Instituto Superior de Engenharia de Lisboa

Computer Networks

Phase 3 - Connecting Multiple Networks

Projeto ISEL 2023/24 — LEETC

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Contents

List of Figures

List of Tables

Listings

Acronyms list

API	Application Programming Interface
CLI	Command Line Interface
CMD	Command Prompt
GUI	Graphical User Interface
HTTP	Hyper Text Transfer Protocol
HTTPS	Hyper Text Transfer Protocol Secure
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
LAN	Local Area Network
OS	Operating System
OSS	openSUSE
PC	Personal Computer
PHP	PHP: Hypertext Preprocessor
SSL	Secure Sockets Layer
TCP	Transmission Control Protocol
TLS	Transport Layer Security
TUI	Terminal User Interface
UDP	User Datagram Protocol
VPN	Virtual Private Network
WWW	World Wide Web
XAMPP	Cross-Platform, Apache, MySQL, PHP, and Perl

Glossary

Apache2
An opensource HTTP web server.

Bit
A unit of information in computing and digital communications. The bit represents a logical state with one of two possible values, 0 or 1 (other representations such as *true / false* are also valid).

Byte
Also a unit of digital information, consists of 8 bits.

Broadcast
A method of transferring a message to all recipients simultaneously.

Browser
A browser is a internet navigation software. It comes in multiple flavours, nowadays the big three are Microsoft Edge, Mozilla Firefox and Google Chrome.

Cisco Packet Tracer
A cross-platform visual network simulation tool.

Command Prompt
The default command-line interpreter for Windows operating systems.

Firewall
A barrier between networks. Controls inbound and outbound traffic.

Gateway
A network gateway provides a connection between networks and devices. Known as protocol translation gateways or mapping gateways, can perform protocol conversions to connect networks with different network protocol technologies.

LibreWolf
An internet browser based on Mozilla's Firefox. It's primary purpose is to allow privacy, and with it comes security. It achieves this by removing telemetry and data collection.

Linux
Open-source Unix-like operating systems based on the Linux kernel.

MariaDB
A community-developed fork of MySQL database server.

openSUSE Tumbleweed
An openSUSE (OSS) is an open-source community driven Linux-based distribuition sponsored by SUSE Software Solutions. Tumbleweed is a rolling release version allowing for up-to-date software releases.

Operating system
A program that manages a computer's resources from software to hardware.

Ping
A software utility used to test the reachability of a host on an IP network.

Tracert
Or **traceroute** in unix and linux systems, is a computer network diagnostic command for displaying possible routes and measuring transit delays of packets across an IP network.

Ipconfig
Or **ifconfig** in unix and linux systems, is a console application program that displays all current TCP/IP network configuration values.

Python
Python is a high-level programming language, object-oriented.

Perl
A high-level, general-purpose, interpreted, dynamic programming language

Rolling release distribuition
A distribuition where it's software release cycle is more frequent than those of Long Term Support (LTS). It's up to the Linux-based distribuitor to guarantee the testing of a package.

Router
A networking device that forwards data packets between computer networks, including internetworks such as the global Internet.

Switch
A networking hardware that connects devices on a computer network by using packet switching to receive and forward data to the destination device.

Socket
A network socket serves as an endpoint for sending and receiving data across the network.

Subnet Mask
Is a logical subdivision of an IP network.

Unix
Is a family of multitasking, multi-user computer operating systems that derive from the original AT&T Unix.

VPN
A private network creating a secure connection between a device and a network.

Windows
Microsoft's operating system. First released in 1985 as a Graphical User Interface (GUI) for MS-DOS, continued to evolve with it's latest version being 11. Due to it's nature, it's not recommended for server production environment.

Wireshark
Wireshark is a network protocol analyser software. Allows traffic capture between a computer and a network.

XAMPP
A software package environment collection containing Apache2 webserver, MariaDB database, PHP and Perl.

Chapter 1

Introduction

For this phase we're going to expand on the previous phase 2 outline.
Conveniently taking advantage of the work already performed, it's time to execute it. If only it were that simple. As we'll see, firstly correcting the IP assigments to meet the right standards, then re-applying those new IP addresses to the network.

Chapter 2

Phase 3

Taking information from the previous phase 2 project, this is what we're re-applying:

- IP range: 192.168.***GROUP NUMBER***.0.
- Commands:
  - ping: to test connectivity between devices over IP.
  - tracert: diagnostic command for displaying possible routes, also measures transit delay of packages across IP.
  - ipconfig: console application program of some computer operating systems that displays all current TCP/IP network configuration values. Unix and linux equivalent is *ifconfig*.

