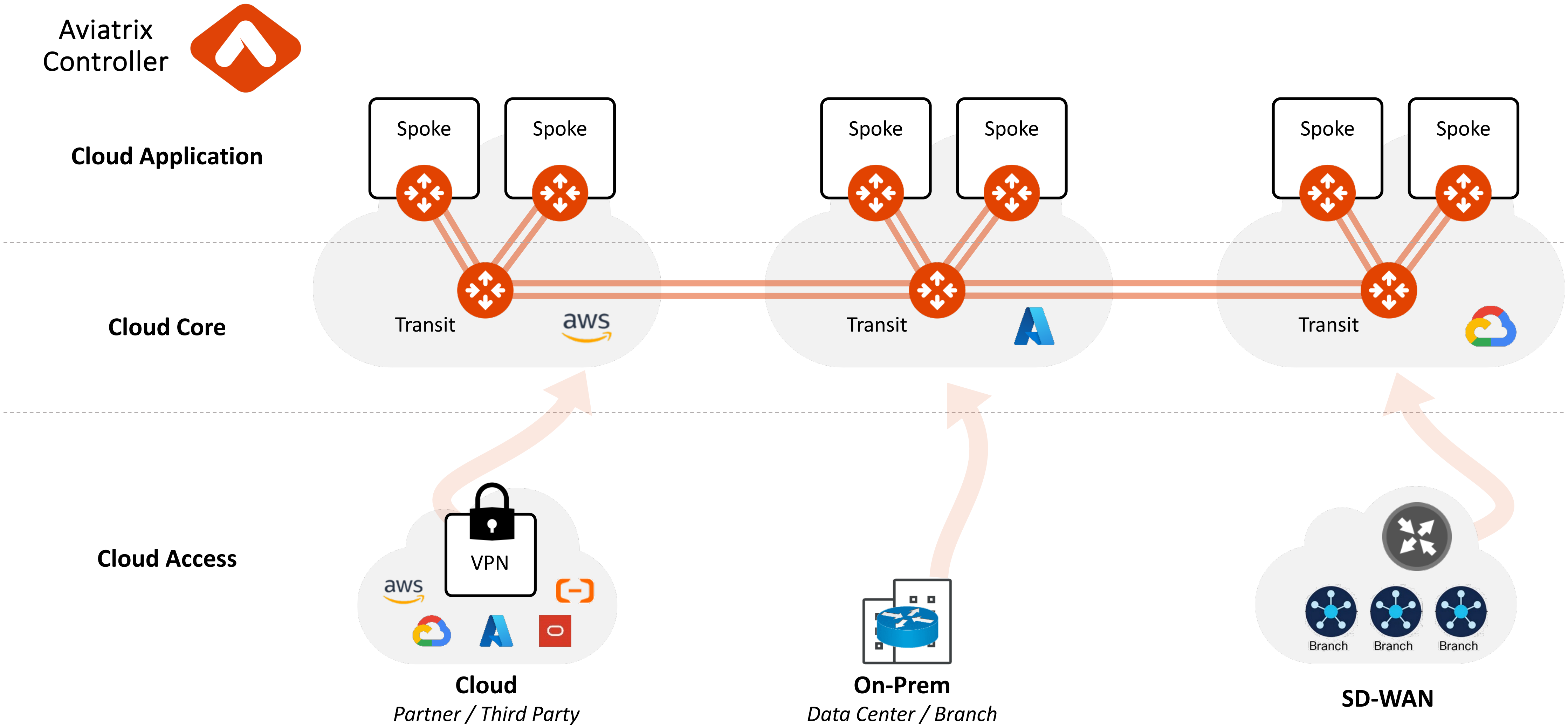
aviatrix
ACE
OPERATIONS
SPECIALTY

Site2Cloud

ACE Solutions Architecture Team

Aviatrix Multicloud Network Architecture



Aviatrix Controller

Cloud Application

Cloud Core

Cloud Access

Spoke
Spoke
Spoke
Spoke
Spoke
Spoke
Transit
aws
Transit
Transit
VPN
aws
Branch
Branch
Branch

Cloud
Partner / Third Party

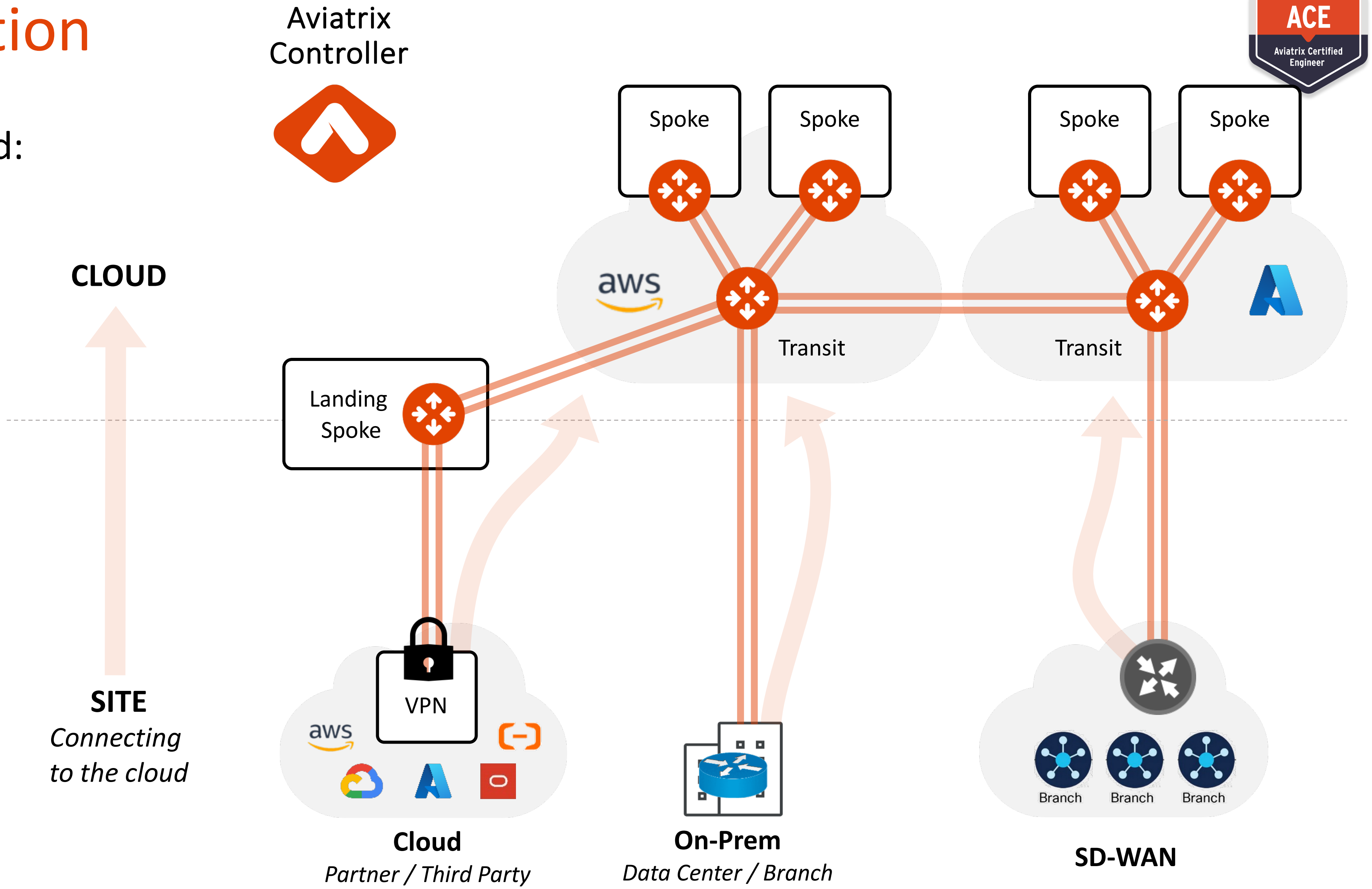
On-Prem
Data Center / Branch

SD-WAN

Site2Cloud Introduction

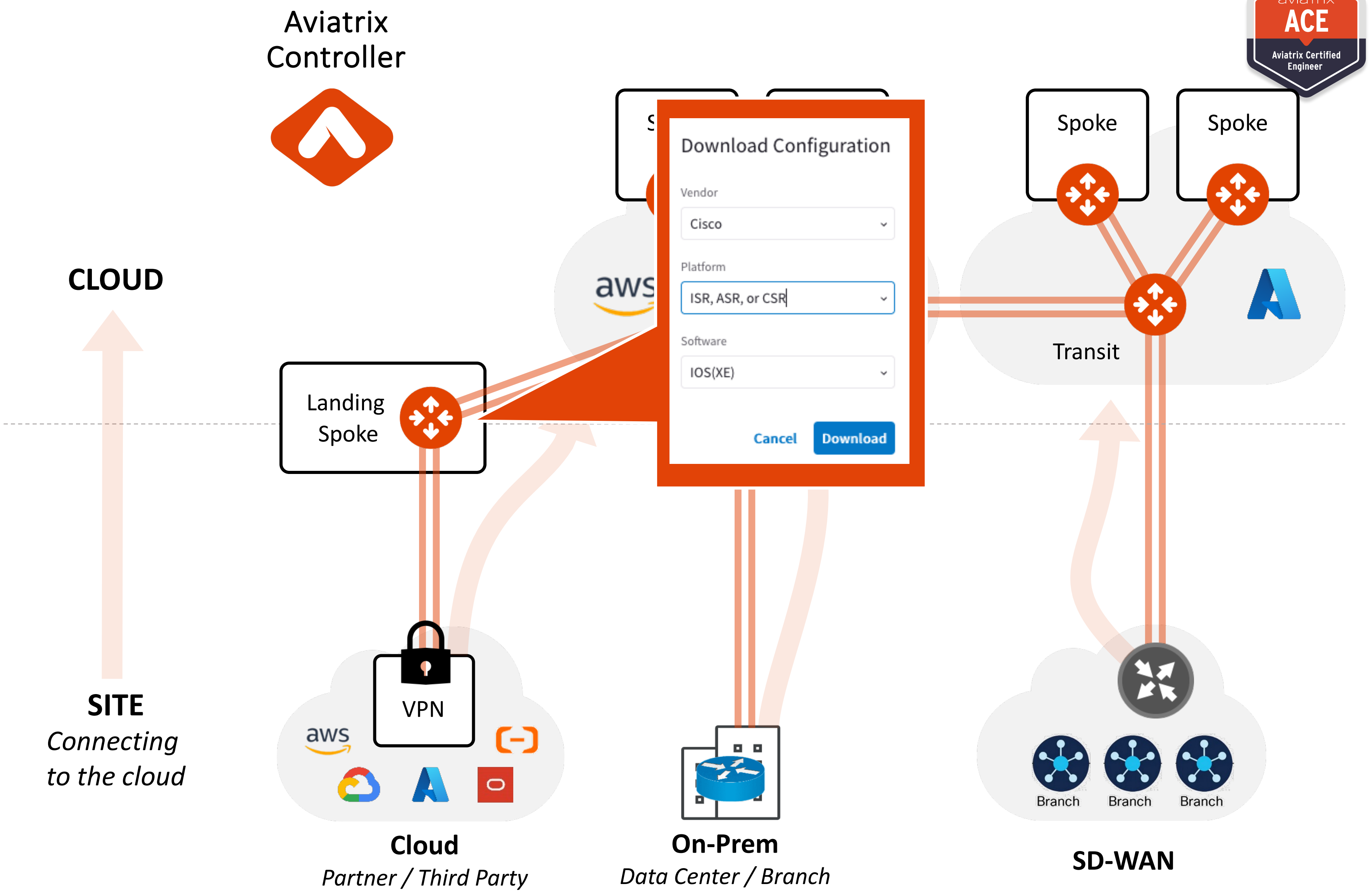
IPsec connection to Public Cloud:

- On-Prem DC
- Branch
- 3rd Party Appliances, SD-WAN
- Clouds Native Constructs (VPCs/VNets/VCNs)


Aviatrix Controller
CLOUD
SITE
Connecting to the cloud
Spoke
Spoke
Spoke
Spoke
aws
Transit
Transit
Landing Spoke
VPN
aws
Branch
Branch
Branch
Cloud
Partner / Third Party
On-Prem
Data Center / Branch
SD-WAN

Site2Cloud Solution

- Easy to use and template-driven
- Built-in diagnostic tools
- Solves Overlapping IPs Challenges



Aviatrix Controller
CLOUD
SITE
Connecting to the cloud
Landing Spoke
S
aws
Spoke
Spoke
Transit
VPN
aws
Branch
Branch
Branch
Cloud
Partner / Third Party
On-Prem
Data Center / Branch
SD-WAN

Download Configuration

Vendor: Cisco

Platform: ISR, ASR, or CSR

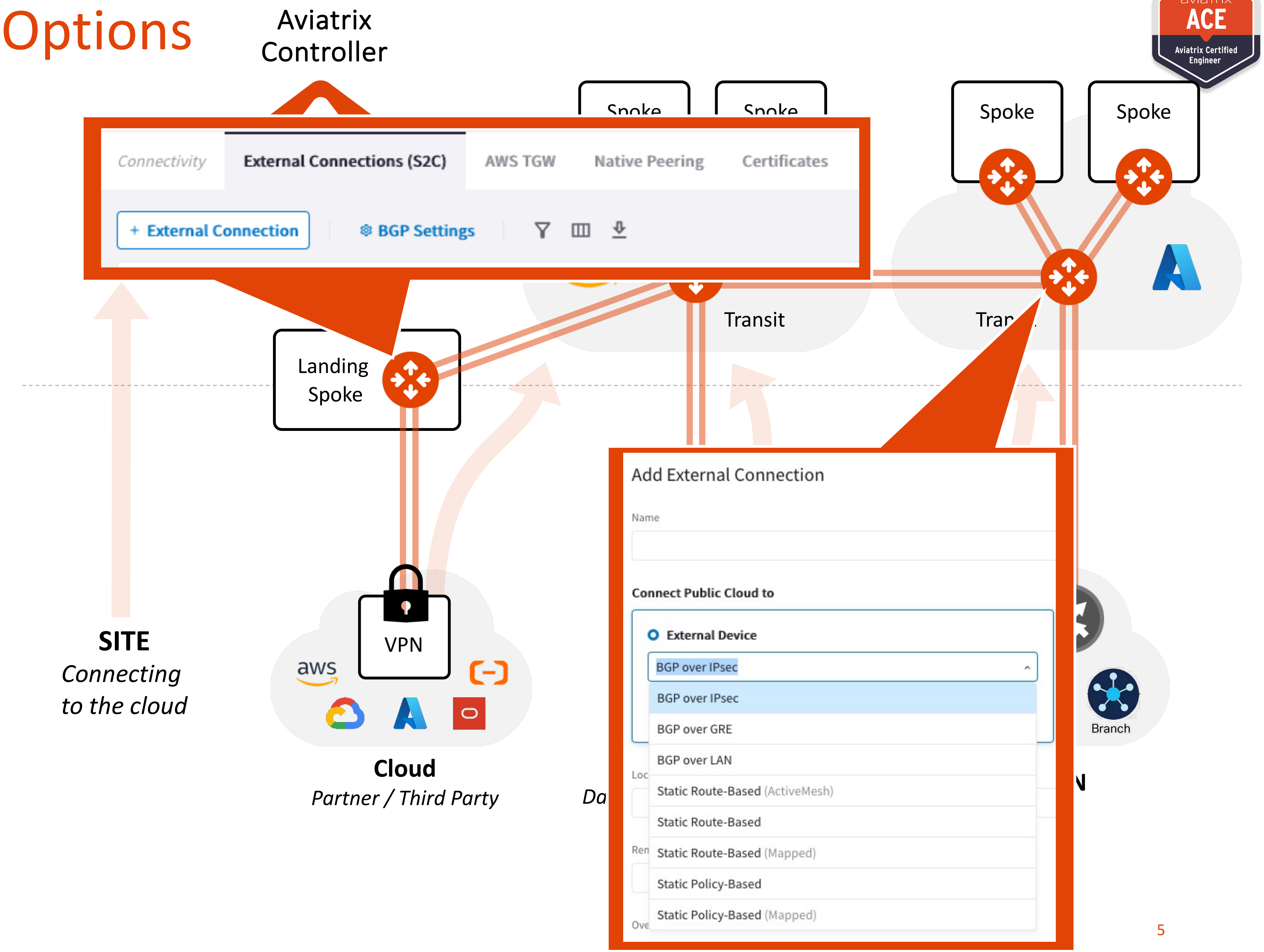
Software: IOS(XE)

Cancel
Download

Site2Cloud Landing Options

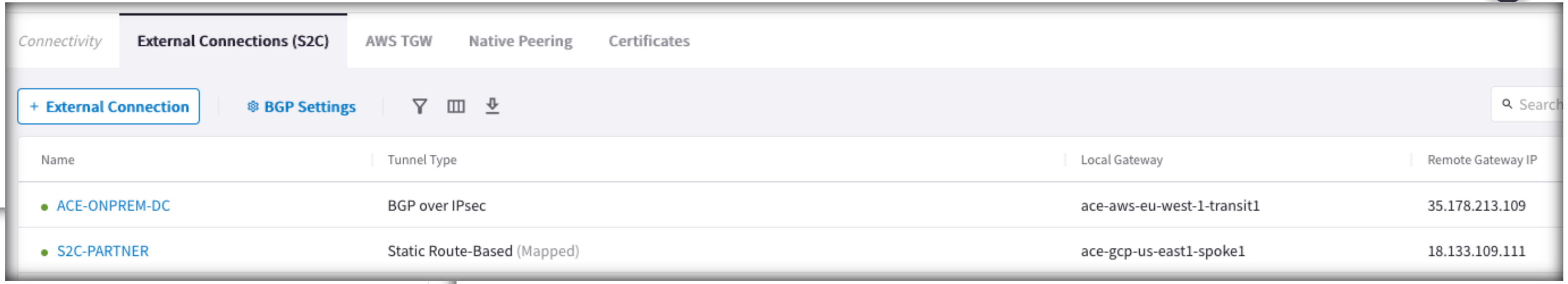
- **Landing on Transit**
  - Extend Core
  - SD-WAN

- **Landing on Spoke**
  - Scale
  - Partners
  - Complex Overlapping IP
  - Advanced NAT capabilities


Aviatrix Controller
Connectivity
External Connections (S2C)
AWS TGW
Native Peering
Certificates
+ External Connection
BGP Settings
Spoke
Spoke
Spoke
Spoke
Transit
Tran
Landing Spoke
SITE
Connecting to the cloud
VPN
aws
Cloud
Partner / Third Party
Da
Branch
N
Add External Connection
Name
Connect Public Cloud to
External Device
BGP over IPsec
BGP over IPsec
BGP over GRE
BGP over LAN
Static Route-Based (ActiveMesh)
Static Route-Based
Static Route-Based (Mapped)
Static Policy-Based
Static Policy-Based (Mapped)
Loc
Ren
Ove

