

Azure IPv6 Update

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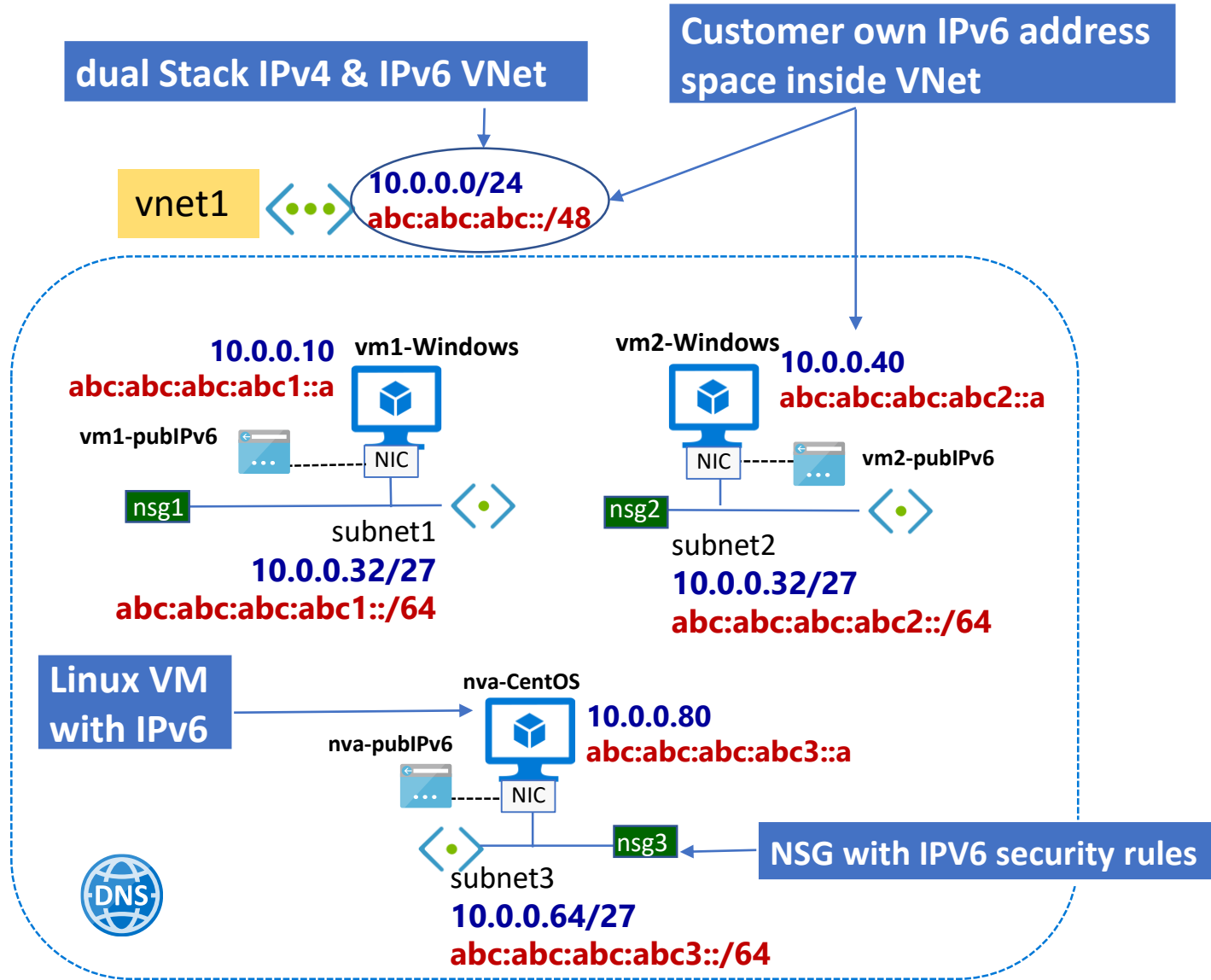
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Azure IPv6 in VNet: feature list summary