Now for the specific requirements in phase 3. Most of it was already accomplished in phase 2. The mathemathical formula is still valid here:

$$Clients_{LAN_A} = max\left(20, \left(\sum_{k=0}^{n} studentnumber_k\right) mod 100\right) \quad <=> Clients_{LAN_A} = 48$$

$$Clients_{LAN_B} = \frac{Clients_{LAN_A}}{2} \quad <=> Clients_{LAN_B} = 27$$

What about our network diagram? Well, it's still pretty much the same with only one small caveat, static routes.
This circuit must obey the subsequent rules:

- Connection between LAN's A and B to LAN Servers always go through router R1 to router R2.
- LAN's A and B with outside destination always use the router R1 and router R0 path.
- LAN server to the outside must go through router R2 and router R0.

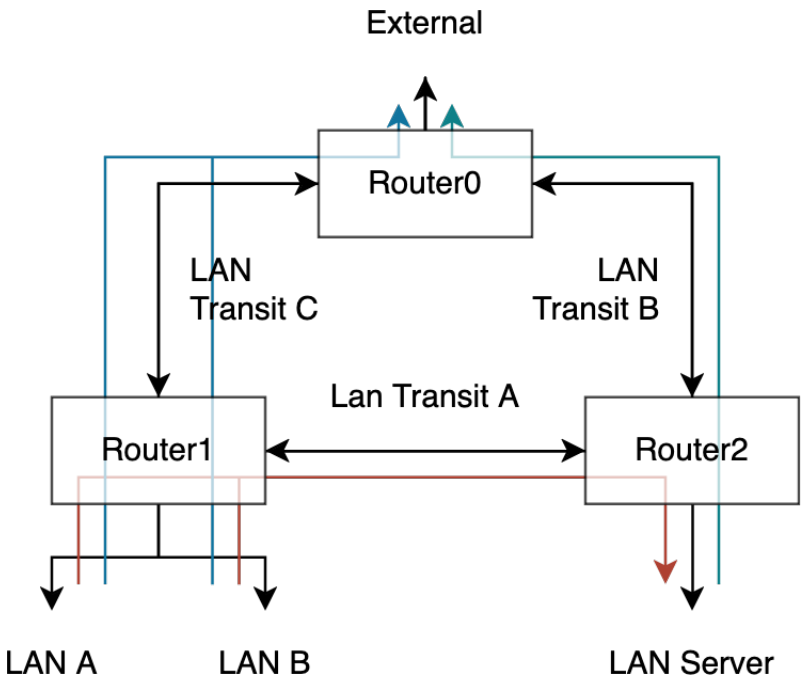


Figure 2.1: Phase 3 simplified network diagram

Router	From	To	Network	Via	Through
R1	LAN A / LAN B	LAN Servers Any	192.168.7.0/25 8.8.8.8/30	192.168.7.254 192.168.7.249	R1 > R2 > R0
R2	LAN Servers	LAN A LAN B	192.168.7.128/26 192.168.7.192/27	192.168.7.253	R2 > R1
		Any	8.8.8.8/30	192.168.7.245	> R0
R0	Any	LAN A LAN B	192.168.7.128/26 192.168.7.192/27	192.168.7.250	R0 > R1
		LAN Servers	192.168.7.0/25	192.168.7.246	> R2

Table 2.1: Static routes table

2.1 Outline

Previously the subdivision was perfomed by opening with the lowest subdivision, **/30**, then expanding till **/25**.
However, this was inappropriate due to best practices rules which assert that network subdivision starts with the largest network, **/25**, and then continues till the smallest network, **/30**.

And so, here are the results:

Subnet	IP															
	0	127	128	191	192	223	224	239	240	243	244	247	248	251	252	255
/30																
/30																
/30																

Table 2.2 continued from previous page

Subnet	IP															
	0	127	128	191	192	223	224	239	240	243	244	247	248	251	252	255
/30																
/28																
/27																
/26																
/25																
Subnet visual split																/24
																/25
																/26
																/27
																/28
												/29				/29
	/25			/26		/27		/28		/30		/30		/30		/30

