Site-to-Site Connectivity with Overlapping Subnets in Cisco Secure Access

Contents

Introduction

This document describes the Cisco Secure Access overlapping subnet solution.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Cisco Secure Access administration.
- Firewall / Router administration.

Cisco recommends that you have:

- Administrative Access to Cisco Secure Access.
- Administrative Access to the IPSec Headend device (Firewall or Router)

Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Before you Begin

In this example there are two different branch sites with the same IP subnet 192.168.200.0/24, in which they are connected to the Cisco Secure Access via two separate IPSec Tunnel.

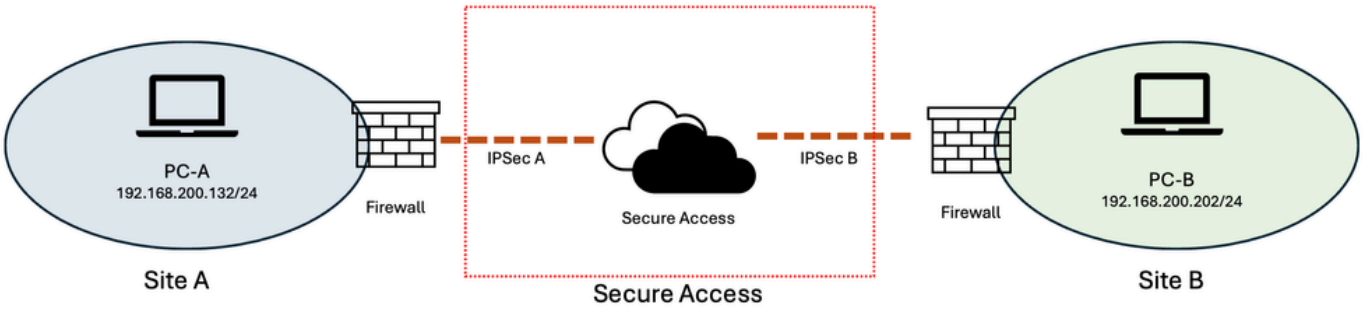


Image - Network Diagram

The goal is, users from "Site A" can access the resources in "Site B" and vise versa.

Preparing and Plannig

Because both sites use the same IP subnet (`192.168.200.0/24`), the overlapping address space prevents direct communication between the two sites. To resolve this overlap, two non-overlapping virtual subnets are assigned to represent the resources at each site.

For this example:

- **Site A:** `10.30.30.0/24`
- **Site B:** `10.40.40.0/24`
- **Actual subnet at both sites:** `192.168.200.0/24`

The virtual subnets provide unique address spaces for each site while the actual resources continue to use their existing `192.168.200.0/24` addresses.

When a user at **Site A** accesses a resource located at **Site B**, the user accesses the resource through the **Site B virtual subnet (`10.40.40.0/24`)** rather than directly using the overlapping `192.168.200.0/24` address space.

Cisco Secure Access provides a **One-to-One Destination NAT (D-NAT)** feature that can translate the virtual addresses to the corresponding real addresses. The D-NAT address range has the same size as the original subnet. In this example, both the virtual and actual networks are `/24` subnets, providing a one-to-one mapping between the virtual and real IP addresses.

For example:

`10.40.40.202` → `192.168.200.202`

Therefore, a request from Site A destined for `10.40.40.202` is translated by D-NAT to `192.168.200.202`, allowing the request to reach the corresponding resource at Site B despite both sites using the same underlying IP subnet.

This approach effectively creates a **virtual, non-overlapping address space** for each site while preserving the existing IP addressing of the resources. It also provides a consistent one-to-one relationship between the virtual and real addresses, making the configuration easier to understand, manage, and troubleshoot.

Configuration Steps

Due to the current design and limitations of Cisco Secure Access, achieving this scenario requires configuration on both the **headend devices behind the IPsec tunnels** and Cisco Secure Access.

The headend device is the firewall or router that establishes the IPsec tunnel to Cisco Secure Access. In addition to configuring **D-NAT** in Cisco Secure Access, the headend firewall must also perform Source NAT (S-NAT) for the return traffic.