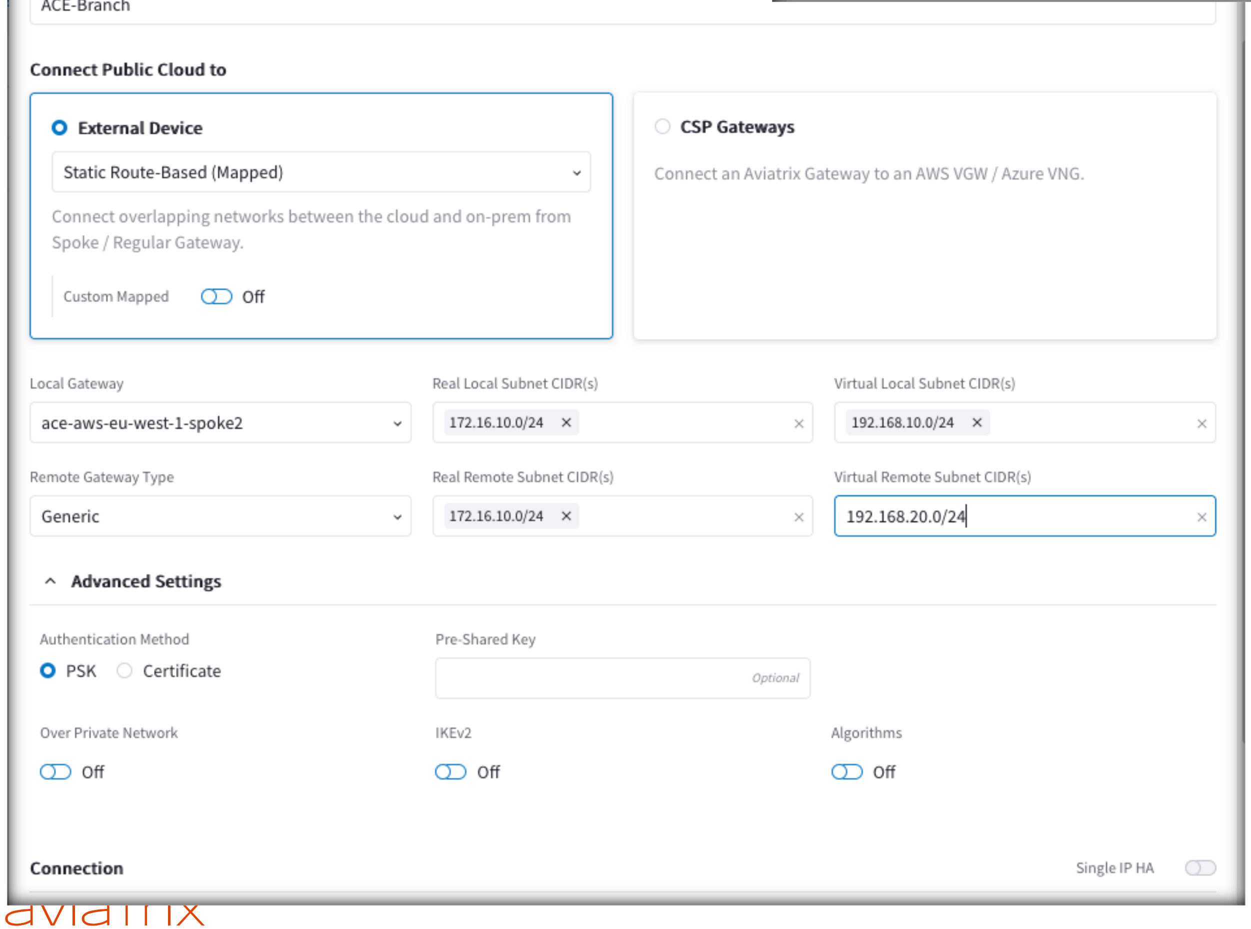
Site2Cloud – Deployment

BGP is supported on Site2Cloud tunnels to either Transit Gateway or Spoke Gateway



Name	Tunnel Type	Local Gateway	Remote Gateway IP
● ACE-ONPREM-DC	BGP over IPsec	ace-aws-eu-west-1-transit1	35.178.213.109
● S2C-PARTNER	Static Route-Based (Mapped)	ace-gcp-us-east1-spoke1	18.133.109.111

Add External Connection



ACE-Branch

Connect Public Cloud to

● **External Device**

Static Route-Based (Mapped)

Connect overlapping networks between the cloud and on-prem from Spoke / Regular Gateway.

Custom Mapped Off

○ **CSP Gateways**

Connect an Aviatrix Gateway to an AWS VGW / Azure VNG.

Local Gateway: ace-aws-eu-west-1-spoke2

Real Local Subnet CIDR(s): 172.16.10.0/24

Virtual Local Subnet CIDR(s): 192.168.10.0/24

Remote Gateway Type: Generic

Real Remote Subnet CIDR(s): 172.16.10.0/24

Virtual Remote Subnet CIDR(s): 192.168.20.0/24

Advanced Settings

Authentication Method: ● PSK ○ Certificate

Pre-Shared Key: *Optional*

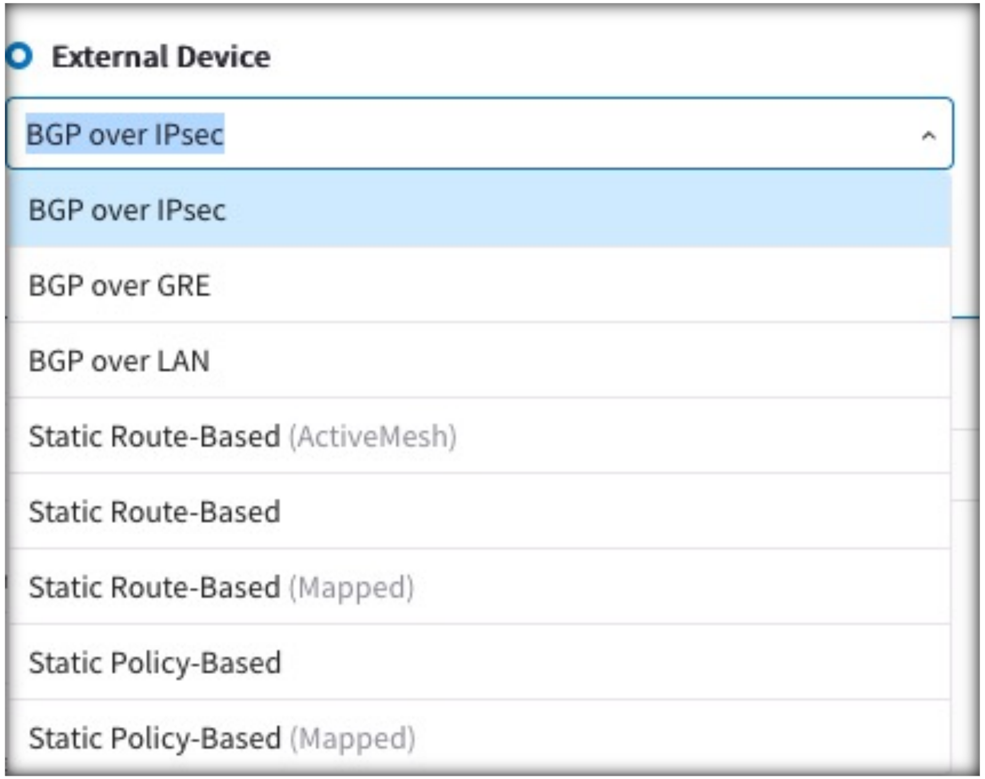
Over Private Network: Off

IKEv2: Off

Algorithms: Off

Connection

Single IP HA



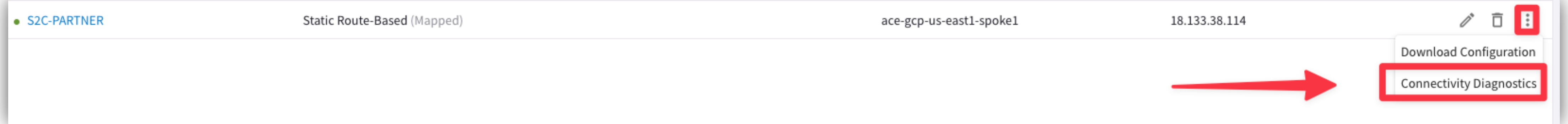
● **External Device**

BGP over IPsec

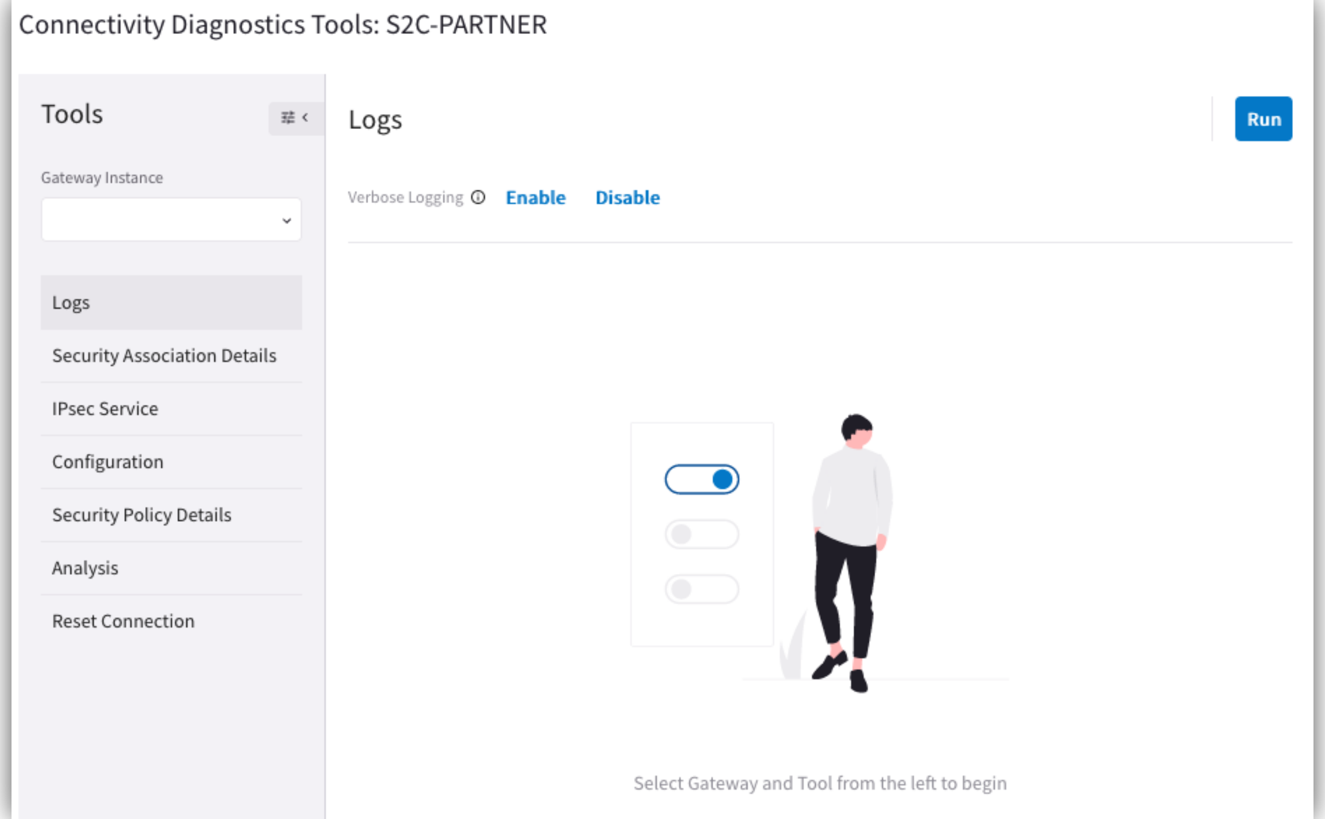
- BGP over IPsec
- BGP over GRE
- BGP over LAN
- Static Route-Based (ActiveMesh)
- Static Route-Based
- Static Route-Based (Mapped)
- Static Policy-Based
- Static Policy-Based (Mapped)

Monitoring & Troubleshooting Site2Cloud

Connectivity Diagnostics


S2C-PARTNER Static Route-Based (Mapped) ace-gcp-us-east1-spoke1 18.133.38.114
Download Configuration
Connectivity Diagnostics

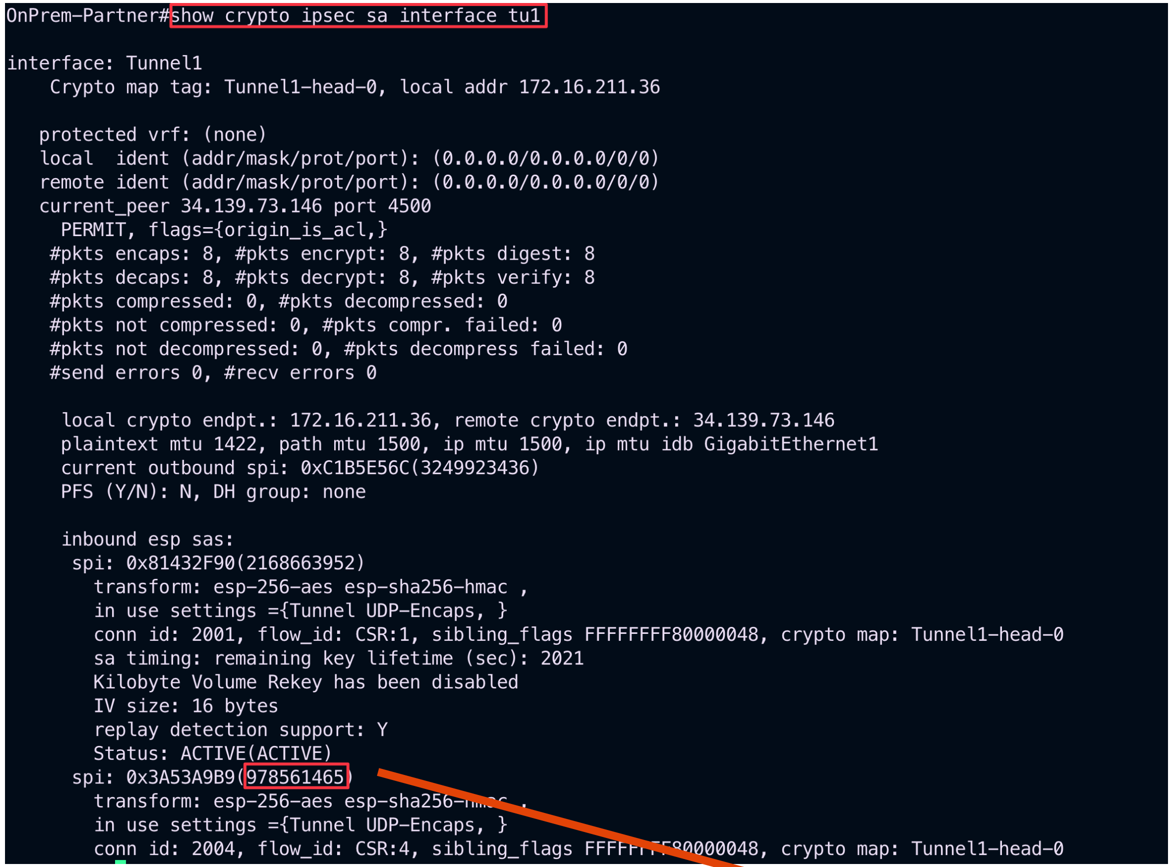
- Tunnel is operational?
- ‘Current’ number is increasing on both ends
  - **CoPilot> Networking > Connectivity > External Connections (S2C) > Connectivity Diagnostics**
  - Make sure SPI (Security Parameter Index) matches on remote end
  - SPI is an identification tag added to the header while using IPsec for tunneling the IP traffic
  - SPI is required part of an IPSec Security Association (SA)
  - https://en.wikipedia.org/wiki/Security_Parameter_Index


Connectivity Diagnostics Tools: S2C-PARTNER
Tools
Gateway Instance
Logs
Security Association Details
IPsec Service
Configuration
Security Policy Details
Analysis
Reset Connection
Logs
Run
Verbose Logging
Enable
Disable

Select Gateway and Tool from the left to begin

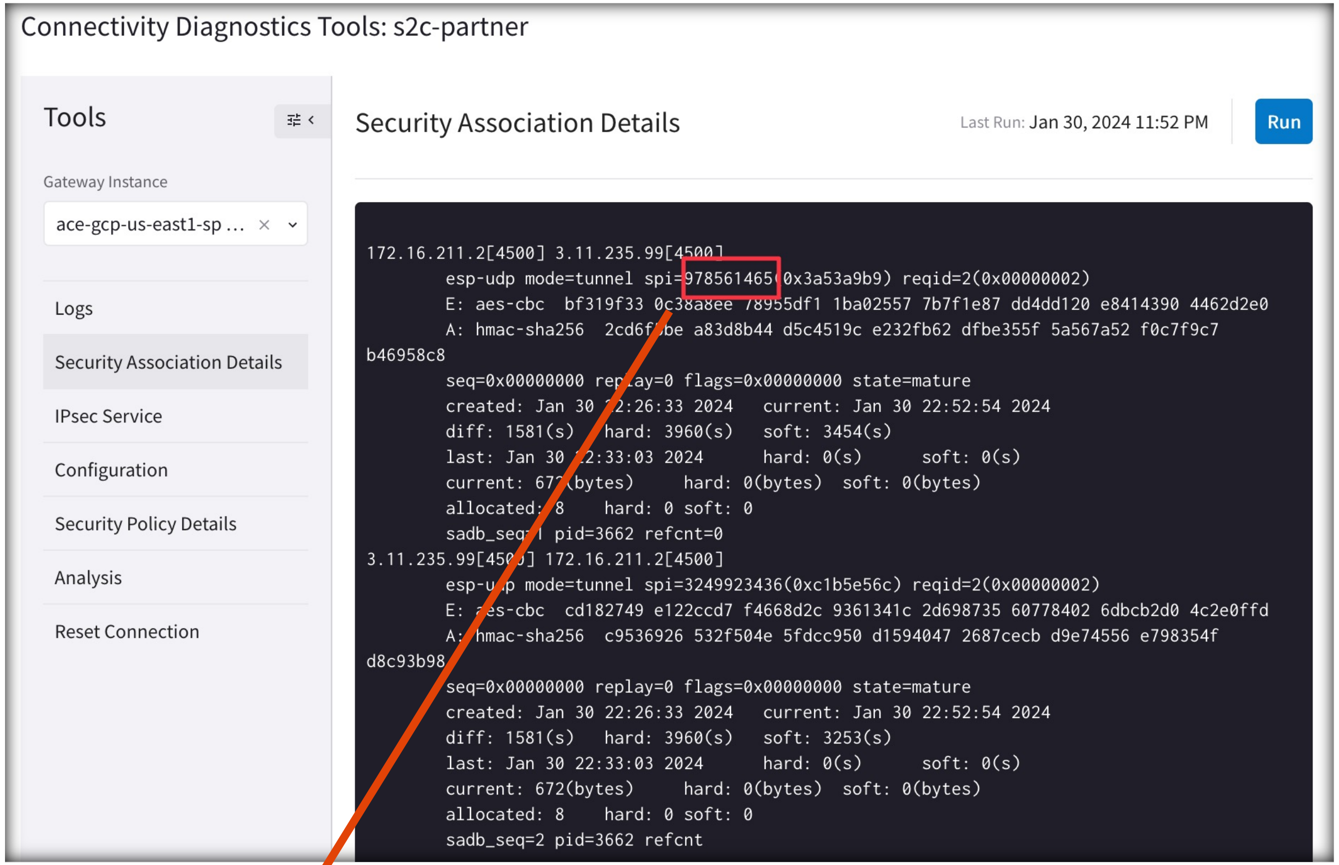
Monitoring – SPI

Cisco IOS outcome



```
OnPrem-Partner#show crypto ipsec sa interface tu1

interface: Tunnel1
    Crypto map tag: Tunnel1-head-0, local addr 172.16.211.36

   protected vrf: (none)
   local  ident (addr/mask/prot/port): (0.0.0.0/0.0.0.0/0/0)
   remote ident (addr/mask/prot/port): (0.0.0.0/0.0.0.0/0/0)
   current_peer 34.139.73.146 port 4500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 8, #pkts encrypt: 8, #pkts digest: 8
    #pkts decaps: 8, #pkts decrypt: 8, #pkts verify: 8
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 0, #recv errors 0

     local crypto endpt.: 172.16.211.36, remote crypto endpt.: 34.139.73.146
     plaintext mtu 1422, path mtu 1500, ip mtu 1500, ip mtu idb GigabitEthernet1
     current outbound spi: 0xC1B5E56C(3249923436)
     PFS (Y/N): N, DH group: none

     inbound esp sas:
      spi: 0x81432F90(2168663952)
        transform: esp-256-aes esp-sha256-hmac ,
        in use settings ={Tunnel UDP-Encaps, }
        conn id: 2001, flow_id: CSR:1, sibling_flags FFFFFFFF80000048, crypto map: Tunnel1-head-0
        sa timing: remaining key lifetime (sec): 2021
        Kilobyte Volume Rekey has been disabled
        IV size: 16 bytes
        replay detection support: Y
        Status: ACTIVE(ACTIVE)
      spi: 0x3A53A9B9(978561465)
        transform: esp-256-aes esp-sha256-hmac ,
        in use settings ={Tunnel UDP-Encaps, }
        conn id: 2004, flow_id: CSR:4, sibling_flags FFFFFFFF80000048, crypto map: Tunnel1-head-0
```