Table 2.2: Visual LAN allocation

Name	Network	Usable IPs	Router	Broadcast	Subnet Mask	Populated
	192.168.7.				255.255.255.	
LAN Server	0	1 - 125	126	127	128	126
LAN A	128	129 - 189	190	191	192	48
LAN B	192	193 - 221	222	223	224	27
Unused	224	225 - 238		239		0
remaining	240	241 - 242		243		0
LAN Transit C	244	245 - 246		247	252	2
LAN Transit B	248	249 - 250		251	252	2
LAN Transit A	252	253 - 254		255	252	2

Table 2.3: LAN allocation table

Name	Ports Link		Network	IP	Gateway	Subnet Mask
	From	To		192.168.7.		255.255.255.
PC0	Fa0	Sw0 Fa0/2	LAN A	129	190	192
Laptop0	Fa0	Sw0 Fa0/3		130		
PC1	Fa0	Sw1 Fa0/2	LAN B	193	222	224
Laptop1	Fa0	Sw1 Fa0/3		194		
R0	Fa0/0	Fa0/0	External			
	Fa4/0	R2 Fa4/0	LAN Transit C	245		252
	Fa5/0	R1 Fa5/0	LAN Transit B	249		
R1	Fa0/0	Sw0 Fa0/1	LAN A	190		192
	Fa1/0	Sw1 Fa0/1	LAN B	222		224
	Fa4/0	R2 Fa5/0	LAN Transit A	253		252
	Fa5/0	R1 Fa4/0	LAN Transit B	250		
	Fa0/0	Sw2 Fa0/4	LAN Server	126		128
R2						

Table 2.4 continued from previous page

Name	Ports Link		Network	IP	Gateway	Subnet Mask
	From	**To**		192.168.7.		255.255.255.
	Fa4/0	R0 Fa4/0	LAN Transit C	246		252
	Fa5/0	R1 Fa4/0	LAN Transit A	254		
HTTP-Server	Fa0	Sw2 Fa0/1		3		
DNS-Server	Fa0	Sw2 Fa0/2	LAN Server	2	126	128
DHCP-Server	Fa0	Sw2 Fa0/3		1		
	Fa0/1	R1 Fa0/0				
Sw0	Fa0/2	PC0	LAN A			
	Fa0/3	Laptop0				
	Fa0/1	R1 Fa1/0				
Sw1	Fa0/2	PC1	LAN B			
	Fa0/3	Laptop1				
	Fa0/1	HTTP-Server				
Sw2	Fa0/2	DNS-Server	LAN Server			
	Fa0/3	DHCP-Server				
	Fa0/4	R2 Fa0/0				

Table 2.4: IP configuration table

Beautifully charted. Let's implement it with our favorite tool, Cisco Packet Trace.

2.2 Configuring devices

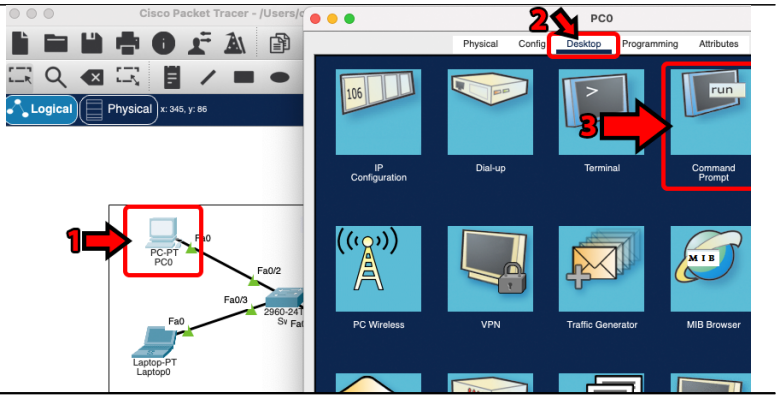
Steps	Example
To configure the IP on a device we must **single-click** in the intended device (1), go to the *desktop tab* (2) and select *IP Configuration* (3).	

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Table 2.5 continued from previous page

