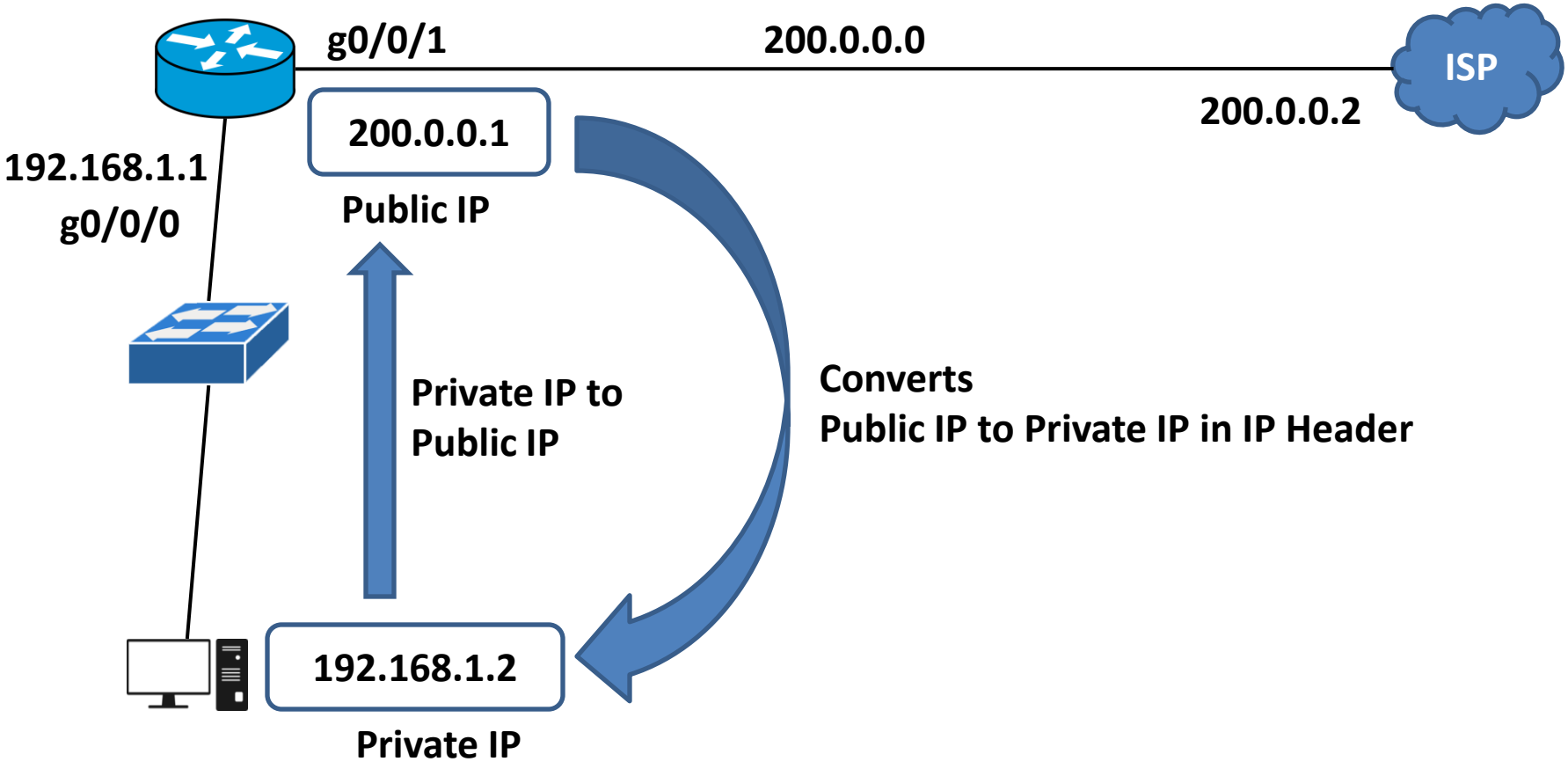
Network Address Translation:

NAT (Network Address Translation) is a technique used in networking to modify network address information in the IP header of packets while they are in transit across a traffic routing device. NAT allows multiple devices on a local network to be mapped to a single public IP address (or a small pool of public IP addresses) and helps improve security and decrease the number of IP addresses an organization needs.

Network Address Translation:



Key Purposes of NAT:

IP Address Conservation: NAT allows multiple devices on a private network to share a single public IP address for accessing the Internet. This is essential in conserving the limited supply of IPv4 addresses.

Security: By hiding internal IP addresses, NAT provides a layer of security by making the internal network structure less visible to external entities.

Routing Flexibility: NAT allows private IP addresses to be used internally, enabling network administrators to change internal IP addresses without affecting external communication.