The configuration therefore consists of two sections:

1. **Configuring Destination NAT (D-NAT) in Cisco Secure Access** for each network tunnel separately.
2. **Configuring Source NAT (S-NAT) on the firewalls** to ensure that return traffic is translated back to the virtual address space.

Configuring Cisco Secure Access

Step 1: From the Cisco Secure Access management portal, navigate to **Connect > Network Connections** and select the **Network Tunnel Groups** tab.

Step 2: Edit the Network Tunnel Group associated with the IPsec tunnel for the site that uses the overlapping subnet.

In this example:

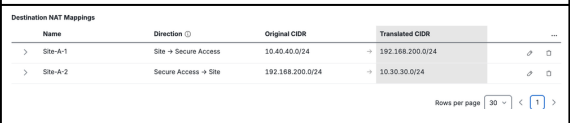
- **IPSec-A** = Network Tunnel Group for Site A
- **IPSec-B** = Network Tunnel Group for Site B

Step 3: Click the **three-dot menu** next to the required Network Tunnel Group and select **Edit**.

Step 4: From the left-hand menu, select the **Routing** tab and enable **Network Address Translation (NAT)** if it is not already enabled.

Step 5: Under **Destination NAT Mappings**, click **Add Mappings**.

Step 6: Use this table to configure the D-NAT mappings for each Network Tunnel Group:

	Site A - IPSec Tunnel	**Site B - IPSec Tunnel**
Destination NAT-1	**Site → Secure Access** Original CIDR: **10.40.40.0/24** Translated CIDR: **192.168.200.0/24**	**Site → Secure Access** Original CIDR: **10.30.30.0/24** Translated CIDR: **192.168.200.0/24**
Destination NAT-2	**Secure Access → Site** Original CIDR: **192.168.200.0/24** Translated CIDR: **10.30.30.0/24**	**Secure Access → Site** Original CIDR: **192.168.200.0/24** Translated CIDR: **10.40.40.0/24**
	 *IPsec Tunnel Site A - D-NAT Configuration*	 *IPsec Tunnel Site B - D-NAT Configuration*

Note: After configuring the settings for each Network Tunnel Group, click **Save**. When the confirmation window appears, enter **UPDATE** to confirm the change. Repeat the same procedure for the other Network Tunnel Group

Configuring the Firewall

The firewall configuration is required because of a current limitation in the handling of overlapping IP subnets behind Network Tunnel Groups.

When Cisco Secure Access performs D-NAT on an incoming packet, the translated destination address is used to deliver the packet to the destination resource. However, the corresponding reverse translation is not automatically performed for the return traffic in this overlapping-subnet scenario.

As a result, the return traffic needs to be manually source-NATed on the firewall.

The key requirement is that the destination server sees the return traffic using the **virtual IP address** that the client originally accessed, rather than the server actual IP address.

Example

Assume the following:

- **Site A client:** `192.168.200.132`
- **Site B web server:** `192.168.200.202`
- **Site B virtual subnet:** `10.40.40.0/24`
- **Virtual address of the web server:** `10.40.40.202`

The client at Site A accesses the Site B web server using `https://10.40.40.202`

Cisco Secure Access performs the D-NAT `10.40.40.202 → 192.168.200.202`

The packet then reaches the web server at `192.168.200.202`.

The problem occurs with the return traffic. Without additional NAT on the firewall, the web server generates the response with **Source:** `192.168.200.202`

However, the client initiated the connection to **Destination:** `10.40.40.202`

Therefore, the return traffic needs to be translated so that the source address presented to the client corresponds to the virtual address`192.168.200.202 → 10.40.40.202`