- Inside a VNet: customer can define their own IPv6 address space
- Dual Stack (IPv4 and IPv6) VNet
- Add IPv6 to existing IPv4-only deployments
- IPv6 support: Azure VM Linux & Windows
- Reserved IPv6 Public IP addresses and address ranges (predictable IPs)
- Instance-level Public IP provides IPv6 Internet connectivity directly to a VM
- Custom IPv6 routing: UDR
- VM protection: NSG with IPv6 security rules
- External and Internal Standard load balancer
- IPv6 VNet peering

See ARM templates:

<https://github.com/fabferri/az-pattern/tree/master/01-ipv6-single-vnet>



Reserved IPv6 Public IP address ranges

Reserved IPv6 address range

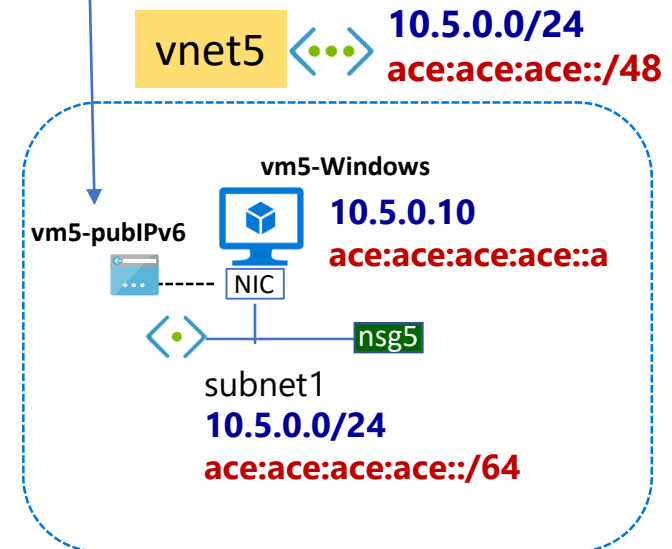


/125 = 8 addresses

- vm1-pubIPv6
- vm2-pubIPv6
- nva-pubIPv6
- vm5-pubIPv6

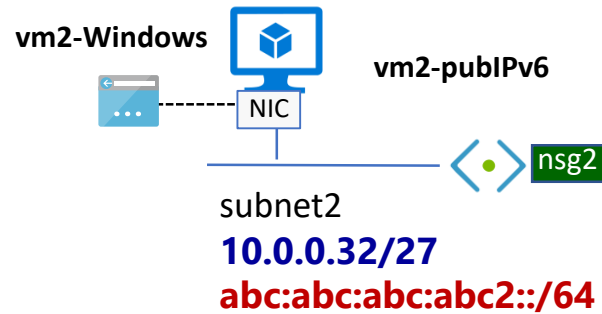
Min IPv6 Prefix size: /127 = 2 addresses
Max IPv6 Prefix size: /124 = 16 addresses

Instance level public IPv6 associated with the VM

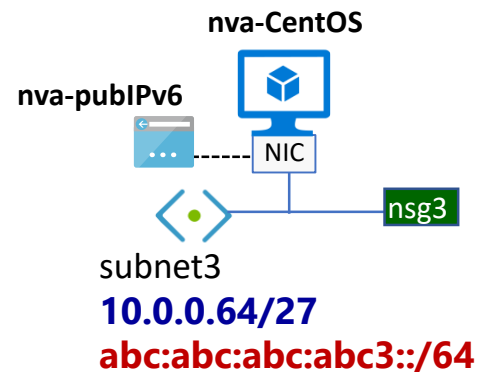
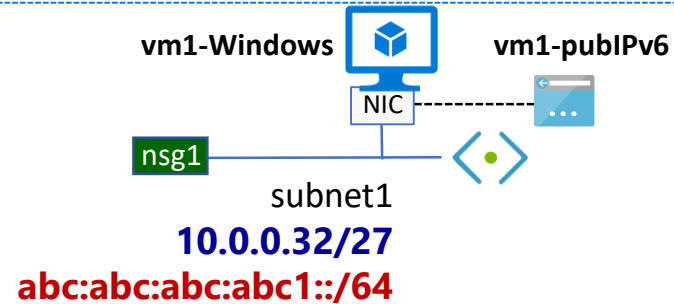


4 IPs assigned to each Azure VM

Public IP address : 51.132.52.249
Private IP address : 10.0.0.40
Public IP address (IPv6) : 2603:1020:702:3::18
Private IP address (IPv6) : abc:abc:abc:abc2::a
Virtual network/subnet : vnet1/subnet2