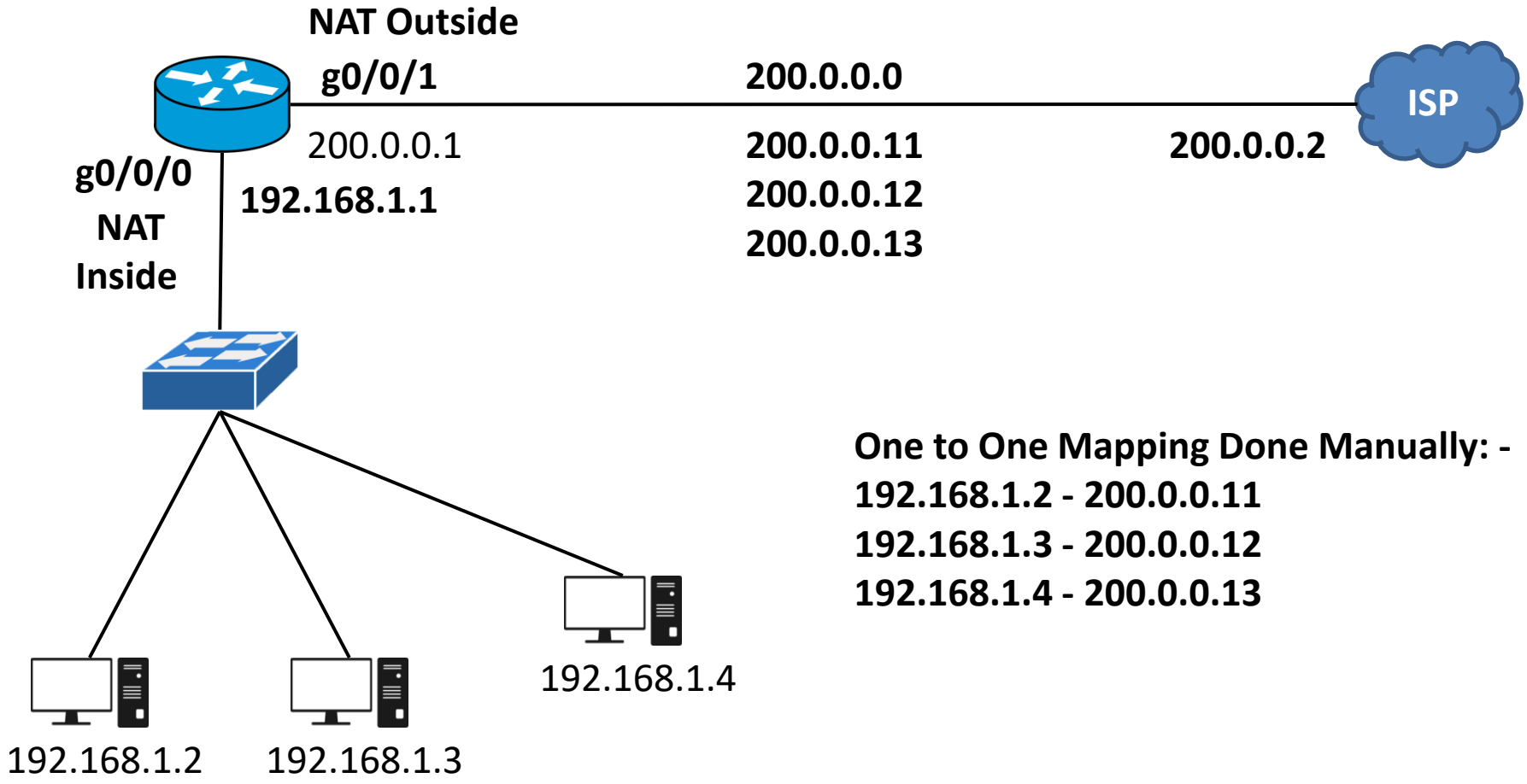
Types of NAT:

Static NAT (SNAT):

One-to-One Mapping: Static NAT provides a one-to-one mapping between a private IP address and a public IP address.

Use Case: Useful for devices that need to be accessible from outside the network, such as web servers or email servers.

