Network Services

Ross Bagurdes
Network Engineer

@bagurdes

Module Goals

Network Address Translation

Dynamic Host Configuration Protocol

Domain Name System

Network Services

Network Address Translation

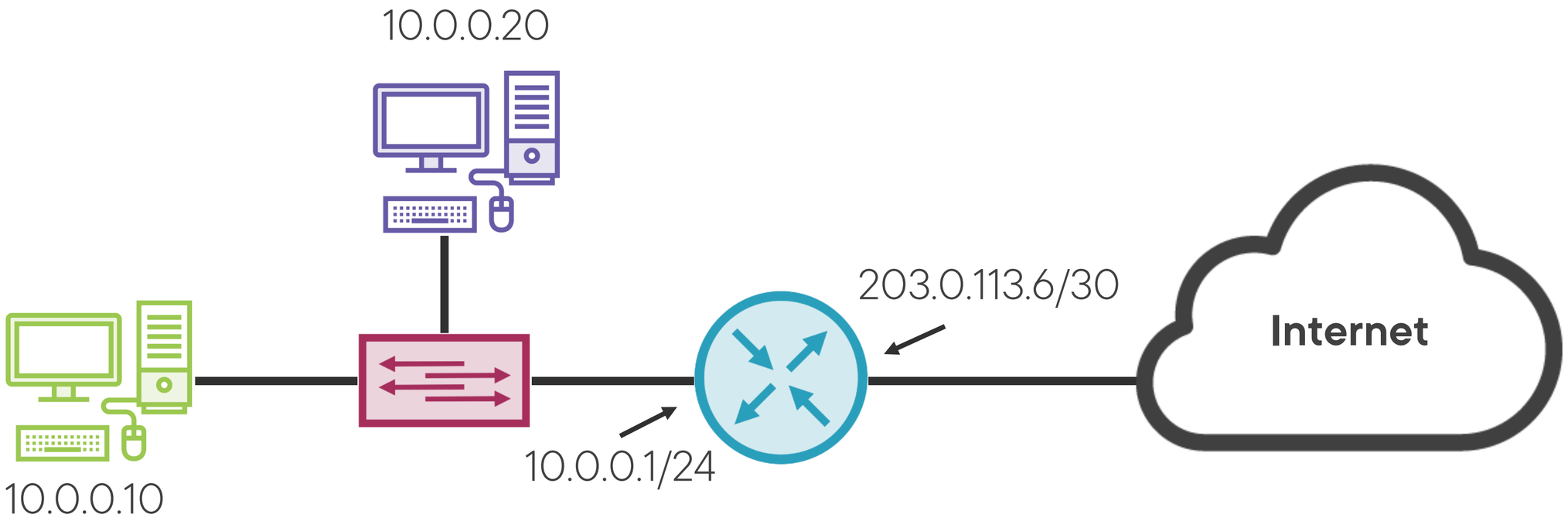
OSI Model

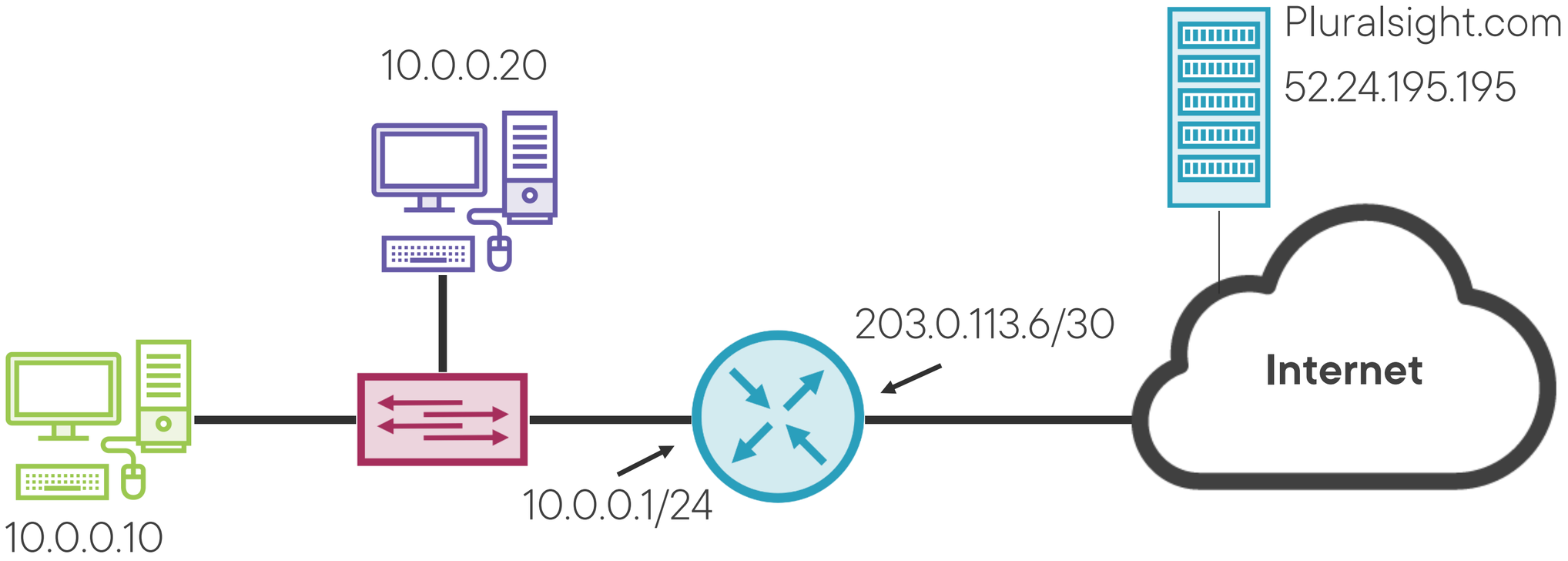
7	Application Layer
6	Presentation Layer
5	Session Layer
4	Transport Layer
3	Network Layer
2	Data Link Layer
1	Physical Layer

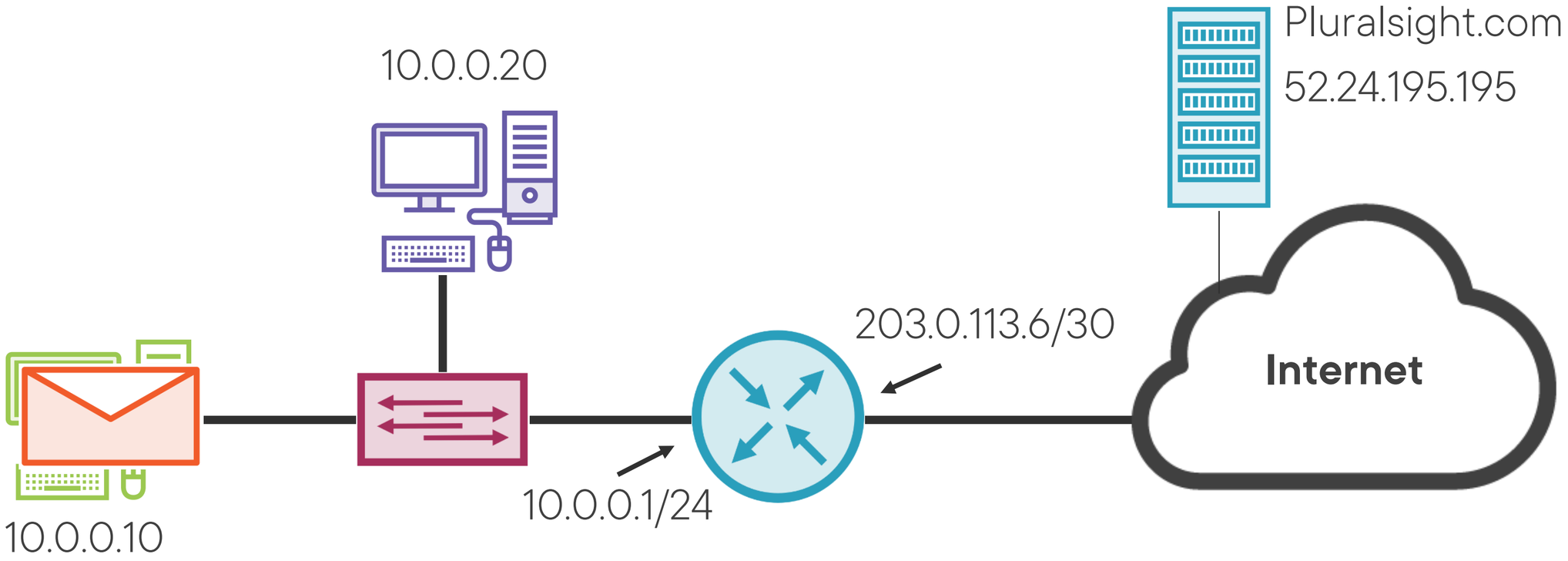
Private IP Address

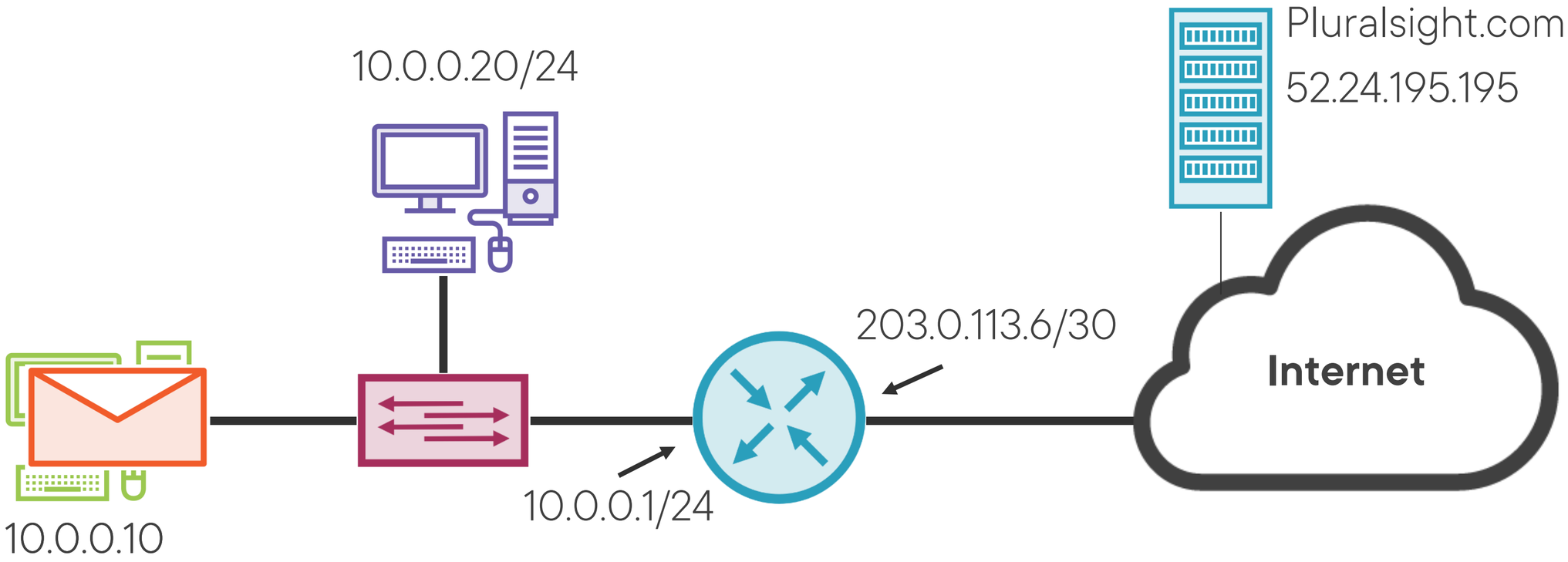
Private IP Address Range
10.0.0.0/8
172.16.0.0/12
192.168.0.0/16

APIPA
169.254.0.0/16

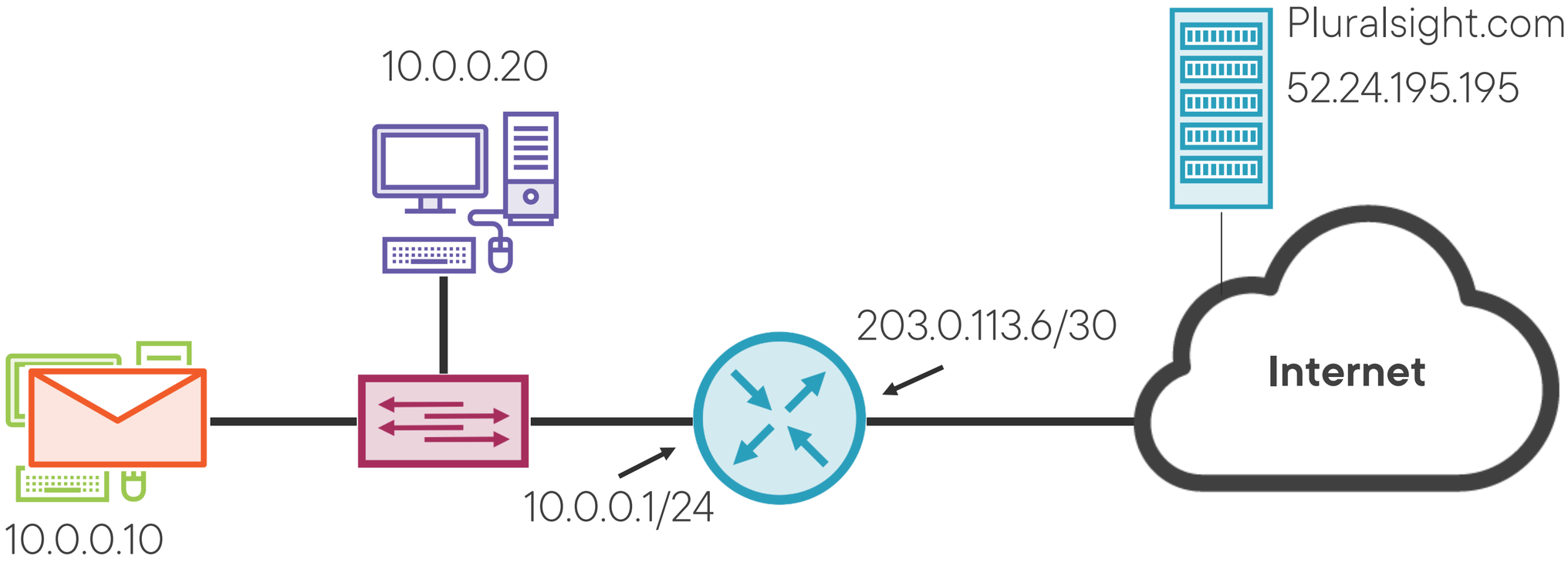

10.0.0.20
203.0.113.6/30
Internet
10.0.0.1/24
10.0.0.10


Pluralsight.com
52.24.195.195
10.0.0.20
203.0.113.6/30
Internet
10.0.0.1/24
10.0.0.10

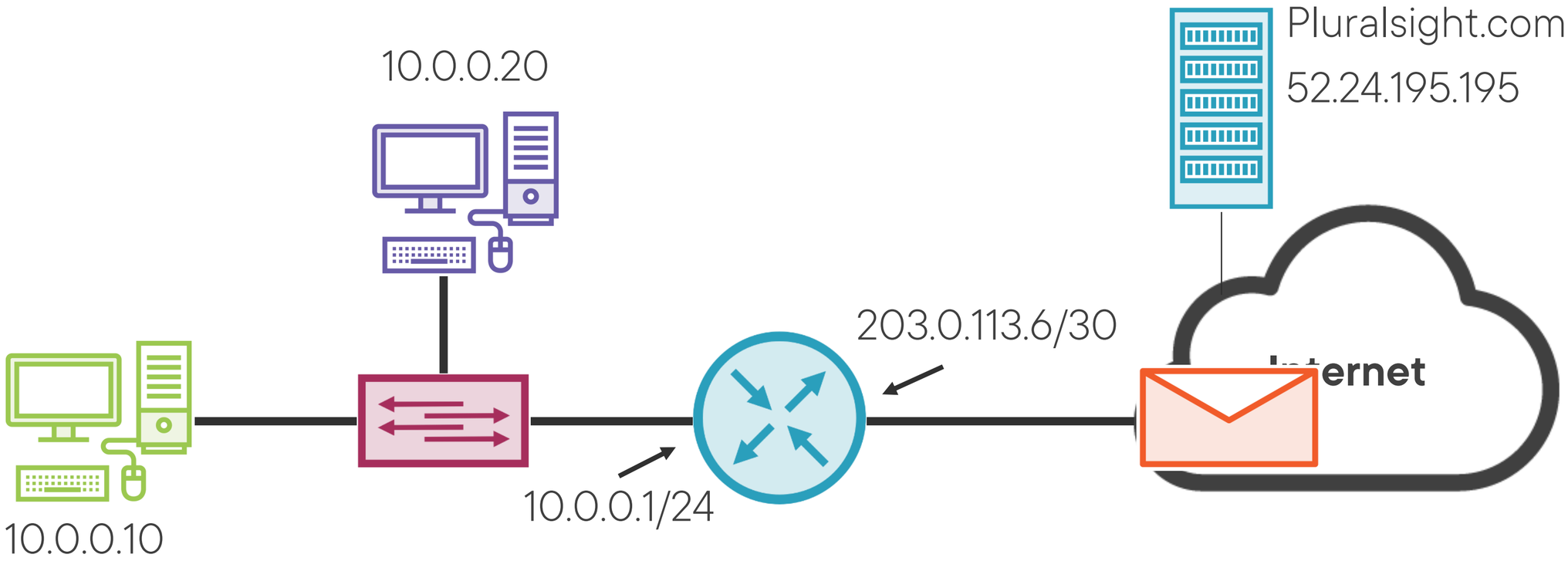

Pluralsight.com
52.24.195.195
10.0.0.20
203.0.113.6/30
Internet
10.0.0.1/24
10.0.0.10



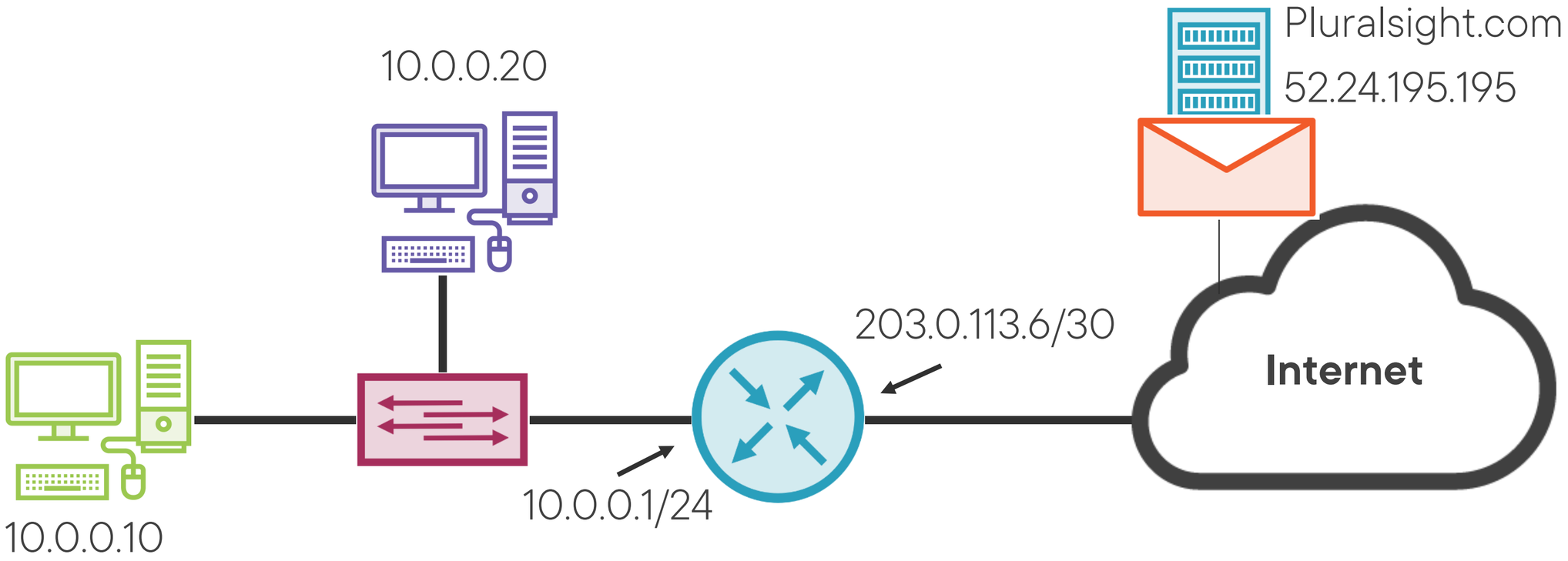
Source IP	Destination IP



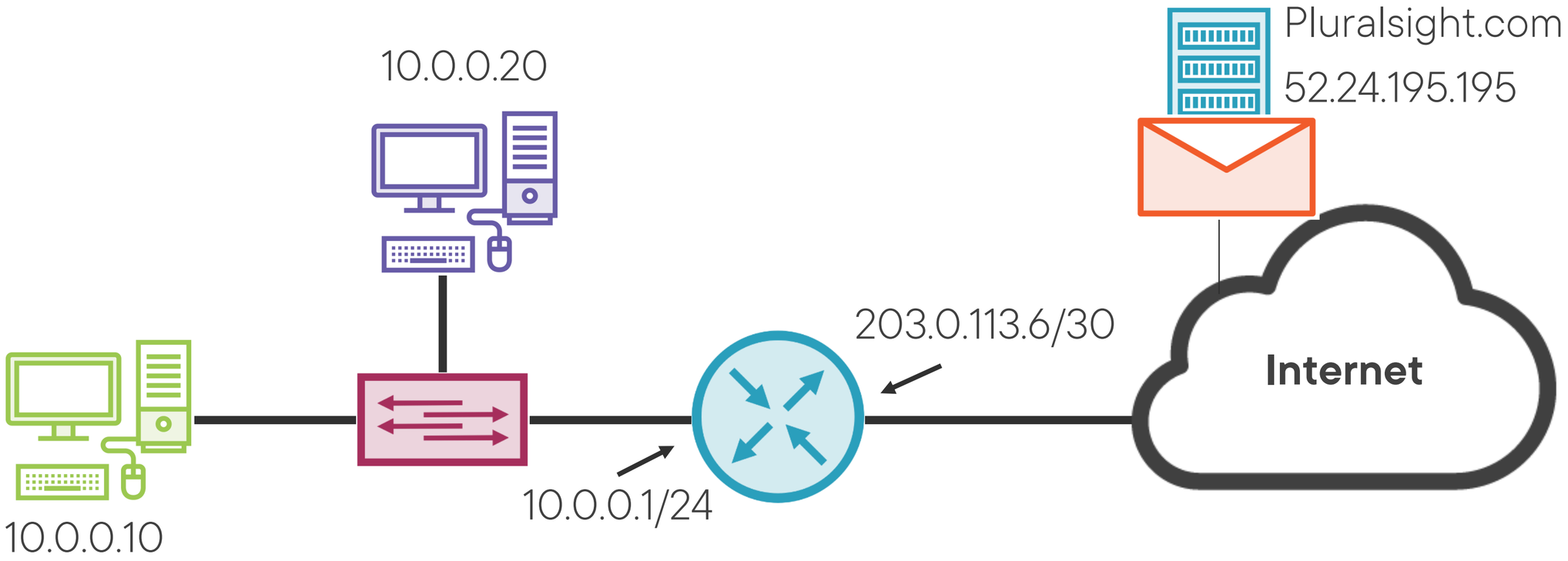
Source IP	Destination IP
10.0.0.10	52.24.195.195