Public IP address : 51.132.52.248
Private IP address : 10.0.0.20
Public IP address (IPv6) : 2603:1020:702:3::19
Private IP address (IPv6) : abc:abc:abc:abc1::a
Virtual network/subnet : vnet1/subnet1



Public IP address : 51.132.52.250
Private IP address : 10.0.0.80
Public IP address (IPv6) : 2603:1020:702:3::1a
Private IP address (IPv6) : abc:abc:abc:abc3::a
Virtual network/subnet : vnet1/subnet3

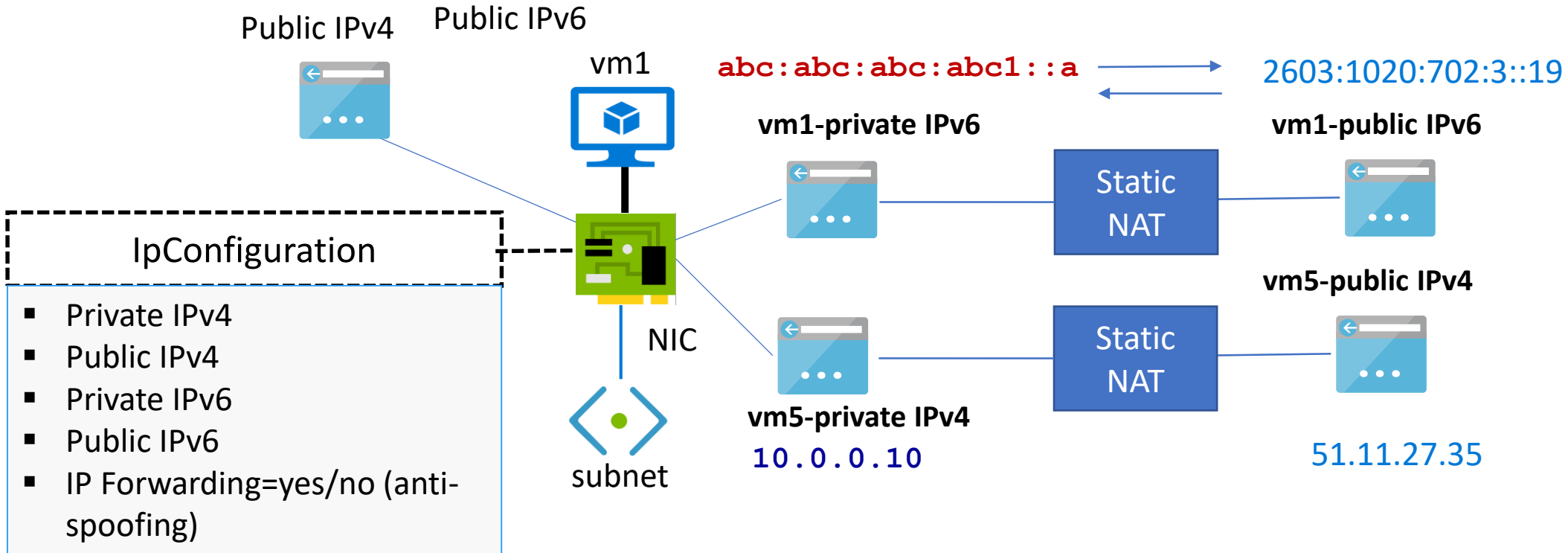
Capture of packets by tcpdump



```
tcpdump -i 1 -n -c 100 -q ip6 and net abc:abc:abc:abc1::/64
OR
tcpdump -i 1 -n -c 100 -q ip6 and tcp port 80
```