Network Address Translation: Static NAT



One to One Mapping Done Manually: -
192.168.1.2 - 200.0.0.11
192.168.1.3 - 200.0.0.12
192.168.1.4 - 200.0.0.13

Static Network Address Translation:

Internal private IP: 192.168.1.2, 192.168.1.3, 192.168.1.4,

Mapped public IP: 200.0.0.11, 200.0.0.12, 200.0.0.13

Configuration Example:

Router(config)#*int g0/0/0*

Router(config)#i*p nat inside*

Router(config)#*int g0/0/1*

Router(config)#*ip nat outside*

Router(config)#*ip nat inside source static 192.168.1.2 200.0.0.11*

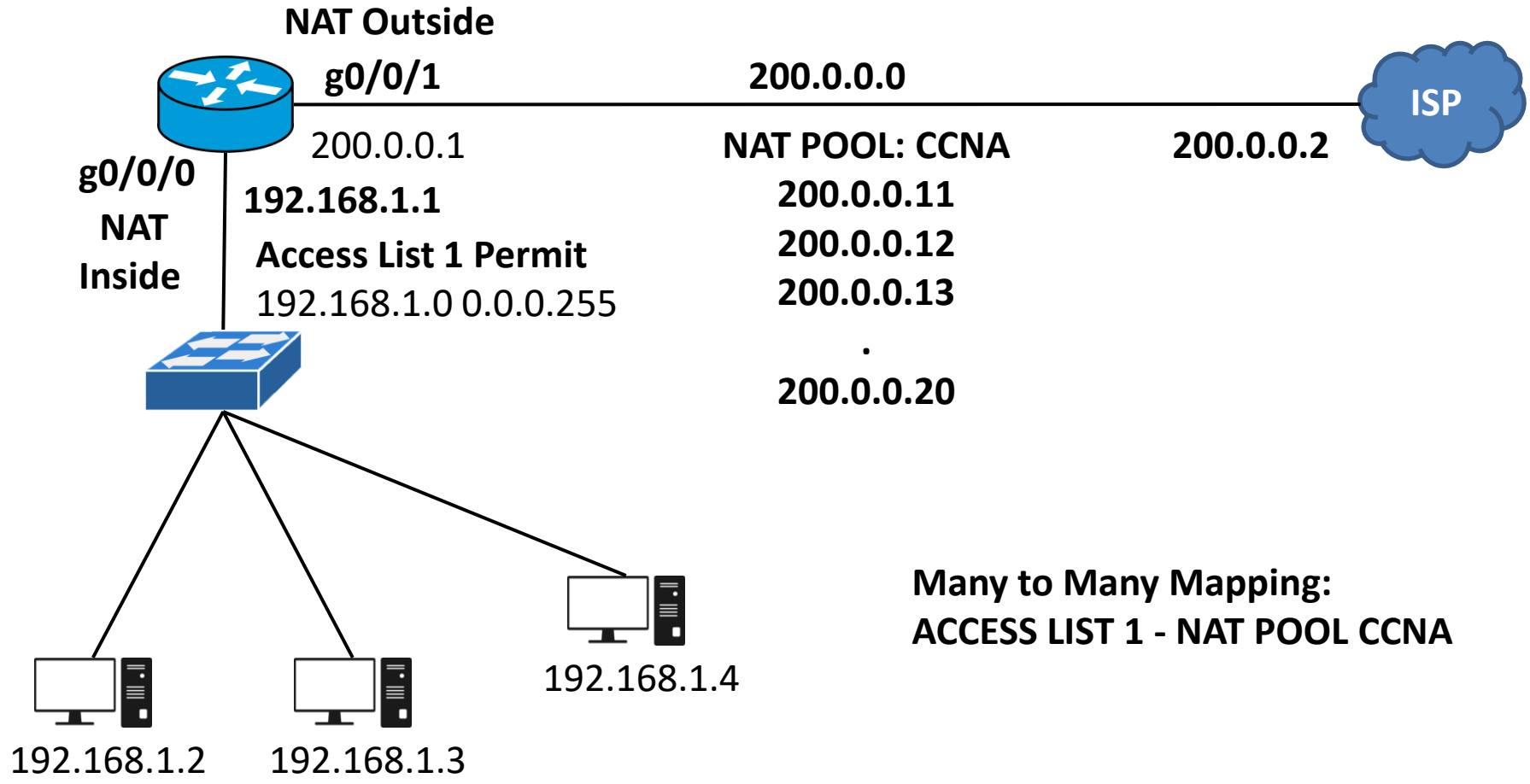
Types of NAT:

Dynamic NAT (DNAT):

Many-to-Many Mapping: Dynamic NAT maps private IP addresses to a pool of public IP addresses on a first-come, first-served basis.

Use Case: Useful when there are more internal devices than available public IPs, but not all devices need simultaneous access to the internet.