Aviatrix CoPilot outcome



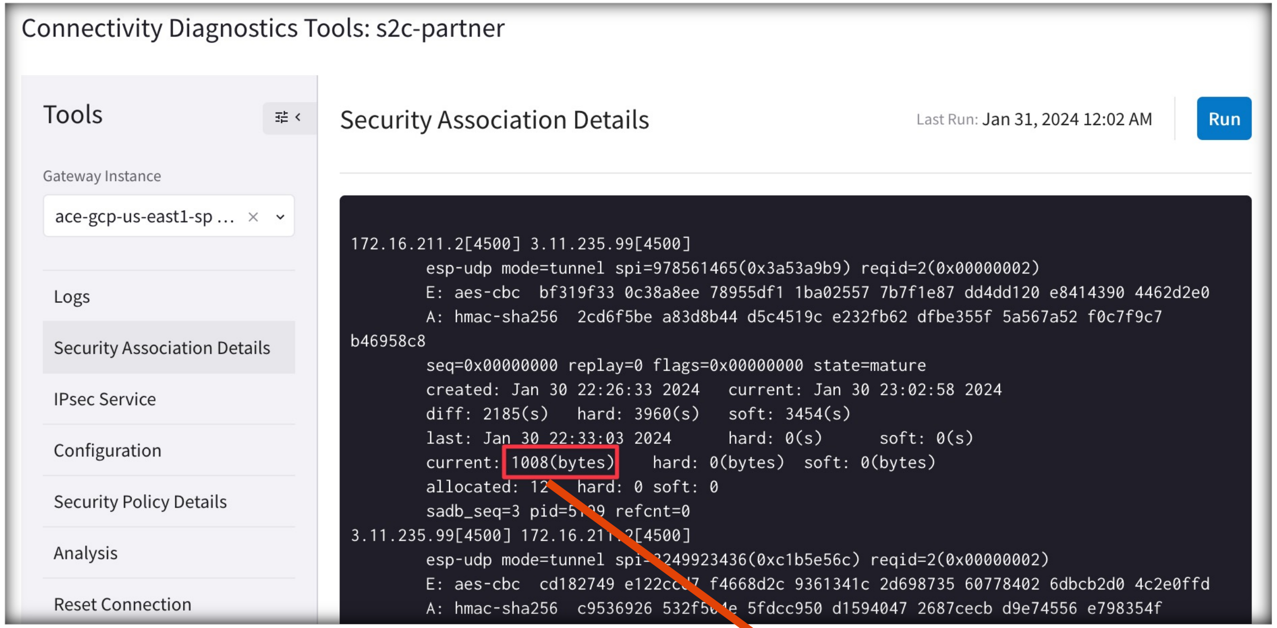
Connectivity Diagnostics Tools: s2c-partner
Tools
Gateway Instance
ace-gcp-us-east1-sp ...
Logs
Security Association Details
IPsec Service
Configuration
Security Policy Details
Analysis
Reset Connection
Security Association Details
Last Run: Jan 30, 2024 11:52 PM
Run

```
172.16.211.2[4500] 3.11.235.99[4500]
        esp-udp mode=tunnel spi=978561465(0x3a53a9b9) reqid=2(0x00000002)
        E: aes-cbc  bf319f33 0c38a8ee 78955df1 1ba02557 7b7f1e87 dd4dd120 e8414390 4462d2e0
        A: hmac-sha256  2cd6f[illegible]be a83d8b44 d5c4519c e232fb62 dfbe355f 5a567a52 f0c7f9c7
b46958c8
        seq=0x00000000 replay=0 flags=0x00000000 state=mature
        created: Jan 30 22:26:33 2024   current: Jan 30 22:52:54 2024
        diff: 1581(s)   hard: 3960(s)   soft: 3454(s)
        last: Jan 30 22:33:03 2024      hard: 0(s)      soft: 0(s)
        current: 672(bytes)     hard: 0(bytes)  soft: 0(bytes)
        allocated: 8    hard: 0 soft: 0
        sadb_seq=1 pid=3662 refcnt=0
3.11.235.99[4500] 172.16.211.2[4500]
        esp-udp mode=tunnel spi=3249923436(0xc1b5e56c) reqid=2(0x00000002)
        E: aes-cbc  cd182749 e122ccd7 f4668d2c 9361341c 2d698735 60778402 6dbcb2d0 4c2e0ffd
        A: hmac-sha256  c9536926 532f504e 5fdcc950 d1594047 2687cecb d9e74556 e798354f
d8c93b98
        seq=0x00000000 replay=0 flags=0x00000000 state=mature
        created: Jan 30 22:26:33 2024   current: Jan 30 22:52:54 2024
        diff: 1581(s)   hard: 3960(s)   soft: 3253(s)
        last: Jan 30 22:33:03 2024      hard: 0(s)      soft: 0(s)
        current: 672(bytes)     hard: 0(bytes)  soft: 0(bytes)
        allocated: 8    hard: 0 soft: 0
        sadb_seq=2 pid=3662 refcnt
```

SPI matches on both ends

Monitoring – ‘Current’ number is increasing

Aviatrix CoPilot outcome – First Time


Connectivity Diagnostics Tools: s2c-partner

Security Association Details

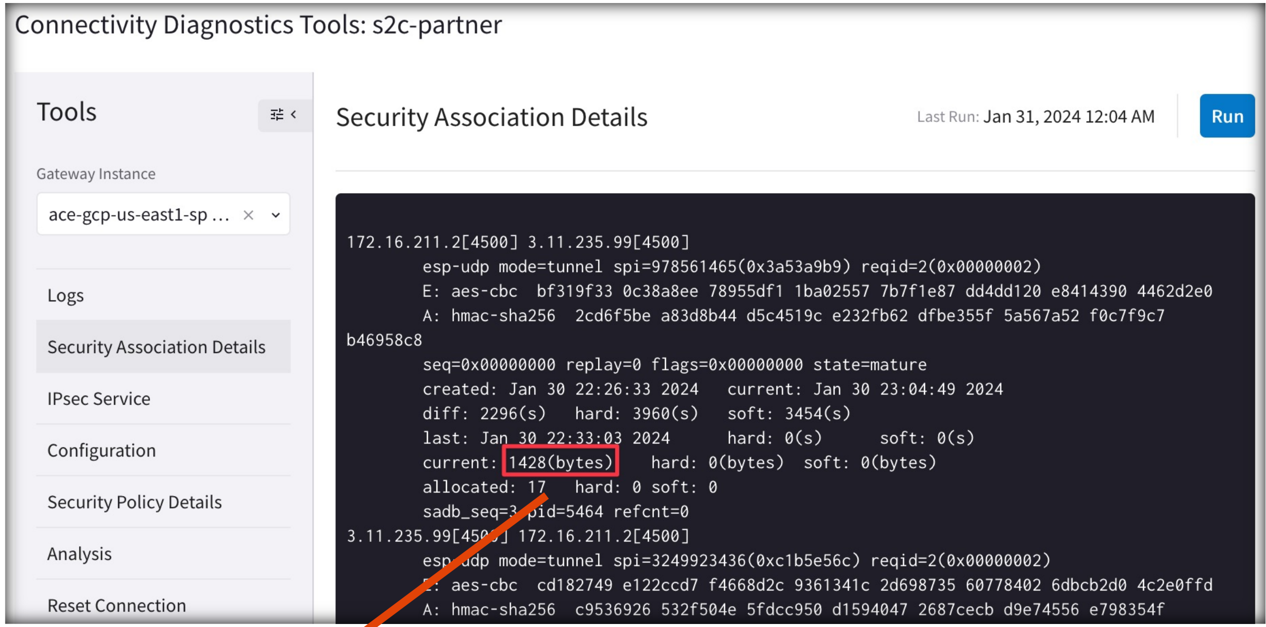
Last Run: Jan 31, 2024 12:02 AM

Gateway Instance: ace-gcp-us-east1-sp ...

Tools
Run
Logs
Security Association Details
IPsec Service
Configuration
Security Policy Details
Analysis
Reset Connection

```
172.16.211.2[4500] 3.11.235.99[4500]
        esp-udp mode=tunnel spi=978561465(0x3a53a9b9) reqid=2(0x00000002)
        E: aes-cbc  bf319f33 0c38a8ee 78955df1 1ba02557 7b7f1e87 dd4dd120 e8414390 4462d2e0
        A: hmac-sha256  2cd6f5be a83d8b44 d5c4519c e232fb62 dfbe355f 5a567a52 f0c7f9c7
b46958c8
        seq=0x00000000 replay=0 flags=0x00000000 state=mature
        created: Jan 30 22:26:33 2024   current: Jan 30 23:02:58 2024
        diff: 2185(s)   hard: 3960(s)   soft: 3454(s)
        last: Jan 30 22:33:03 2024      hard: 0(s)      soft: 0(s)
        current: 1008(bytes)    hard: 0(bytes)  soft: 0(bytes)
        allocated: 12   hard: 0 soft: 0
        sadb_seq=3 pid=5109 refcnt=0
3.11.235.99[4500] 172.16.211.2[4500]
        esp-udp mode=tunnel spi=3249923436(0xc1b5e56c) reqid=2(0x00000002)
        E: aes-cbc  cd182749 e122ccd7 f4668d2c 9361341c 2d698735 60778402 6dbcb2d0 4c2e0ffd
        A: hmac-sha256  c9536926 532f504e 5fdcc950 d1594047 2687cecb d9e74556 e798354f
```

Aviatrix CoPilot outcome – Second Time


Connectivity Diagnostics Tools: s2c-partner

Security Association Details

Last Run: Jan 31, 2024 12:04 AM

Gateway Instance: ace-gcp-us-east1-sp ...

Tools
Run
Logs
Security Association Details
IPsec Service
Configuration
Security Policy Details
Analysis
Reset Connection

```
172.16.211.2[4500] 3.11.235.99[4500]
        esp-udp mode=tunnel spi=978561465(0x3a53a9b9) reqid=2(0x00000002)
        E: aes-cbc  bf319f33 0c38a8ee 78955df1 1ba02557 7b7f1e87 dd4dd120 e8414390 4462d2e0
        A: hmac-sha256  2cd6f5be a83d8b44 d5c4519c e232fb62 dfbe355f 5a567a52 f0c7f9c7
b46958c8
        seq=0x00000000 replay=0 flags=0x00000000 state=mature
        created: Jan 30 22:26:33 2024   current: Jan 30 23:04:49 2024
        diff: 2296(s)   hard: 3960(s)   soft: 3454(s)
        last: Jan 30 22:33:03 2024      hard: 0(s)      soft: 0(s)
        current: 1428(bytes)    hard: 0(bytes)  soft: 0(bytes)
        allocated: 17   hard: 0 soft: 0
        sadb_seq=3 pid=5464 refcnt=0
3.11.235.99[4500] 172.16.211.2[4500]
        esp-udp mode=tunnel spi=3249923436(0xc1b5e56c) reqid=2(0x00000002)
        E: aes-cbc  cd182749 e122ccd7 f4668d2c 9361341c 2d698735 60778402 6dbcb2d0 4c2e0ffd
        A: hmac-sha256  c9536926 532f504e 5fdcc950 d1594047 2687cecb d9e74556 e798354f
```

‘Current’ number is increasing

Troubleshooting

In the event of an IPsec VPN tunnel going down, follow these steps in sequence:

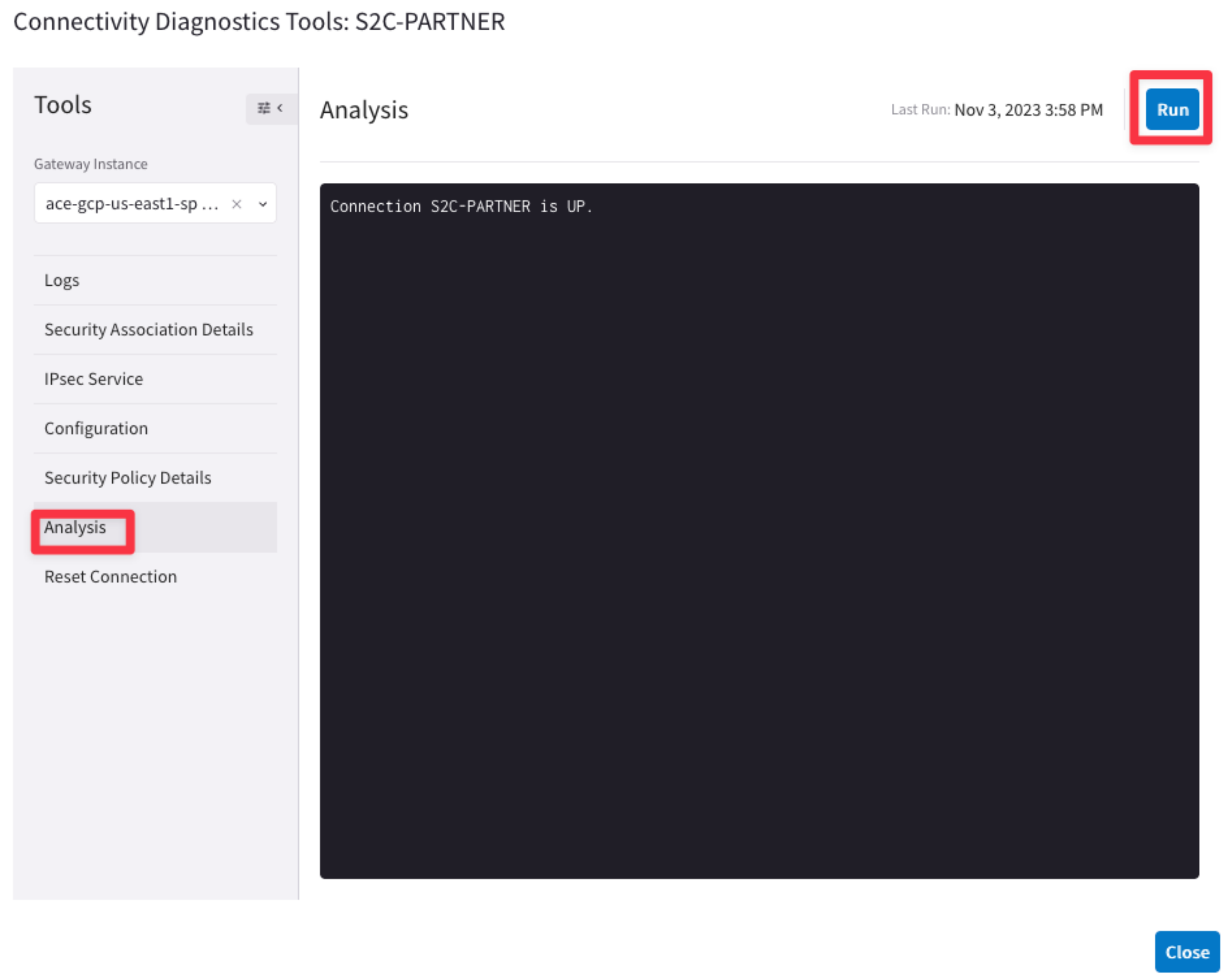
1. **Confirm Layer 3 connectivity**
   - Public IP reachable? Is there an ISP (BGP) issue?
   - If ping is disabled, check packet capture on remote public IP for ISAKMP packets
2. **Confirm SG/NSG allowed for outbound**
   - UDP 500 (ISAKMP – for ESP)
   - UDP 4500 (NAT- Traversal)
3. **Confirm whether IPsec Phase 2 or IPsec SA negotiation is stuck**
   - Restart IPsec service from SITE2CLOUD > Diagnostics
4. **Check policies outside each end of the tunnel**
   - ACL policies on remote end
   - Security Groups/NACLs on Cloud side

Supported IPsec Encryption Algorithms

Type	Value
Phase 1 Authentication	SHA-1, SHA-512, SHA-384, SHA-256
Phase 1 DH Groups	1, 2, 5, 14, 15, 16, 17, 18, 19, 20, 21
Phase 1 Encryption	AES-256-CBC, AES-256-GCM-64, AES-256-GCM-96, AES-256-GCM-128, AES-192-CBC, AES-128-CBC, AES-128-GCM-64, AES-128-GCM-96, AES-128-GCM-128, 3DES
Phase 2 Authentication	HMAC-SHA-1, HMAC-SHA-512, HMAC-SHA-384, HMAC-SHA-256, NO-AUTH
Phase 2 DH Groups	1, 2, 5, 14, 15, 16, 17, 18, 19, 20, 21
Phase 2 Encryption	AES-128-CBC, AES-192-CBC, AES-256-CBC, AES-256-GCM-64, AES-256-GCM-96, AES-256-GCM-128, AES-128-GCM-64, AES-128-GCM-96, AES-128-GCM-128, 3DES, NULL-ENCR

https://docs.aviatrix.com/HowTos/site2cloud_faq.html

Diagnostics - Run Analysis



Connectivity Diagnostics Tools: S2C-PARTNER

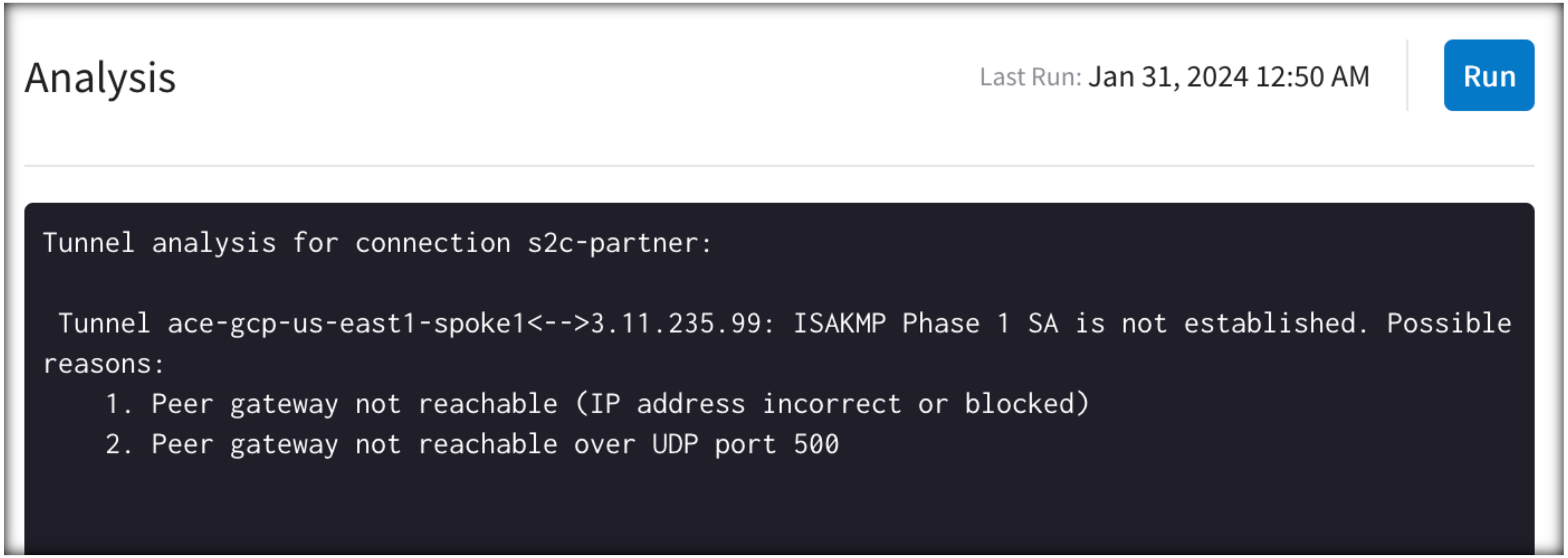
Tools
Gateway Instance
ace-gcp-us-east1-sp ...
Logs
Security Association Details
IPsec Service
Configuration
Security Policy Details
Analysis
Reset Connection
Analysis
Run
Close

