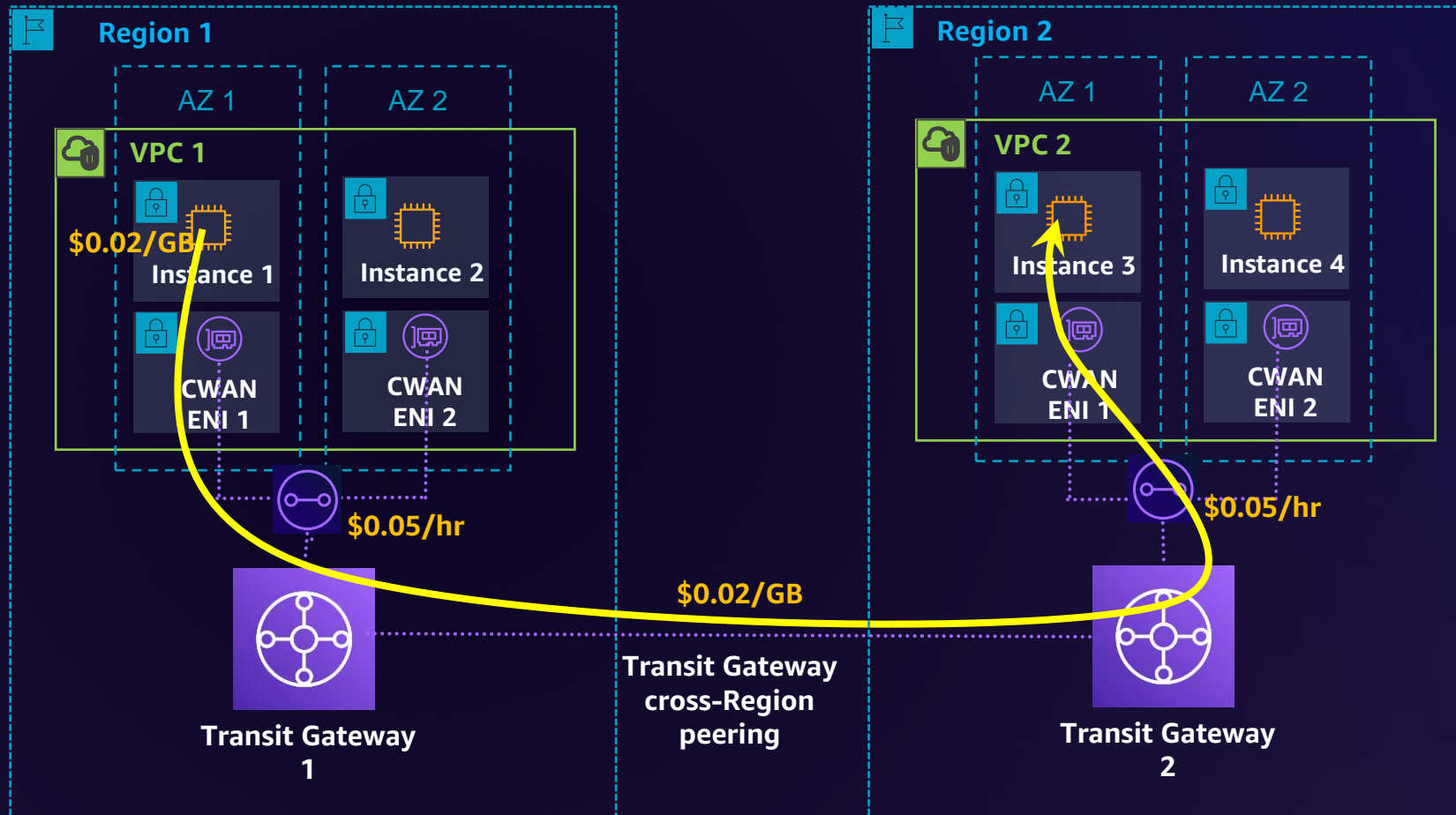
- VPC 1 owner charged \$0.02/GB
- VPC 2 owner charged \$0.02/GB