Network Address Translation: Dynamic NAT:



Many to Many Mapping:
ACCESS LIST 1 - NAT POOL CCNA

Types of NAT:

Example:
Private IPs: 192.168.1.0/24
Public IP pool: 200.0.0.11 – 200.0.0.20

Configuration Example:
Router(config)# *ip nat pool ccna 200.0.0.11 200.0.0.20 netmask 255.255.255.0*
Router(config)# *access-list 1 permit 192.168.1.0 0.0.0.255*
Router(config)# *ip nat inside source list 1 pool ccna*

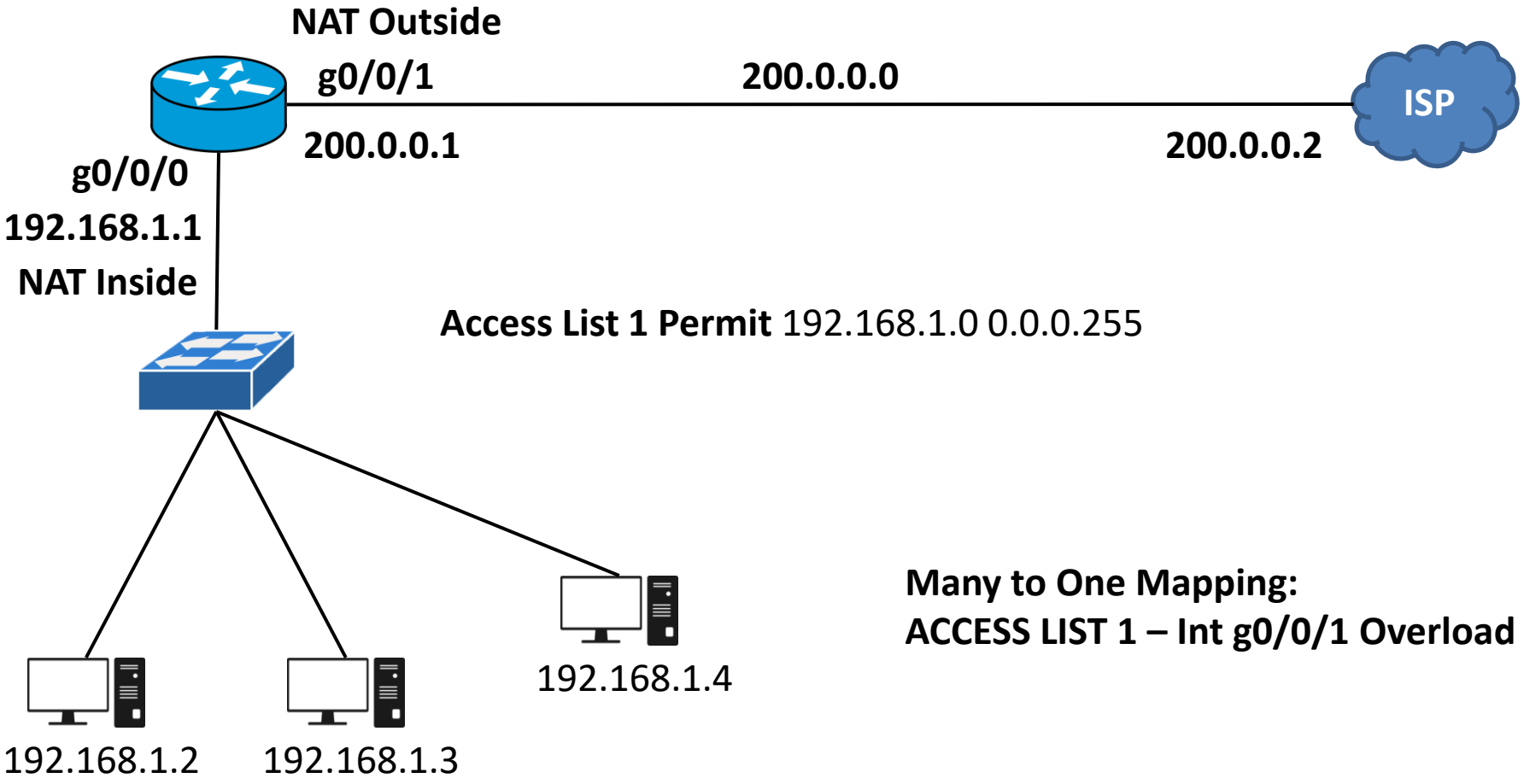
Types of NAT:

Port Address Translation (PAT) or Overloading:

Many-to-One Mapping: Also known as "NAT overload," PAT maps multiple private IP addresses to a single public IP address using different ports.

Use Case: The most common form of NAT, used to enable multiple devices on a local network to access the internet using a single public IP address.

NAT: Port Address Translation: NAT Overload



Many to One Mapping:
ACCESS LIST 1 – Int g0/0/1 Overload

Port Address Translation (PAT) or NAT Overload:

Example:
Private IPs: 192.168.1.0/24
Public IP: 200.0.0.2 (or IP alloted to Interface g0/0/1)

Configuration Example:
Router(config)# *access-list 1 permit 192.168.1.0 0.0.0.255*
Router(config)# *ip nat inside source list 1*
interface GigabitEthernet0/0/1 overload