Last Run: Nov 3, 2023 3:58 PM

```
Connection S2C-PARTNER is UP.
```

Analysis – On-prem router is down

On-prem router is **down…**

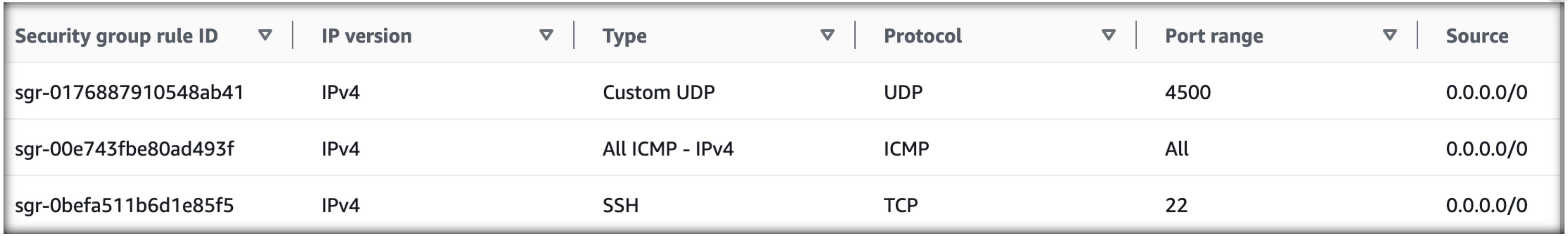


Analysis

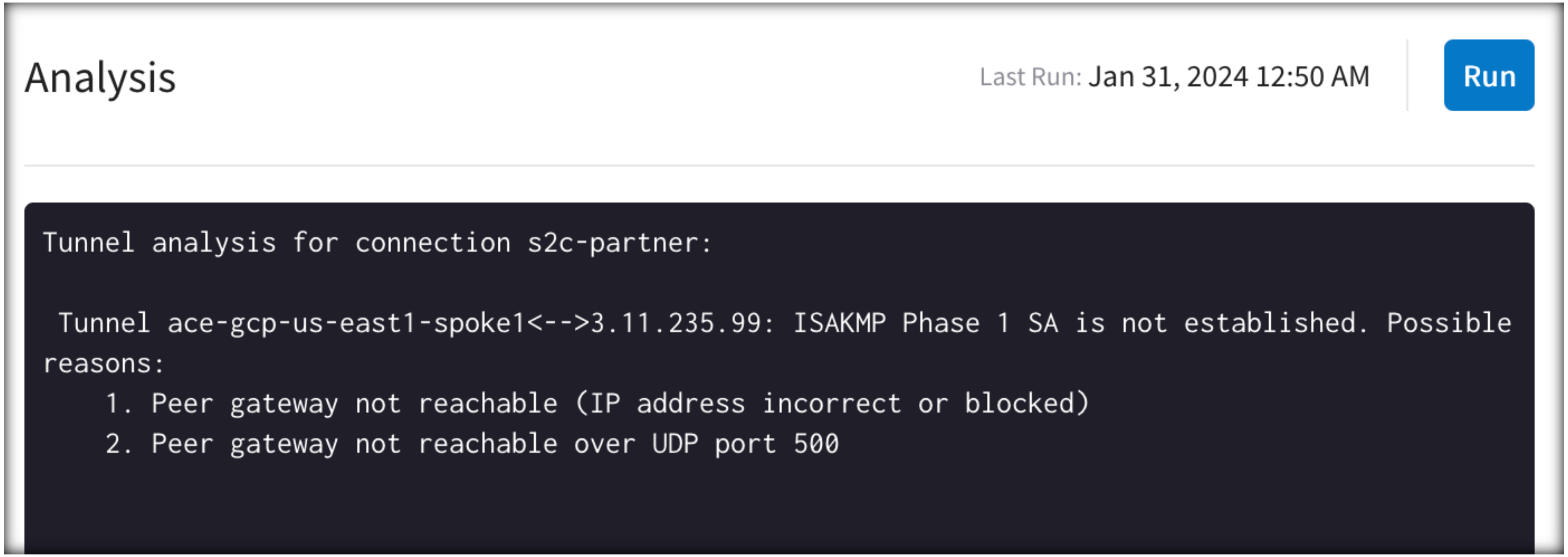
Last Run: Jan 31, 2024 12:50 AM

```
Tunnel analysis for connection s2c-partner:

 Tunnel ace-gcp-us-east1-spoke1<-->3.11.235.99: ISAKMP Phase 1 SA is not established. Possible
reasons:
    1. Peer gateway not reachable (IP address incorrect or blocked)
    2. Peer gateway not reachable over UDP port 500
```

Analysis – UDP port 500 is not permitted

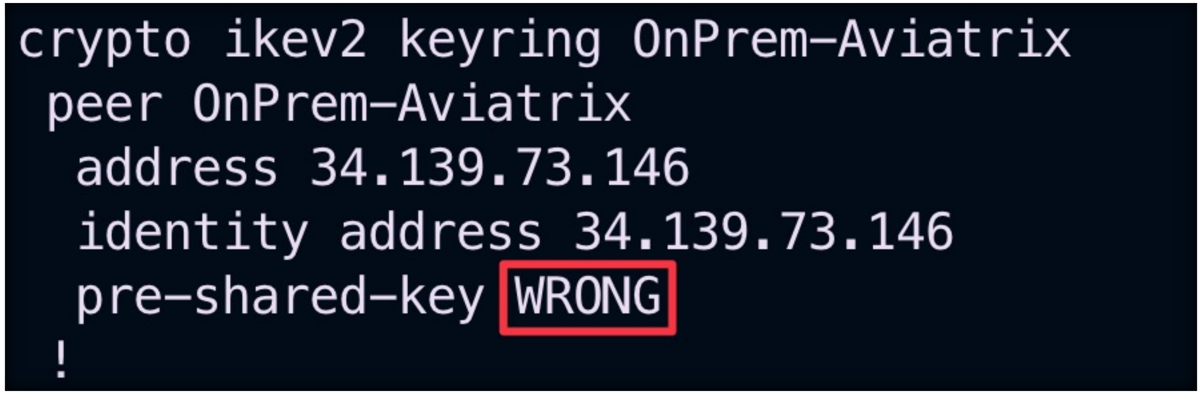


Security group rule ID	IP version	Type	Protocol	Port range	Source
sgr-0176887910548ab41	IPv4	Custom UDP	UDP	4500	0.0.0.0/0
sgr-00e743fbe80ad493f	IPv4	All ICMP - IPv4	ICMP	All	0.0.0.0/0
sgr-0befa511b6d1e85f5	IPv4	SSH	TCP	22	0.0.0.0/0

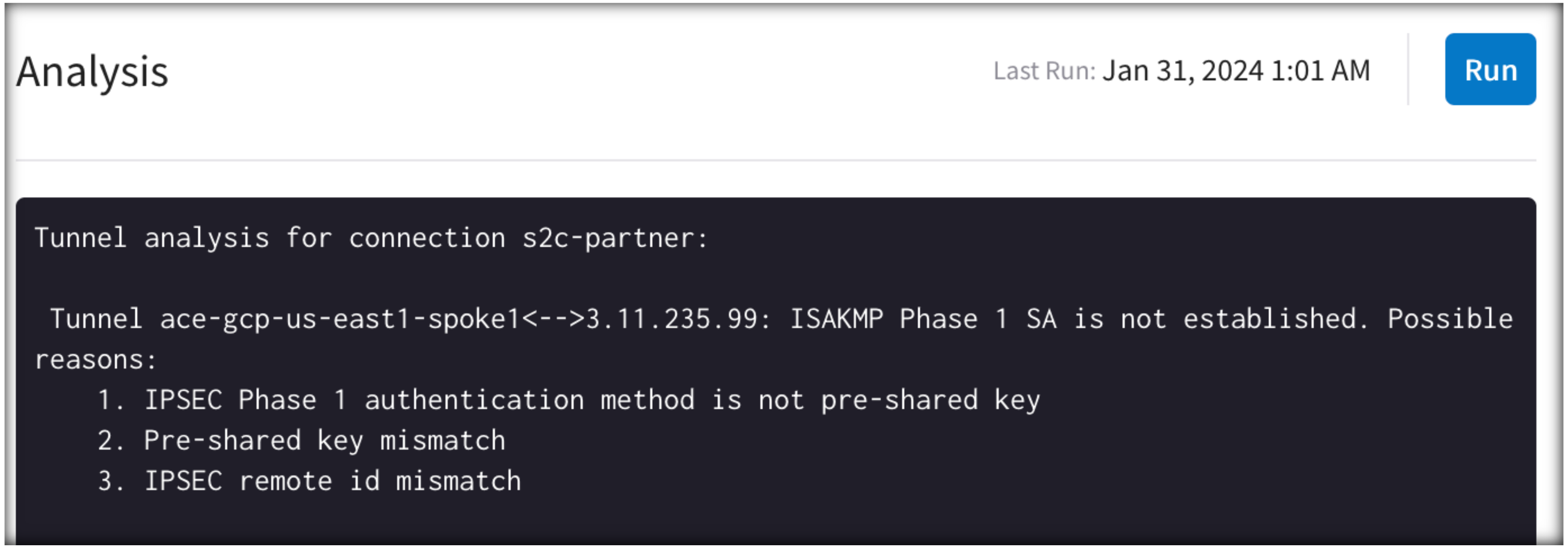


```
Tunnel analysis for connection s2c-partner:

 Tunnel ace-gcp-us-east1-spoke1<-->3.11.235.99: ISAKMP Phase 1 SA is not established. Possible
reasons:
    1. Peer gateway not reachable (IP address incorrect or blocked)
    2. Peer gateway not reachable over UDP port 500
```

Analysis – Pre-shared key mismatch

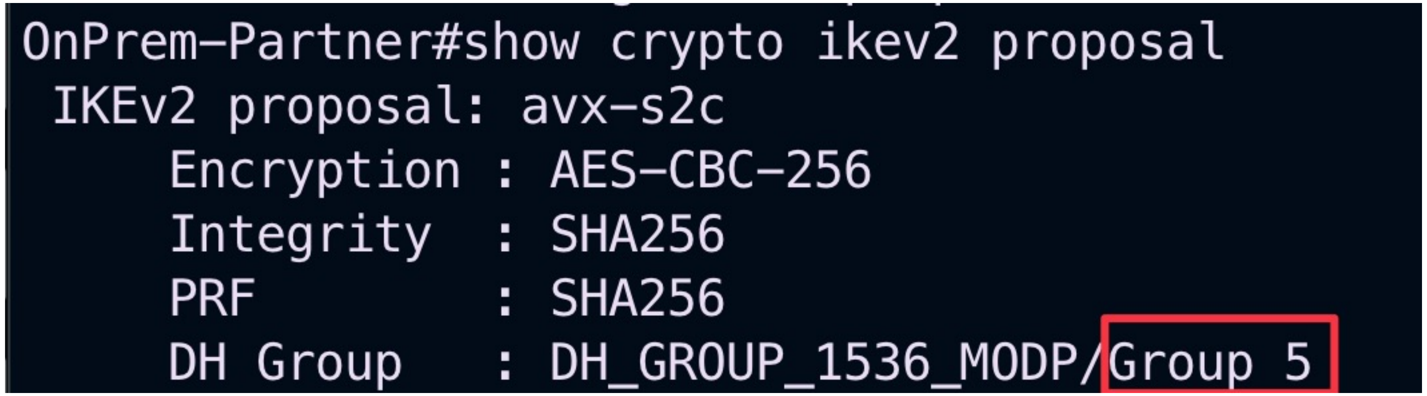


```
crypto ikev2 keyring OnPrem-Aviatrix
 peer OnPrem-Aviatrix
  address 34.139.73.146
  identity address 34.139.73.146
  pre-shared-key WRONG
 !
```

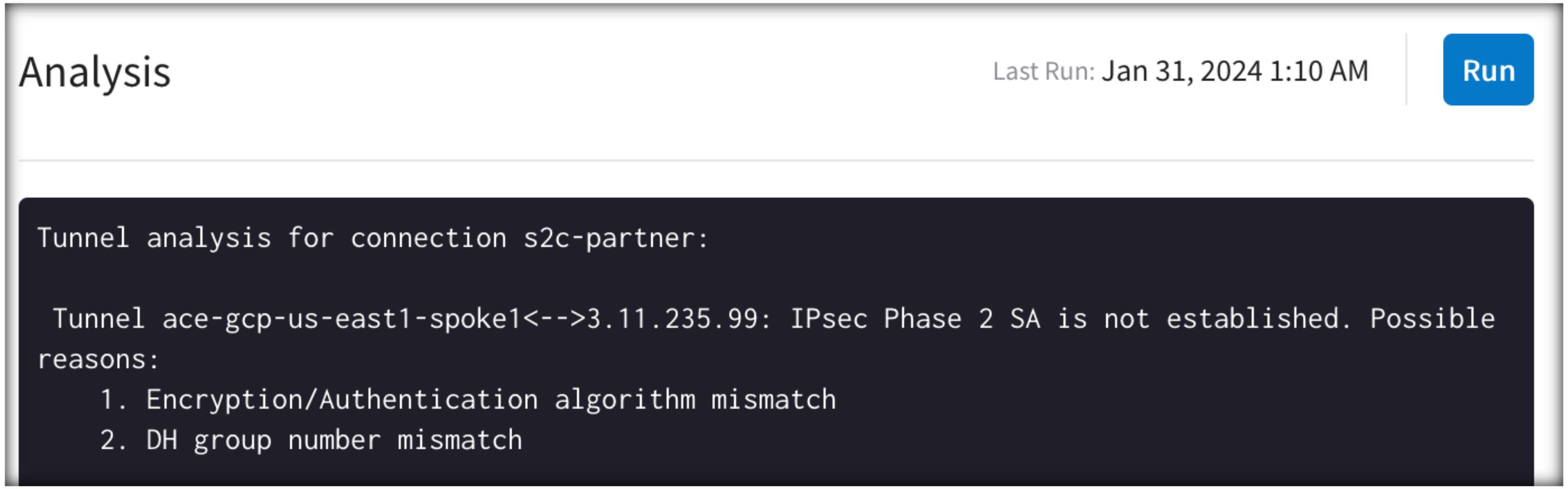


```
Tunnel analysis for connection s2c-partner:

 Tunnel ace-gcp-us-east1-spoke1<-->3.11.235.99: ISAKMP Phase 1 SA is not established. Possible
reasons:
    1. IPSEC Phase 1 authentication method is not pre-shared key
    2. Pre-shared key mismatch
    3. IPSEC remote id mismatch
```

Analysis – DH Group mismatch



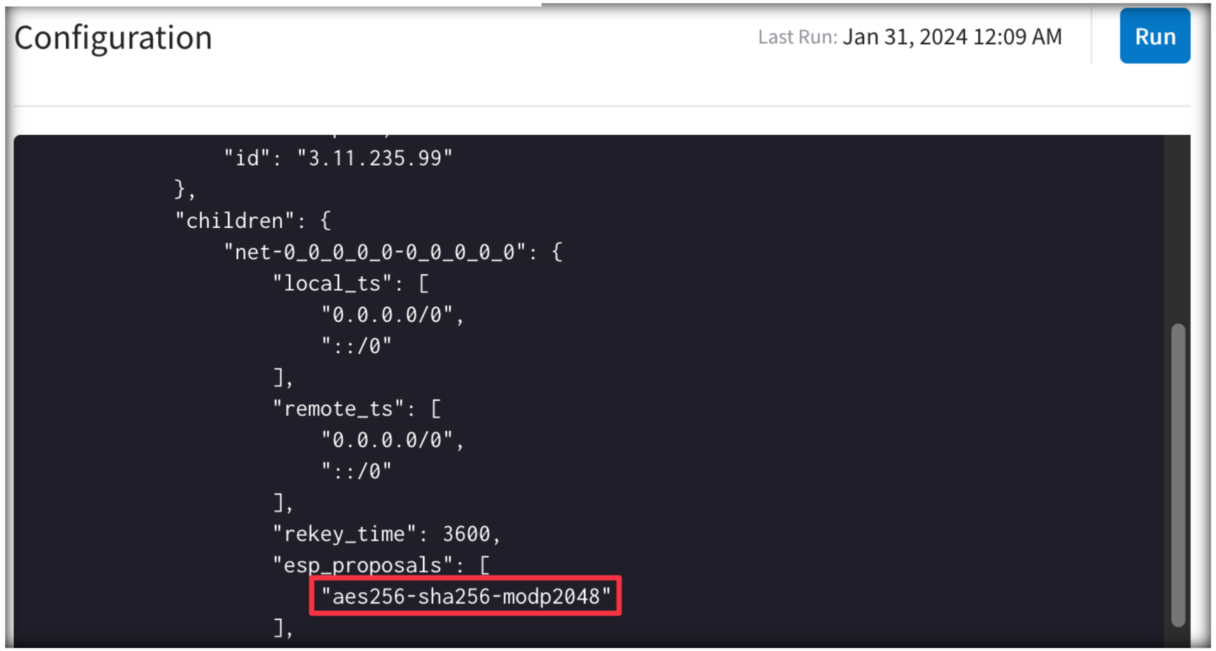
```
OnPrem-Partner#show crypto ikev2 proposal
 IKEv2 proposal: avx-s2c
     Encryption : AES-CBC-256
     Integrity  : SHA256
     PRF        : SHA256
     DH Group   : DH_GROUP_1536_MODP/Group 5
```



```
Tunnel analysis for connection s2c-partner:

 Tunnel ace-gcp-us-east1-spoke1<-->3.11.235.99: IPsec Phase 2 SA is not established. Possible
reasons:
    1. Encryption/Authentication algorithm mismatch
    2. DH group number mismatch
```