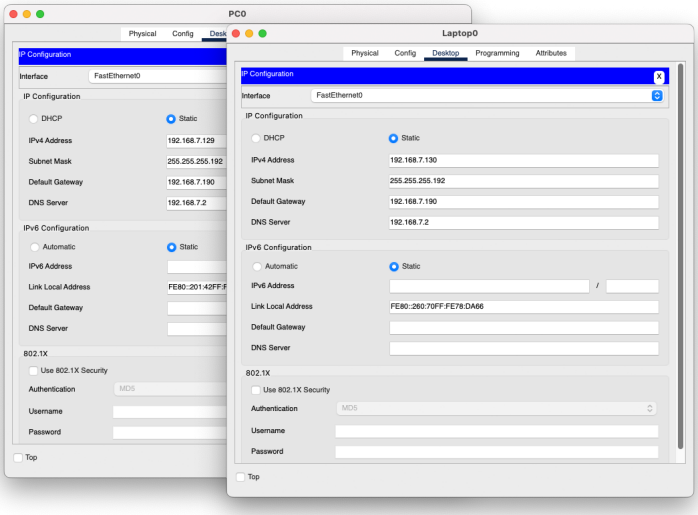
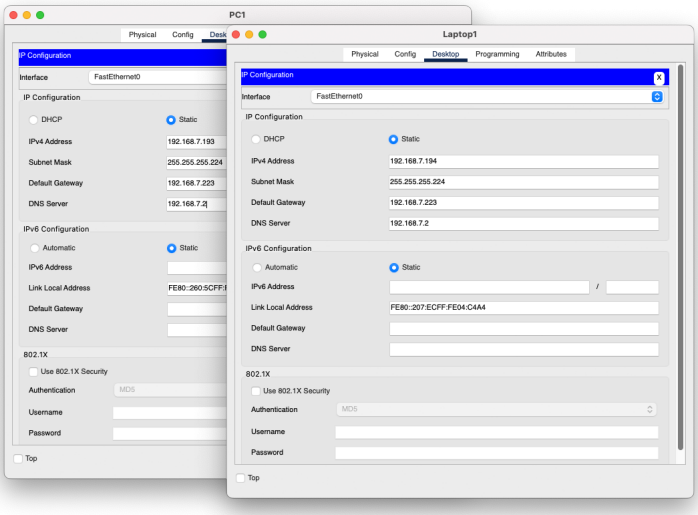
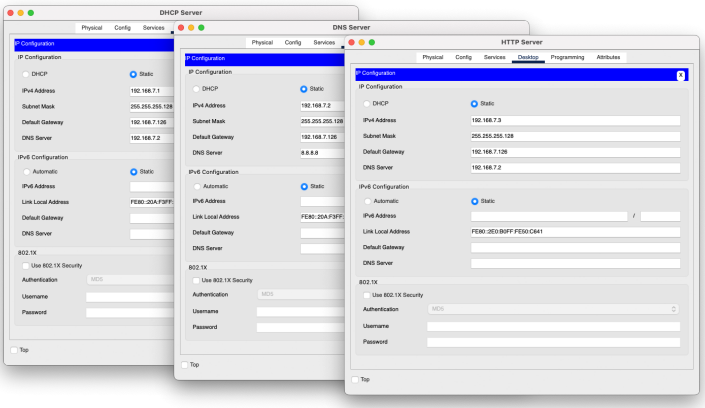
Steps	Example
IP configuration for LAN A, PC0 and Laptop0.	
IP configuration for LAN B, PC1 and Laptop1.	
IP configuration for LAN Servers, DHCP-Server, DNS-Server and HTTP-Server.	

Table 2.5: Cisco Packet Tracer IP device guide

2.3 Configuring routers

For the router there's two options, both valid and exhibited in the report. The graphical user interface (GUI) in the right and the command line interface (CLI) in the output subsection. Going by the GUI it's crystal clear, just input the necessary IP and subnet mask. And also the static routes.

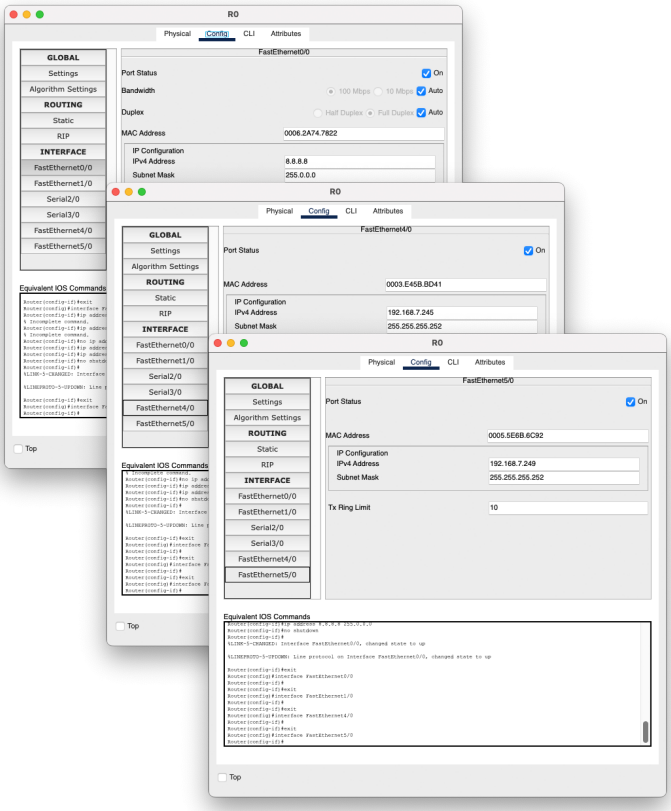
Steps	Example
IP configuration for Router 0.	