Hourly charges: \$.10/hr

- VPC 1 owner charged \$0.05/hr
- VPC 2 owner charged \$0.05/hr

**1** No inter AZ data transfer charges

# Transit Gateway – Data transfer cross-Region



Instance 1 sending 1 gigabyte of data to Instance 3

Data processing

- VPC 1 owner charged \$0.02/GB
- No data processing charge by Transit Gateway 2

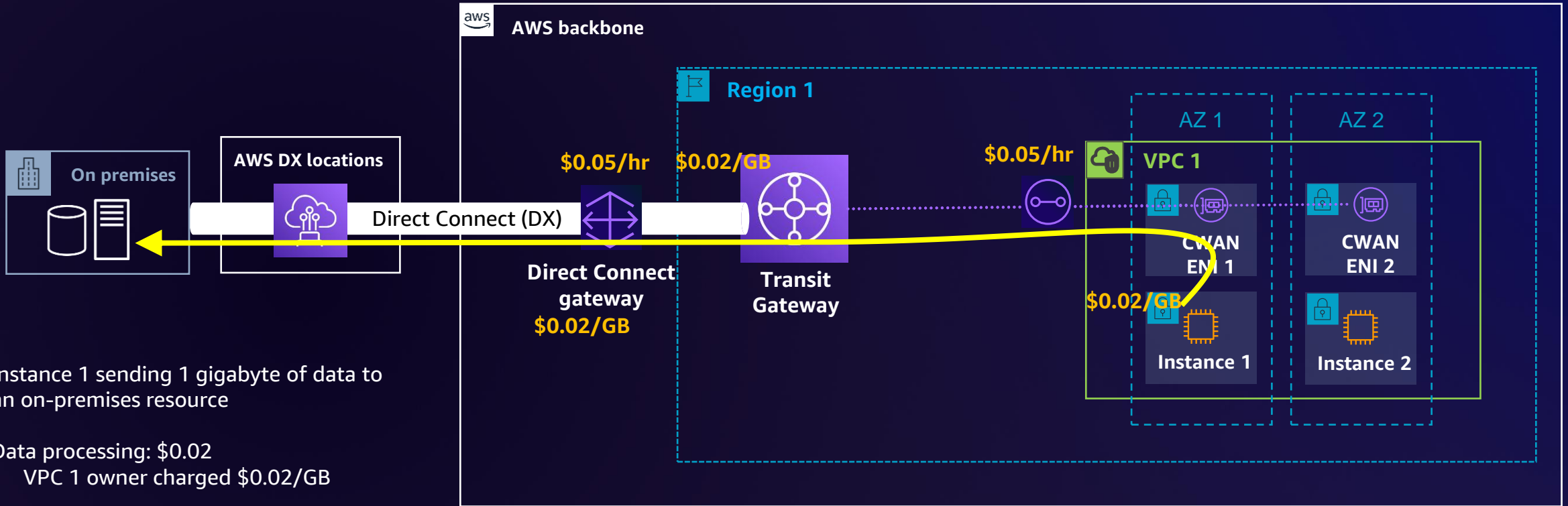
Hourly charges

- VPC 1 owner charged \$0.05/hr
- VPC 2 owner charged \$0.05/hr

Cross-Region data transfer

- \$0.02/GB outbound inter-Region data transfer charges

# Transit Gateway – Data transfer to on premises



Instance 1 sending 1 gigabyte of data to an on-premises resource

Data processing:  $\$0.02$

- VPC 1 owner charged  $\$0.02/\text{GB}$

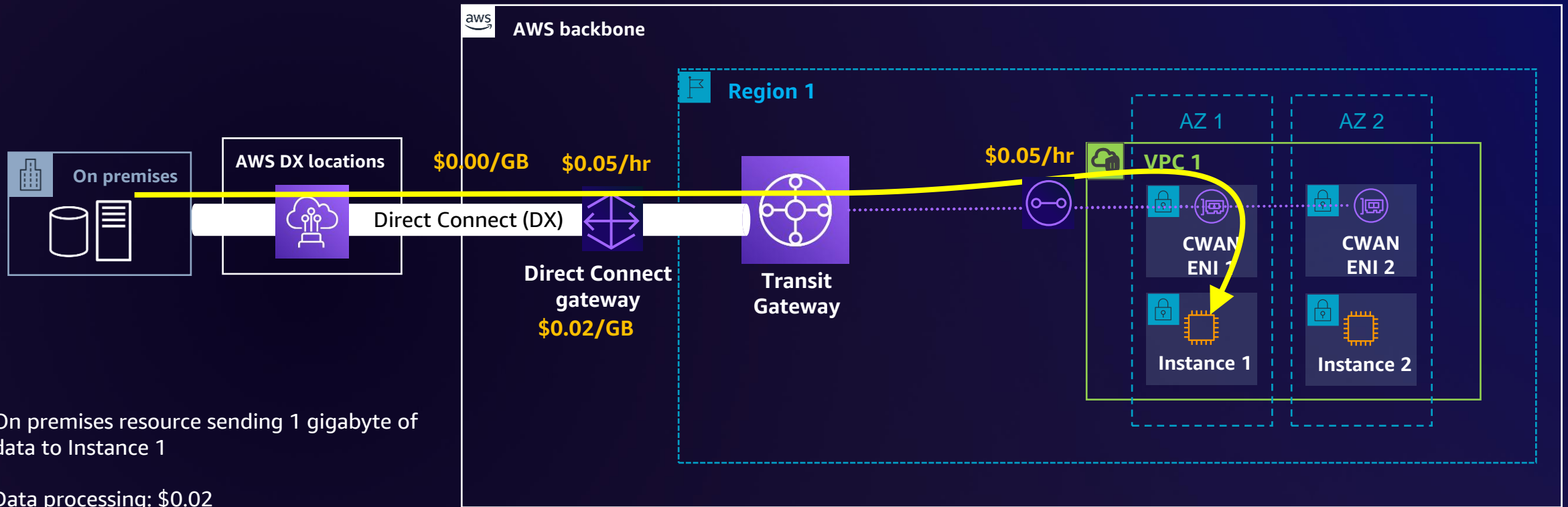
Hourly charges:  $\$0.10$

- VPC 1 owner charged  $\$0.05/\text{hr}$
- AWS Direct Connect gateway owner charged  $\$0.05$  for the Direct Connect gateway association/attachment

Data transfer OUT:  $\$0.02$

- AWS Direct Connect gateway owner charged  $\$0.02/\text{GB}$  outbound inter-Region data transfer charges

# Transit Gateway – Data transfer from on premises



Data processing: \$0.02

- AWS Direct Connect gateway owner charged \$0.02/GB

Hourly charges: \$0.10

- VPC 1 owner charged \$0.05/hr
- AWS Direct Connect gateway owner charged \$0.05 for the Direct Connect gateway association/attachment