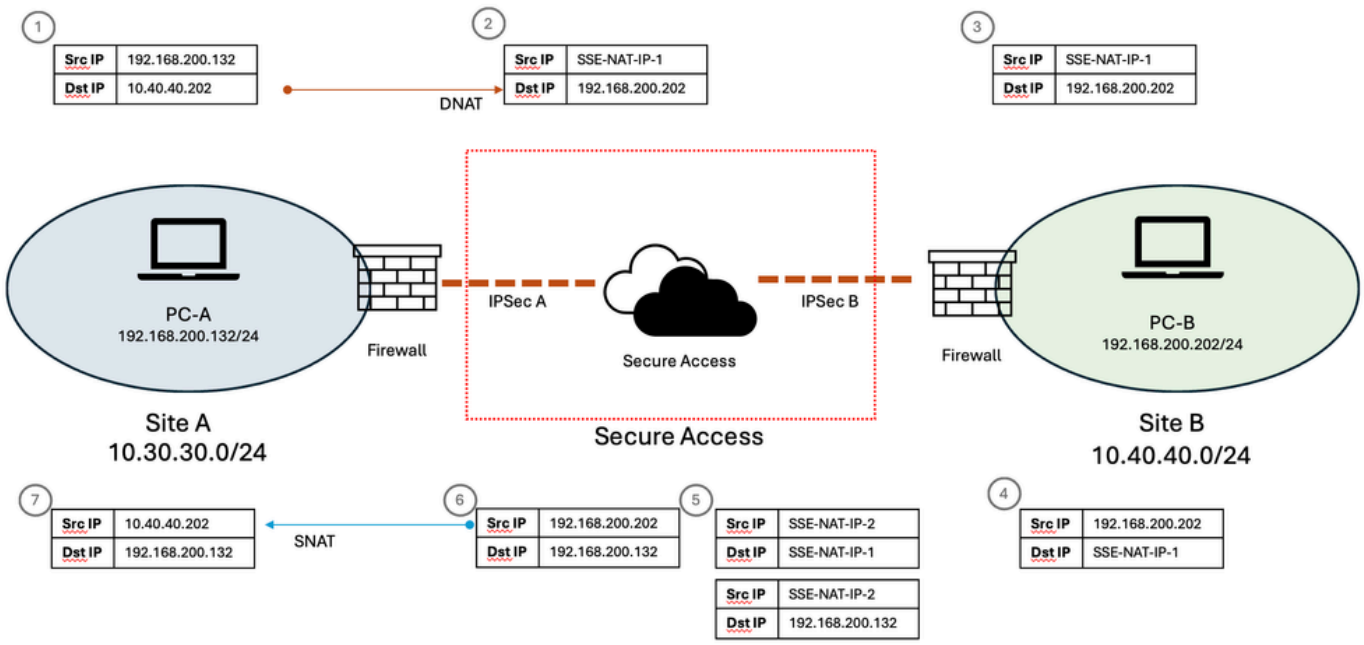


Image - Network Flow

To achieve this, the firewall performs Source NAT on traffic leaving toward the Network Tunnel Group.

For this example, the required mapping is`192.168.200.0/24 → 10.40.40.0/24`

This creates the reverse one-to-one relationship between the real addresses and their corresponding virtual addresses.

One-to-One SNAT

If the firewall supports one-to-one Source NAT for the entire subnet, a single NAT rule can represent the complete `/24` address range.

For example:

Real Source	Translated Source
`192.168.200.0/24`	`10.40.40.0/24`

This results in mappings such as `192.168.200.202 → 10.40.40.202` and `192.168.200.203 → 10.40.40.203`

The same one-to-one relationship applies across the entire subnet.

Firewalls Without One-to-One SNAT

If the firewall does not support one-to-one Source NAT for the entire subnet, each required mapping needs to be configured individually.

For example, for the web server:

- **Source IP:** `192.168.200.202`
- **Source interface:** Network Tunnel Group
- **Traffic direction:** Inbound
- **Translated Source IP:** `10.40.40.202`

The resulting translation is`192.168.200.202 → 10.40.40.202`

The same approach can be applied to each resource that requires access through the virtual subnet.

This ensures that both directions of the communication maintain the virtual addressing scheme and that the client receives the response from the same virtual IP address that it used when establishing the connection.

Related Information

Cisco Secure Access NAT Mapping / Network Tunnel Group configuration : https://securitydocs.cisco.com/docs/csa/olh/168842.dita

Cisco Secure Access Network Tunnel Group configuration and routing reference: https://securitydocs.cisco.com/docs/csa/olh/118900.dita

Cisco Secure Access troubleshooting and basic-data collection guide: https://www.cisco.com/c/en/us/support/docs/security/secure-access/221240-troubleshoot-and-collect-basic-informati.html