Source IP	Destination IP
10.0.0.10	52.24.195.195



Source IP	Destination IP
10.0.0.10	52.24.195.195



Source IP	Destination IP
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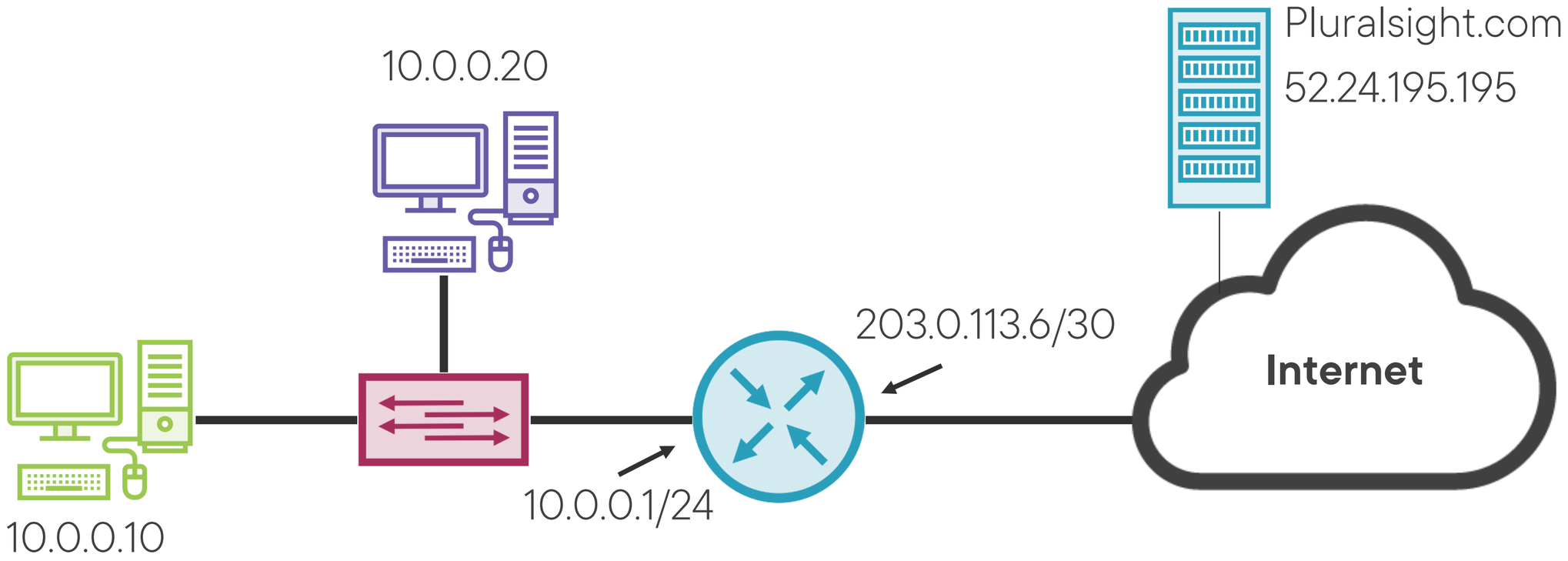
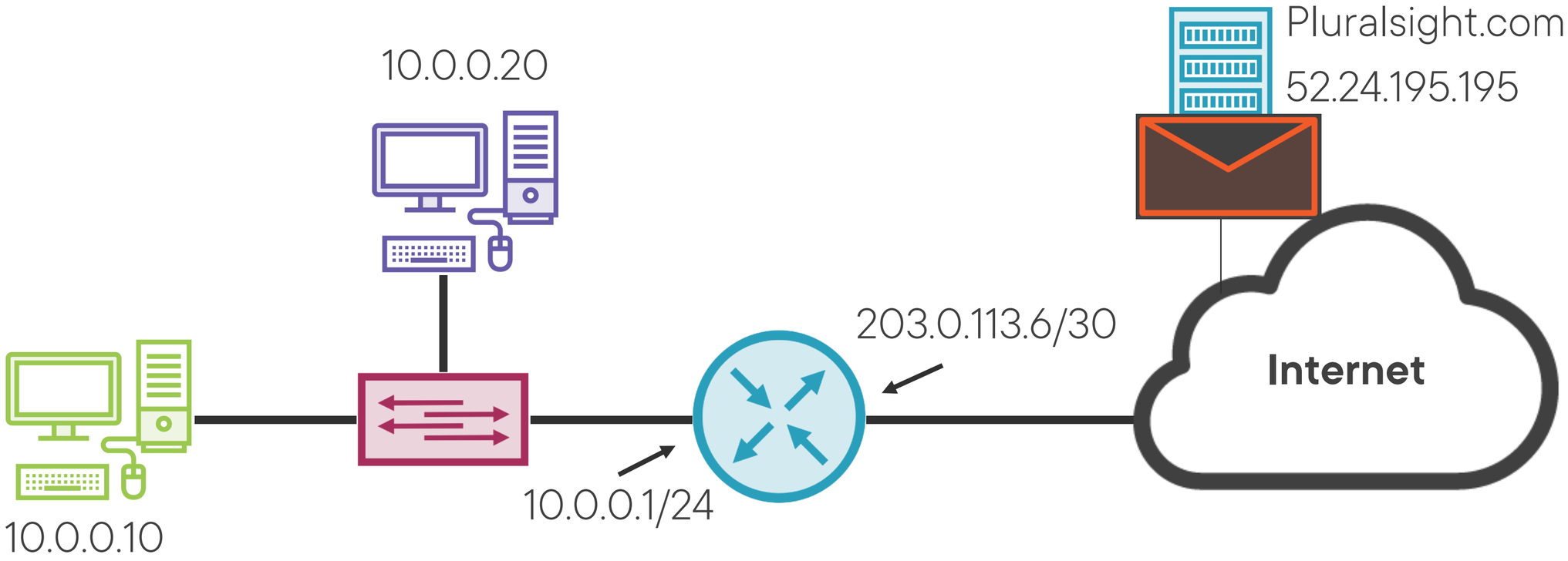
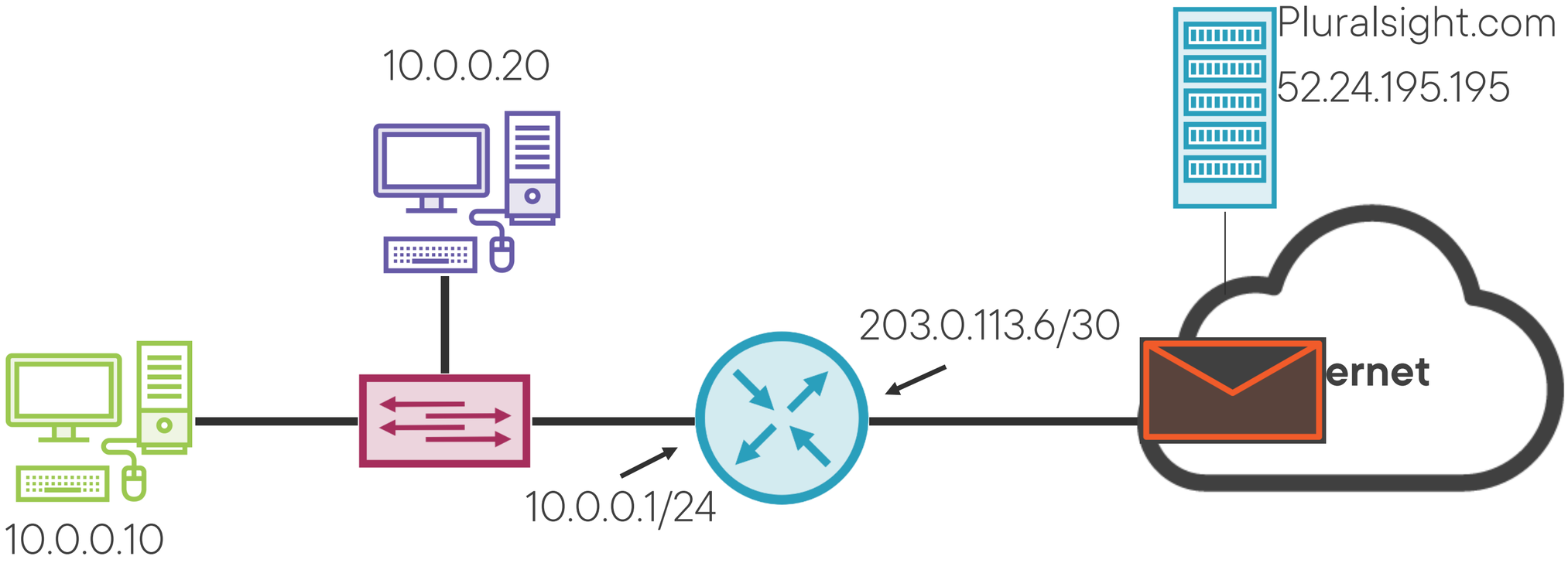


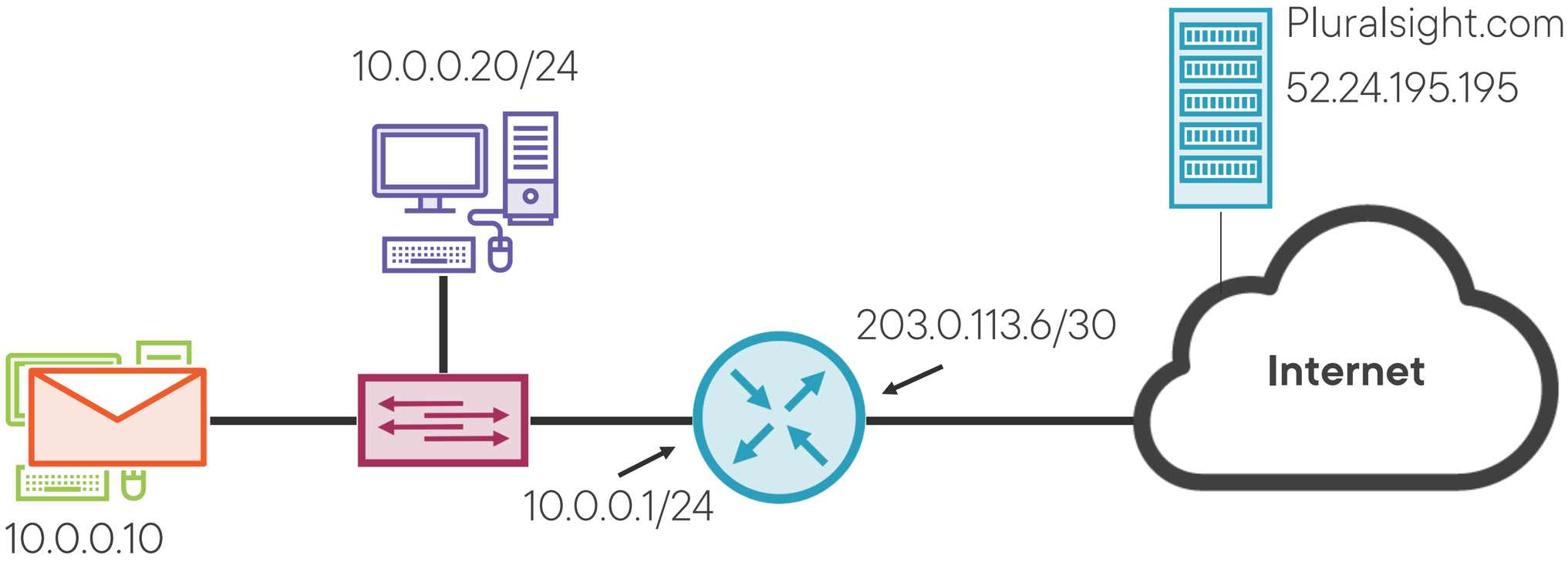
Source IP	Destination IP
10.0.0.10	52.24.195.195



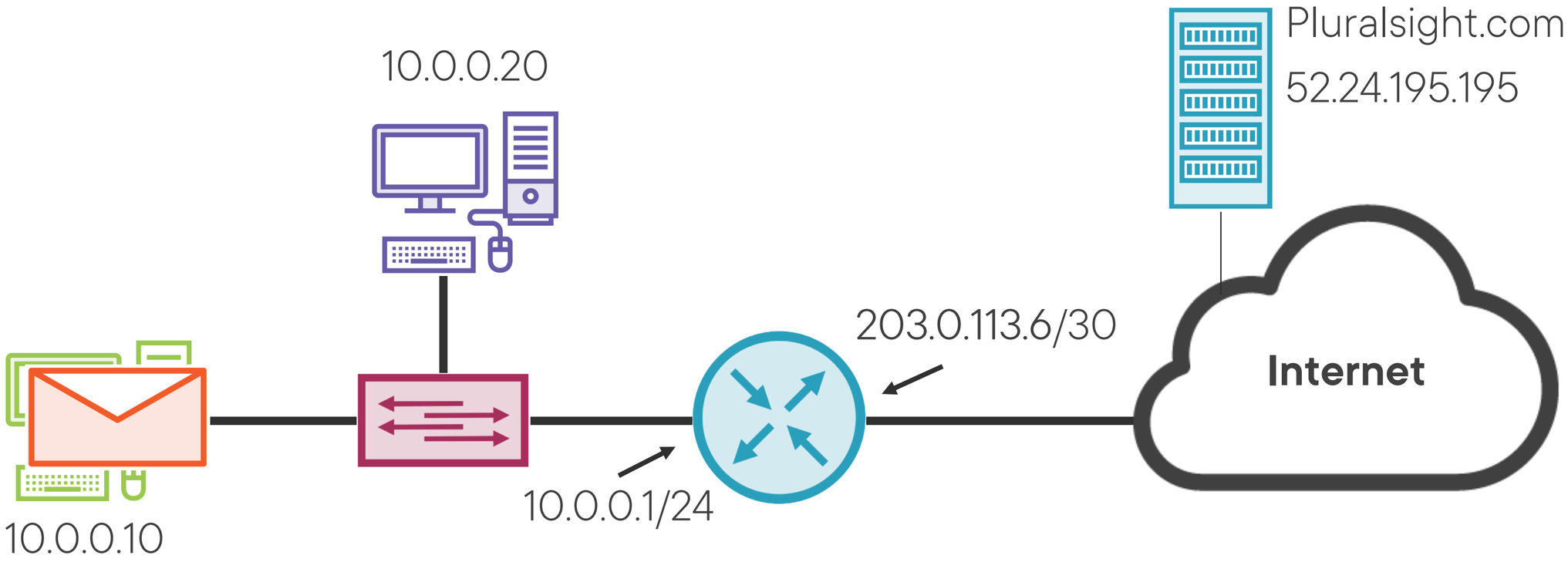
Source IP	Destination IP
52.24.195.195	10.0.0.10



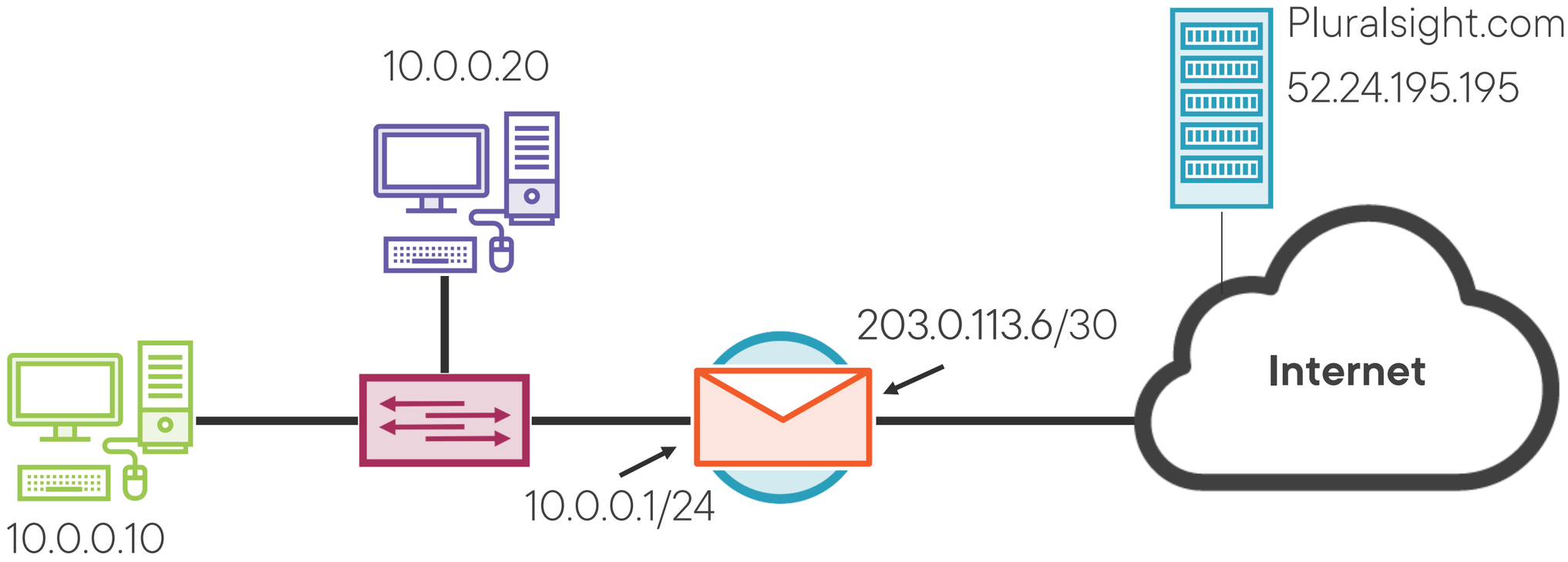
Source IP	Destination IP
52.24.195.195	10.0.0.10