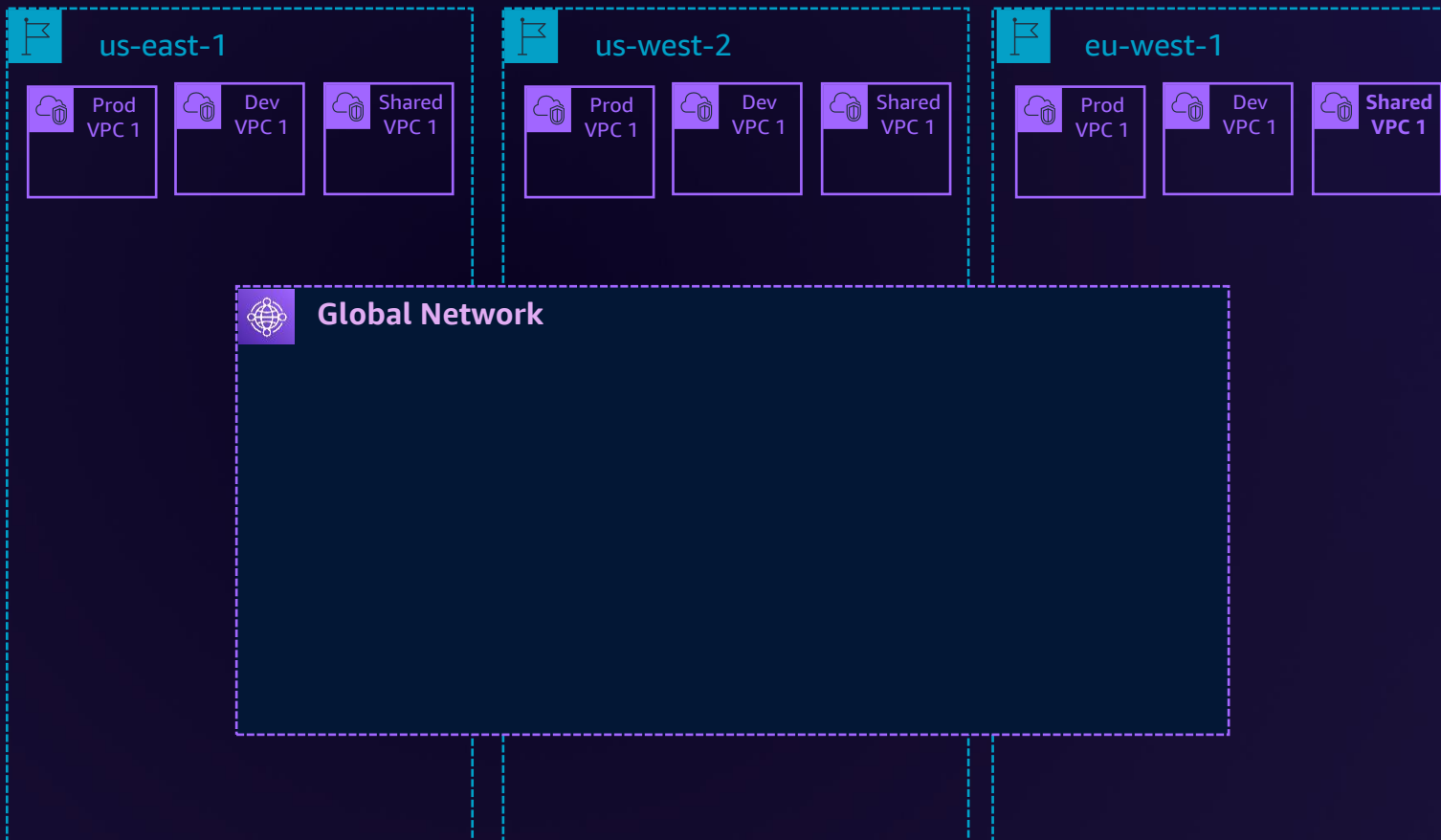
Data transfer IN: \$0.00

- There is no charge for Data Transfer IN

# Network

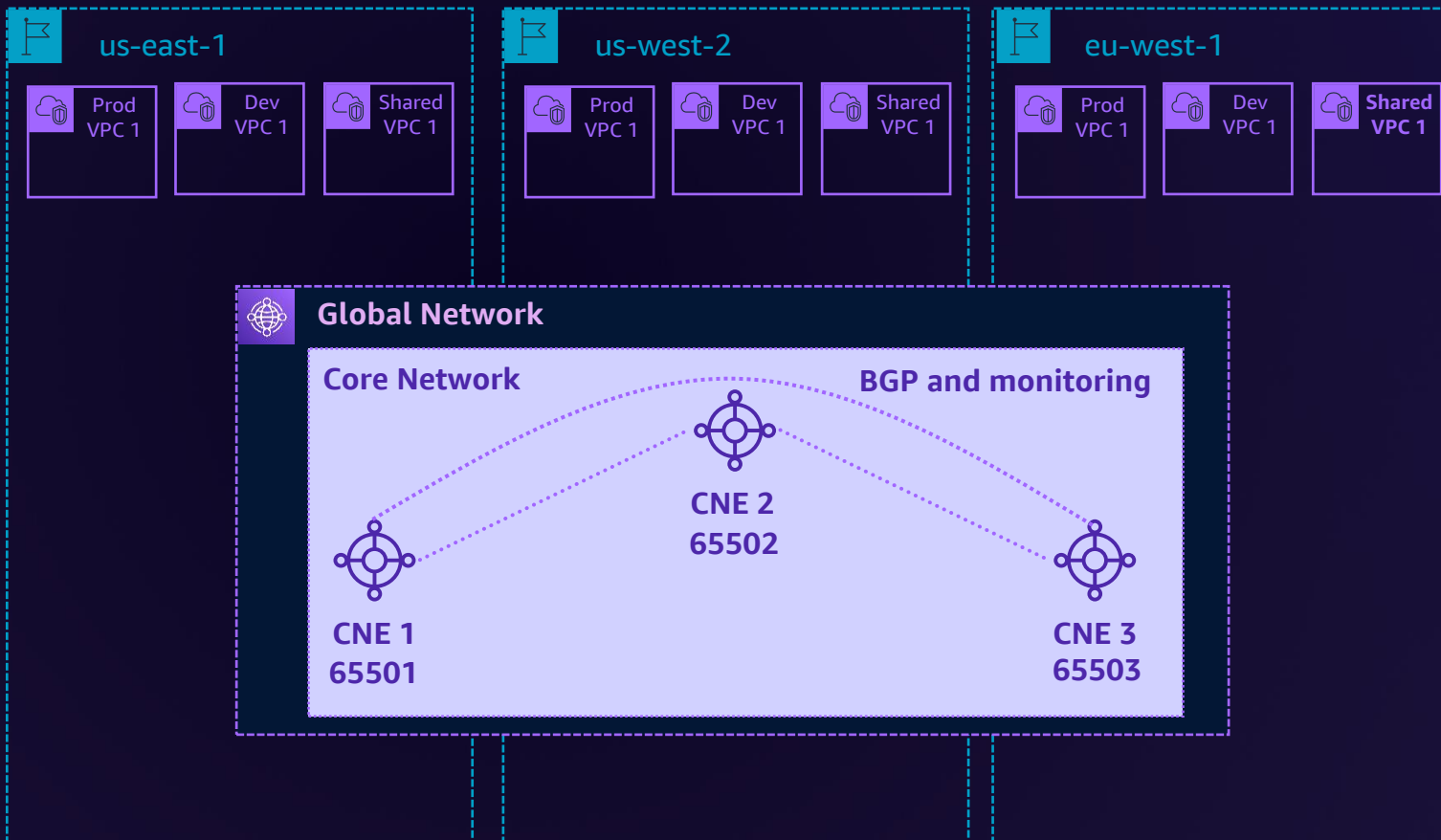


# Core network policy: Network configuration



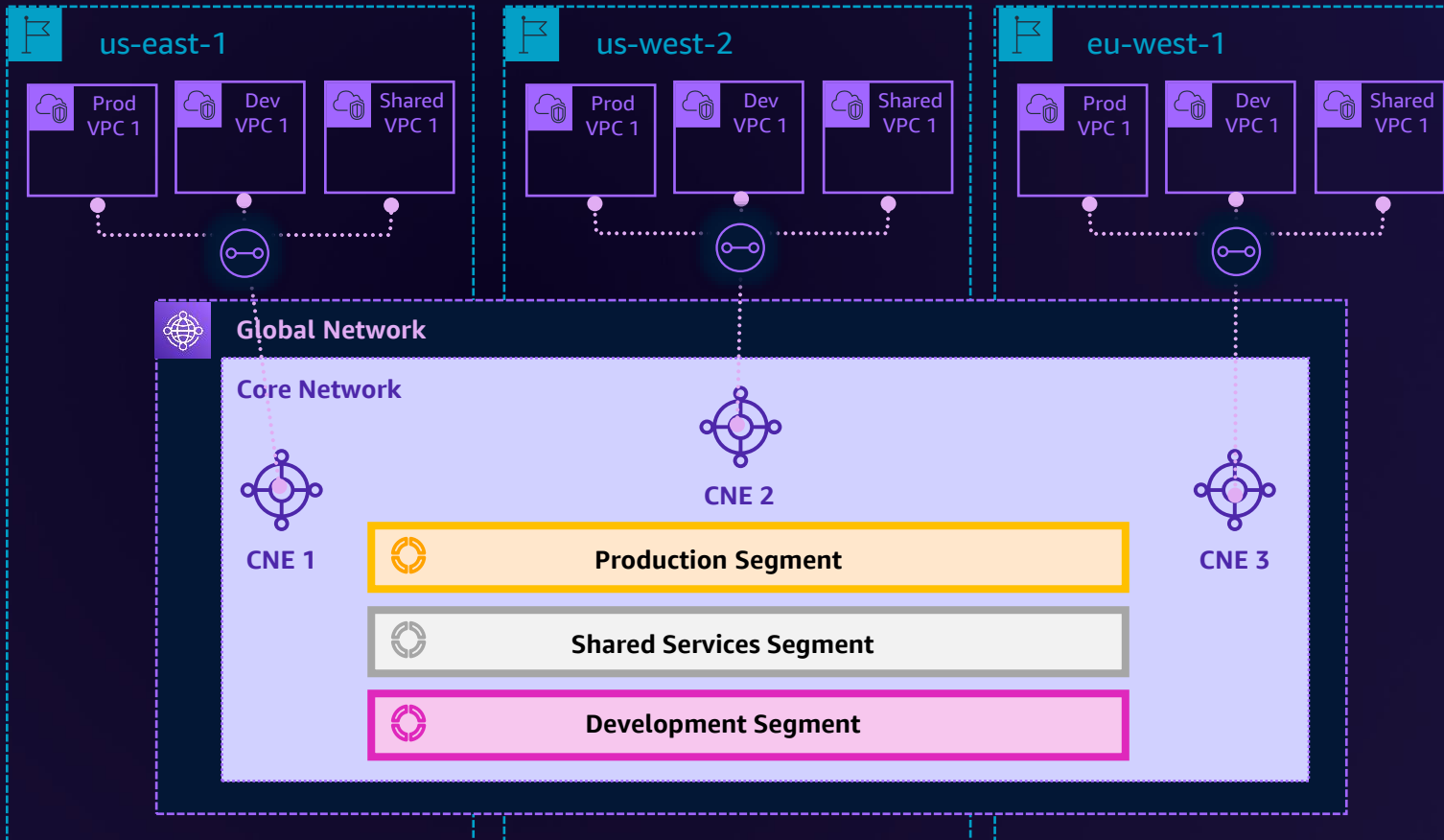
```
"core-network-configuration": {  
  "vpn-ecmp-support": true,  
  "asn-ranges": [  
    "64512-65534"  
  ],  
  "edge-locations": [  
    {  
      "location": "us-east-1"  
    },  
    {  
      "location": "us-west-2"  
    },  
    {  
      "location": "eu-west-1"  
    },  
  ],  
}
```