Analysis – Encryption algorithm mismatch

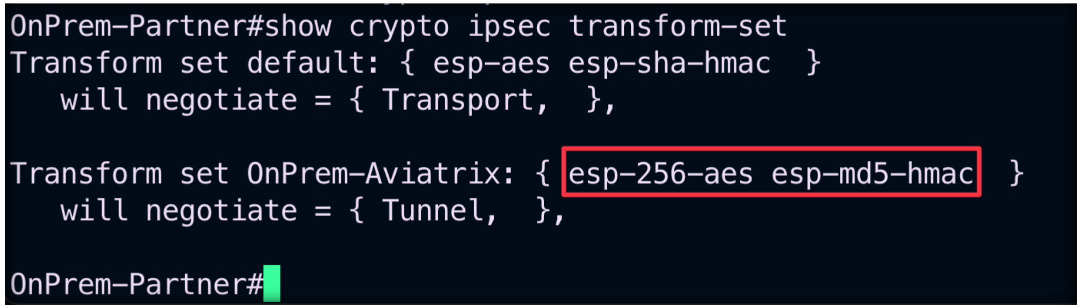
Aviatrix CoPilot outcome



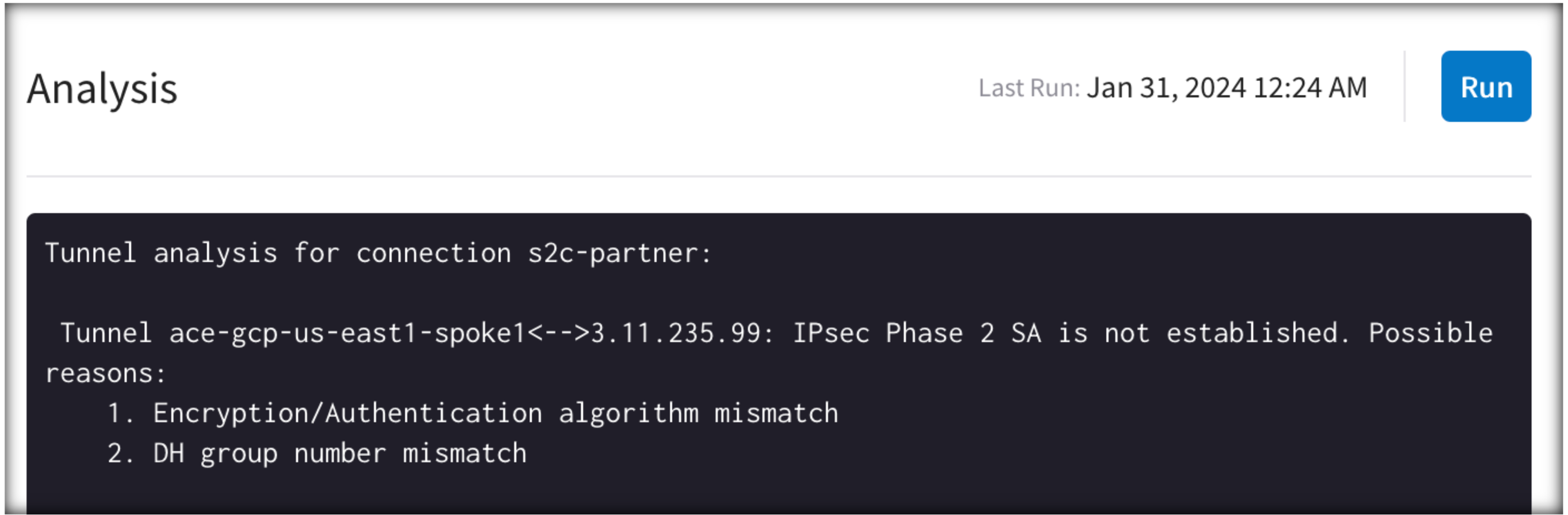
Configuration
Last Run: Jan 31, 2024 12:09 AM
Run

```
                "id": "3.11.235.99"
            },
            "children": {
                "net-0_0_0_0_0-0_0_0_0_0": {
                    "local_ts": [
                        "0.0.0.0/0",
                        "::/0"
                    ],
                    "remote_ts": [
                        "0.0.0.0/0",
                        "::/0"
                    ],
                    "rekey_time": 3600,
                    "esp_proposals": [
                        "aes256-sha256-modp2048"
                    ],
```

Cisco IOS outcome



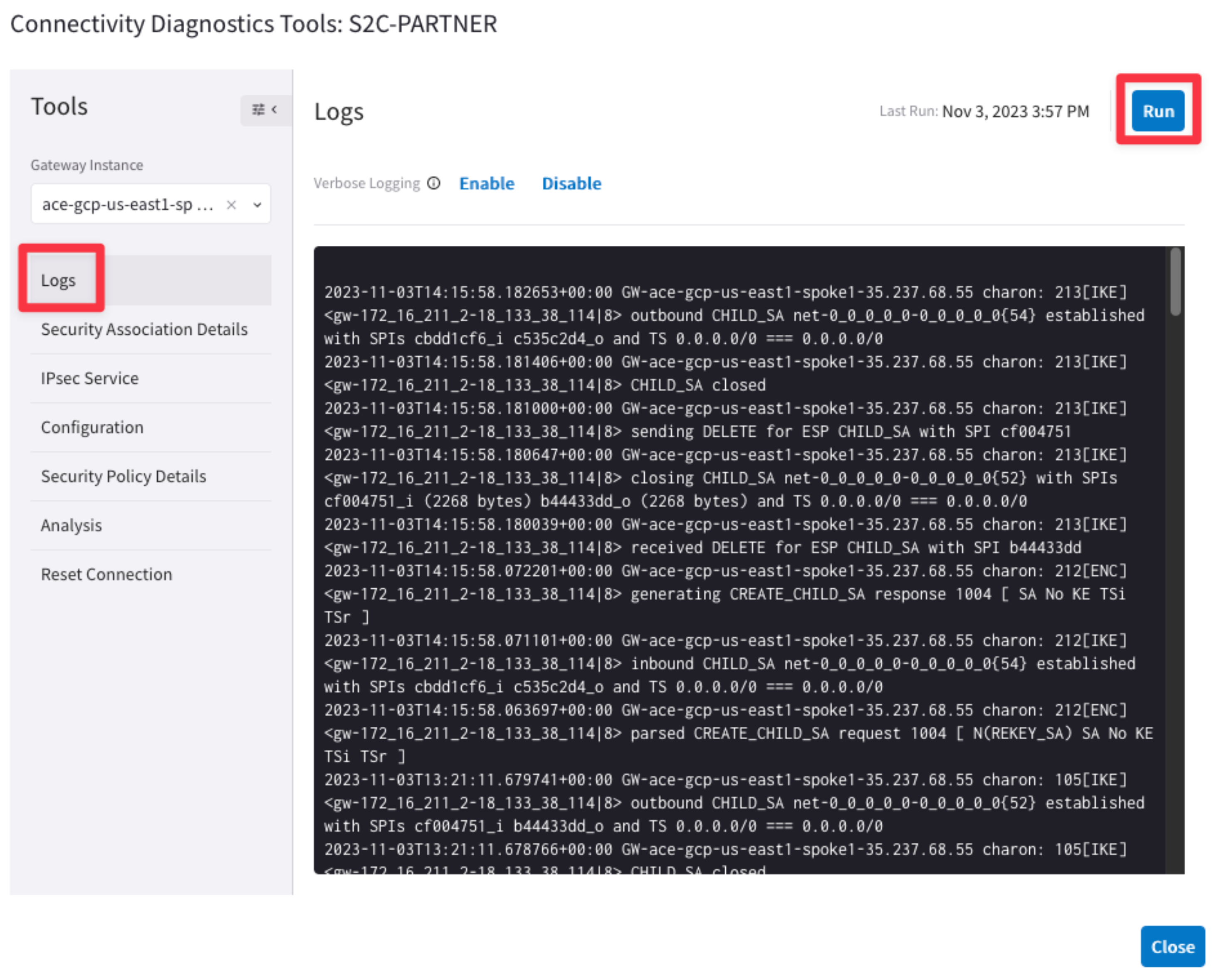
```
OnPrem-Partner#show crypto ipsec transform-set
Transform set default: { esp-aes esp-sha-hmac  }
   will negotiate = { Transport,  },

Transform set OnPrem-Aviatrix: { esp-256-aes esp-md5-hmac  }
   will negotiate = { Tunnel,  },

OnPrem-Partner#
```



Analysis
Last Run: Jan 31, 2024 12:24 AM
Run

```
Tunnel analysis for connection s2c-partner:

 Tunnel ace-gcp-us-east1-spoke1<-->3.11.235.99: IPsec Phase 2 SA is not established. Possible
reasons:
    1. Encryption/Authentication algorithm mismatch
    2. DH group number mismatch
```

Diagnostics – show logs


Connectivity Diagnostics Tools: S2C-PARTNER
Tools
Gateway Instance
ace-gcp-us-east1-sp …
Logs
Security Association Details
IPsec Service
Configuration
Security Policy Details
Analysis
Reset Connection
Logs
Run
Enable
Disable
Close

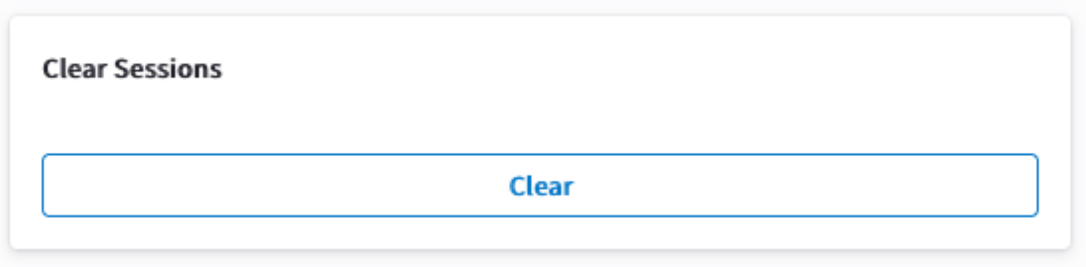
Last Run: Nov 3, 2023 3:57 PM

Verbose Logging

```
2023-11-03T14:15:58.182653+00:00 GW-ace-gcp-us-east1-spoke1-35.237.68.55 charon: 213[IKE]
<gw-172_16_211_2-18_133_38_114|8> outbound CHILD_SA net-0_0_0_0_0-0_0_0_0_0{54} established
with SPIs cbdd1cf6_i c535c2d4_o and TS 0.0.0.0/0 === 0.0.0.0/0
2023-11-03T14:15:58.181406+00:00 GW-ace-gcp-us-east1-spoke1-35.237.68.55 charon: 213[IKE]
<gw-172_16_211_2-18_133_38_114|8> CHILD_SA closed
2023-11-03T14:15:58.181000+00:00 GW-ace-gcp-us-east1-spoke1-35.237.68.55 charon: 213[IKE]
<gw-172_16_211_2-18_133_38_114|8> sending DELETE for ESP CHILD_SA with SPI cf004751
2023-11-03T14:15:58.180647+00:00 GW-ace-gcp-us-east1-spoke1-35.237.68.55 charon: 213[IKE]
<gw-172_16_211_2-18_133_38_114|8> closing CHILD_SA net-0_0_0_0_0-0_0_0_0_0{52} with SPIs
cf004751_i (2268 bytes) b44433dd_o (2268 bytes) and TS 0.0.0.0/0 === 0.0.0.0/0
2023-11-03T14:15:58.180039+00:00 GW-ace-gcp-us-east1-spoke1-35.237.68.55 charon: 213[IKE]
<gw-172_16_211_2-18_133_38_114|8> received DELETE for ESP CHILD_SA with SPI b44433dd
2023-11-03T14:15:58.072201+00:00 GW-ace-gcp-us-east1-spoke1-35.237.68.55 charon: 212[ENC]
<gw-172_16_211_2-18_133_38_114|8> generating CREATE_CHILD_SA response 1004 [ SA No KE TSi
TSr ]
2023-11-03T14:15:58.071101+00:00 GW-ace-gcp-us-east1-spoke1-35.237.68.55 charon: 212[IKE]
<gw-172_16_211_2-18_133_38_114|8> inbound CHILD_SA net-0_0_0_0_0-0_0_0_0_0{54} established
with SPIs cbdd1cf6_i c535c2d4_o and TS 0.0.0.0/0 === 0.0.0.0/0
2023-11-03T14:15:58.063697+00:00 GW-ace-gcp-us-east1-spoke1-35.237.68.55 charon: 212[ENC]
<gw-172_16_211_2-18_133_38_114|8> parsed CREATE_CHILD_SA request 1004 [ N(REKEY_SA) SA No KE
TSi TSr ]
2023-11-03T13:21:11.679741+00:00 GW-ace-gcp-us-east1-spoke1-35.237.68.55 charon: 105[IKE]
<gw-172_16_211_2-18_133_38_114|8> outbound CHILD_SA net-0_0_0_0_0-0_0_0_0_0{52} established
with SPIs cf004751_i b44433dd_o and TS 0.0.0.0/0 === 0.0.0.0/0
2023-11-03T13:21:11.678766+00:00 GW-ace-gcp-us-east1-spoke1-35.237.68.55 charon: 105[IKE]
<gw-172_16_211_2-18_133_38_114|8> CHILD_SA closed
```

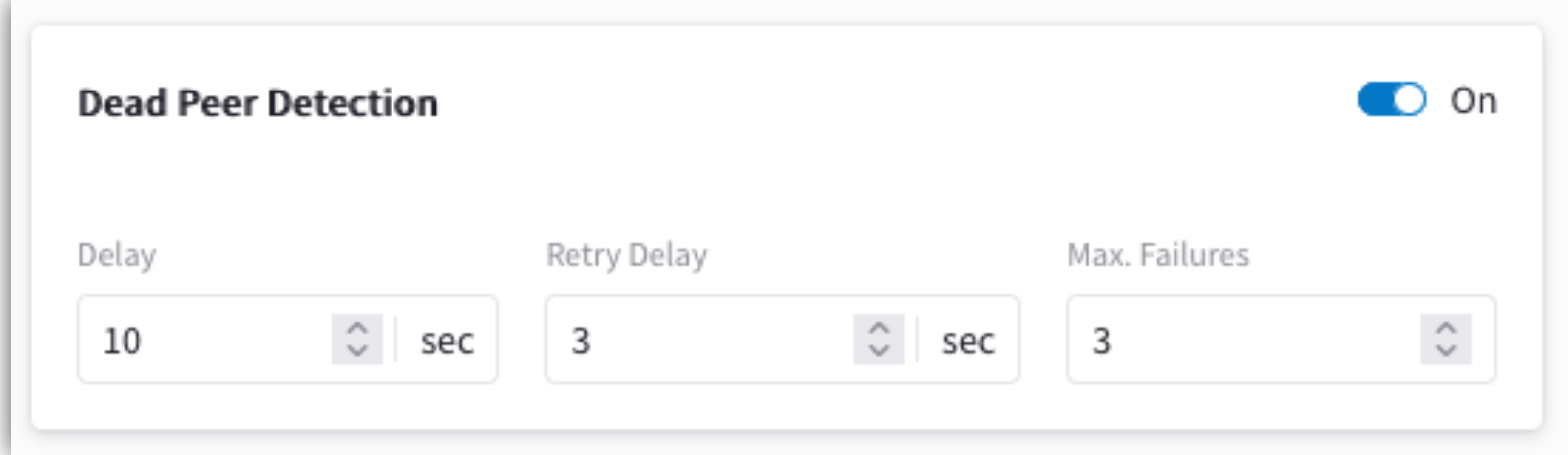
Dead Peer Detection Mismatch

- Dead Peer Detection is configured on Aviatrix gateways by default as follows (can be configured):
  - interval 10 seconds
  - retry 3 times
  - max failure 3 times



Clear Sessions

- If DPD is disabled on remote end:
  - Disable it on Site2Cloud gateway from **Networking > Connectivity > S2C conn. > Settings**
  - Restart the VPN service from **Networking > Connectivity > S2C conn. > Connectivity Diagnostics**



Dead Peer Detection On

Delay: 10 sec

Retry Delay: 3 sec

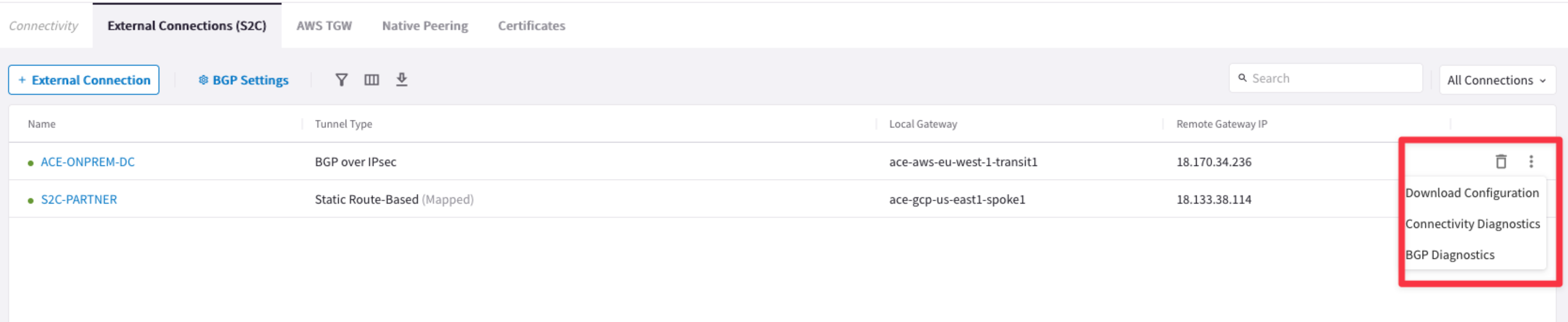
Max. Failures: 3

NOTE:

- This will restart all tunnels on this gateway
- Could impact your service till the tunnels come up

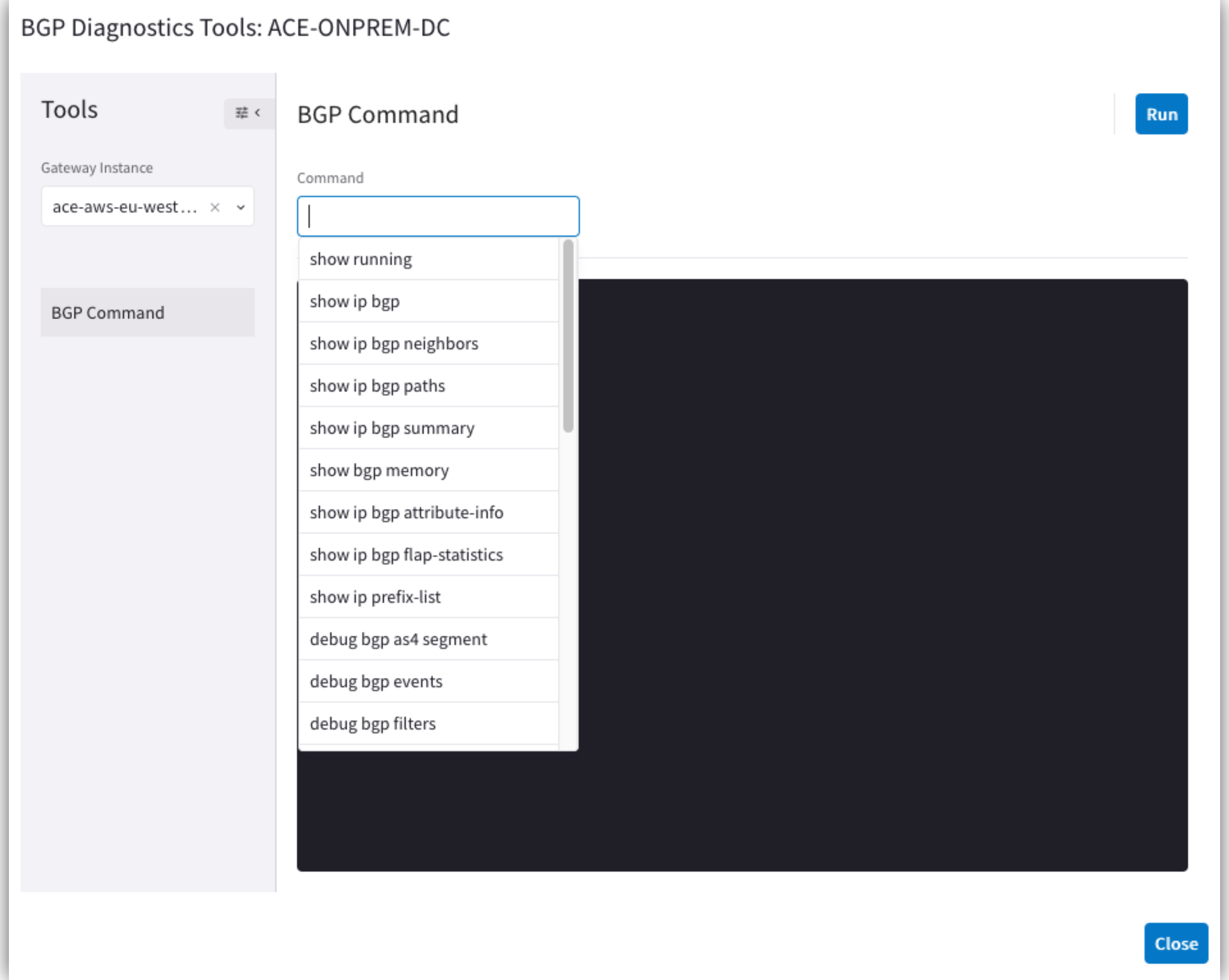
BGP Troubleshooting

- **PATH:** CoPilot> Networking > Connectivity > External Connections (S2C) > BGP Diagnostics