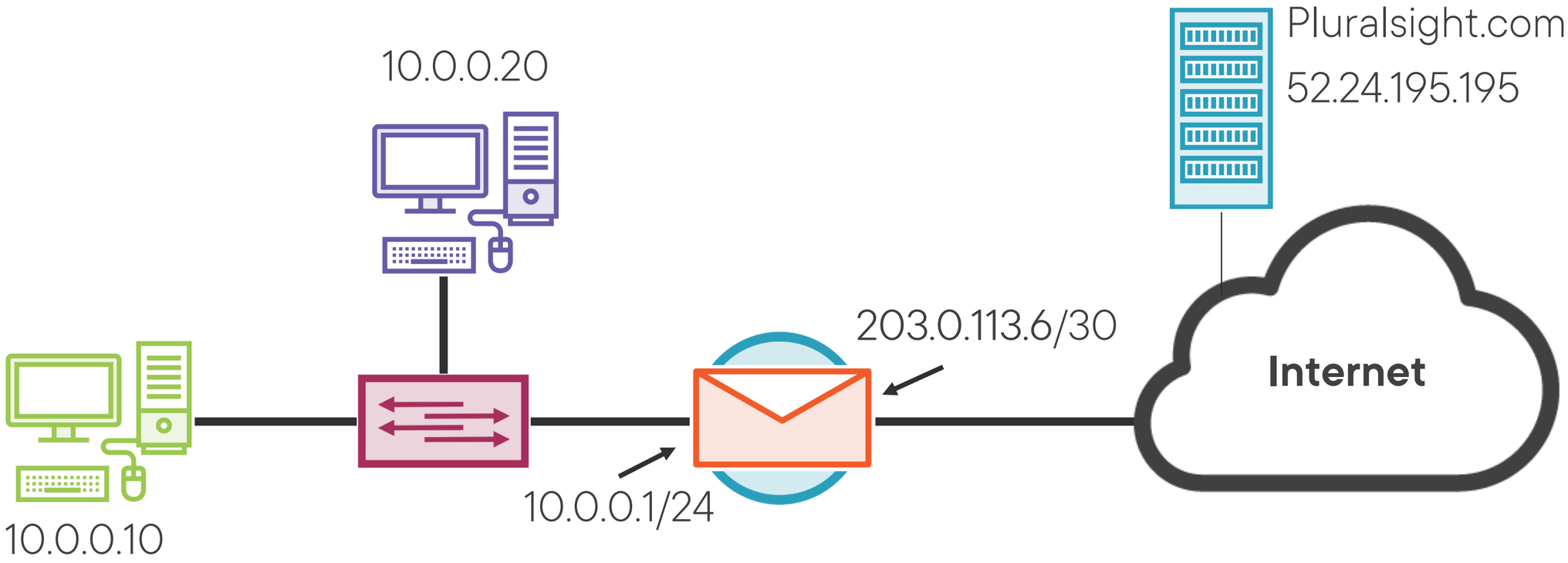
Source IP	Destination IP



Source IP	Destination IP
10.0.0.10	52.24.195.195

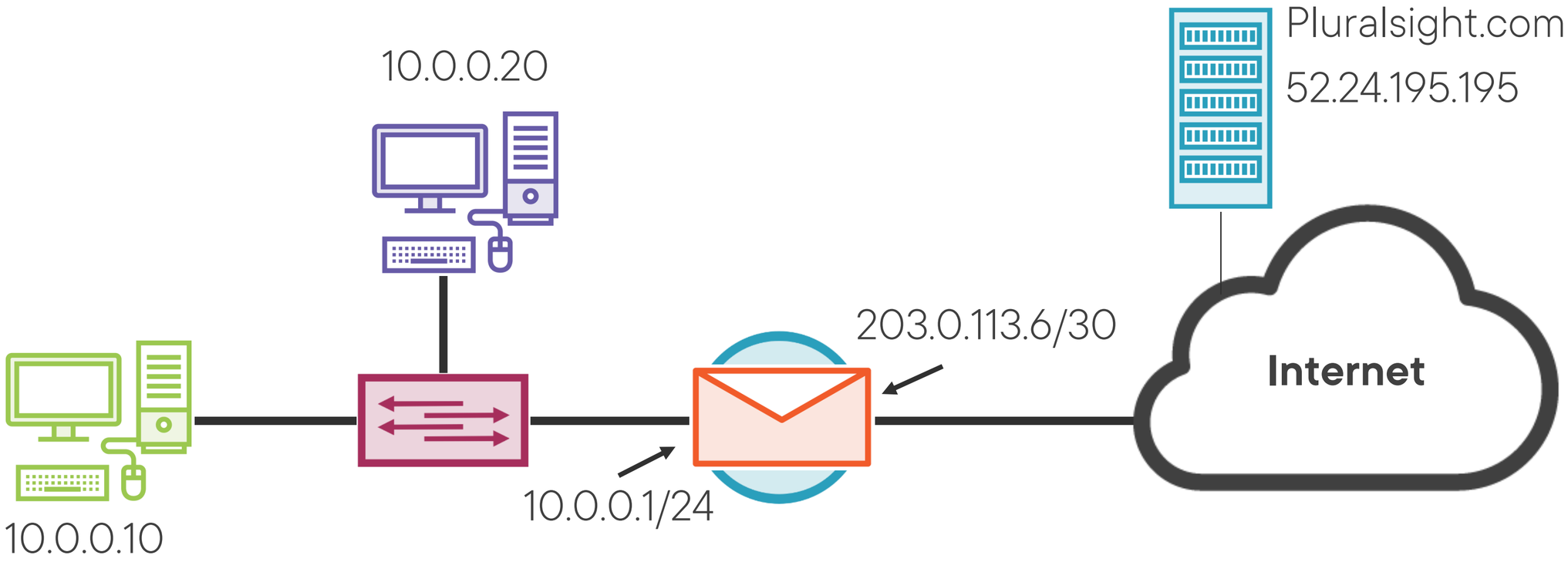


Source IP	Destination IP
10.0.0.10	52.24.195.195



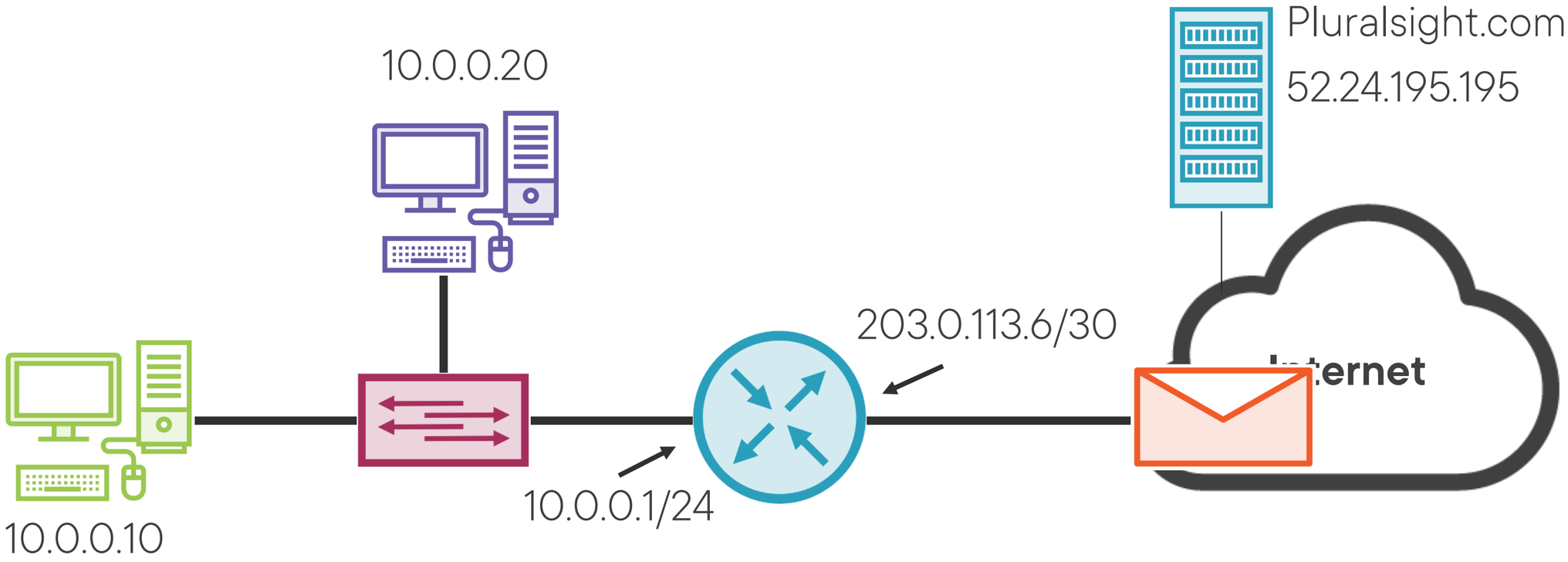
Source IP	Destination IP
	52.24.195.195

10.0.0.10

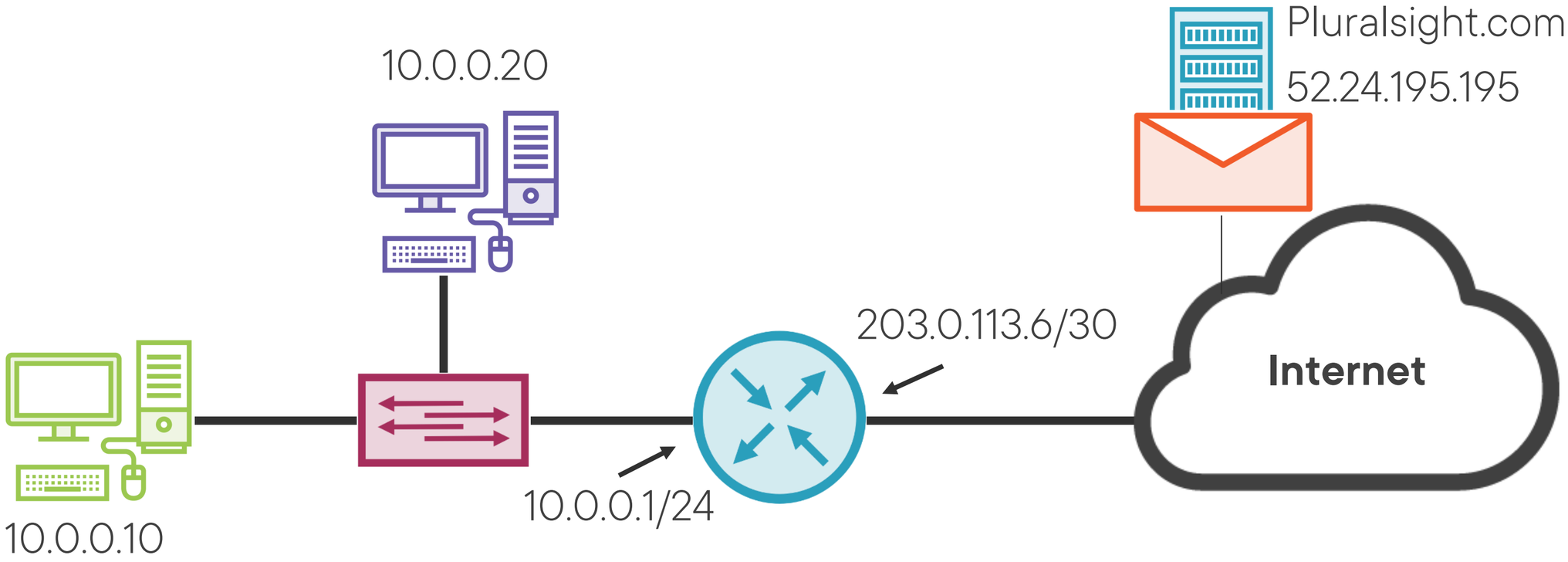


Source IP	Destination IP
203.0.113.6	52.24.195.195

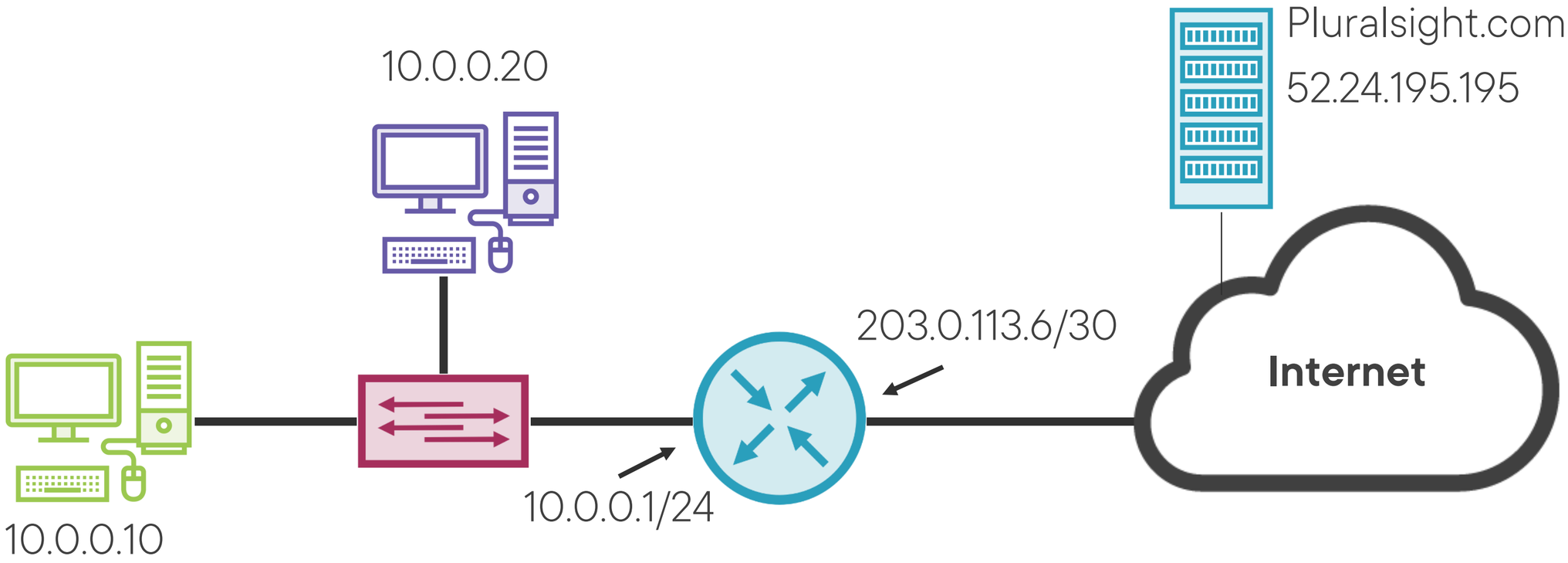
10.0.0.10



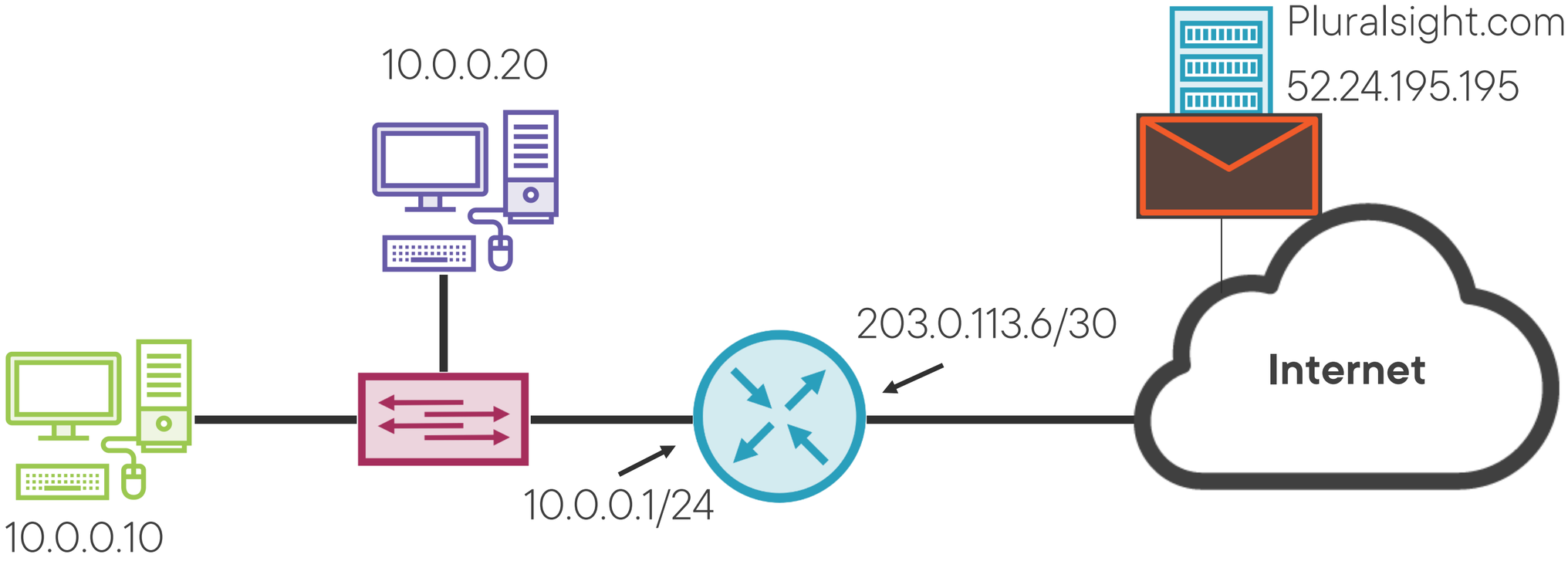
Source IP	Destination IP
203.0.113.6	52.24.195.195
10.0.0.10	



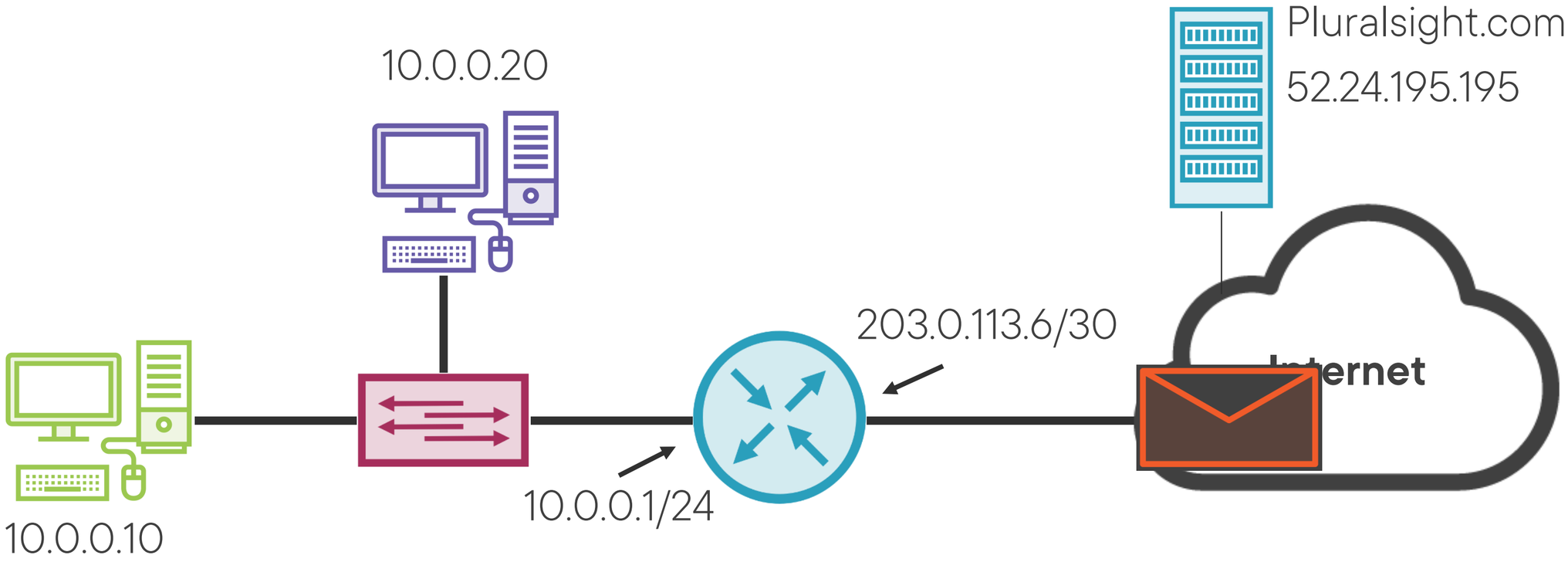
Source IP	Destination IP
203.0.113.6	52.24.195.195
10.0.0.10	



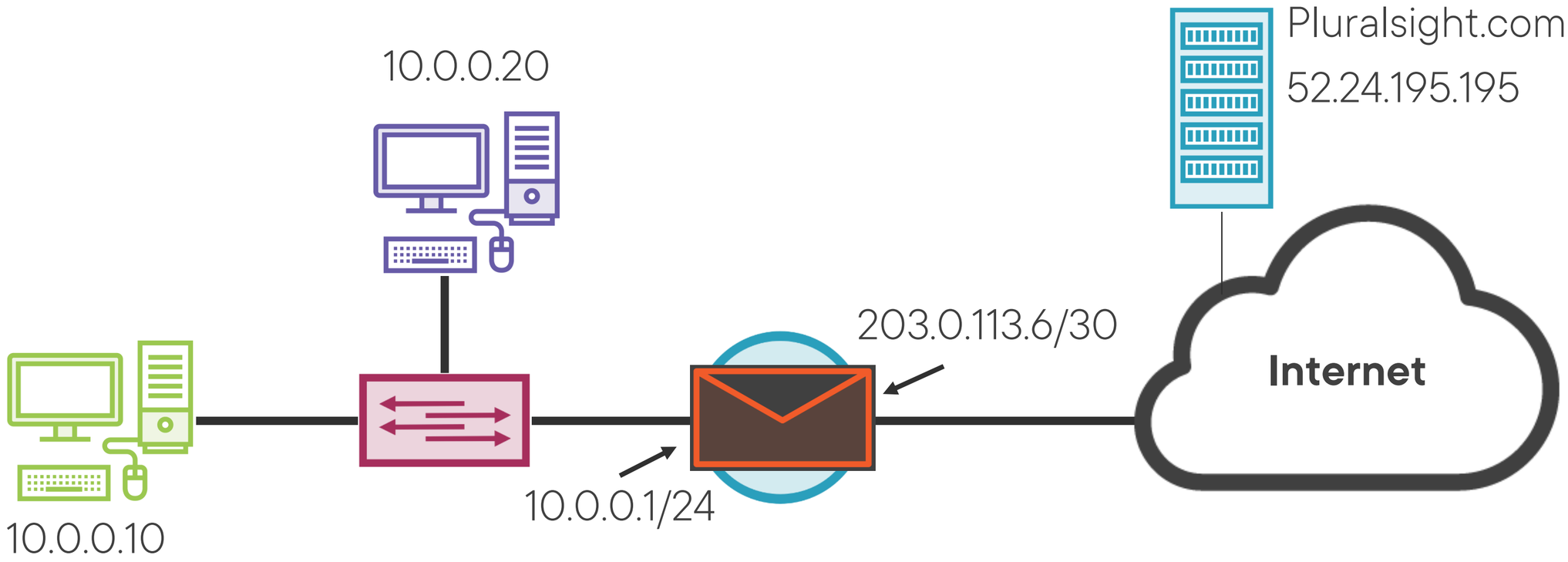
Source IP	Destination IP
203.0.113.6	52.24.195.195
10.0.0.10	