# Core network policy: Network configuration



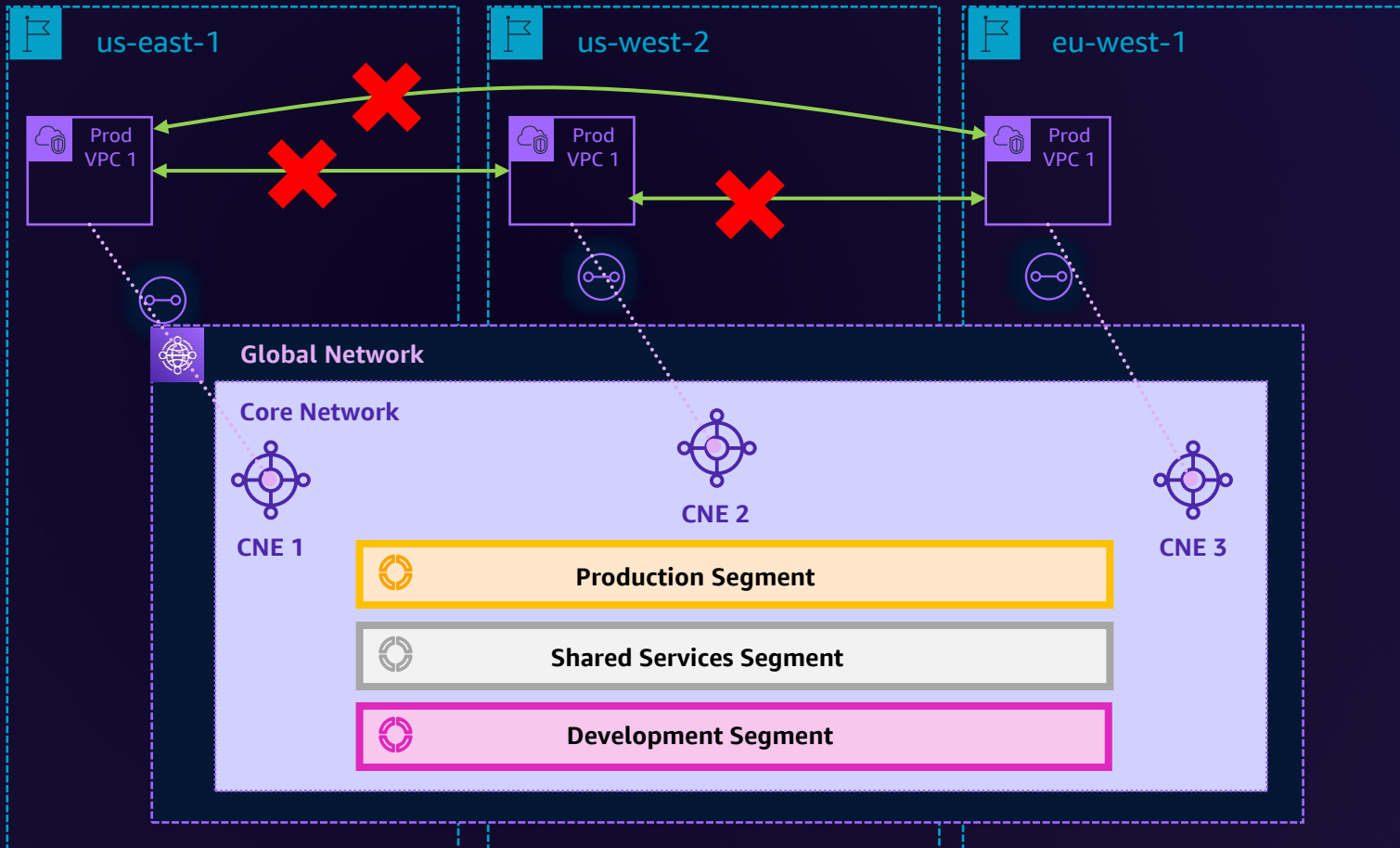
```
"core-network-configuration": {  
  "vpn-ecmp-support": true,  
  "asn-ranges": [  
    "64512-65534"  
  ],  
  "edge-locations": [  
    {  
      "location": "us-east-1"  
    },  
    {  
      "location": "us-west-2"  
    },  
    {  
      "location": "eu-west-1"  
    },  
  ],  
}
```