Connectivity
External Connections (S2C)
AWS TGW
Native Peering
Certificates
+ External Connection
BGP Settings
Search
All Connections
Download Configuration
Connectivity Diagnostics
BGP Diagnostics

Name	Tunnel Type	Local Gateway	Remote Gateway IP
● ACE-ONPREM-DC	BGP over IPsec	ace-aws-eu-west-1-transit1	18.170.34.236
● S2C-PARTNER	Static Route-Based (Mapped)	ace-gcp-us-east1-spoke1	18.133.38.114

BGP Troubleshooting – List of commands

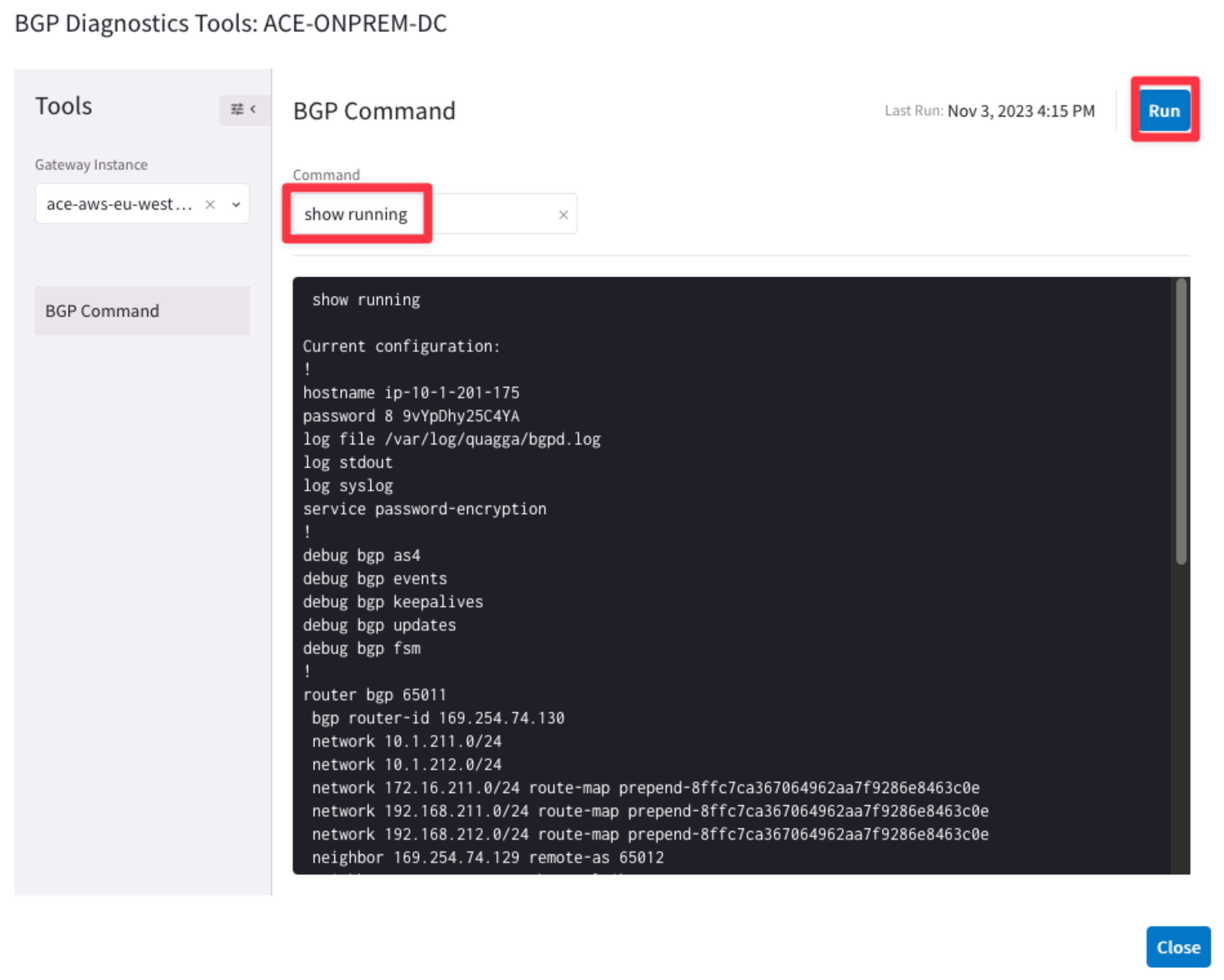


BGP Diagnostics Tools: ACE-ONPREM-DC

Tools
Gateway Instance
ace-aws-eu-west…
BGP Command
BGP Command
Run
Command
Close

- show running
- show ip bgp
- show ip bgp neighbors
- show ip bgp paths
- show ip bgp summary
- show bgp memory
- show ip bgp attribute-info
- show ip bgp flap-statistics
- show ip prefix-list
- debug bgp as4 segment
- debug bgp events
- debug bgp filters

BGP Troubleshooting – show running



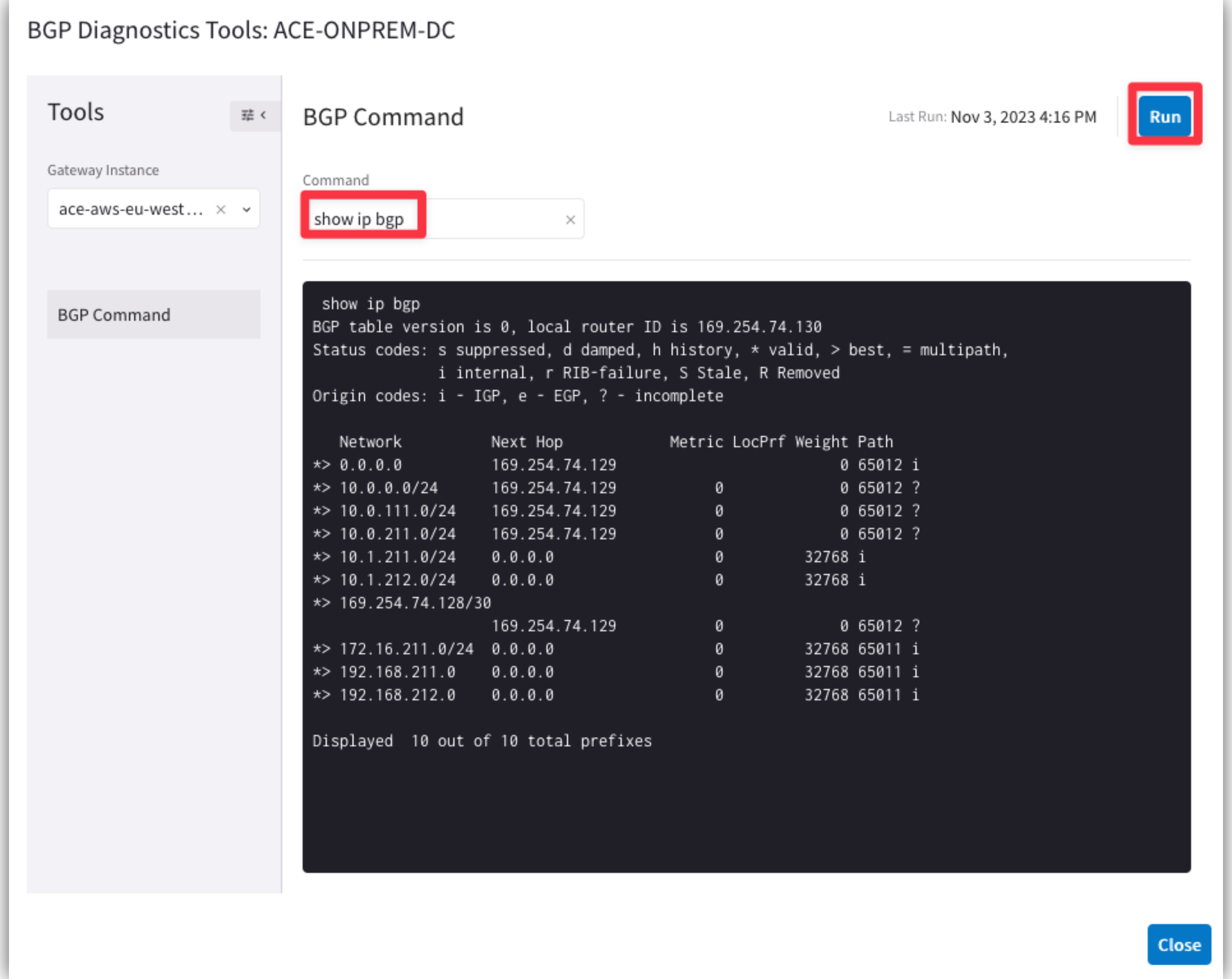
Last Run: Nov 3, 2023 4:15 PM

Gateway Instance: ace-aws-eu-west…

Command: show running

```
 show running

Current configuration:
!
hostname ip-10-1-201-175
password 8 9vYpDhy25C4YA
log file /var/log/quagga/bgpd.log
log stdout
log syslog
service password-encryption
!
debug bgp as4
debug bgp events
debug bgp keepalives
debug bgp updates
debug bgp fsm
!
router bgp 65011
 bgp router-id 169.254.74.130
 network 10.1.211.0/24
 network 10.1.212.0/24
 network 172.16.211.0/24 route-map prepend-8ffc7ca367064962aa7f9286e8463c0e
 network 192.168.211.0/24 route-map prepend-8ffc7ca367064962aa7f9286e8463c0e
 network 192.168.212.0/24 route-map prepend-8ffc7ca367064962aa7f9286e8463c0e
 neighbor 169.254.74.129 remote-as 65012
```

BGP Troubleshooting – show ip bgp



Gateway Instance: ace-aws-eu-west…

Last Run: Nov 3, 2023 4:16 PM

Command: show ip bgp

```
 show ip bgp
BGP table version is 0, local router ID is 169.254.74.130
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, r RIB-failure, S Stale, R Removed
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop           Metric LocPrf Weight Path
*> 0.0.0.0          169.254.74.129                         0 65012 i
*> 10.0.0.0/24      169.254.74.129          0              0 65012 ?
*> 10.0.111.0/24    169.254.74.129          0              0 65012 ?
*> 10.0.211.0/24    169.254.74.129          0              0 65012 ?
*> 10.1.211.0/24    0.0.0.0                 0          32768 i
*> 10.1.212.0/24    0.0.0.0                 0          32768 i
*> 169.254.74.128/30
                    169.254.74.129          0              0 65012 ?
*> 172.16.211.0/24  0.0.0.0                 0          32768 65011 i
*> 192.168.211.0    0.0.0.0                 0          32768 65011 i
*> 192.168.212.0    0.0.0.0                 0          32768 65011 i

Displayed  10 out of 10 total prefixes
```

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Edge

Introducing Aviatrix Edge

The only multi-cloud native platform with enterprise-grade visibility and control for public cloud and the edge

Aviatrix software in multiple form factors providing consistent network, security, and visibility to the edge.

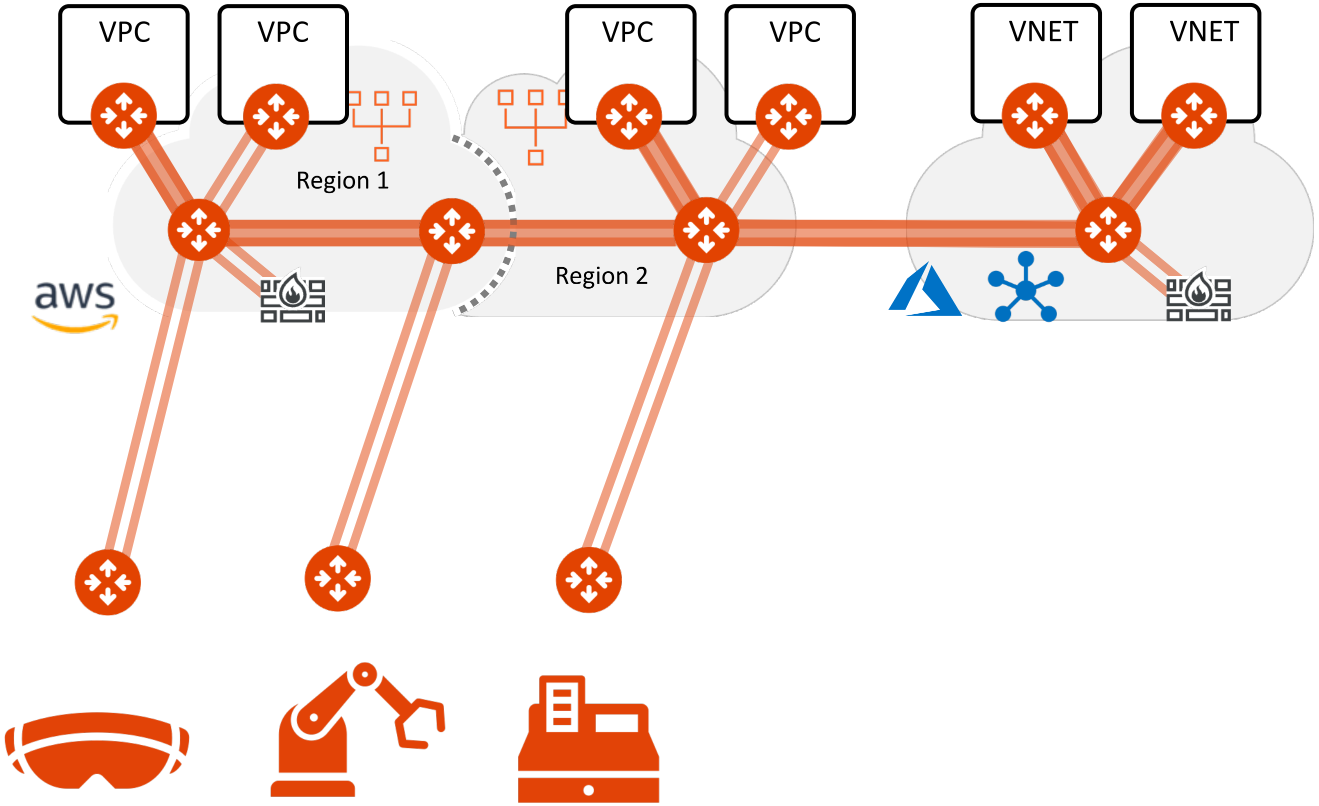
Edge locations appear and behave as another VPC/VNET with spoke and transit capabilities.

Cloud Out Architecture

Simplified Edge Management

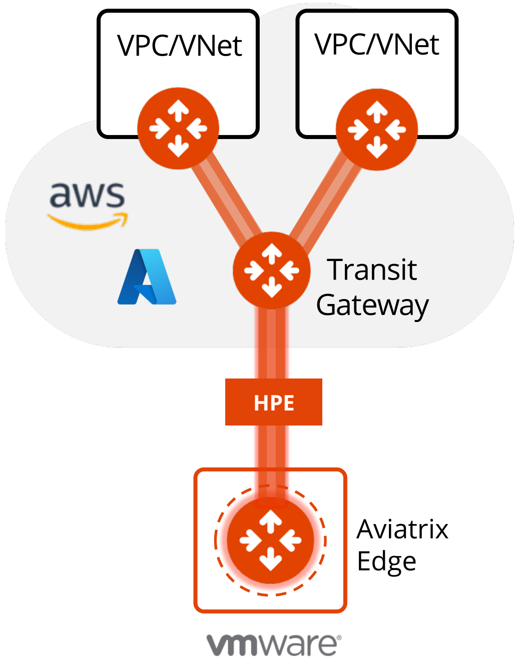
Consistent Secure Edge

Simplified Edge On-boarding

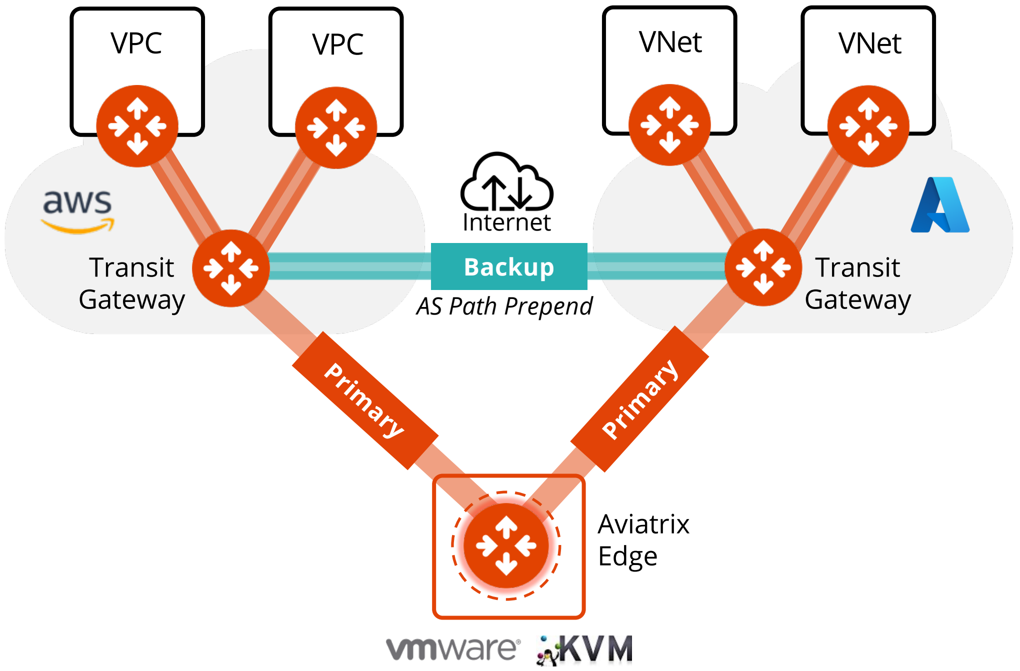


Aviatrix Edge Use Cases

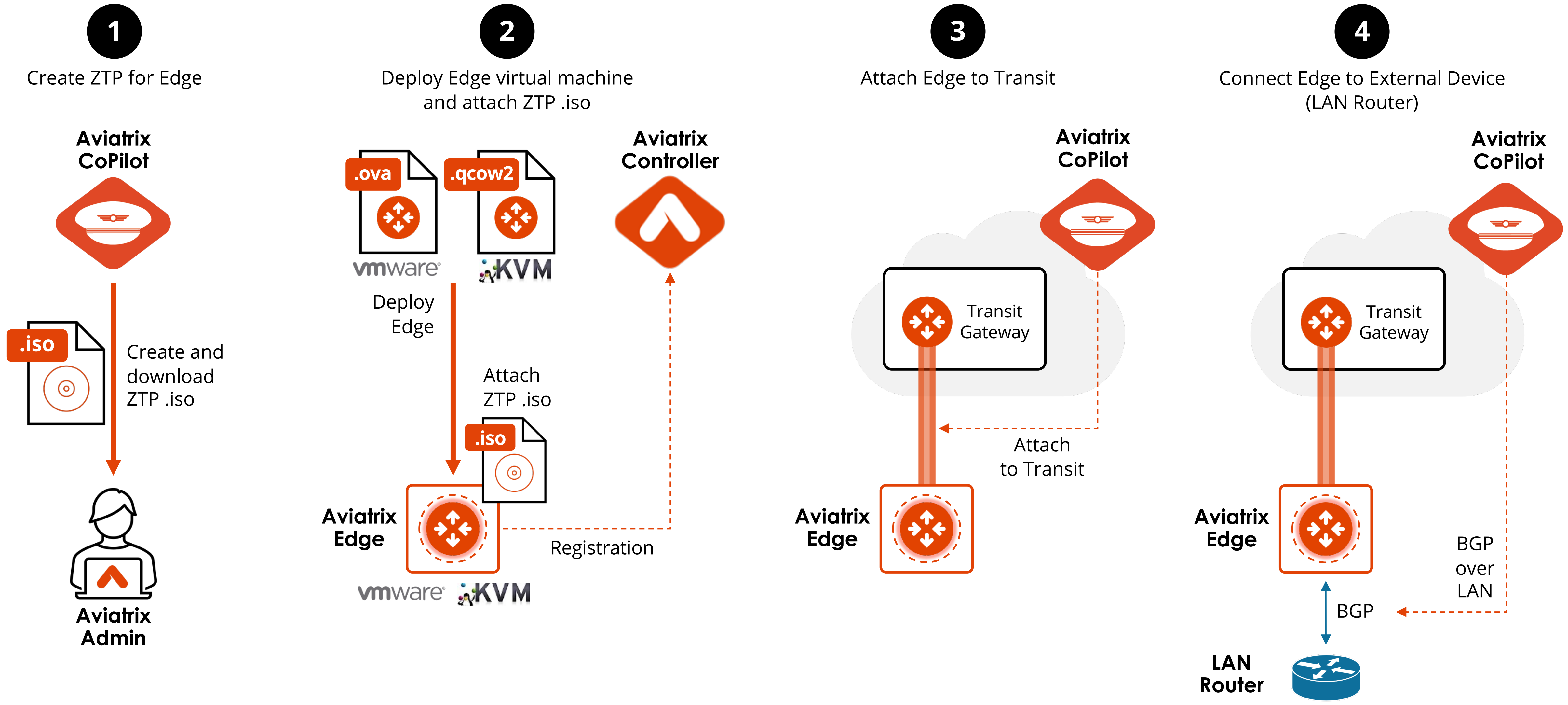
Extend the Aviatrix Platform to the Edge