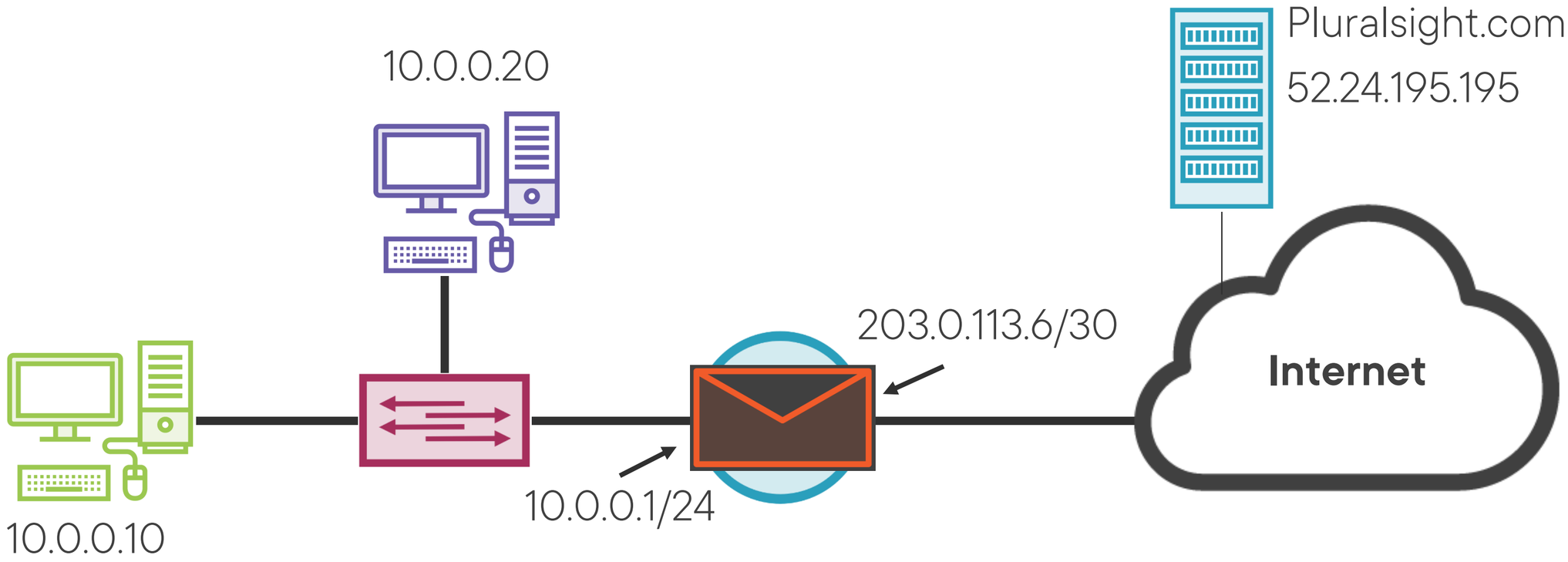
Source IP	Destination IP
52.24.195.195	203.0.113.6
	10.0.0.10



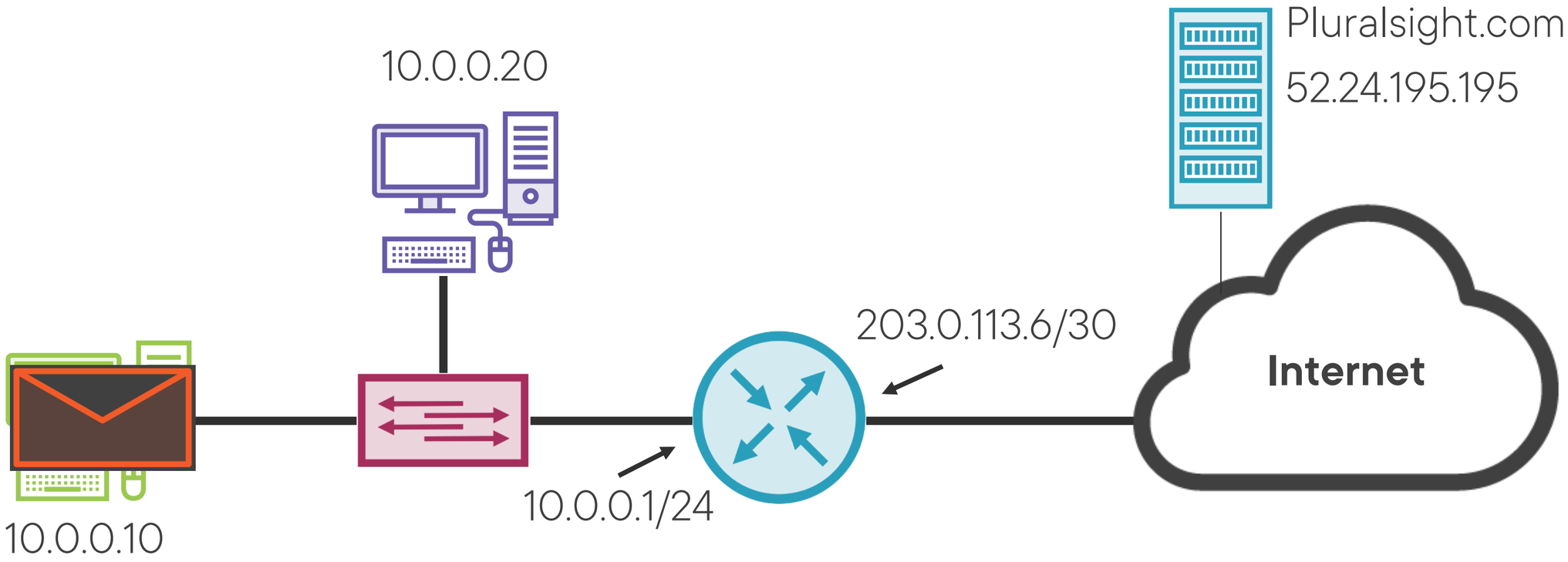
Source IP	Destination IP
52.24.195.195	203.0.113.6
	10.0.0.10



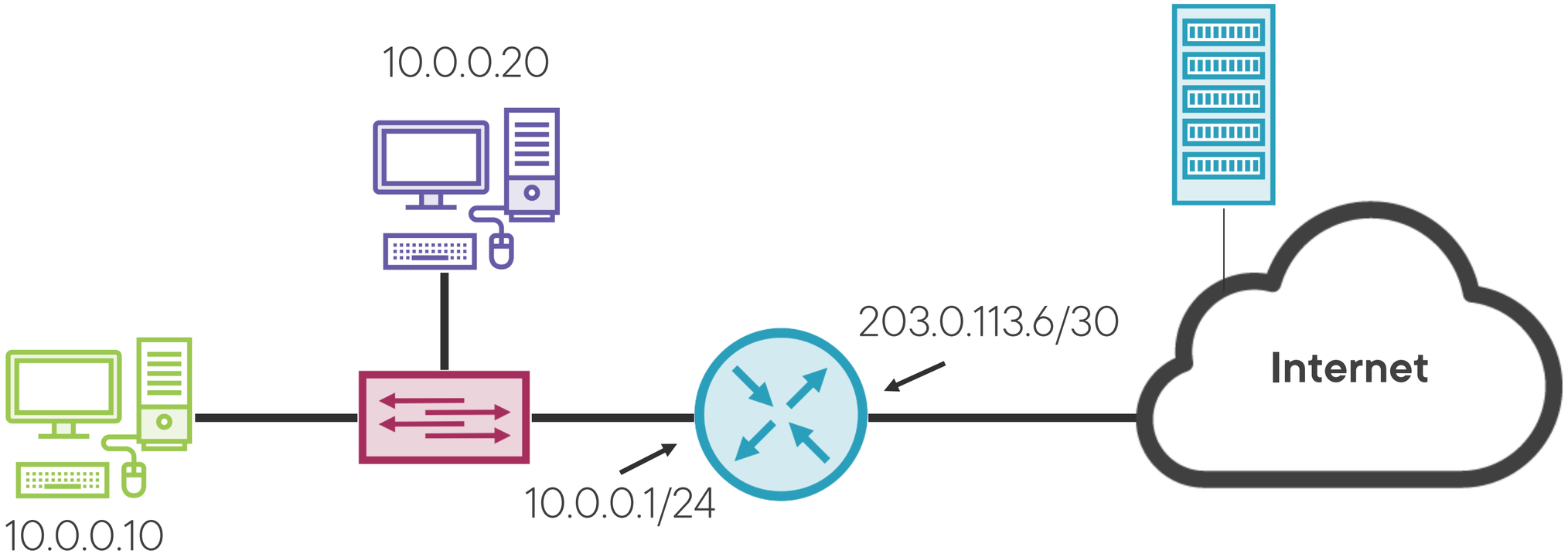
Source IP	Destination IP
52.24.195.195	203.0.113.6
	10.0.0.10



Source IP	Destination IP
52.24.195.195	10.0.0.10



Source IP	Destination IP
52.24.195.195	10.0.0.10



Network Address Translation

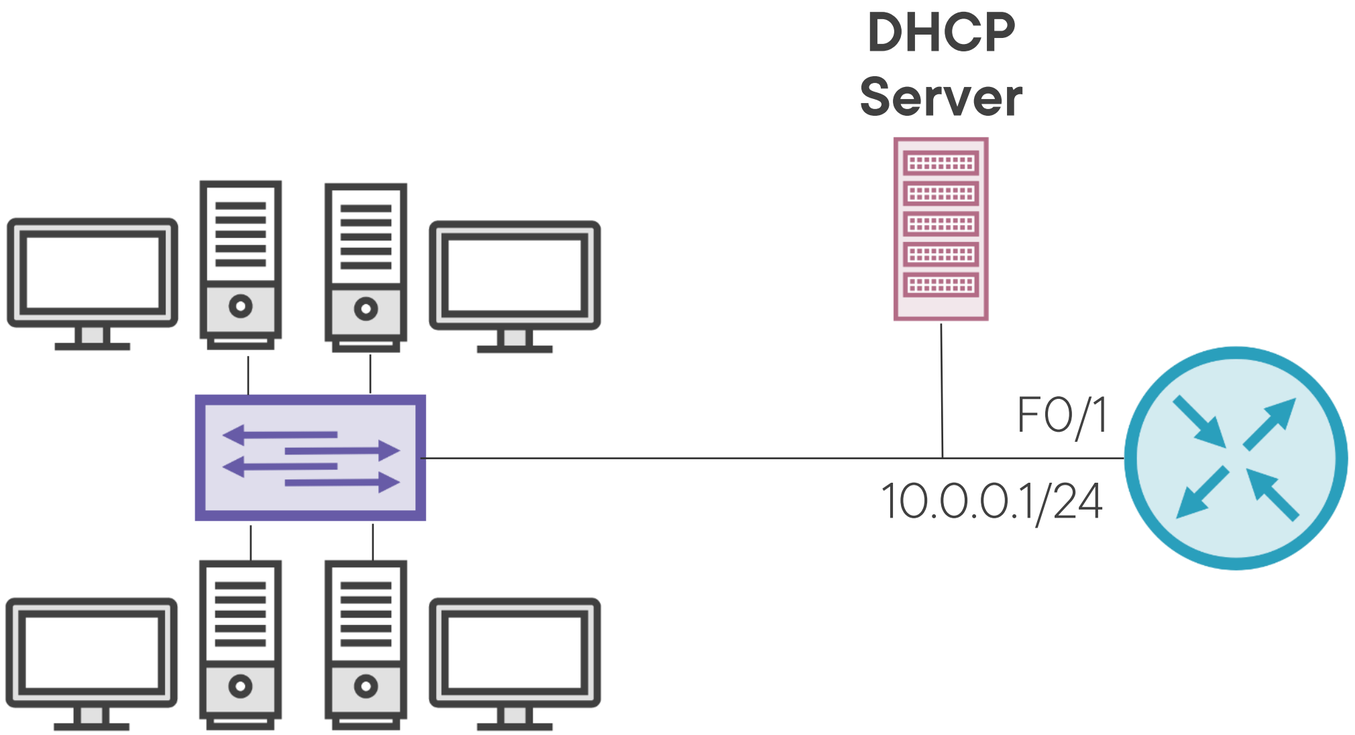
Port Address Translation

Dynamic Host Configuration Protocol (DHCP)

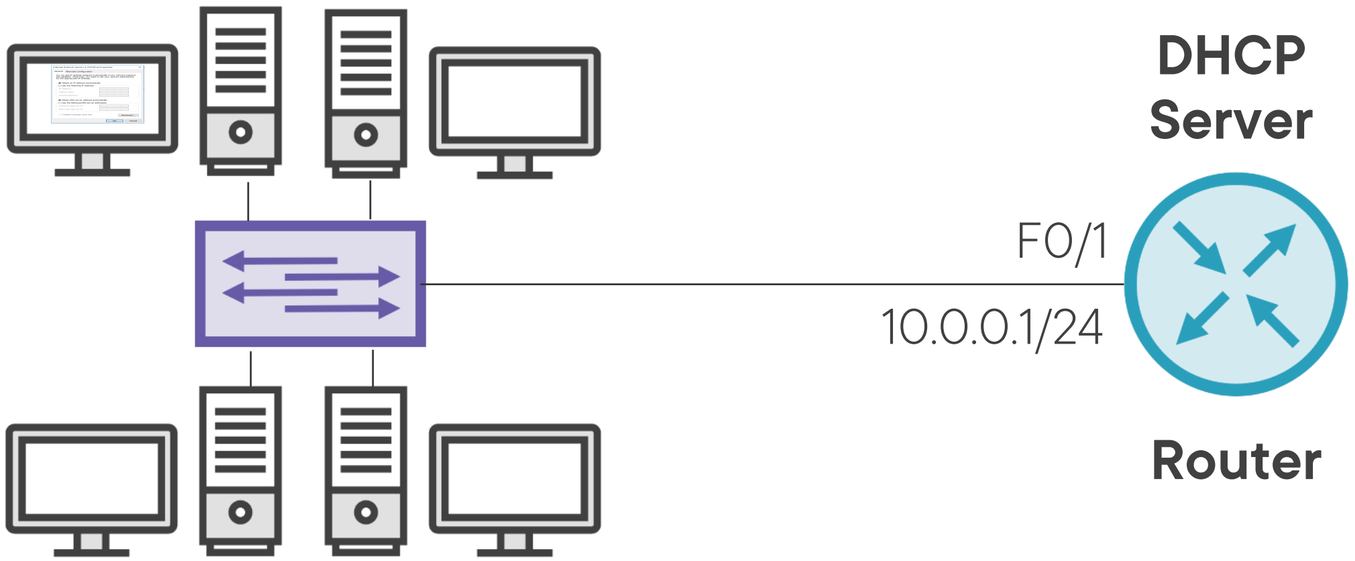
OSI Model

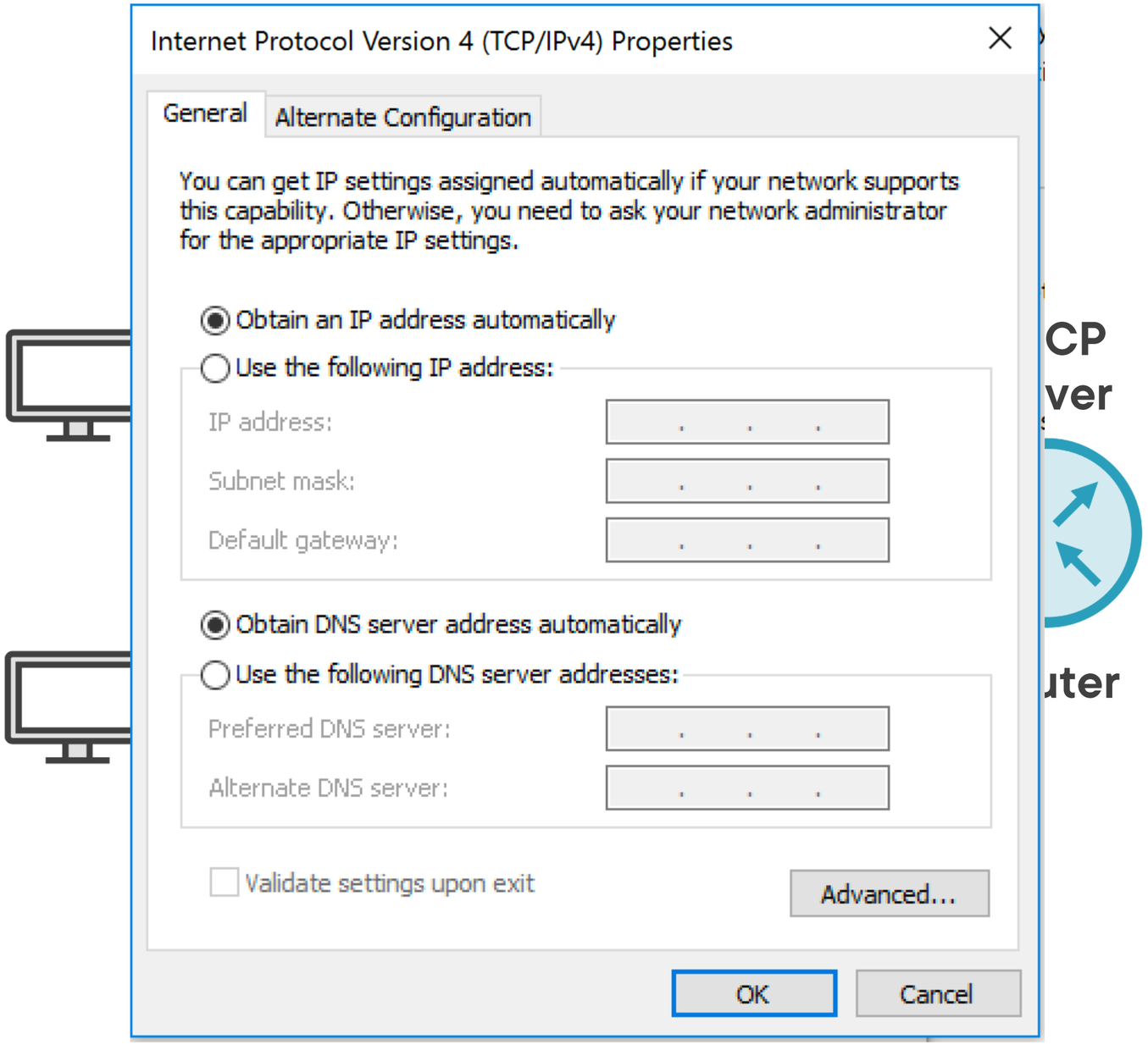
7	Application Layer
6	Presentation Layer
5	Session Layer
4	Transport Layer
3	Network Layer
2	Data Link Layer
1	Physical Layer

DHCP

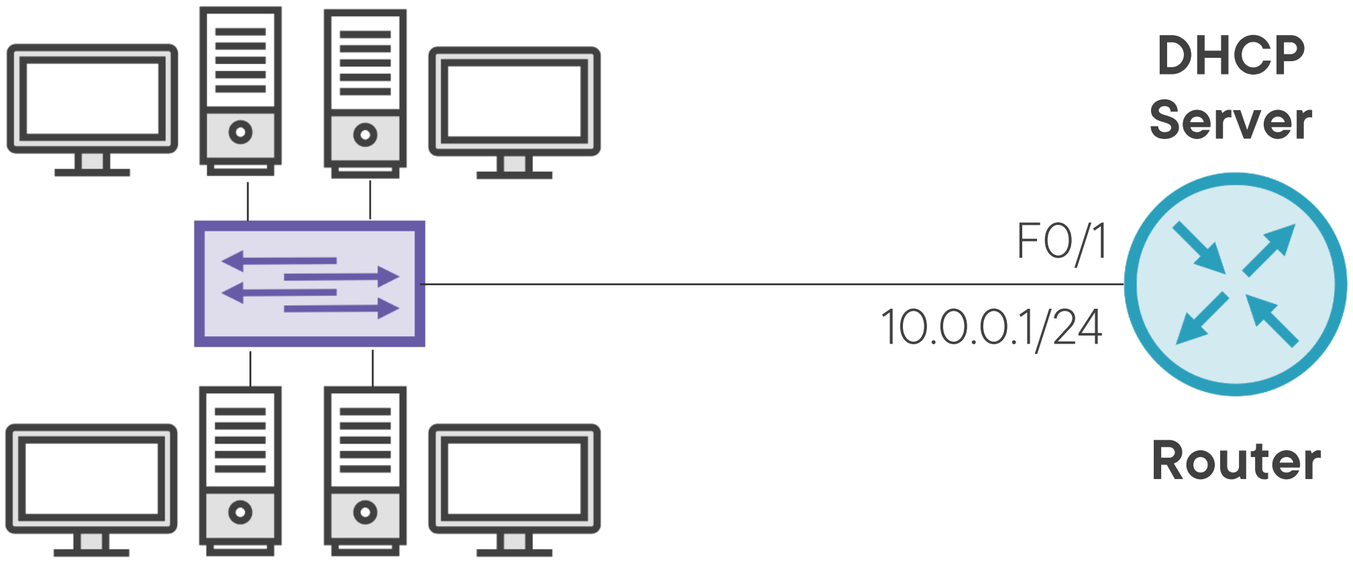


DHCP




Internet Protocol Version 4 (TCP/IPv4) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

