

## How to use NetScaler as a Border Router(BR) in MAP-T?

Mapping of Address and Port commonly referred to as MAP is an IPv6 transition method that uses aggregation of address and port to translate or encapsulate IPv4 address in to an IPv6 address. There are two flavours of MAP that exist today – MAP-T and MAP-E where translation is used for IPv4 to IPv6 conversion in the former, while encapsulation is used in the latter. MAP-T is our primary focus of discussion in this guide.

### Why Mapping of Address and Port?

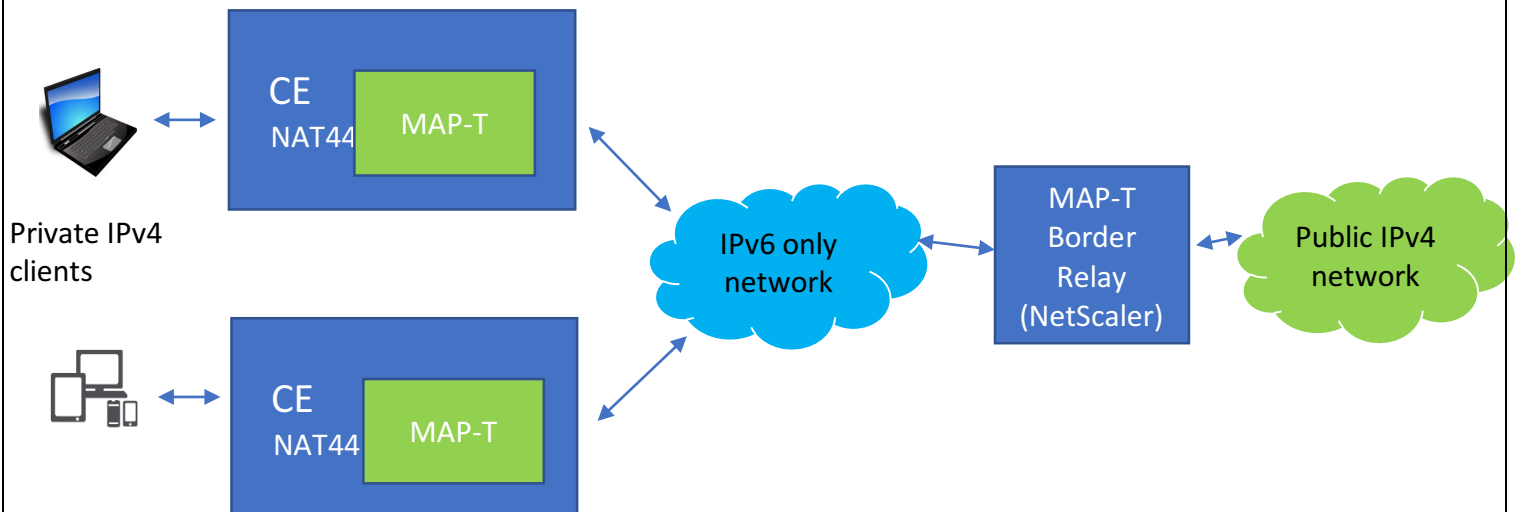
Mapping of Address and Port solves the problem of supporting residual IPv4 deployments in different parts of the network where service provider supports IPv6 only infrastructure. This is a typical problem faced by service providers in phased migrations from IPv4 to IPv6. IPv6 only solution at service provider cannot be offered to end users unless there is a proper mechanism to handle every type of packet and MAP-T comes in to picture to the aid of service providers.

MAP-T uses aggregation model through Classless Inter Domain Routing (CIDR) where the address space is represented by both IP address and L4 ports. The L3 and L4 information are available to IPv6 devices using IPv6 header where this information is embedded.

In MAP-T, every Customer Edge(CE) router converts private IPv4 to a public IPv4 address before performing the translation to IPv6 so that the packets can traverse through IPv6 only infrastructure. This helps in conserving IPv4 address for service providers.

Advantage of using MAP method of transition is that it is stateless which allows it to scale proportionally to the traffic volume instead of number of end user states. MAP-T provides advantage of zero logging requirement since it is stateless.