# Core network policy: Segments



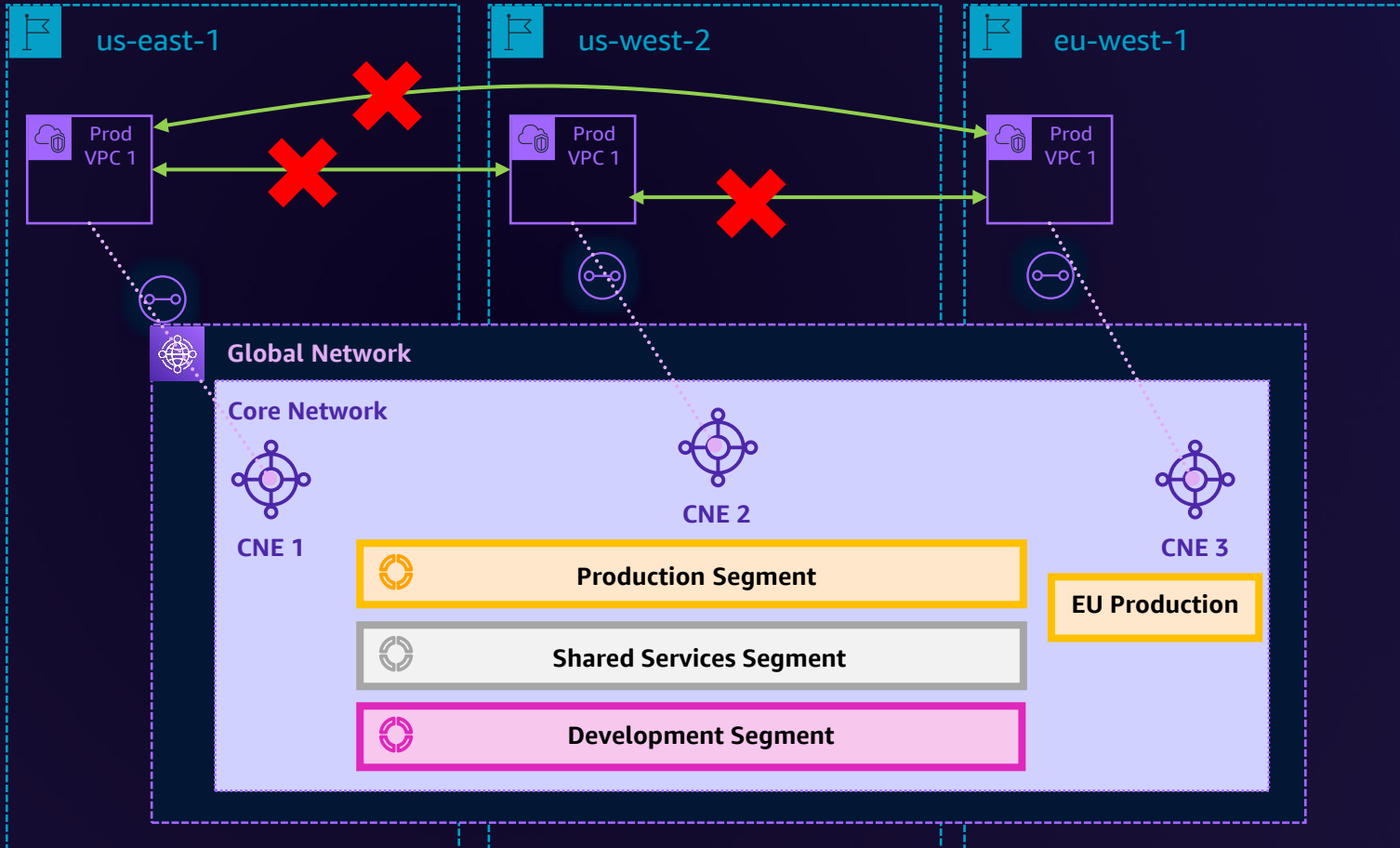
```
"segments": [  
  {  
    "name": "Production",  
    "require-attachment-acceptance":  
false,  
  },  
  {  
    "name": "Development",  
    "require-attachment-acceptance": false  
  },  
  {  
    "name": "Shared Service",  
    "require-attachment-acceptance": false  
  }  
]
```

# Core network policy: Segments



```
"segments": [  
  {  
    "name": "Production",  
    "require-attachment-acceptance":  
false,  
    "isolate-attachments": true  
  },  
  {  
    "name": "Development",  
    "require-attachment-acceptance": false  
  },  
  {  
    "name": "Shared Service",  
    "require-attachment-acceptance": false  
  }  
]
```

# Core network policy: Segments



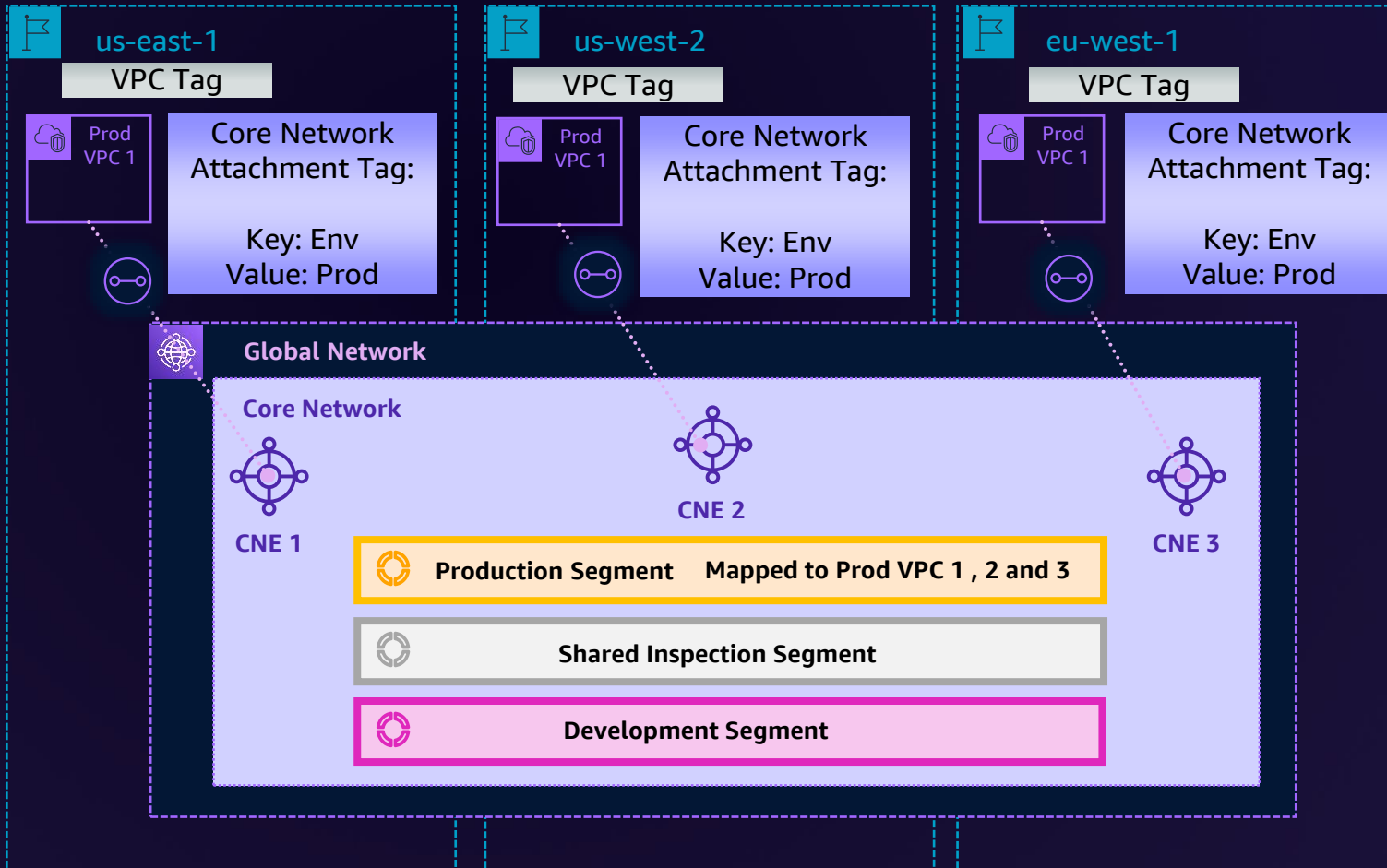
```
"segments": [  
  {  
    "name": "Production",  
    "require-attachment-acceptance": false,  
    "isolate-attachments": true  
  },  
  {  
    "name": "Development",  
    "require-attachment-acceptance": false  
  },  
  {  
    "name": "Shared Service",  
    "require-attachment-acceptance": false  
  },  
  {  
    "name": "EU Production",  
    "edge-locations": [  
      "eu-west-1"  
    ]  
    "require-attachment-acceptance": false  
  }  
]
```