DHCP



DHCP Scope

Network: 10.0.0.0/24

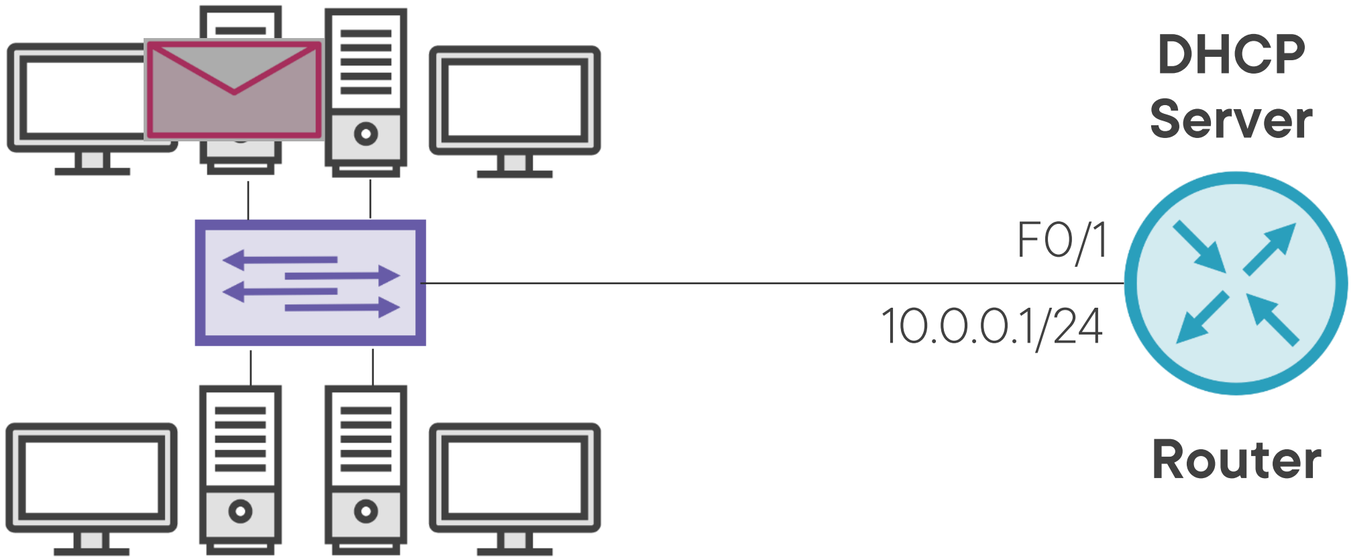
Excluded: 10.0.0.10 – 10.0.0.99

Gateway: 10.0.0.1

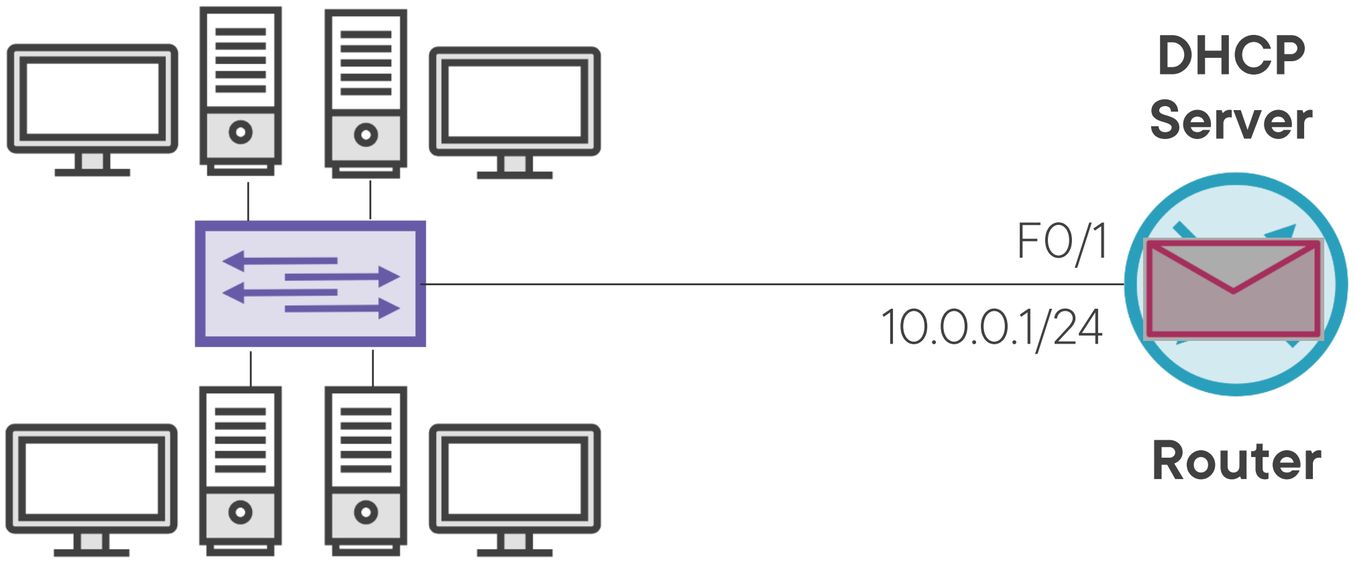
DNS: 8.8.8.8

Lease Time: 10,080 min

DHCP



DHCP

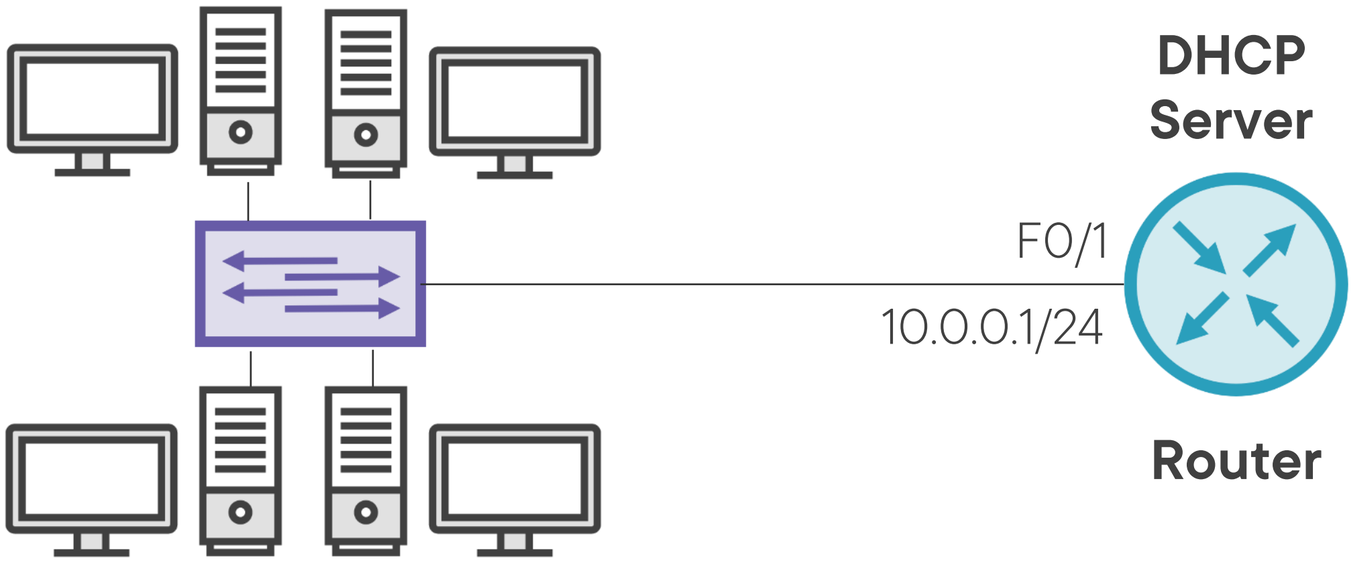


DHCP Offer

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8

DHCP

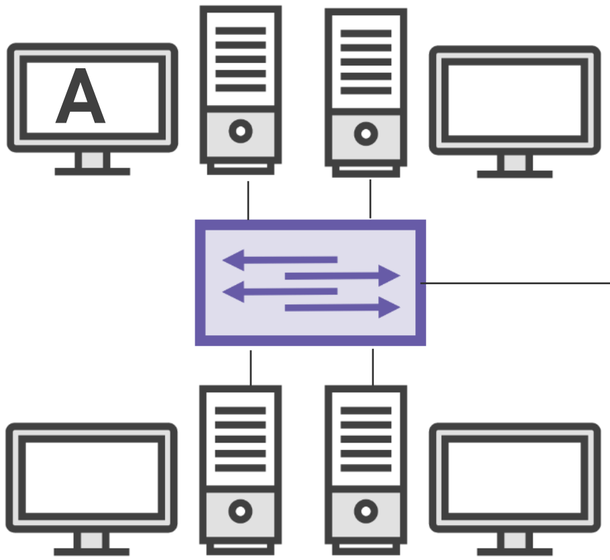
IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8



IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8

DHCP

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8



DHCP Server

F0/1

10.0.0.1/24

Router

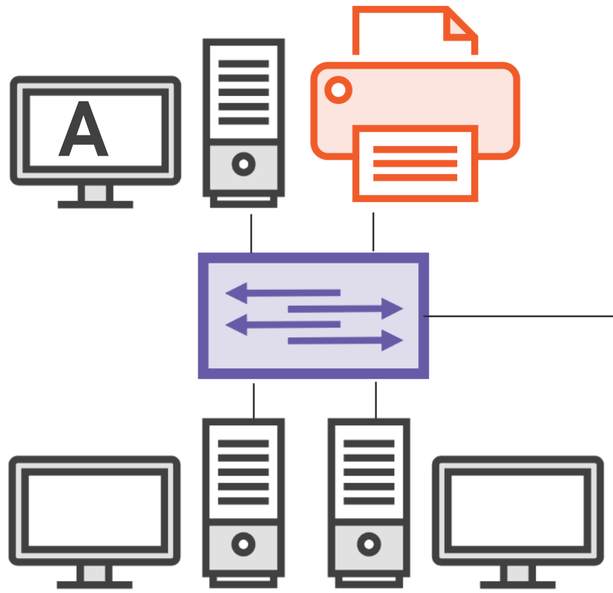
DHCP Binding

A

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8

DHCP

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8



DHCP Server

F0/1

10.0.0.1/24

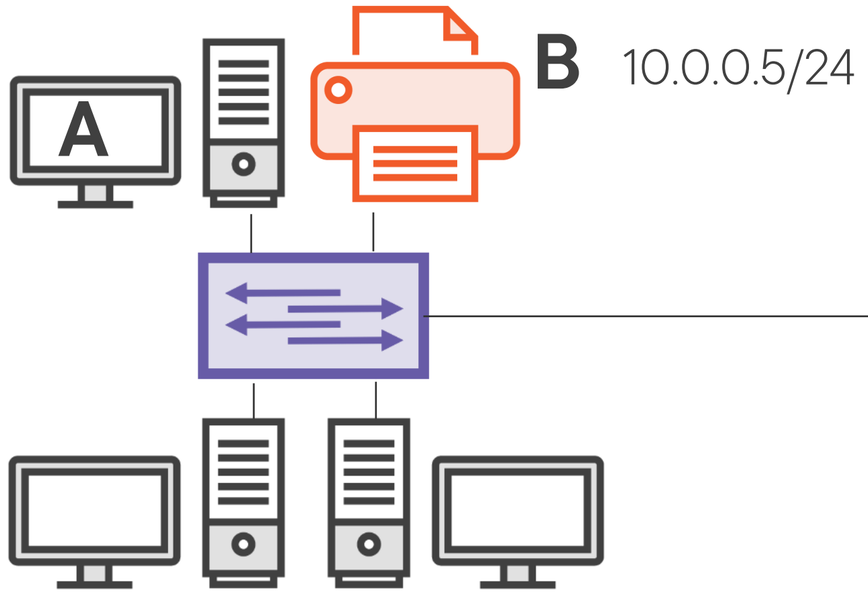
Router

A

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8

DHCP

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8



DHCP Server

F0/1

10.0.0.1/24

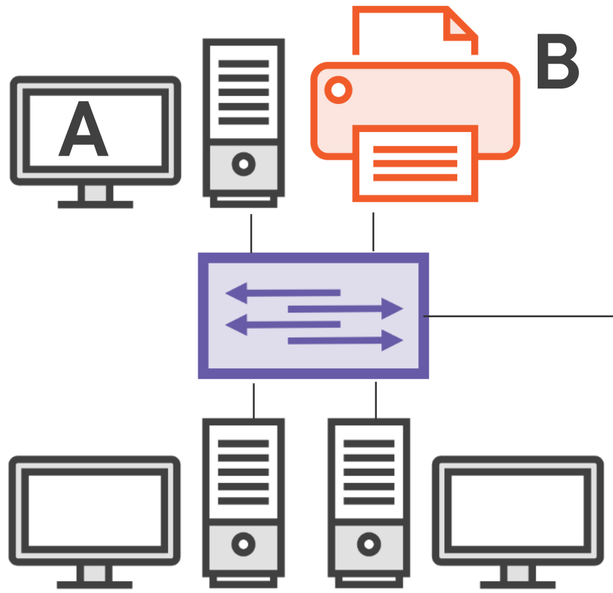
Router

A

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8

DHCP

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8



B 10.0.0.5/24

DHCP Server

F0/1

10.0.0.1/24

Router

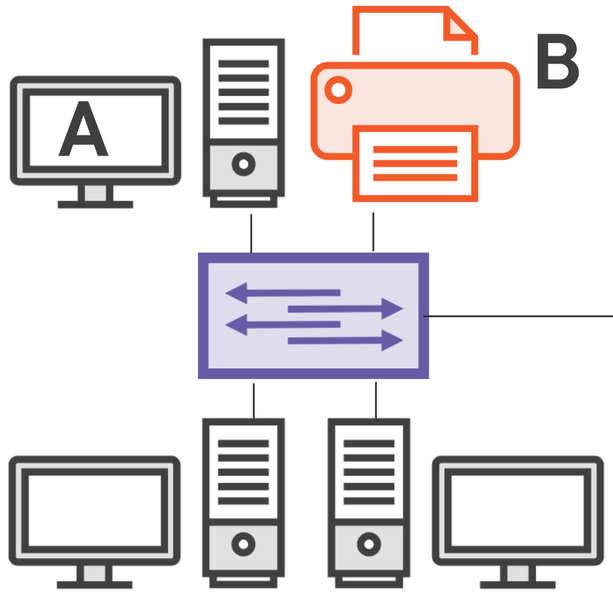
A

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8

B 10.0.0.5/24

DHCP

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8



B 10.0.0.5/24

DHCP Server

F0/1

10.0.0.1/24

Router

A

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8

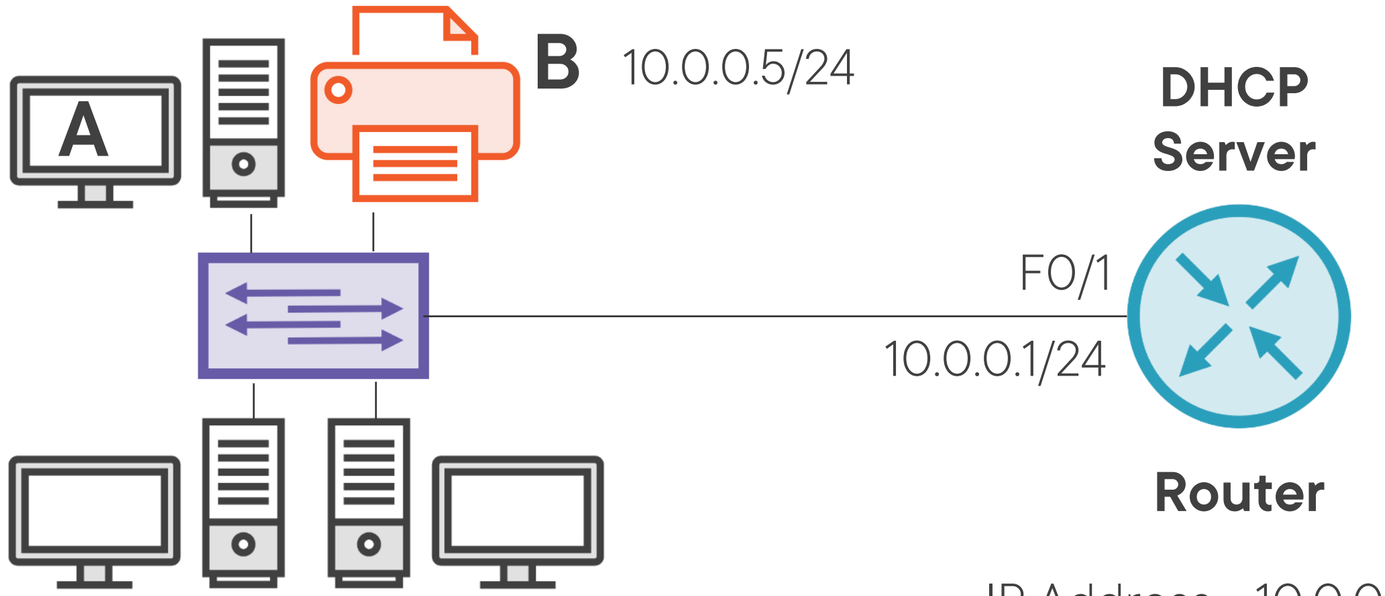
7 days

B 10.0.0.5/24

DHCP

7 days

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8



A

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8

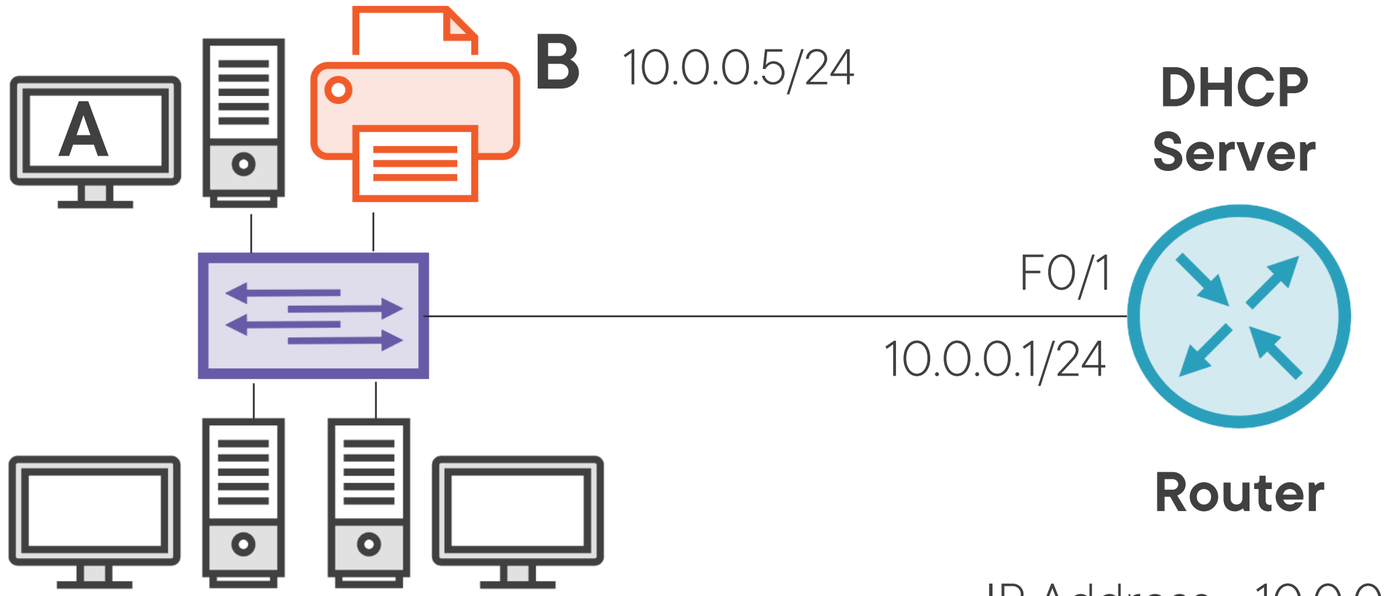
7 days

B 10.0.0.5/24

DHCP

7 days

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8



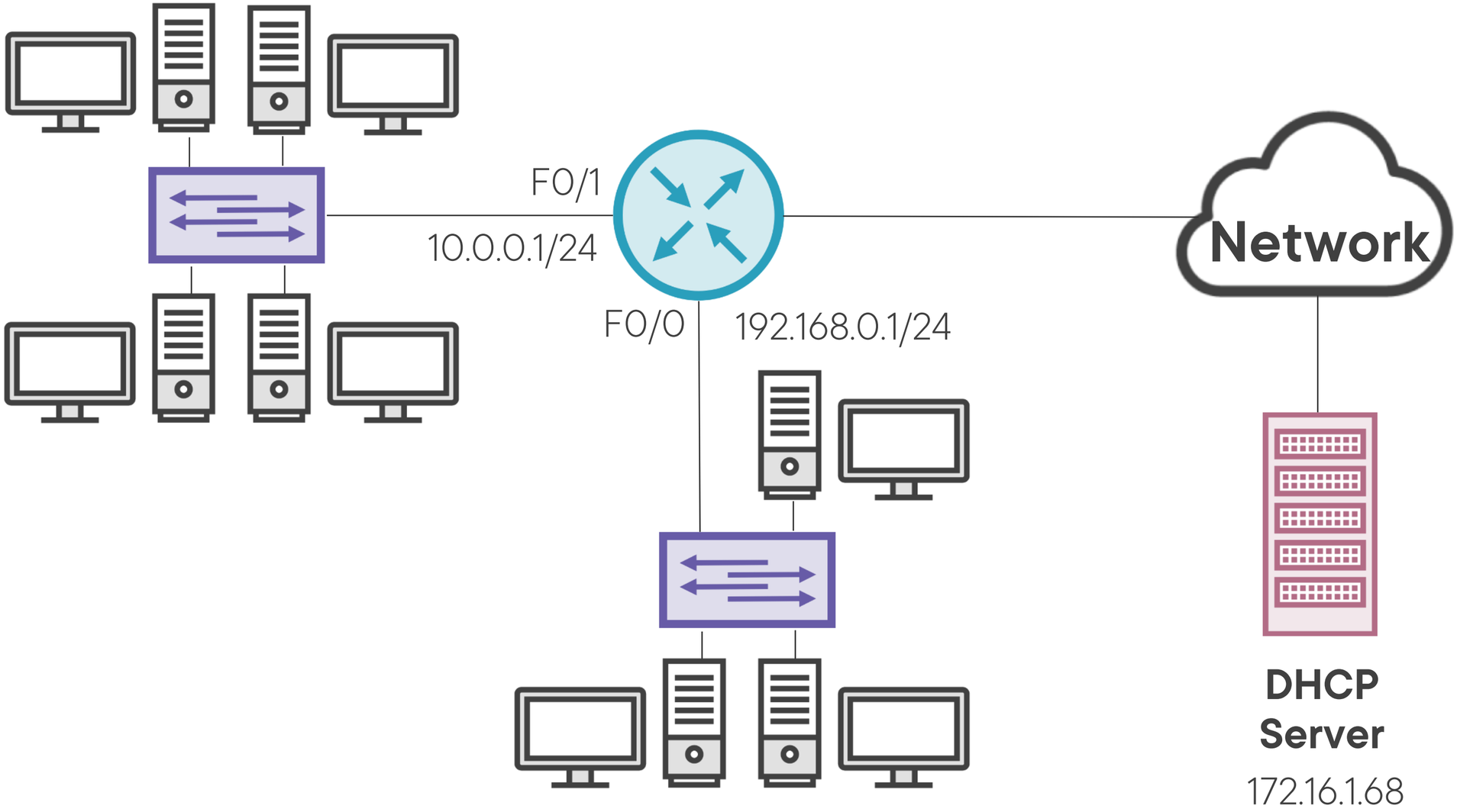
A

IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS - 8.8.8.8

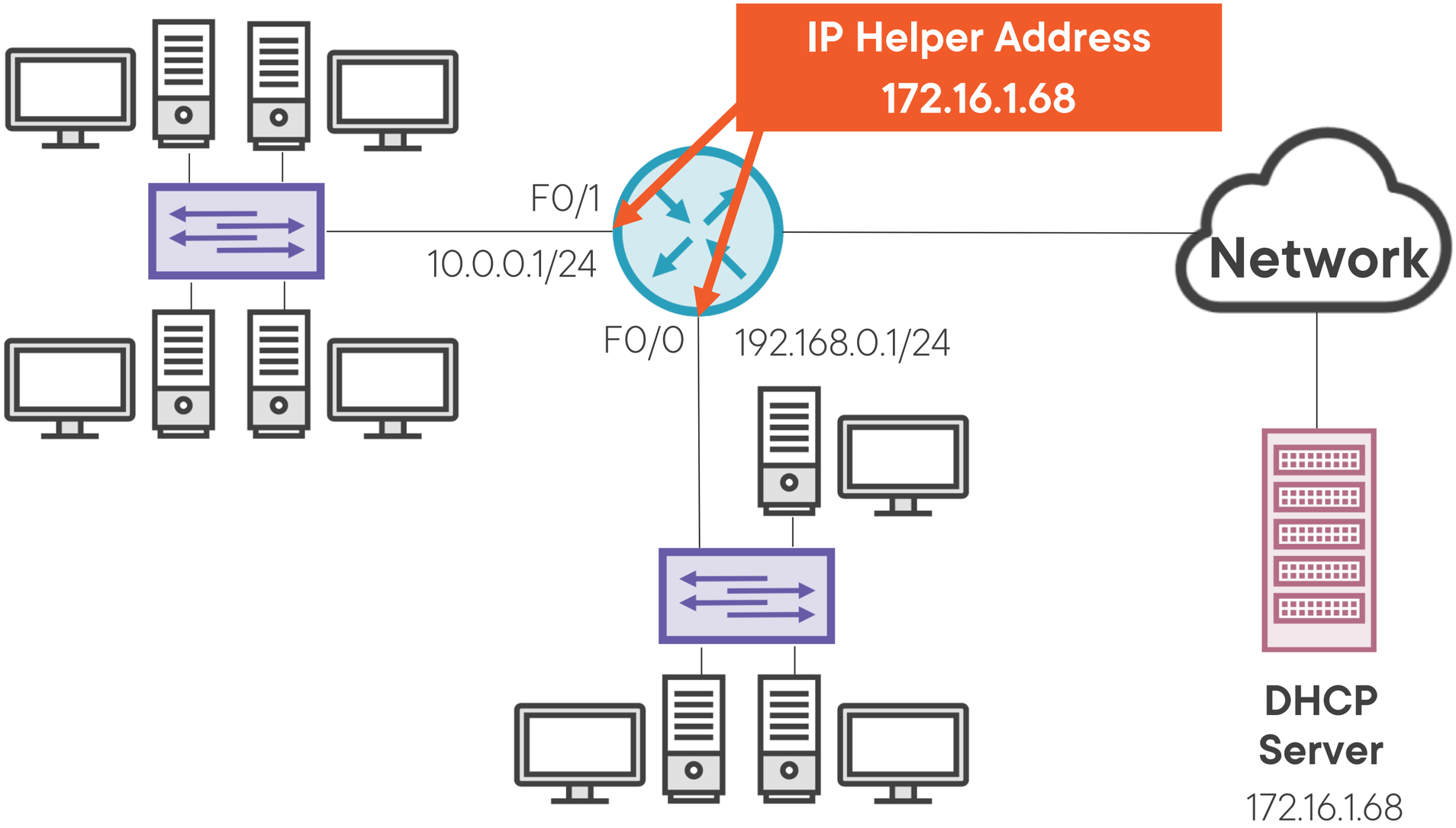
7 days

B 10.0.0.5/24

DHCP



DHCP


IP Helper Address
172.16.1.68
F0/1
10.0.0.1/24
F0/0
192.168.0.1/24
Network
DHCP
Server
172.16.1.68

Domain Name System

OSI Model

7	Application Layer
6	Presentation Layer
5	Session Layer
4	Transport Layer
3	Network Layer
2	Data Link Layer
1	Physical Layer

Uniform Resource Locater (URL)

Uniform Resource Locater (URL)

www.pluralsight.com

Uniform Resource Locater (URL)

www.pluralsight.com

Top Level Domain (TLD)

.com .edu .org .net .gov .mil

.ca .jp .uk .in .au

Uniform Resource Locater (URL)

www.pluralsight.com

Uniform Resource Locater (URL)

www.pluralsight.com

Second Level Domain

Uniform Resource Locater (URL)

www.pluralsight.com

Second Level Domain

google.com
wikipedia.org
cisco.com
he.net

Uniform Resource Locater (URL)

www.pluralsight.com

Third Level Domain

Uniform Resource Locater (URL)

Third Level Domain

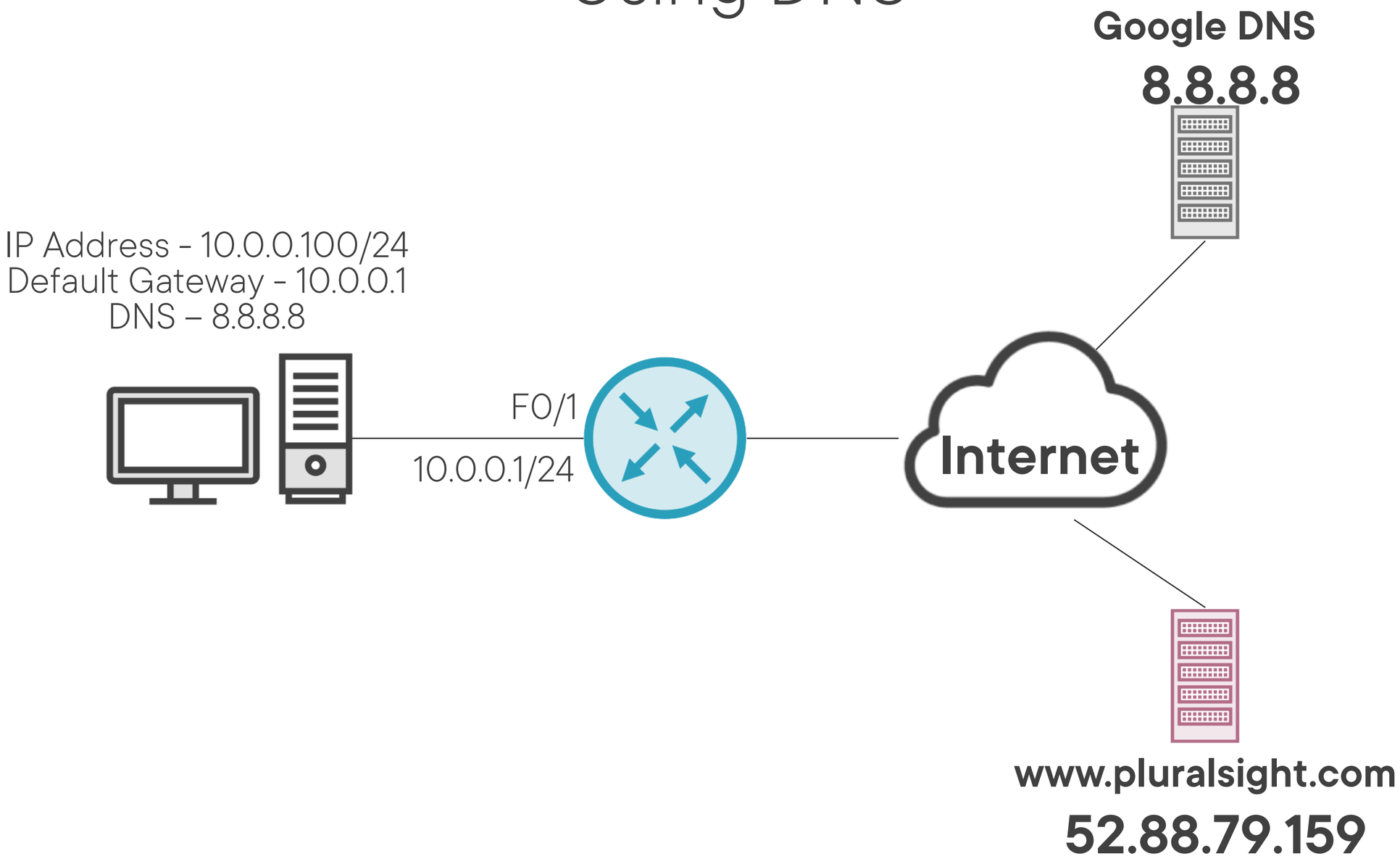
Hostname

Uniform Resource Locater (URL)

Uniform Resource Locater (URL)

www.engineering.university.edu

Using DNS


Google DNS
8.8.8.8
IP Address - 10.0.0.100/24
Default Gateway - 10.0.0.1
DNS – 8.8.8.8
F0/1
10.0.0.1/24
Internet
www.pluralsight.com
52.88.79.159

IP Address - 10.0.0.10
Default Gateway - 10.
DNS – 8.8.8.8

Internet Protocol Version 4 (TCP/IPv4) Properties

General | Alternate Configuration

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

- (•) Obtain an IP address automatically
- ( ) Use the following IP address:
  - IP address: . . .
  - Subnet mask: . . .
  - Default gateway: . . .
- (•) Obtain DNS server address automatically
- ( ) Use the following DNS server addresses:
  - Preferred DNS server: . . .
  - Alternate DNS server: . . .

[ ] Validate settings upon exit

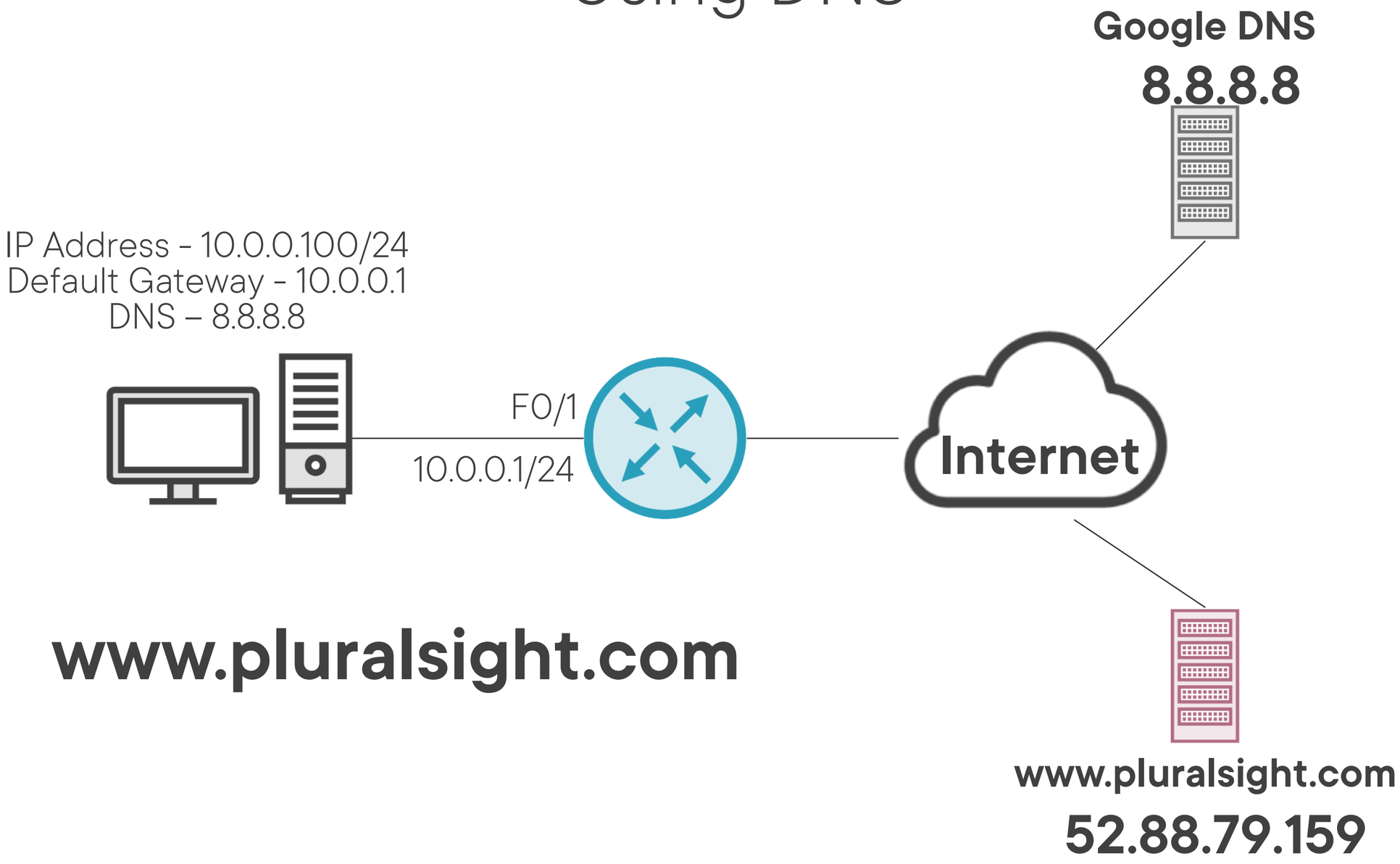
Advanced...

OK | Cancel

oogle DNS
8.8.8.8

luralsight.com
52.88.79.159

Using DNS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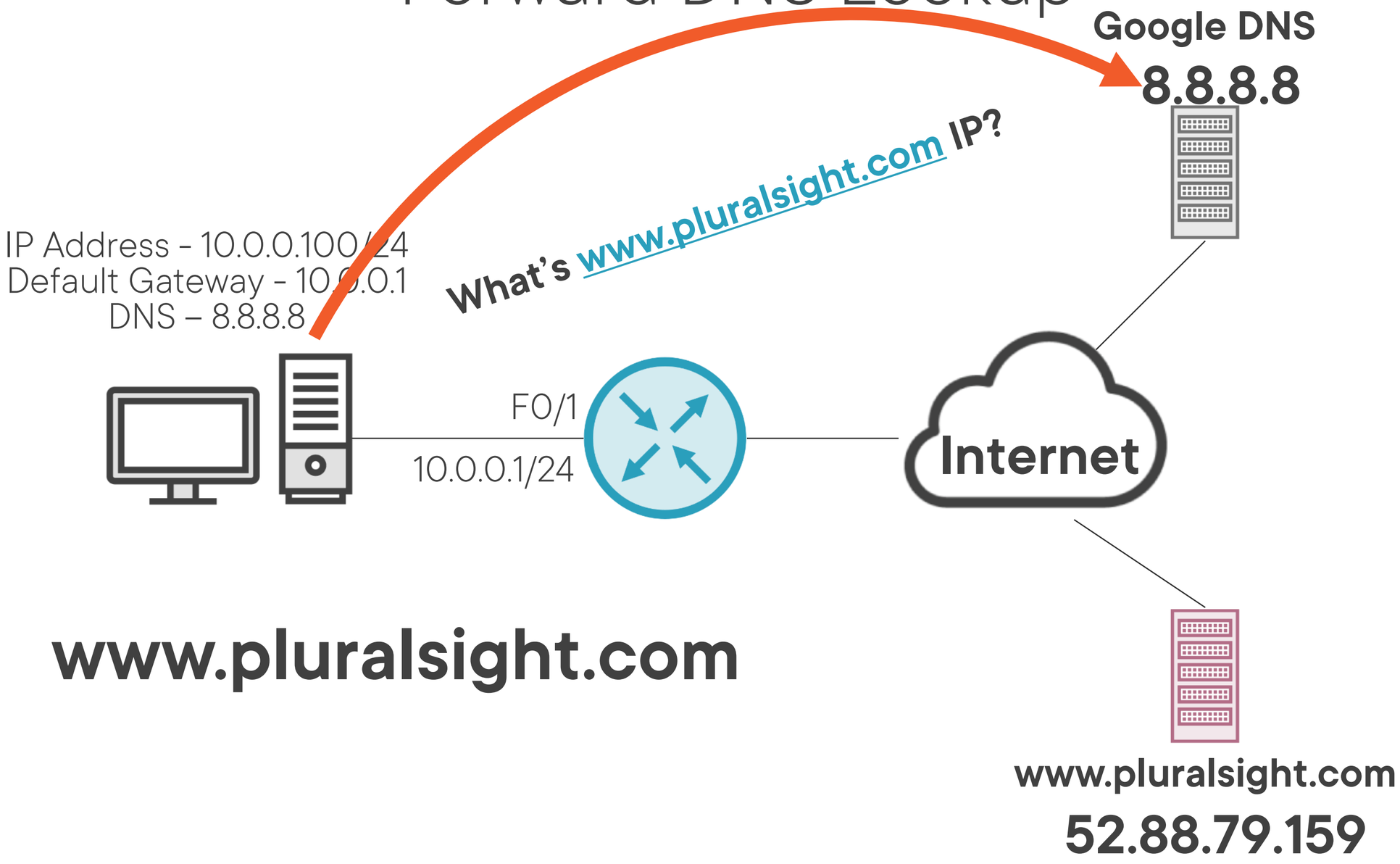
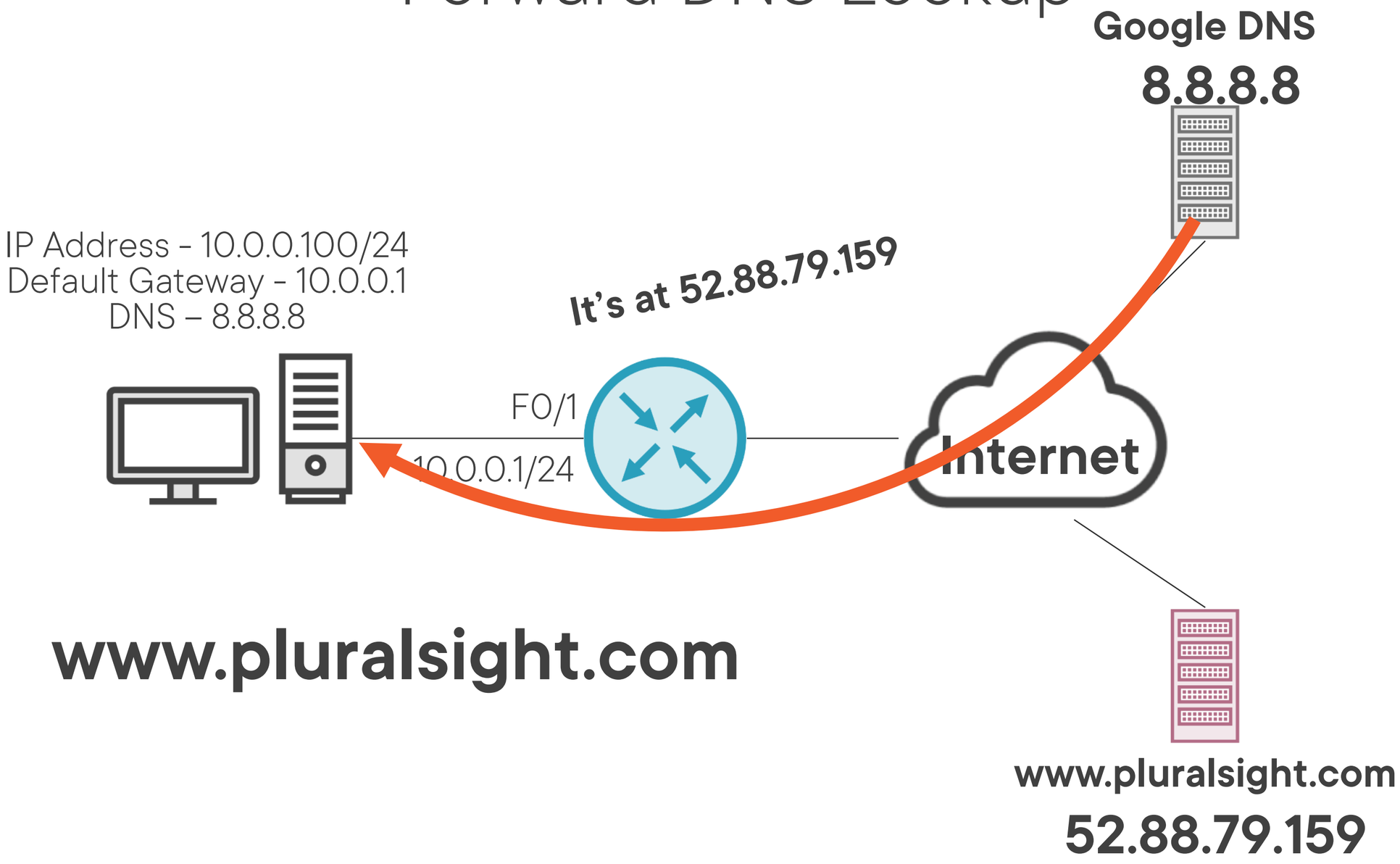
www.pluralsight.com
www.pluralsight.com
52.88.79.159