VPC/VNet
VPC/VNet
aws
Transit Gateway
HPE
Aviatrix Edge
vmware

Multi-Cloud Connectivity via Aviatrix Edge


VPC
VPC
VNet
VNet
aws
Internet
Transit Gateway
Backup
AS Path Prepend
Transit Gateway
Primary
Primary
Aviatrix Edge
vmware
KVM

Edge 2.0 Deployment Workflow - Demo

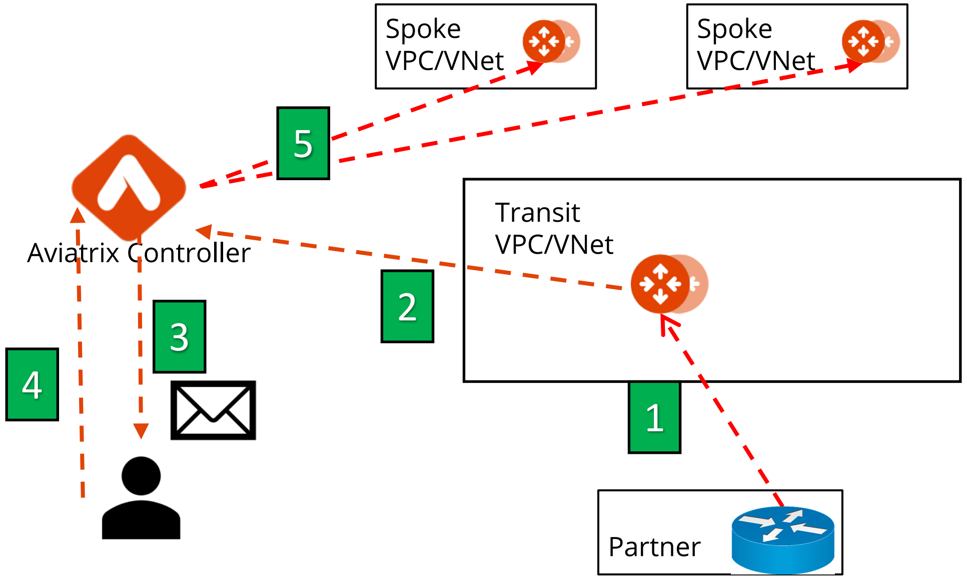

1
Create ZTP for Edge
Aviatrix CoPilot
.iso
Create and download ZTP .iso
Aviatrix Admin
2
Deploy Edge virtual machine and attach ZTP .iso
.ova
.qcow2
vmware
KVM
Deploy Edge
Aviatrix Controller
Attach ZTP .iso
.iso
Aviatrix Edge
Registration
vmware
KVM
3
Attach Edge to Transit
Aviatrix CoPilot
Transit Gateway
Attach to Transit
Aviatrix Edge
4
Connect Edge to External Device (LAN Router)
Aviatrix CoPilot
Transit Gateway
Aviatrix Edge
BGP over LAN
BGP
LAN Router

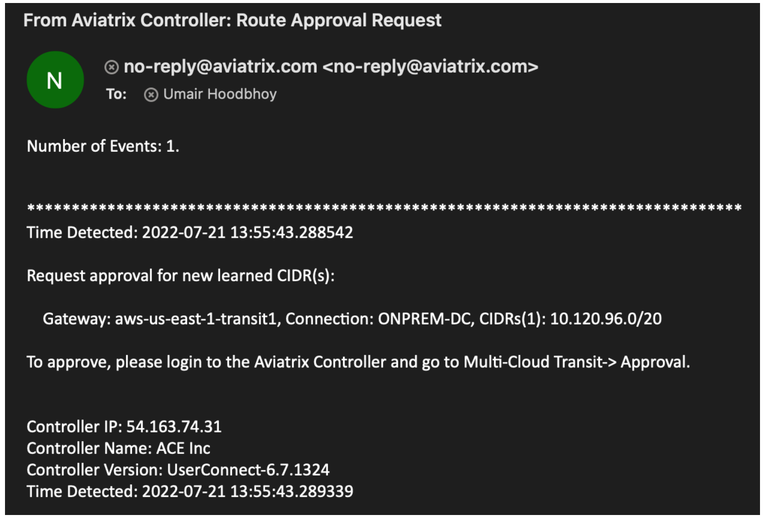
BGP Route Approval

BGP Route Approval

- Can explicitly approve any BGP-learned route from Partner or on-prem into the cloud network
- Prevents unwanted advertisement of routes such as 0/0

1. New routes arrive at Aviatrix Transit GW
2. Transit GW reports new routes to Controller
3. Controller notifies admin via email
4. Admin accesses the Controller to approve
5. If approved, Controller programs the new routes to Spoke VPCs




From Aviatrix Controller: Route Approval Request

N
no-reply@aviatrix.com <no-reply@aviatrix.com>
To: Umair Hoodbhoy

Number of Events: 1.

****
Time Detected: 2022-07-21 13:55:43.288542

Request approval for new learned CIDR(s):

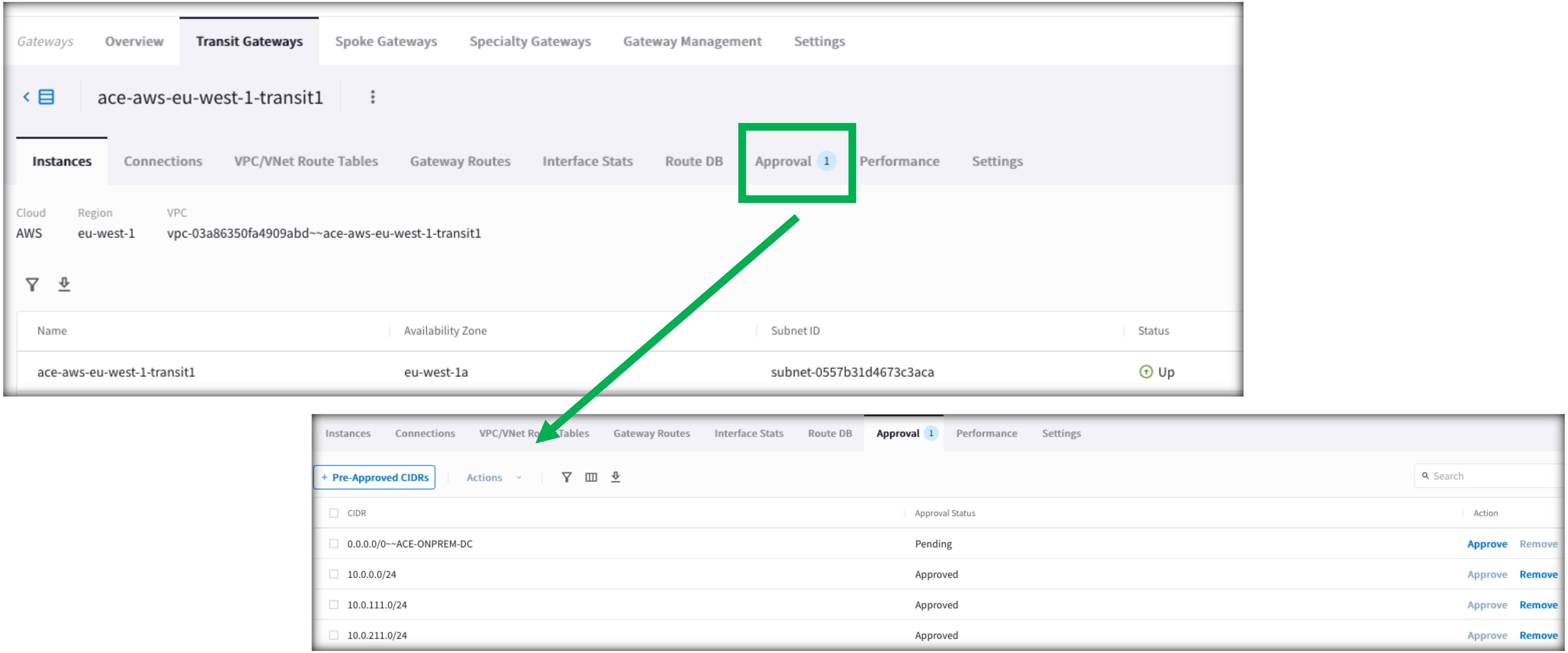
Gateway: aws-us-east-1-transit1, Connection: ONPREM-DC, CIDRs(1): 10.120.96.0/20

To approve, please login to the Aviatrix Controller and go to Multi-Cloud Transit-> Approval.

Controller IP: 54.163.74.31
Controller Name: ACE Inc
Controller Version: UserConnect-6.7.1324
Time Detected: 2022-07-21 13:55:43.289339

BGP Route Approval – Config

- **PATH:** CoPilot > Cloud Fabric > Gateways > select the relevant Gateway



Gateways | Overview | **Transit Gateways** | Spoke Gateways | Specialty Gateways | Gateway Management | Settings

ace-aws-eu-west-1-transit1

Instances | Connections | VPC/VNet Route Tables | Gateway Routes | Interface Stats | Route DB | Approval 1 | Performance | Settings

Cloud	Region	VPC
AWS	eu-west-1	vpc-03a86350fa4909abd~~ace-aws-eu-west-1-transit1

Name	Availability Zone	Subnet ID	Status
ace-aws-eu-west-1-transit1	eu-west-1a	subnet-0557b31d4673c3aca	Up

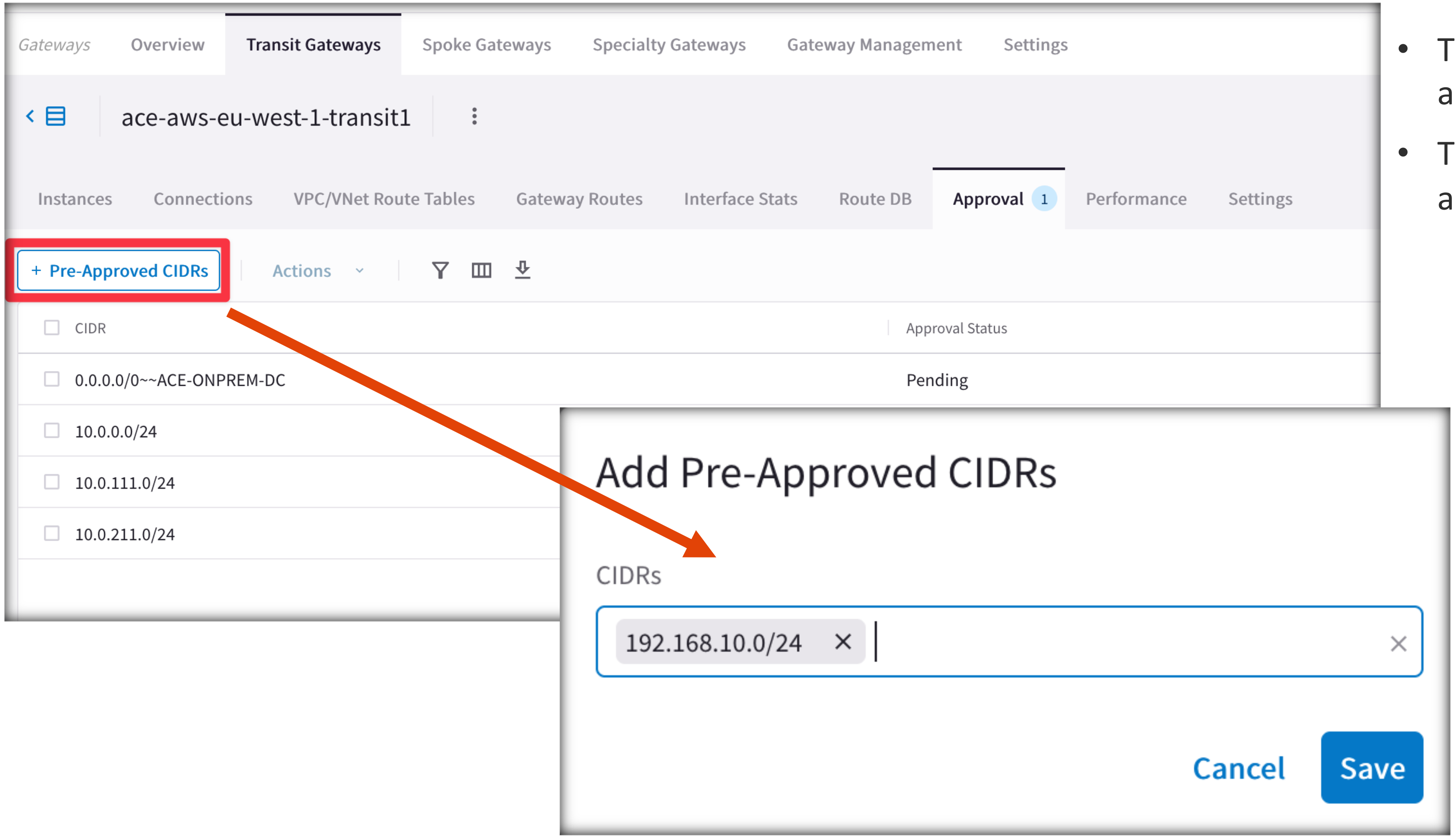
Instances | Connections | VPC/VNet Route Tables | Gateway Routes | Interface Stats | Route DB | **Approval** 1 | Performance | Settings

+ Pre-Approved CIDRs | Actions | Search

☐ CIDR	Approval Status	Action
☐ 0.0.0.0/0~~ACE-ONPREM-DC	Pending	Approve Remove
☐ 10.0.0.0/24	Approved	Approve Remove
☐ 10.0.111.0/24	Approved	Approve Remove
☐ 10.0.211.0/24	Approved	Approve Remove

BGP Route Approval – Config – Pre-Approved CIDRs

- **PATH:** CoPilot > Cloud Fabric > Gateways > select the relevant Gateway > Approval


Gateways
Overview
Transit Gateways
Spoke Gateways
Specialty Gateways
Gateway Management
Settings
ace-aws-eu-west-1-transit1
Instances
Connections
VPC/VNet Route Tables
Gateway Routes
Interface Stats
Route DB
Approval 1
Performance
Settings
+ Pre-Approved CIDRs
Actions
Add Pre-Approved CIDRs
Cancel
Save

CIDR	Approval Status
0.0.0.0/0~~ACE-ONPREM-DC	Pending
10.0.0.0/24	
10.0.111.0/24	
10.0.211.0/24	

CIDRs: 192.168.10.0/24

- This feature allows to pre-approving CIDRs advertised by external networks.
- The CIDRs will be propagated without the administrator logs into the CoPilot

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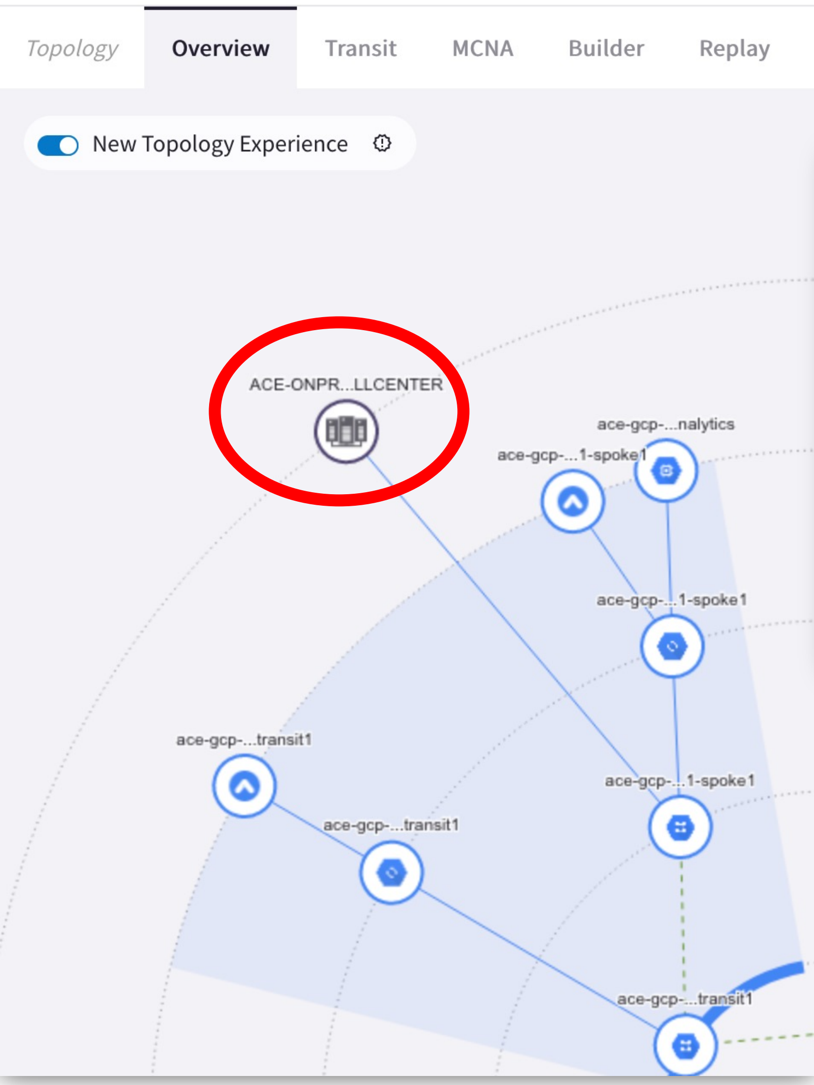
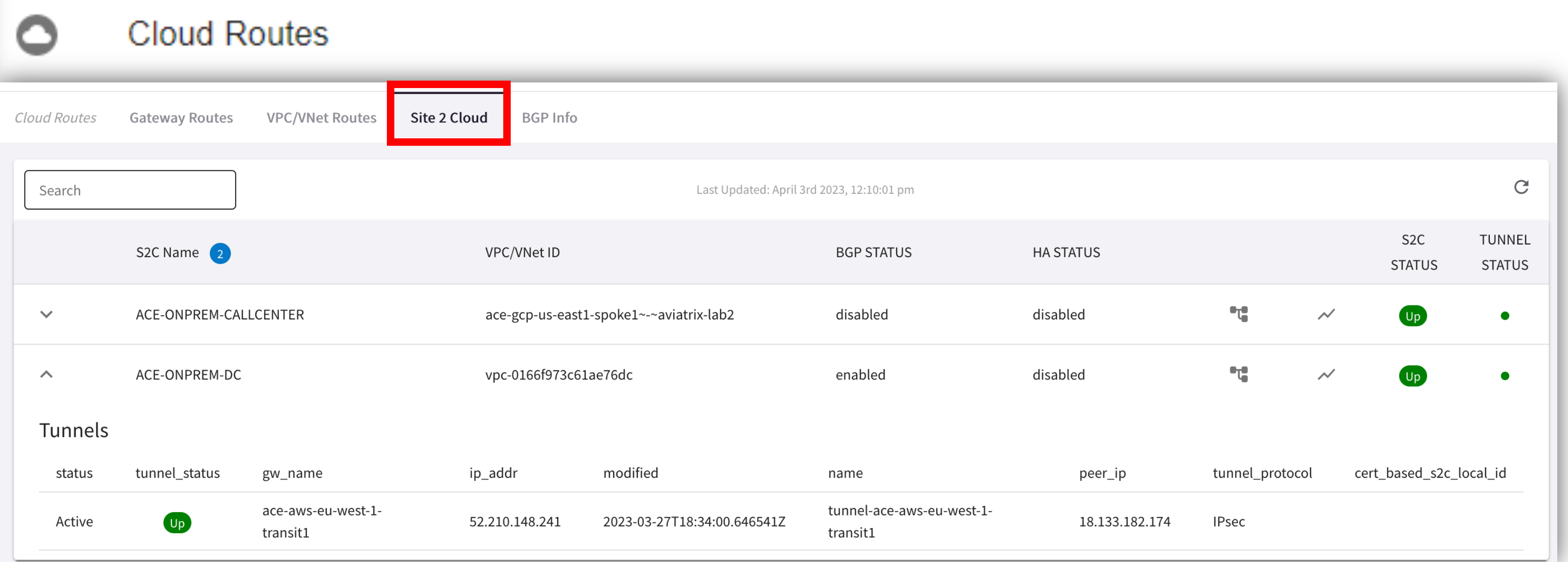
Site2Cloud & CoPilot

