



## Cisco® 675/678 Modem

### Effective Use of NAT Functionality and VIP Interfaces in CBOS Version 2.4.3

Cisco® Broadband Operating System (CBOS) Version 2.4.3 provides a considerable amount of Network Address Translation (NAT) and network interface functionality, which allows high-speed Internet subscribers to configure their networks to address a variety of needs. These instructions will examine some of the features and configuration requirements to benefit from this functionality.

#### Public IP Server Network – Private IP Workstation Network

##### CBOS Commands

```
set ppp wan0-0 login username
set ppp wan0-0 password password
set ppp wan0-0 ipcp 0.0.0.0
set ppp restart enabled
set nat enabled
set int vip0 address 209.98.84.70
set int vip0 mask 255.255.255.248
set int vip0 outside
```

Many high-speed Internet subscribers want to run servers available to the outside world via their high-speed Internet connection and lease public IP address space for this purpose from their Internet Service Provider (ISP). Additionally, these subscribers would like to have a network of internal workstations to have access to these servers as well as the Internet.

Because these subscribers often have a limited number of public IP addresses, they use NAT to provide Internet access as well as access to the servers on the public address space. NAT enables the workstations to access the Internet via the external IP address assigned to the wan0-0 interface of this configuration.

- Packets coming from the network associated with eth0 will have the source address of the wan0-0 interface.
- Workstations on the eth0 network will be configured to reside within a range of RFC 1918 addresses (<http://www.ietf.org/rfc/rfc1918.txt>).
- These addresses have been allocated by the Internet Engineering Task Force (IETF) for precisely this type of application.
- The default network for NAT configuration for the eth0 interface is 10.0.0.0/24.

Ideally, you should allocate a block of addresses large enough to accommodate the servers requiring access from the Internet. If over time the number of servers that require access from the Internet should increase beyond the size of the initial network, you can obtain additional public IP addresses from your ISP and configure them for operation on the next available VIP interface. This is demonstrated in this configuration example:

```
set int vip1 address 209.98.98.0
set int vip1 mask 255.255.255.0
set int vip1 outside
```

There may be times when a subscriber may want to make an application available on the network associated with the eth0 interface to hosts on the outside network. The following example demonstrates a NAT entry for FTP that will allow an application to be statically mapped from vip0(outside) to a host on the eth0(inside) interface.

```
Set nat entry add 10.0.0.2 21 209.98.84.65 21 tcp
```

By segmenting hosts within a network in this fashion, connectivity is effectively realized between the servers on the public IP address space, from hosts on the Internet and from within the local network.

### All NAT – No Public IP Configuration

#### CBOS Commands

```
set ppp wan0-0 login username
set ppp wan0-0 password password
set ppp wan0-0 ipcp 0.0.0.0
set ppp restart enabled
set nat enabled
set int vip0 address 10.0.1.1
set int vip0 mask 255.255.255.0
set int vip0 inside
```

Many high-speed Internet subscribers are primarily interested in having Internet access for workstations with little or no need to host services or to accept incoming connections. For these subscribers NAT connectivity provides a convenient means of facilitating this type of access.

Additionally, the VIP interface mechanisms provide a flexible means of segmenting the network into separate broadcast domains and routing between them. Servers and work-groups can be placed into networks associated with the different VIP interfaces. As long as the VIP interface is defined as being inside from a NAT perspective, traffic destined for these separate networks is routed via the 6xx without requiring NAT between inside interfaces.

A subscriber may want to allow inbound connections to hosts on the internal networks. When these occasions arise, the Port Address Translation (PAT) feature within CBOS can be utilized to map inbound connections from the Internet to the designated host on the inside segment.

The following is a sample NAT entry that will allow HTTP to be statically mapped from wan0-0 to a host on the vip0(inside) interface. Note the use of the global 0.0.0.0 address wildcard to accommodate the dynamic allocation of addresses via IPCP.

```
cbos# set nat entry add 10.0.1.3 80 0.0.0.0 80 tcp
```

An additional NAT entry that will allow FTP to be statically mapped from wan0-0 to a host on the eth0(inside) interface. Again, note the use of the global 0.0.0.0 address wildcard to accommodate the dynamic allocation of addresses via IPCP.

```
Set nat entry add 10.0.0.2 21 0.0.0.0 21 tcp
```



Comprehensive documentation regarding the PAT capabilities of the Cisco 6xx platform is available on the Cisco Web site [www.cisco.com](http://www.cisco.com).

Comprehensive documentation regarding NAT and the PAT capabilities of the Cisco 6xx family can be found at:

- Understanding Port Address Translation on the Cisco 600  
<http://www.cisco.com/warp/public/794/600pat.html>
- Cisco Broadband Operating System (CBOS)  
[http://www.cisco.com/univercd/cc/td/doc/product/dsl\\_prod/c600s/cbos/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/dsl_prod/c600s/cbos/index.htm)

### No NAT – Entirely Public IP Configuration

#### CBOS Commands

```
set ppp wan0-0 login username
set ppp wan0-0 password password
set ppp wan0-0 ipcp 0.0.0.0
set ppp restart enabled
set int vip0 address 209.98.84.70
set int vip0 mask 255.255.255.248
set int vip0 outside
set int vip1 address 209.98.84.70
set int vip1 mask 255.255.255.248
set int vip1 outside
```

Some subscribers have a significant quantity of public address space and would like to make it available for use within their network. The use would be by servers which are publicly accessible via the Internet and workstations, which may run certain applications that require public IP addresses.

The configuration detailed above illustrates the ability of the VIP interface to support this type of configuration as well as route between these network segments.

### VIP Configuration

When setting the address and the mask on the VIP interfaces, the changes aren't reflected until the next reboot of the 6xx device. Configuration elements can be added and changed prior to the reboot but changes will not be reflected until the next reboot. Where applicable, CBOS will inform the user that these changes won't take place until the next reboot.

### NAT Configuration of TFTP and Telnet

If NAT entries are created through the wan0-0 interface for the Telnet service users won't be able to Telnet into the 6xx to administrate it via the wan0-0 interface. Additionally, if NAT entries are created for TFTP, users won't be to TFTP software images to the 6xx device via the wan0-0 interface. Users should exercise care when creating NAT entries for these services.



## Summary

The VIP interface functionality in CBOS provides a considerable amount of operational flexibility. When used in conjunction with the NAT and PAT feature sets, a wide variety of configuration scenarios can be accommodated. By strictly enforcing the NAT boundaries users can effectively segment their networks both internally and externally, providing a means to effectively grow their networks.