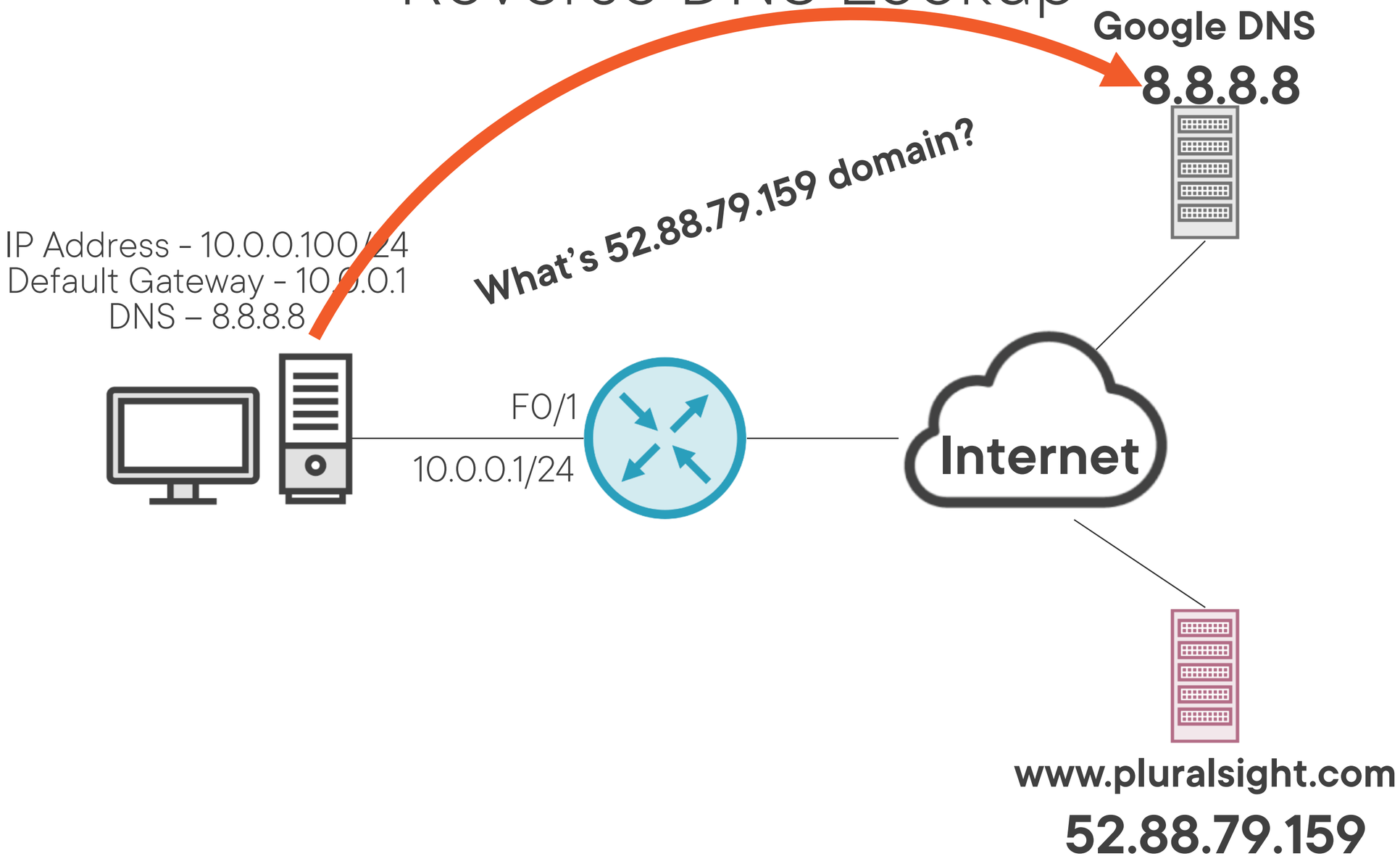
Forward DNS Lookup



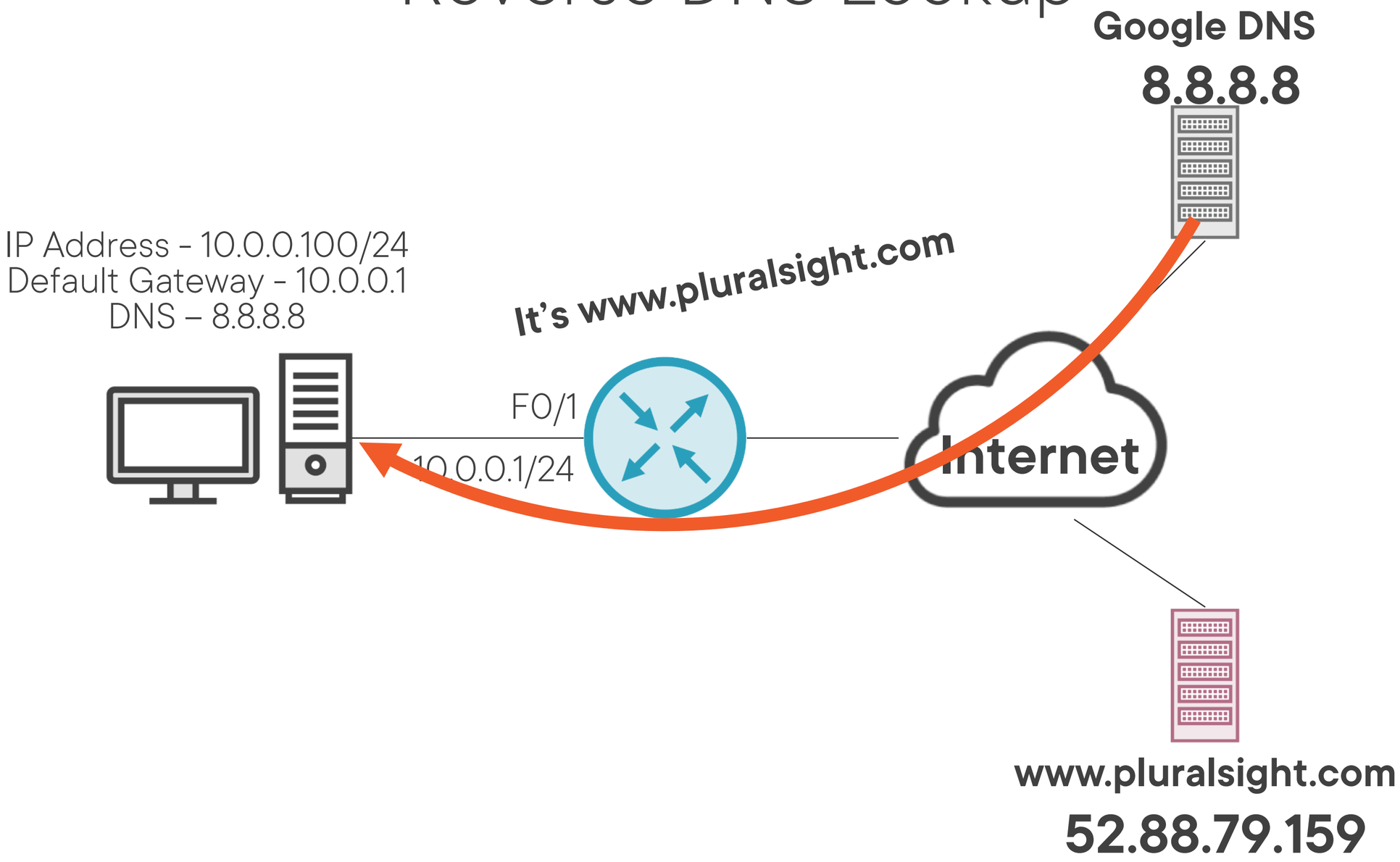
Forward DNS Lookup



Reverse DNS Lookup



Reverse DNS Lookup



DNS Record Types

A – IPv4 Record

AAAA – IPv6 Record

CNAME – Canonical Name Record

MX – Mail Exchange Record

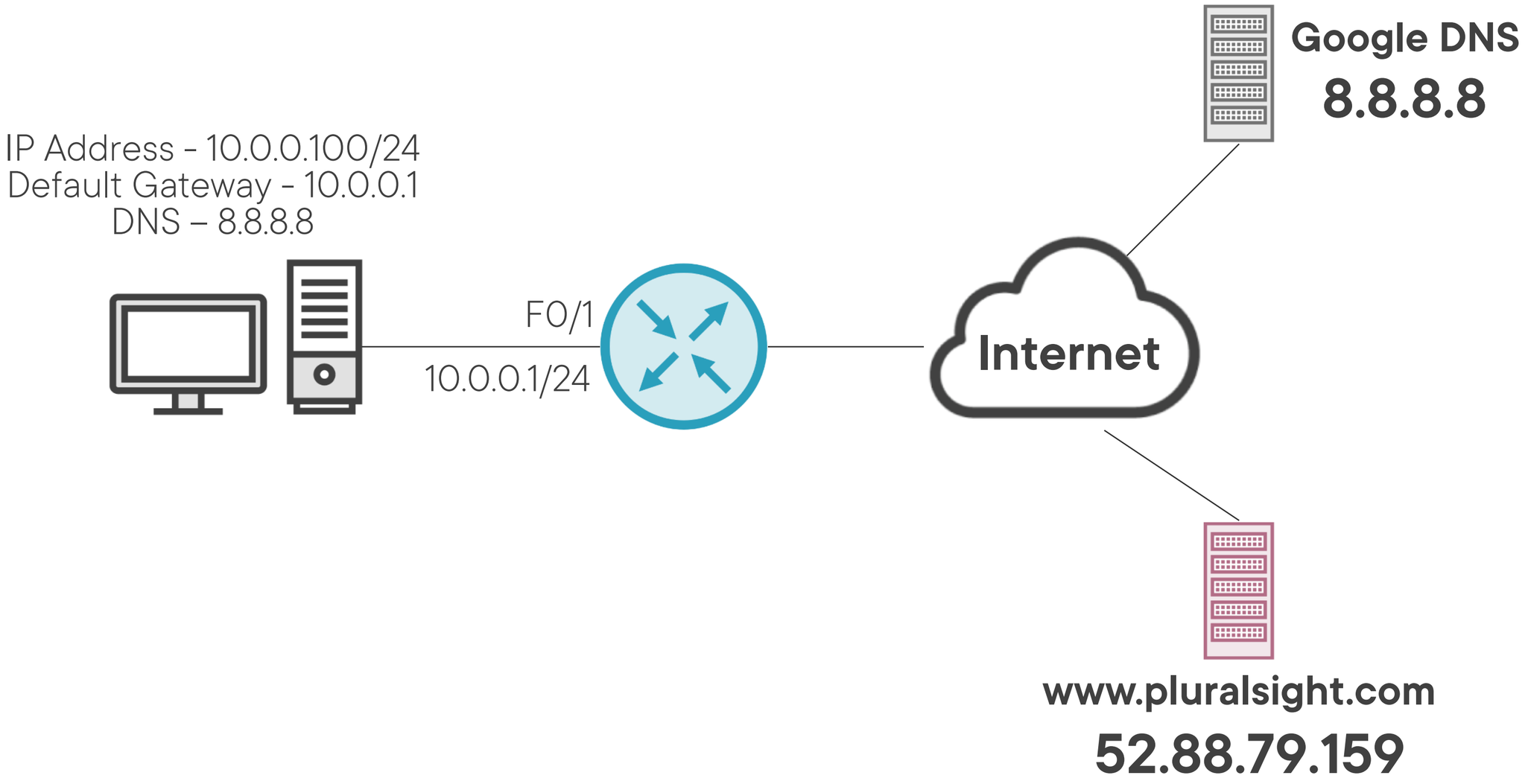
NS – Identifies Authoritative Name Server