### MAP-T Architecture



*Fig: MAP- T Architecture*

MAP-T has the following functional units,

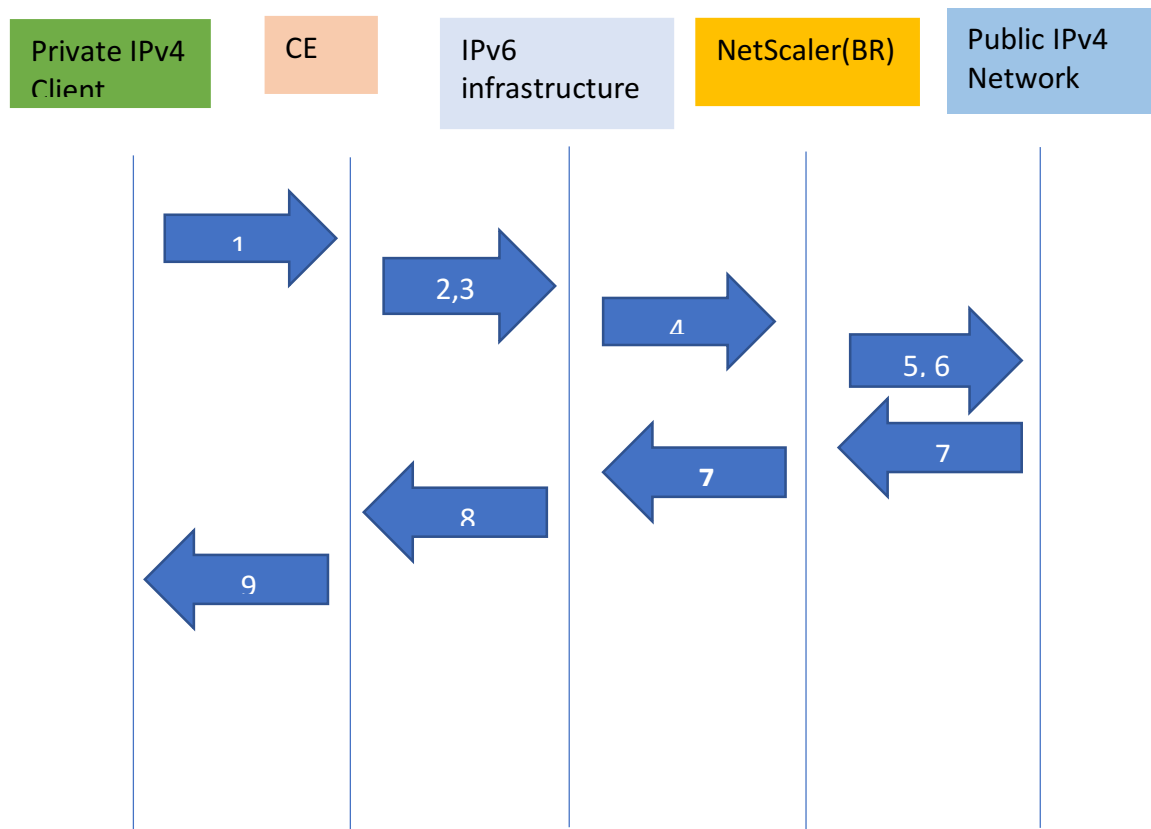
**MAP Customer Edge (CE):** Customer Edge router commonly referred as CE in a MAP deployment uses MAP Rules and will serve a residential site with one WAN-side IPv6-addressed interface and one or more LAN-side interfaces addressed using private IPv4 addressing.

**MAP Border Relay (BR):** This is a router that will be part of service provider networks, sits at the edge of a MAP domain. It will have an IPv6-enabled interface and an IPv4 interface connected to the native IPv4 network. A MAP Border Router is commonly referred to as "BR" in this document and NetScaler will provide Border Relay(BR) solution to service providers.