Site2Cloud Visibility via CoPilot

- **PATH:** COPILOT > Troubleshoot > Cloud Routes > **Site 2 Cloud**


Topology
Overview
Transit
MCNA
Builder
Replay
New Topology Experience
ACE-ONPR...LLCENTER
ace-gcp-...nalytics
ace-gcp-...1-spoke1
ace-gcp-...1-spoke1
ace-gcp-...transit1
ace-gcp-...transit1
ace-gcp-...1-spoke1
ace-gcp-...transit1

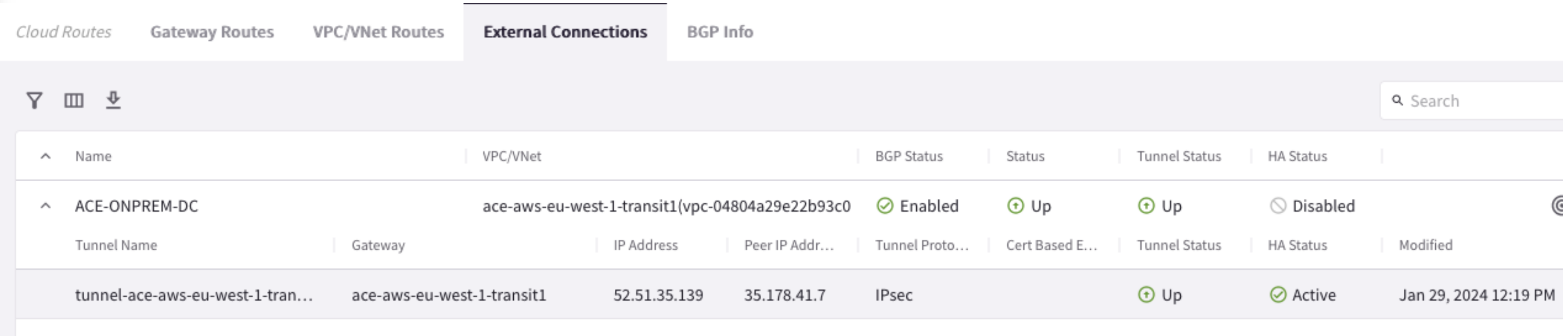

Cloud Routes
Cloud Routes
Gateway Routes
VPC/VNet Routes
Site 2 Cloud
BGP Info
Search

Last Updated: April 3rd 2023, 12:10:01 pm

	S2C Name 2	VPC/VNet ID	BGP STATUS	HA STATUS			S2C STATUS	TUNNEL STATUS
∨	ACE-ONPREM-CALLCENTER	ace-gcp-us-east1-spoke1~-~aviatrix-lab2	disabled	disabled			Up	●
∧	ACE-ONPREM-DC	vpc-0166f973c61ae76dc	enabled	disabled			Up	●

Tunnels

status	tunnel_status	gw_name	ip_addr	modified	name	peer_ip	tunnel_protocol	cert_based_s2c_local_id
Active	Up	ace-aws-eu-west-1-transit1	52.210.148.241	2023-03-27T18:34:00.646541Z	tunnel-ace-aws-eu-west-1-transit1	18.133.182.174	IPsec	

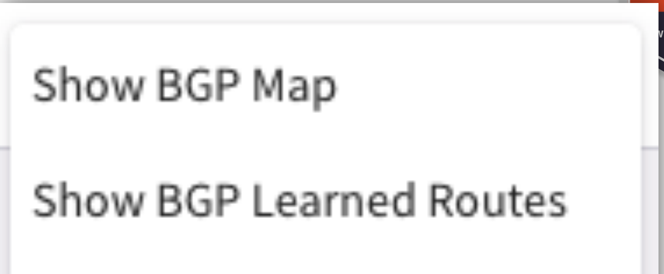

Cloud Routes
Gateway Routes
VPC/VNet Routes
External Connections
BGP Info
Search

Name	VPC/VNet	BGP Status	Status	Tunnel Status	HA Status
ACE-ONPREM-DC	ace-aws-eu-west-1-transit1(vpc-04804a29e22b93c0	Enabled	Up	Up	Disabled

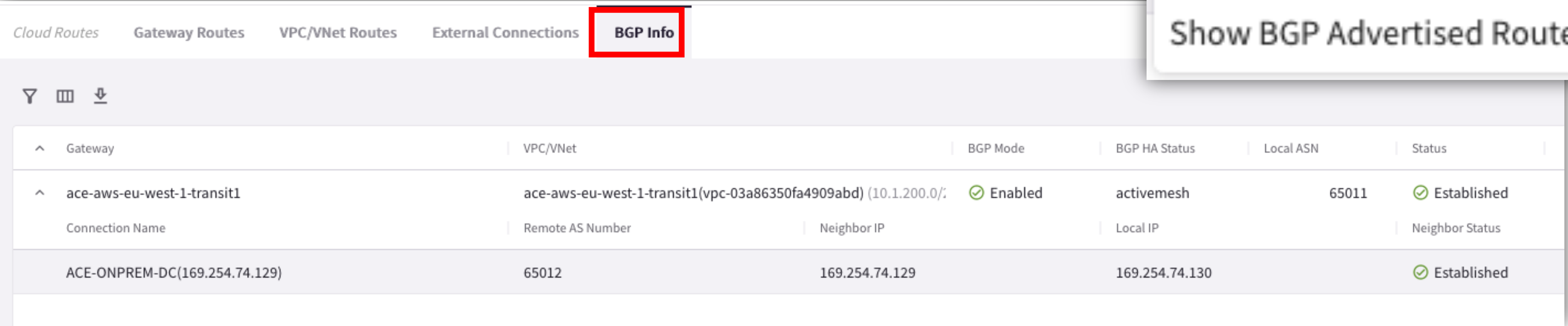
Tunnel Name	Gateway	IP Address	Peer IP Addr...	Tunnel Proto...	Cert Based E...	Tunnel Status	HA Status	Modified
tunnel-ace-aws-eu-west-1-tran...	ace-aws-eu-west-1-transit1	52.51.35.139	35.178.41.7	IPsec		Up	Active	Jan 29, 2024 12:19 PM

Site2Cloud BGP via CoPilot

- **PATH:** COPILOT > Diagnostics > Cloud Routes > **BGP Info**



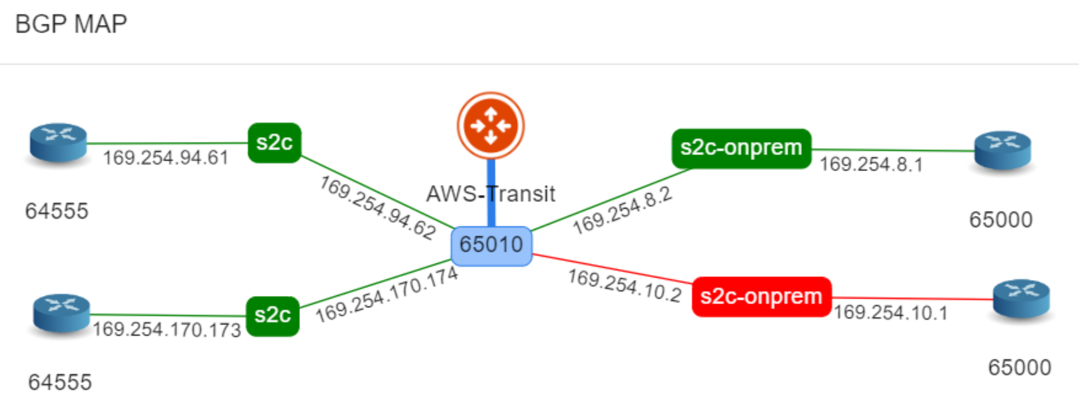
Show BGP Map
Show BGP Learned Routes
Show BGP Advertised Routes



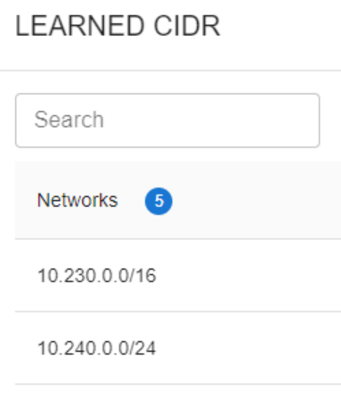
Cloud Routes
Gateway Routes
VPC/VNet Routes
External Connections
BGP Info

Gateway	VPC/VNet	BGP Mode	BGP HA Status	Local ASN	Status
ace-aws-eu-west-1-transit1	ace-aws-eu-west-1-transit1(vpc-03a86350fa4909abd) (10.1.200.0/	✓ Enabled	activemesh	65011	✓ Established

Connection Name	Remote AS Number	Neighbor IP	Local IP	Neighbor Status
ACE-ONPREM-DC(169.254.74.129)	65012	169.254.74.129	169.254.74.130	✓ Established



BGP MAP
169.254.94.61
s2c
64555
169.254.94.62
AWS-Transit
65010
169.254.8.2
s2c-onprem
169.254.8.1
65000
169.254.170.173
s2c
169.254.170.174
64555
169.254.10.2
s2c-onprem
169.254.10.1
65000



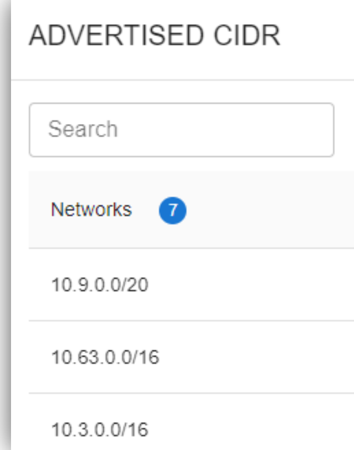
LEARNED CIDR

Search

Networks 5

10.230.0.0/16

10.240.0.0/24



ADVERTISED CIDR

Search

Networks 7

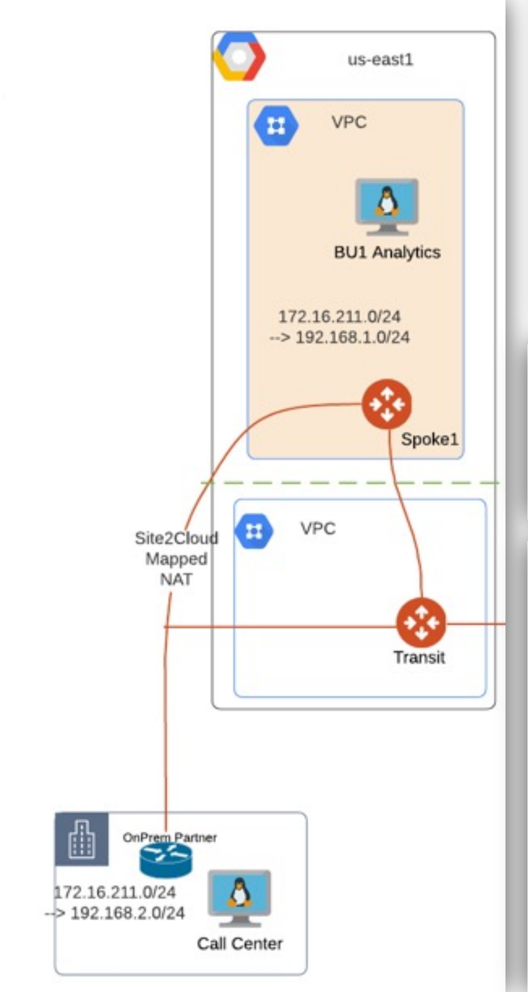
10.9.0.0/20

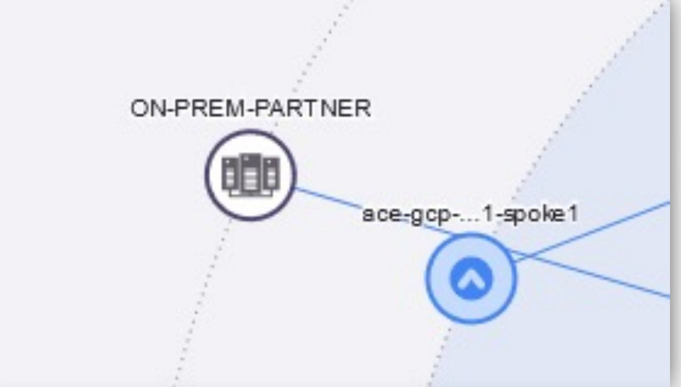
10.63.0.0/16

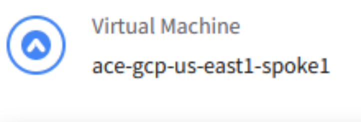
10.3.0.0/16

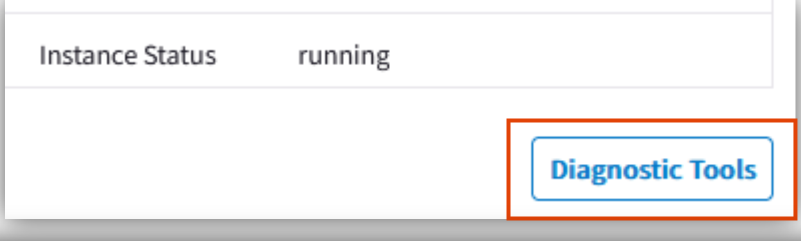
Site2Cloud Sessions via CoPilot

- **PATH:** COPILOT > Cloud Topology > Topology > select the concerned Gateway > **Diagnostic Tools**

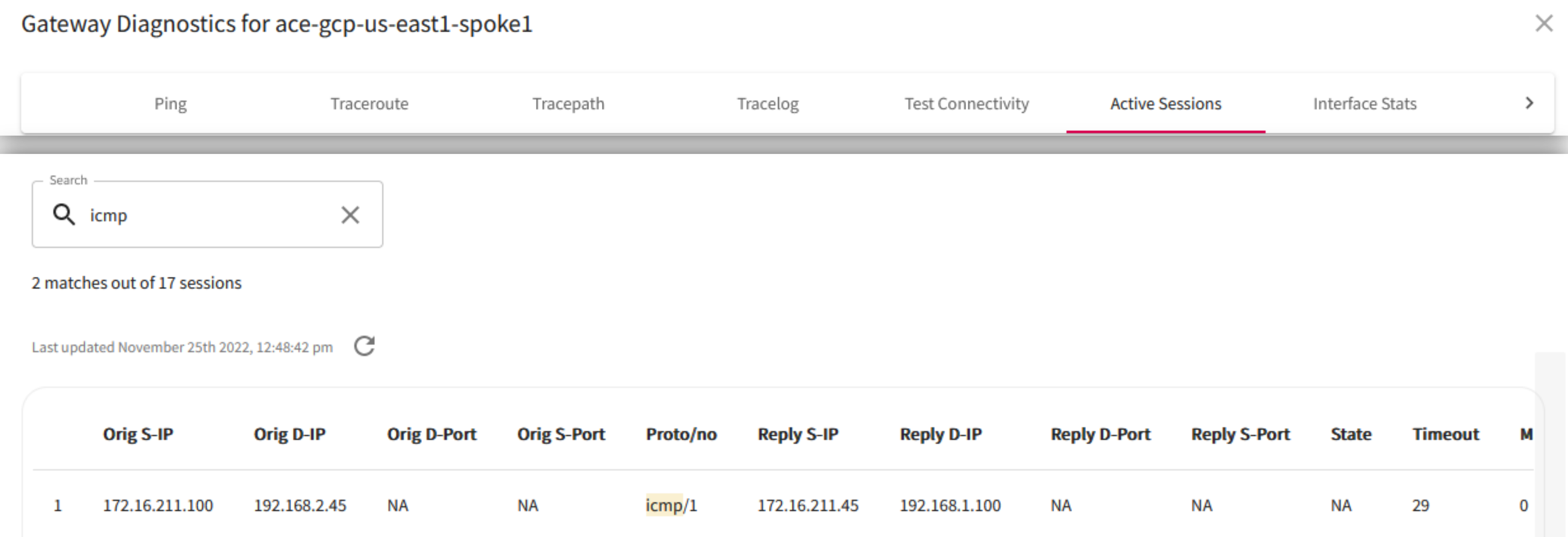

us-east1
VPC
BU1 Analytics
172.16.211.0/24
--> 192.168.1.0/24
Spoke1
Site2Cloud
Mapped
NAT
VPC
Transit
OnPrem Partner
172.16.211.0/24
--> 192.168.2.0/24
Call Center


ON-PREM-PARTNER
ace-gcp-...1-spoke1


Virtual Machine
ace-gcp-us-east1-spoke1


Instance Status running

Diagnostic Tools


Gateway Diagnostics for ace-gcp-us-east1-spoke1

Ping
Traceroute
Tracepath
Tracelog
Test Connectivity
Active Sessions
Interface Stats

Search: icmp

2 matches out of 17 sessions

Last updated November 25th 2022, 12:48:42 pm

	Orig S-IP	Orig D-IP	Orig D-Port	Orig S-Port	Proto/no	Reply S-IP	Reply D-IP	Reply D-Port	Reply S-Port	State	Timeout	M
1	172.16.211.100	192.168.2.45	NA	NA	icmp/1	172.16.211.45	192.168.1.100	NA	NA	NA	29	0

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ACE
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Next: Lab 6 Site2Cloud