# Core network policy: Attachment policies

## VPC owner

- Creates attachment request
- Tags the attachment request

VPC tags are not evaluated



## AWS Cloud WAN owner

- Policy maps tags to segments
- Can also use metadata, e.g.: vpc-id

*"attachment-policies": [*

*{*

*"rule-number": 100,*

*"conditions": [*

*{*

*"type": "tag-value",*

*"operator": "equals",*

*"key": "Env",*

*"value": "Prod"*

*}*

*],*

*"action": {*

*"association-method": "constant",*

*"segment": "Prod"*

*}*

*}*

*]*

# Making changes to AWS Cloud WAN

# Making changes to AWS Cloud WAN

## 1. Generate a policy

# Making changes to AWS Cloud WAN

## 1. Generate a policy

API

Core network policy



# Making changes to AWS Cloud WAN

1. Generate a policy

API

Core network policy



2. Change set

# Making changes to AWS Cloud WAN

1. Generate a policy

2. Change set

API



# Making changes to AWS Cloud WAN

## 1. Generate a policy

API

Core network policy



## 2. Change set

Validation



Change set generated

API

+ / -

AWS Regions  
Core Network Edges  
Attachments  
Segments  
Move/add/change/delete

# Making changes to AWS Cloud WAN

1. Generate a policy

API

Core network policy



2. Change set

Validation



Change set generated

API

+ / -

AWS Regions  
Core Network Edges  
Attachments  
Segments  
Move/add/change/delete

3. Execute policy

# Making changes to AWS Cloud WAN

## 1. Generate a policy

API

Core network policy 

## 2. Change set

Validation



Change set generated

API

+ / -

- AWS Regions
- Core Network Edges
- Attachments
- Segments
- Move/add/change/delete

## 3. Execute policy

API



Execute policy



# Making changes to AWS Cloud WAN

## 1. Generate a policy

API

Core network policy 

→ Validation

## 2. Change set



Change set generated

API

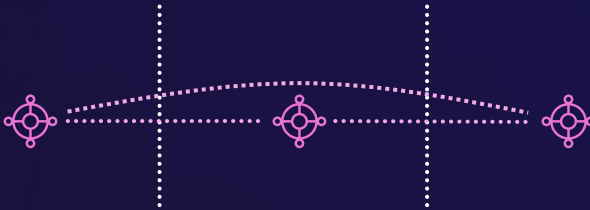
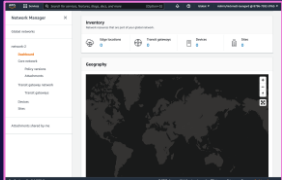
+ / -

- AWS Regions
- Core Network Edges
- Attachments
- Segments
- Move/add/change/delete

## 3. Execute policy

API

Execute policy 



# Making changes to AWS Cloud WAN

## 1. Generate a policy

API

Core network policy



Validation

## 2. Change set



Change set generated

API

+ / -

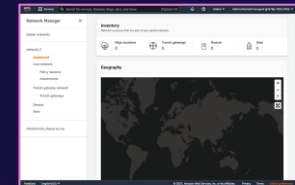
AWS Regions  
Core Network Edges  
Attachments  
Segments  
Move/add/change/delete



## 3. Execute policy

API

Execute policy



# Making changes to AWS Cloud WAN

## 1. Generate a policy

API

Core network policy



## 2. Change set

Validation



Change set generated

API

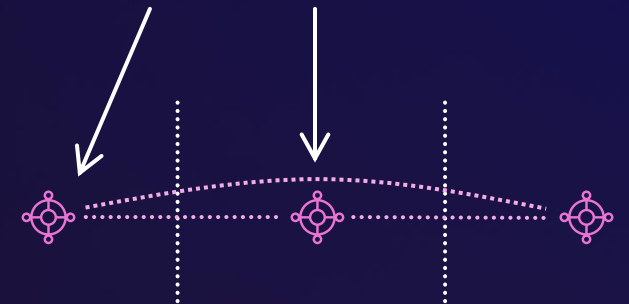
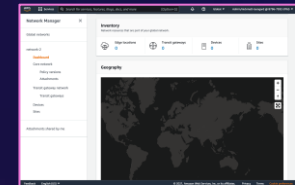
+ / -

AWS Regions  
Core Network Edges  
Attachments  
Segments  
Move/add/change/delete