PTR – Pointer Record

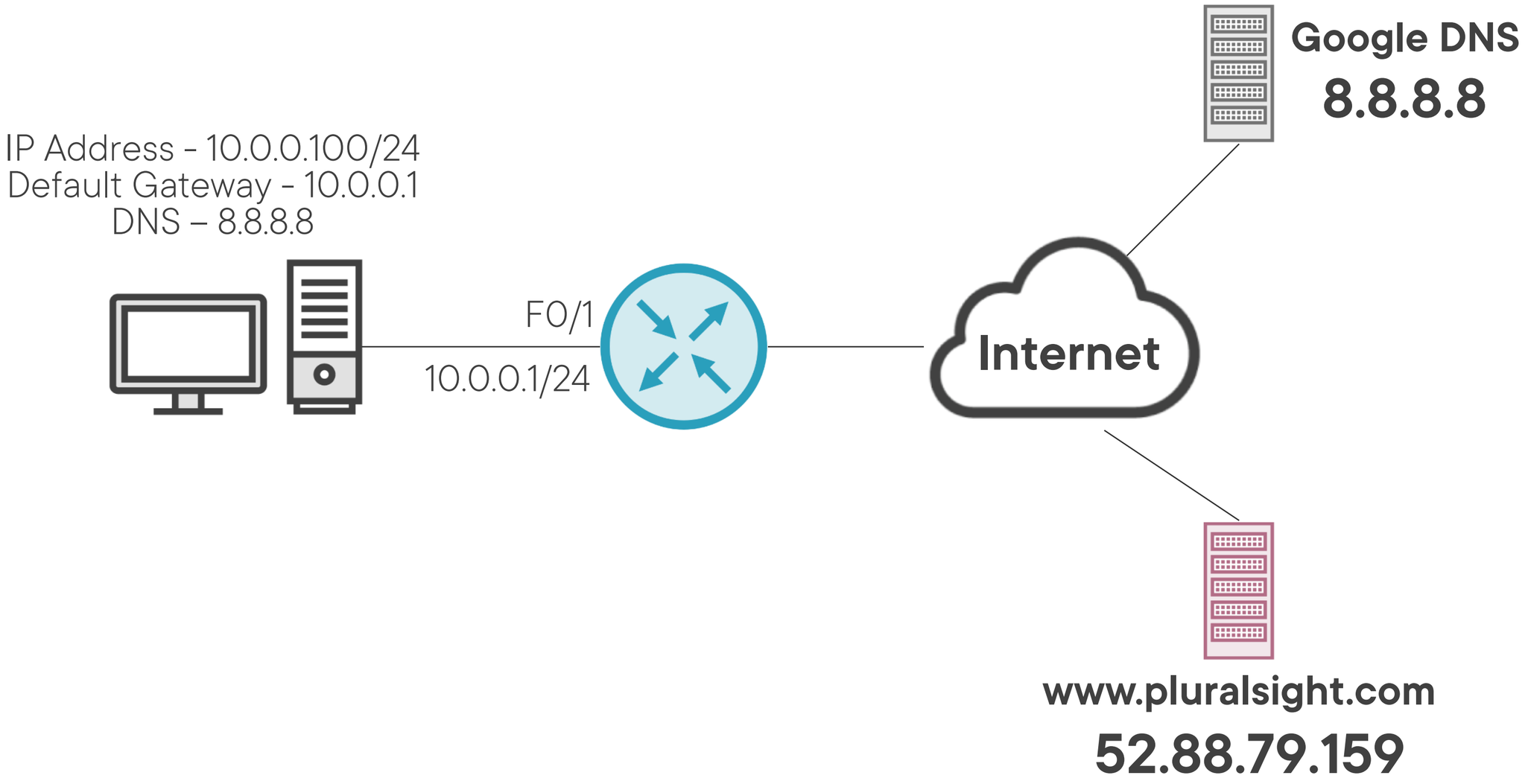
SRV – Service Record

TXT – Text record for miscellaneous use

Internal vs. External DNS



Internal vs. External DNS



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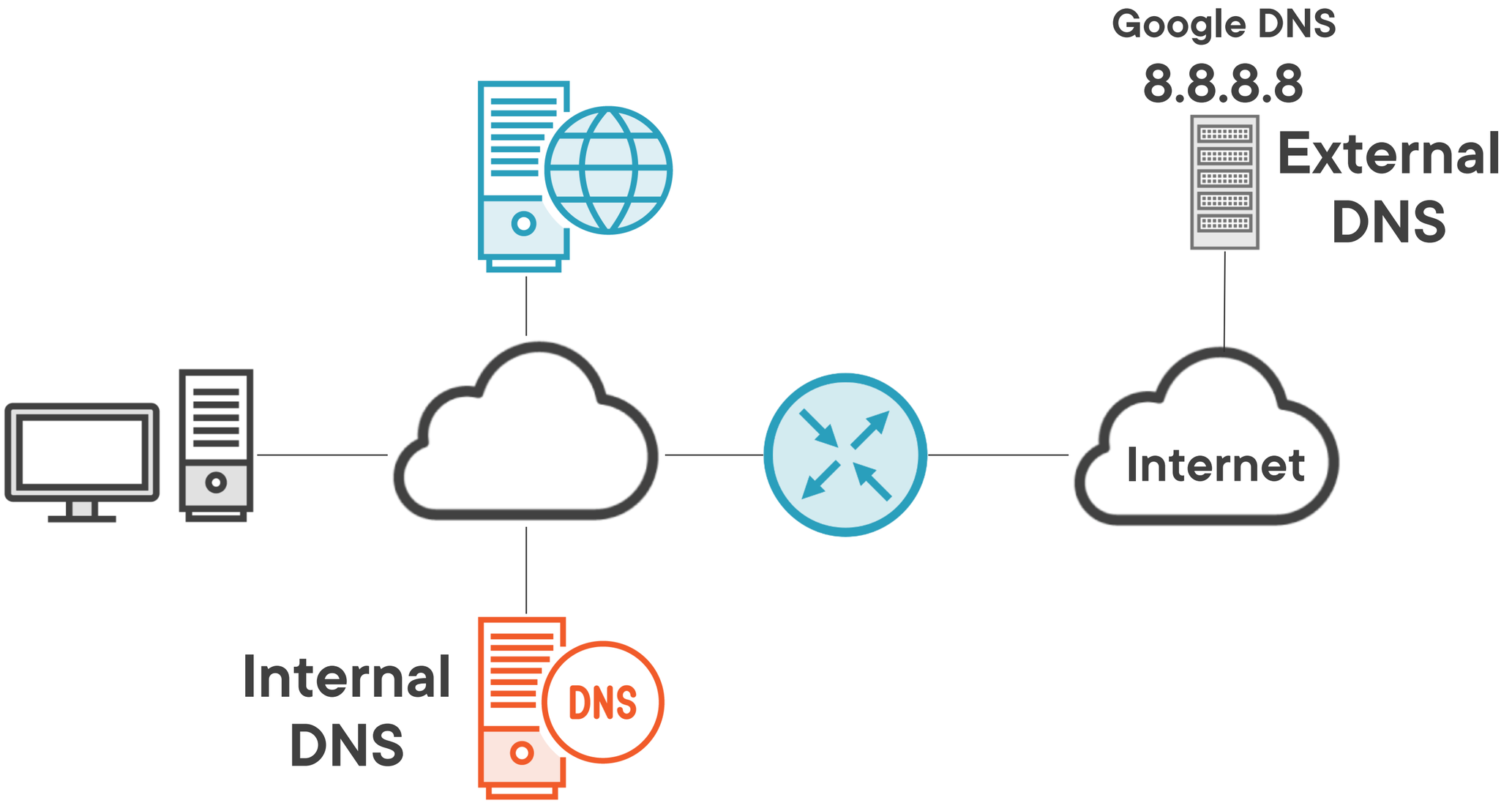
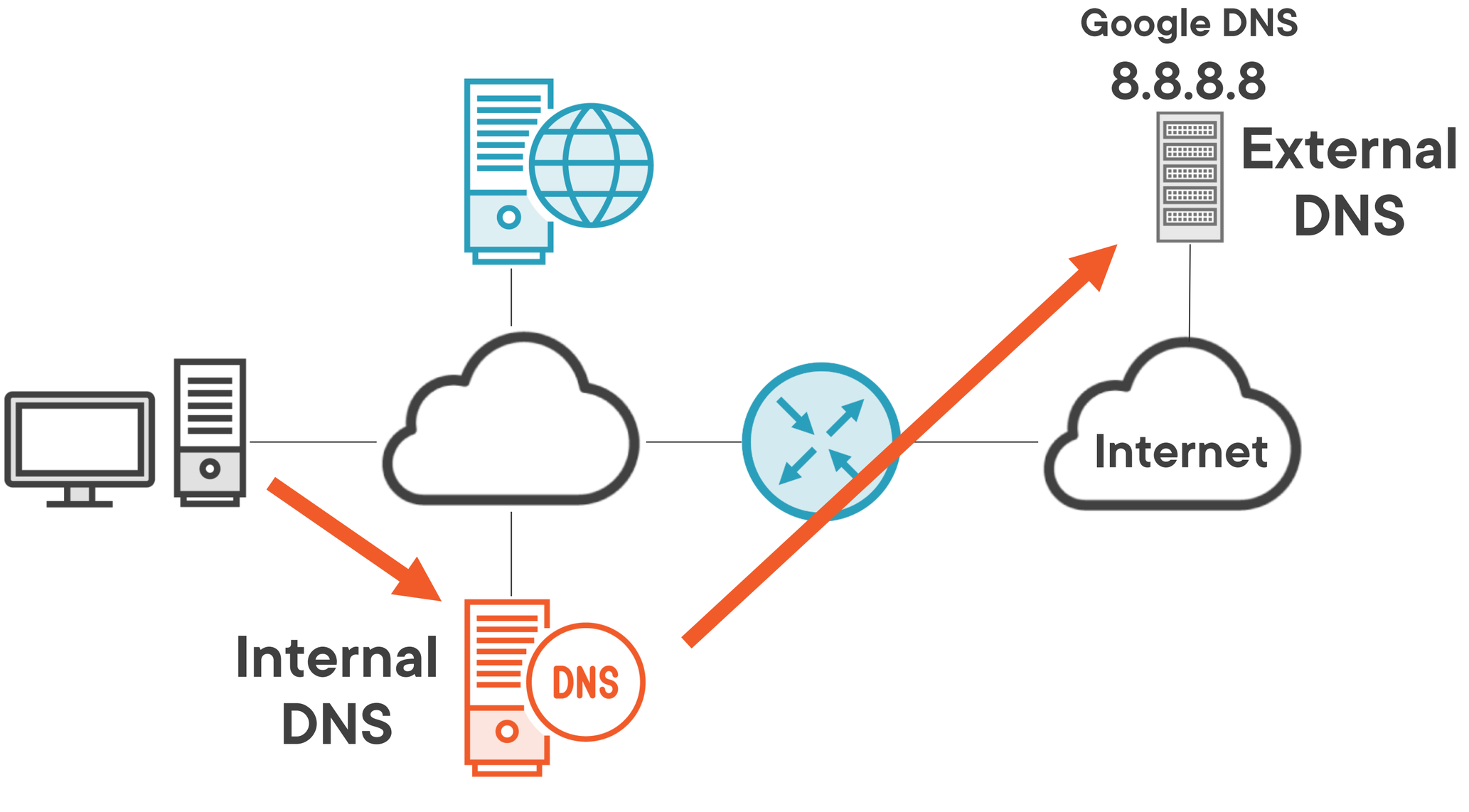
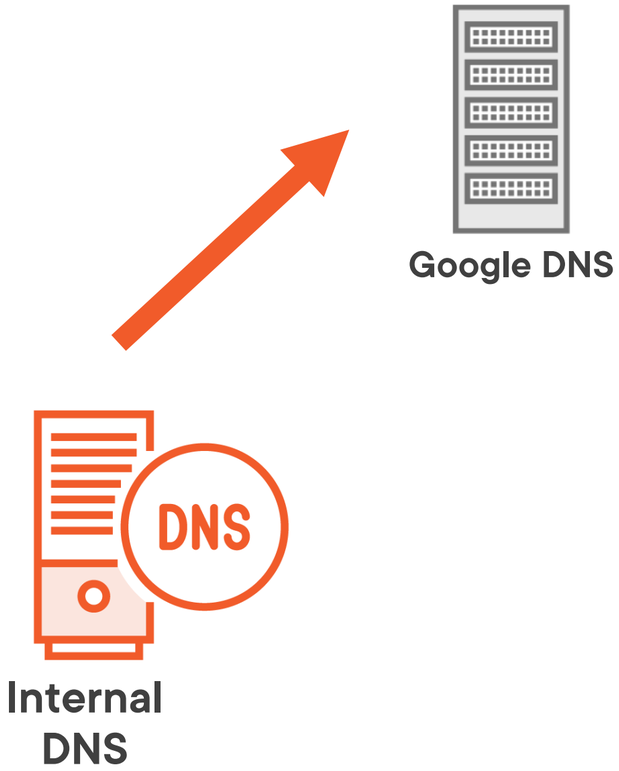


Internal vs. External DNS



Internal vs. External DNS



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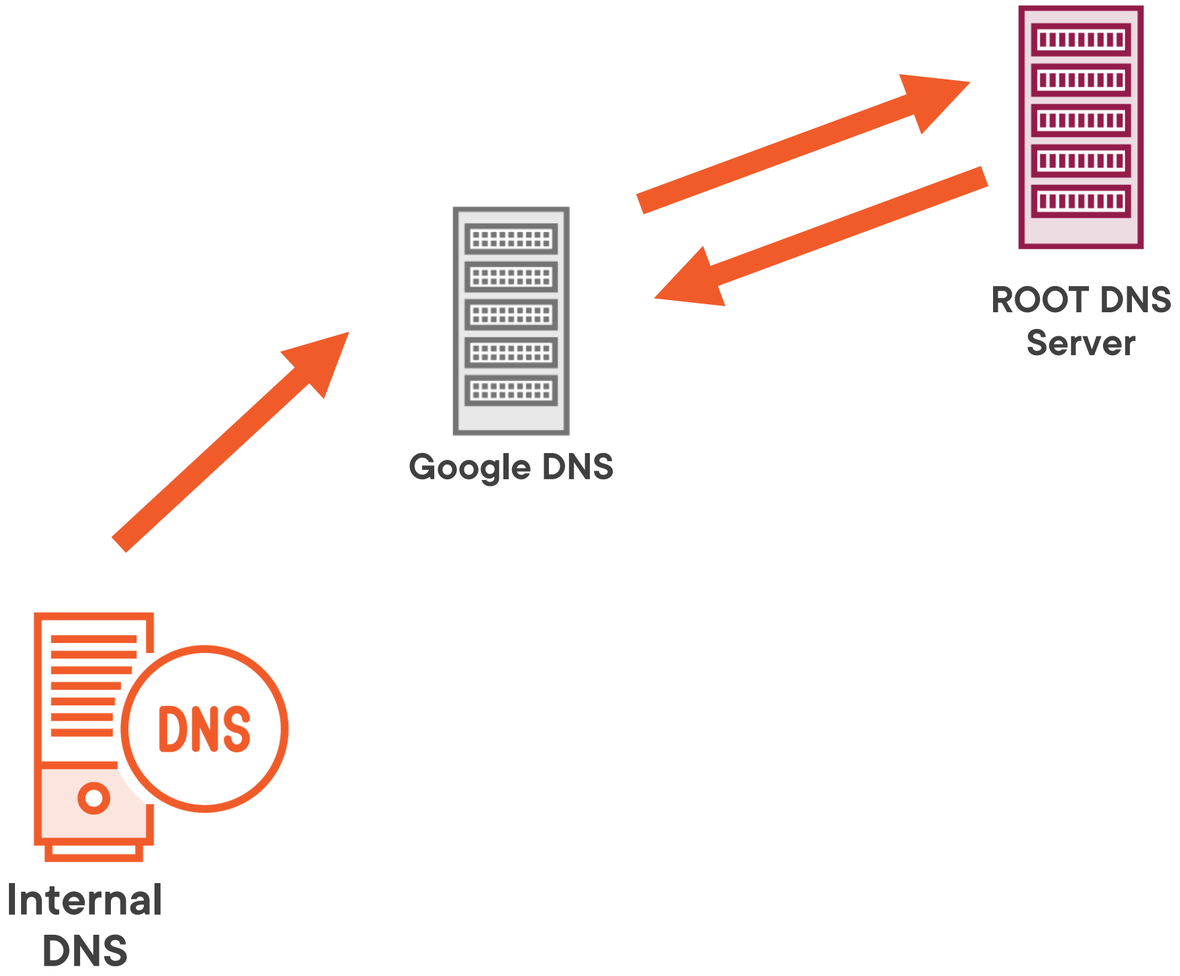
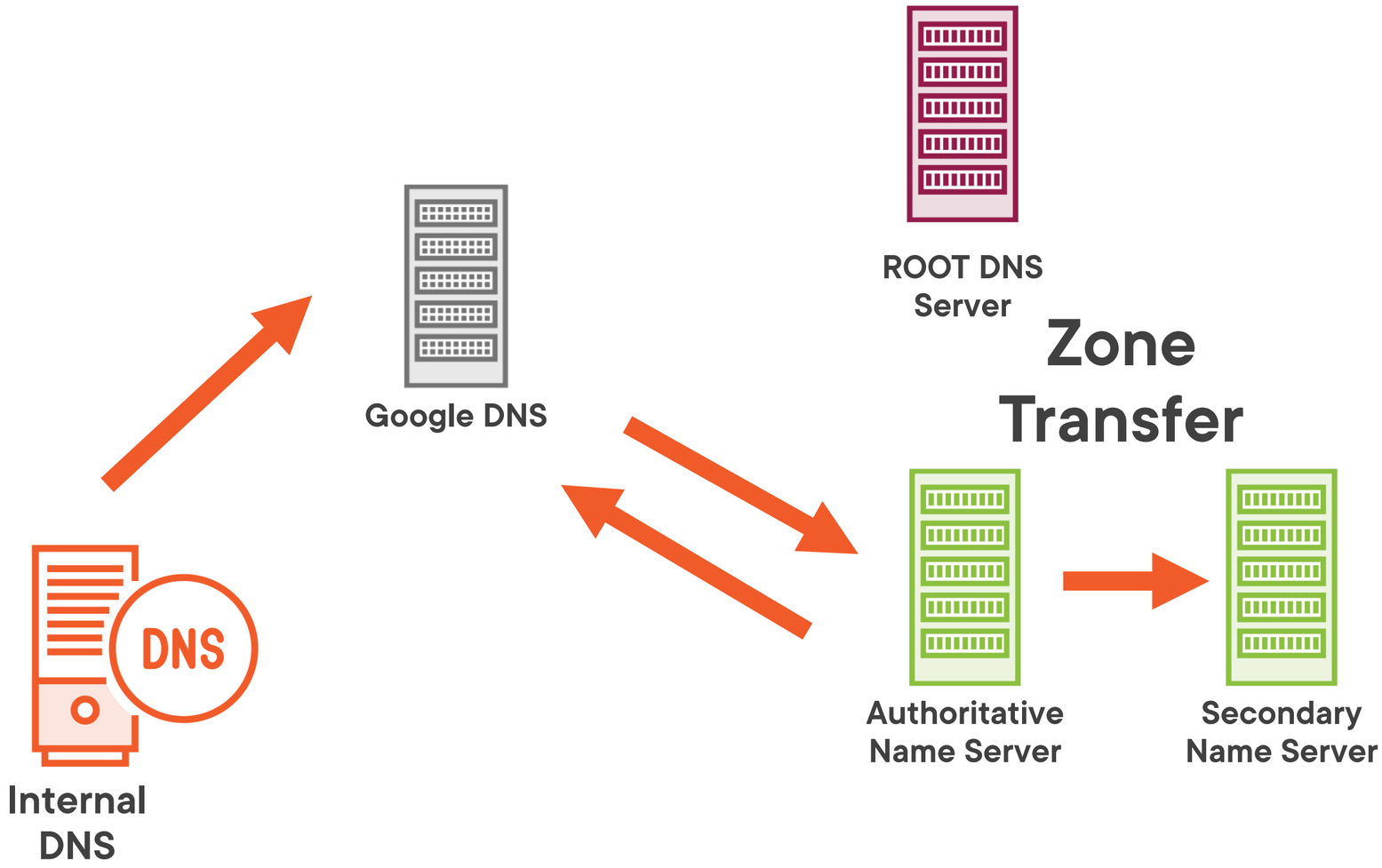
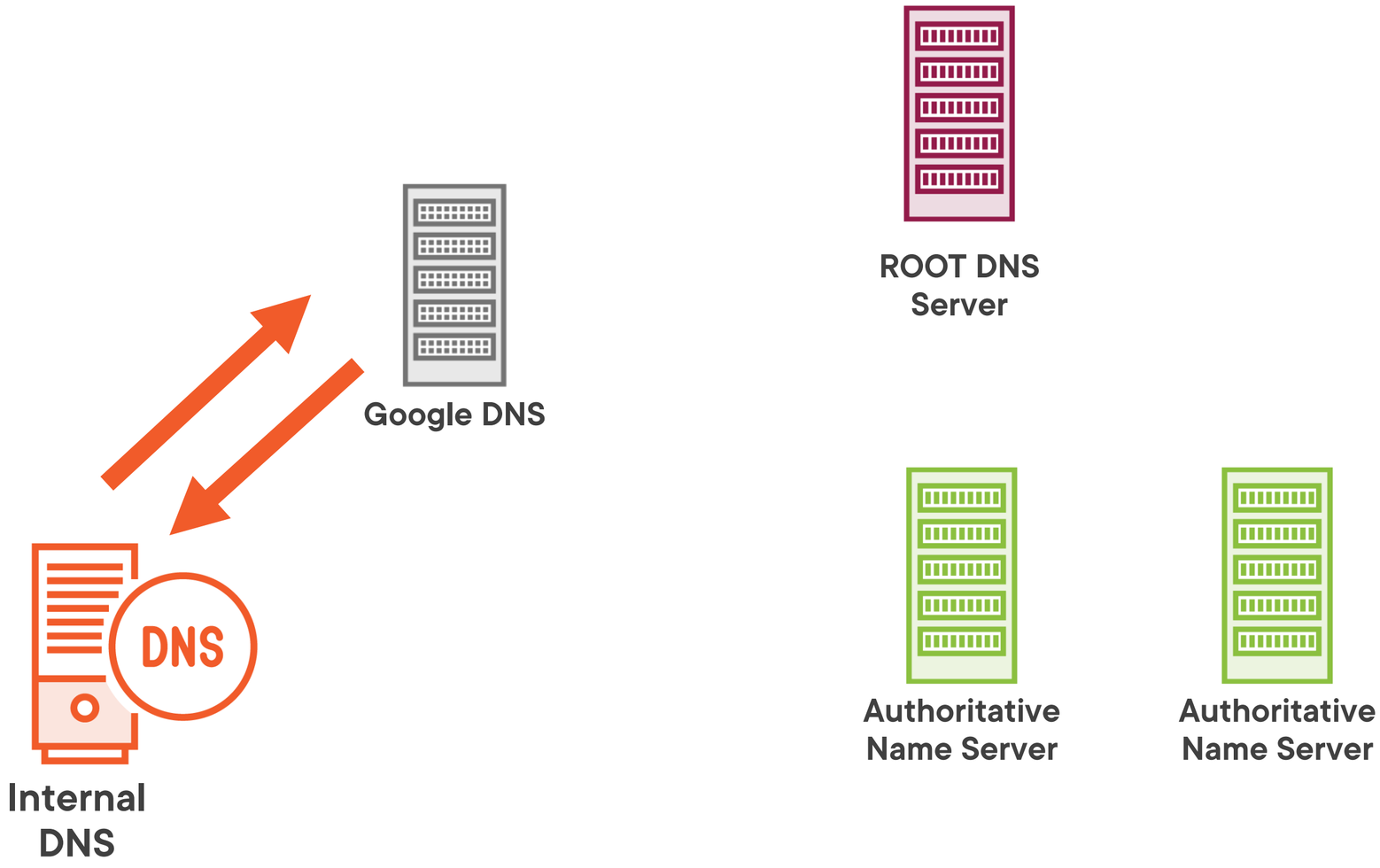


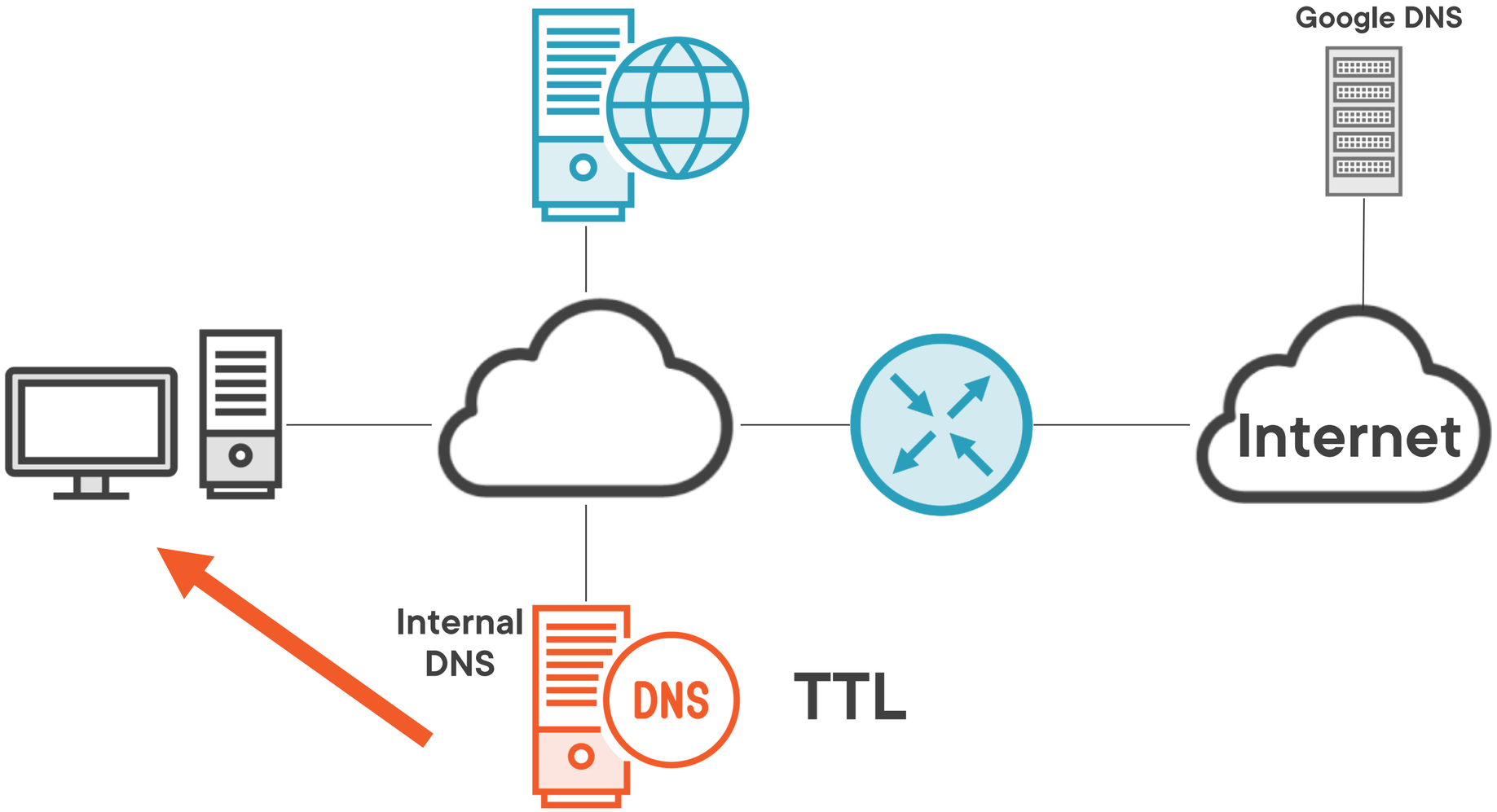
Internal vs. External DNS



Internal vs. External DNS



Internal vs. External DNS



Summary

Network Address Translation

Dynamic Host Configuration Protocol

Domain Name System