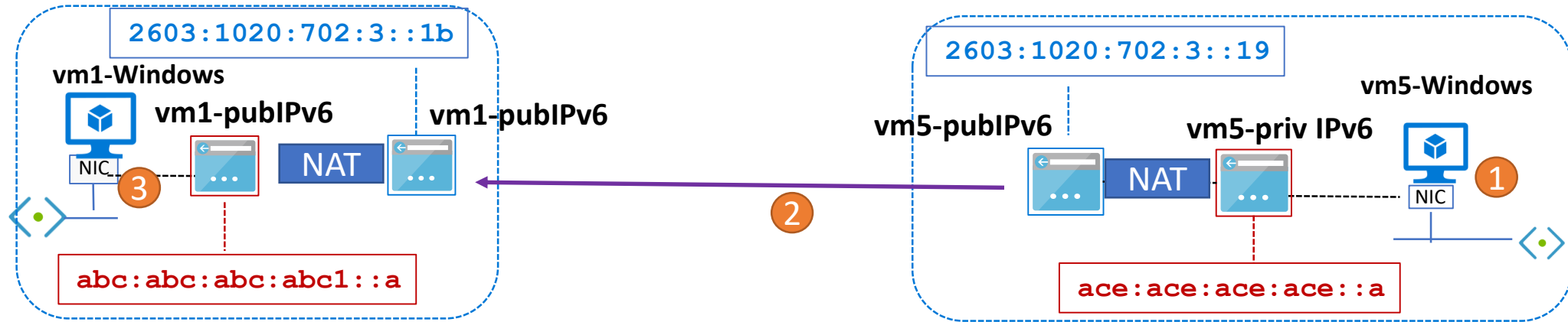
	vm1-Private IPv6		vm5-public IPv6	
IP6	abc:abc:abc:abc1::a	.80	>	2603:1020:702:3::1b.49891: tcp 0
IP6	2603:1020:702:3::1b	.49891	>	abc:abc:abc:abc1::a.80: tcp 0
IP6	2603:1020:702:3::1b	.49891	>	abc:abc:abc:abc1::a.80: tcp 283

IPv6 address mapping



- *Dynamic assignment* = DHCP assigns new IP when VM is re-allocated
- *Static assignment* = DHCP assigns always the same IP
- IP forwarding = NIC can receive/hand off packets with dest IP address different from its private IP
- Public IP = NAT address associated to the NIC

IPv6 address mapping



1 Packet in egress from the VM

Source IPv6	destination IPv6
<code>ace:ace:ace:ace::a</code>	<code>2603:1020:702:3::1b</code>

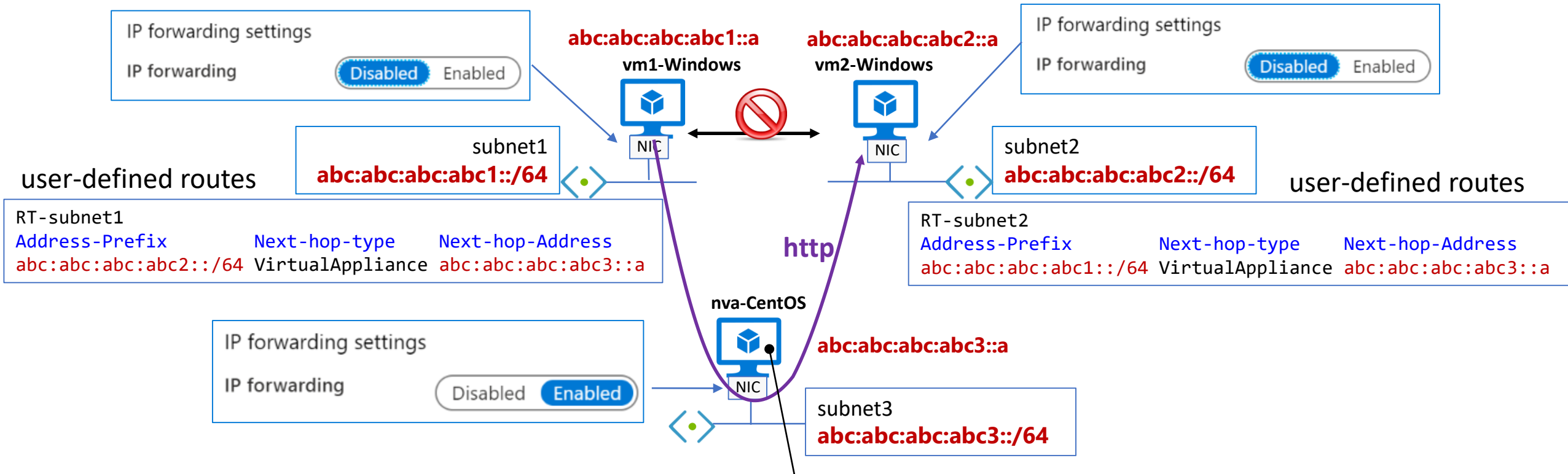
2 Packet through the external network

Source IPv6	destination IPv6
<code>2603:1020:702:3::19</code>	<code>2603:1020:702:3::1b</code>