### MAP-T Implementation

When session goes through MAP solution, it goes through the following steps,

- 1) Private IPv4 client creates a session
- 2) CE applies NAT 44 to map IPv4 private client address to IPv4 public address. This helps service providers to preserve IPv4 address.
- 3) CE applies MAP-T to convert IPv4 public address to IPv6 address
- 4) The packet goes through the IPv6 network
- 5) NetScaler validates the IPv6 packet by using its configuration and then converts IPv6 address to public IPv4 address. The shared values may be informed and configured on the CEs using a variety of methods, including DHCPv6, the Network Configuration Protocol (NETCONF), or by using manual configuration
- 6) IPv4 packet will go through Public IPv4 network to reach the destination
- 7) NetScaler shares some configuration from CE device which is used to reconstruct the IPv6 packet when it comes back from internet. This makes MAP-T stateless.
- 8) IPv6 Packet reconstructed goes through IPv6 infrastructure.
- 9) CE converts the IPv6 packet back to public IPv4 address and performs NAT to get private IPv4 address to reach the Private IPv4 client.



*Fig: MAP- T packet flow*

How to configure MAP-T in NetScaler?

Mapping of Address and Port - Translation using Configuration utility

In order to enable MAP-T in NetScaler,  
 Navigate to System > Networks > MAP > Translation > Click on "DMR"

System / Network / MAP / Translation DMR

## DMR

Add Delete

<input type="checkbox"/>	Name	Border Relay IPV6 Prefix
<input type="checkbox"/>	dmr1	2001:db8::/64
<input type="checkbox"/>	dmr3	6001:db8::/96
<input type="checkbox"/>	dmr2	4001:db8::1/64

Default Mapping Rule prefix(DMR) is used to generate source IPv6 address towards CE as part of NAT46 translation on BR. For generating source IPv6 address towards CE, Border Relay IPv6 prefix is used. Details of DMR name and Border Relay IPv6 prefix has to be filled as shown below.

← Create MAP-T Default Mapping Rule

Name\*

dmr1

Border Relay IPV6 Prefix

2001:db8::/64

Create Close

Next step is to configure BMR parameters for MAP-T. Basic Mapping Rule(BMR) is used to validate IPv6 traffic originating from CE on the BR. Now navigate to BMR under MAP Translation and enter parameters for BMR as shown below.

## ← Create MAP-T BMR

Name\*

CE IPv6 Prefix\*

PSID offset

EA Bit Length

PSID Length

**Network**



CE IPv4 NAT Address Range

Netmask



4.4.4.4

255.255.255.0

PSID mentioned in BMR parameters refers to Port Set ID which is used to validate the transport layer port in the IPv6 packet originating from the CE. EA bit length provides the length of the embedded address. Port Set ID forms part of IPv6. PSID offset and Length helps to identify Port set ID in the IPv6 address.

Next step is to map DMR and BMR created using a MAP Domain.

Navigate to MAP Domain under MAP Translation and enter the details as shown below,

← Create MAP-T Map Domain

Name\*  
map1

DMR Name\*  
dmr1

BMR	
<input type="checkbox"/>	BMR
<input checked="" type="checkbox"/>	bmr1

**Create** Close

Mapping of Address and Port - Translation using Command Prompt

In order to configure NetScaler as a Border Router in MAP-T using command prompt,

```
>add MapDmr <DMR name eg. dmr1> -BRIPv6Prefix <Border Relay IPv6 Prefix for eg. 2222::/64>
>add MapDomain <domain name eg. map1> -MapDmrName <DMR name eg. dmr1>
>add MapBmr <BMR name eg.bmr1> -RuleIPv6Prefix < Rule IPv6 prefix eg. 4444::/48>
-EAbitLength <EA bit length eg.16> -psidlength <PSID length eg.8> -psidoffset <PSID offset eg.6>
>bind MapBmr <BMR name eg.bmr1> -network <CE IPv4 NAT network eg. 4.4.4.0> -netmask 255.255.255.0
>bind MapDomain <domain name eg.map1> -mapbmrname <BMR name eg.bmr1>
```

With the configuration mentioned above NetScaler can act as a Border Router in MAP-T environment.