## 3. Execute policy

API

Execute policy



# Making changes to AWS Cloud WAN

## 1. Generate a policy

API

Core network policy 

→ Validation

## 2. Change set

↓  
Change set generated

API

+ / -

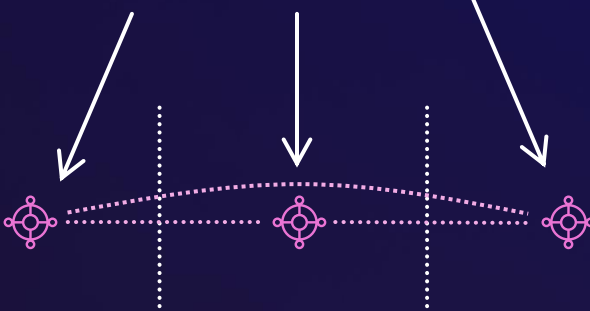
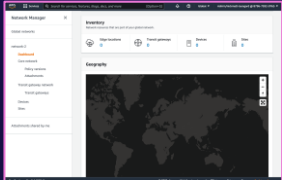
- AWS Regions
- Core Network Edges
- Attachments
- Segments
- Move/add/change/delete

## 3. Execute policy

API

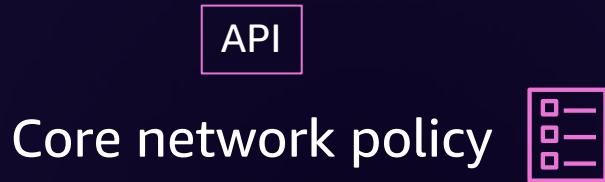


Execute policy

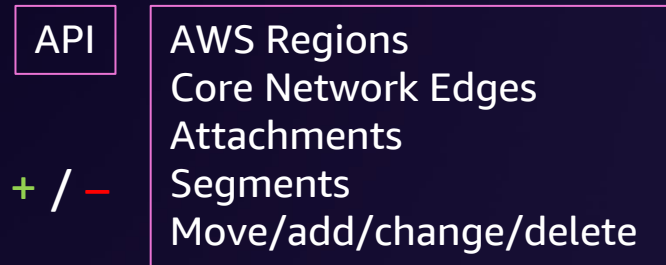
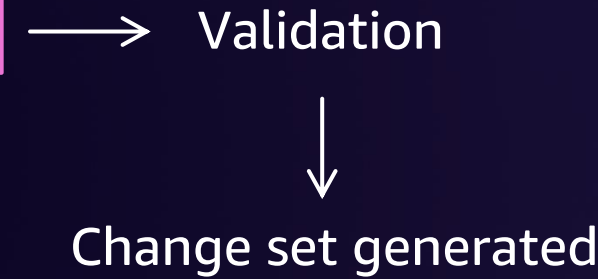


# Making changes to AWS Cloud WAN

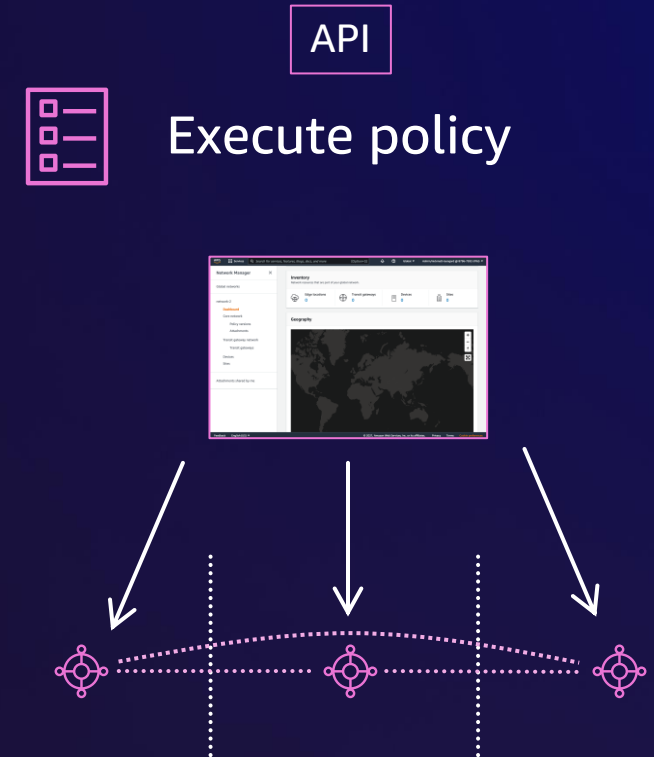
## 1. Generate a policy



## 2. Change set



## 3. Execute policy



# Making changes to AWS Cloud WAN

## 1. Generate a policy

API  
Core network policy



## 2. Change set

Validation

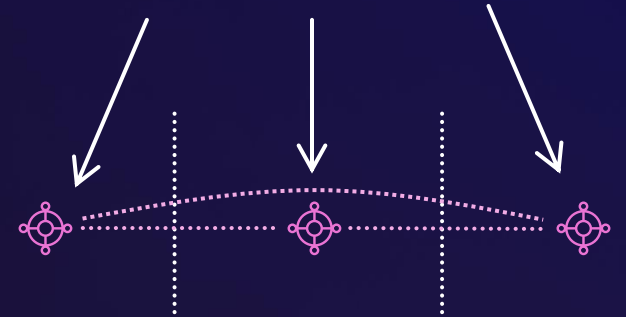
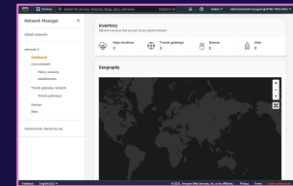


Change set generated



## 3. Execute policy

API  
Execute policy



New person  
(less trusted)

API

+ / -

AWS Regions  
Core Network Edges  
Attachments  
Segments  
Move/add/change/delete

Change  
advisory  
board

# Making changes to AWS Cloud WAN

## 1. Generate a policy

## 2. Change set

## 3. Execute policy