3 Packet reach out the vm1

Source IPv6	destination IPv6
<code>2603:1020:702:3::19</code>	<code>abc:abc:abc:abc1::a</code>

UDR to force the traffic to passthrough nva

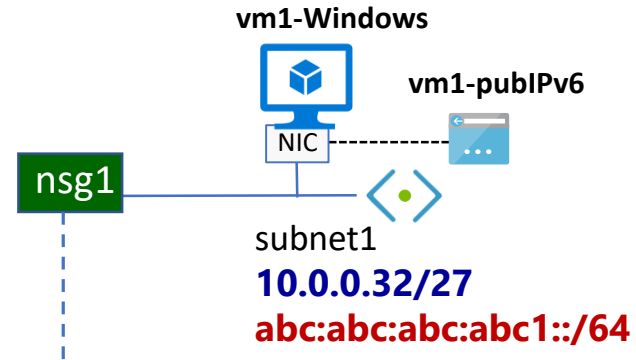


```
tcpdump -i eth0 -n -q 'ip6 and net abc:abc:abc:abc1::/64 and net abc:abc:abc:abc2::/64'
```

```
IP6 abc:abc:abc:abc1::a.50114 > abc:abc:abc:abc2::a.http: tcp 283
IP6 abc:abc:abc:abc1::a.50114 > abc:abc:abc:abc2::a.http: tcp 283
IP6 abc:abc:abc:abc2::a.http > abc:abc:abc:abc1::a.50114: tcp 3168
IP6 abc:abc:abc:abc2::a.http > abc:abc:abc:abc1::a.50114: tcp 3168
IP6 abc:abc:abc:abc1::a.50114 > abc:abc:abc:abc2::a.http: tcp 0
IP6 abc:abc:abc:abc1::a.50114 > abc:abc:abc:abc2::a.http: tcp 0
```


Network Security Group

Accept all incoming traffic from the Azure reserved public IPv6 Prefixes



Inbound security rules

Priority	Name	Port	Protocol	Source	Destination	Action
1010	⚠ allow-inbound-RDP-lpv6-sub...	3389	TCP	Any	abc:abc:abc:abc1::/64	✔ Allow
1020	allow-inbound-RDP-subnet1	3389	TCP	Any	10.0.0.0/27	✔ Allow
1030	allow-inbound-all-pubIPv6	Any	Any	2603:1020:702:3::18/125	VirtualNetwork	✔ Allow
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	✔ Allow
65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	✔ Allow
65500	DenyAllInBound	Any	Any	Any	Any	✘ Deny

Private DNS Zone IPV6



Name	Type	TTL	Value	Auto registered
nva	A	10	10.0.0.80	True
nva	AAAA	3600	abc:abc:abc:abc3::a	-
nva-pub	AAAA	3600	2603:1020:702:3::1a	-
vm1	A	10	10.0.0.20	True
vm1	AAAA	3600	abc:abc:abc:abc1::a	-
vm1-pub	AAAA	3600	2603:1020:702:3::19	-
vm2	A	10	10.0.0.40	True
vm2	AAAA	3600	abc:abc:abc:abc2::a	-
vm2-pub	AAAA	3600	2603:1020:702:3::18	-

```
C:\>nslookup -q=aaaa vm1.contoso.com
Server: UnKnown
Address: 168.63.129.16

Non-authoritative answer:
Name:   vm1.contoso.com
Address: abc:abc:abc:abc1::a
```

Q&A

Reference

<https://docs.microsoft.com/en-us/azure/virtual-network/ipv6-overview>

<https://docs.microsoft.com/en-us/azure/virtual-network/ipv6-public-ip-address-prefix>

<https://myignite.techcommunity.microsoft.com/sessions/83926?source=sessions>