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Table 2.6 continued from previous page

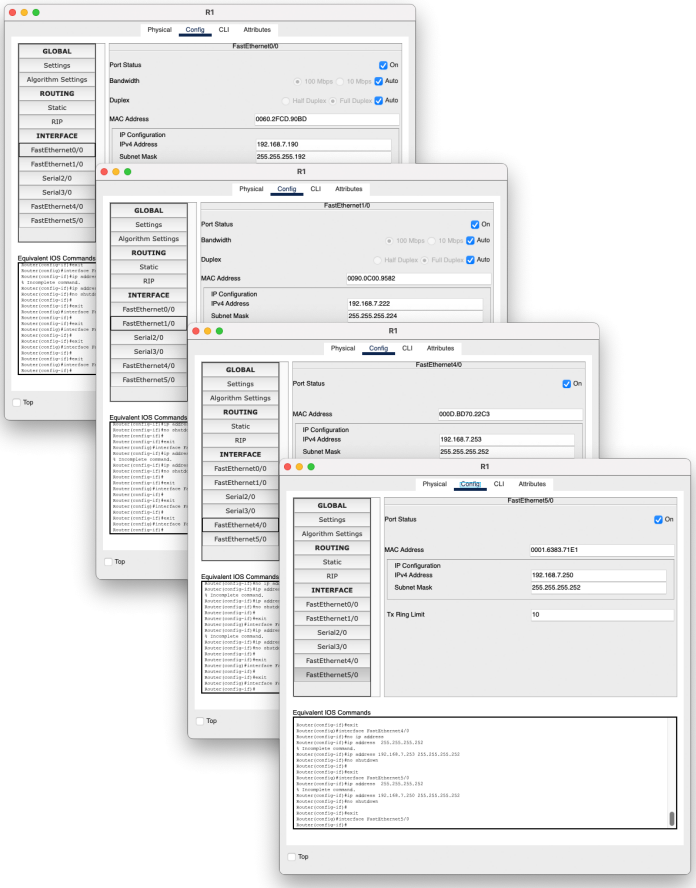
Steps	Example
IP configuration for Router 1.	

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Table 2.6 continued from previous page

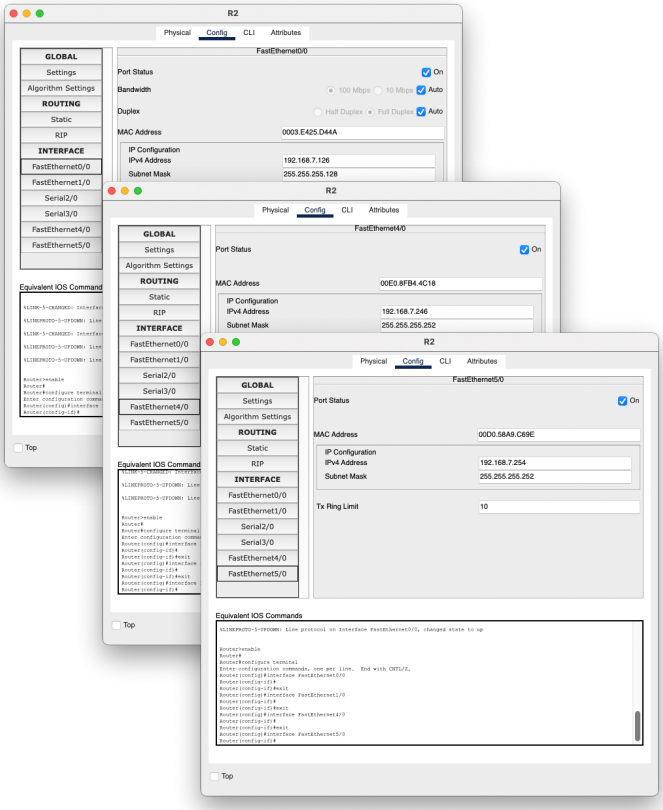
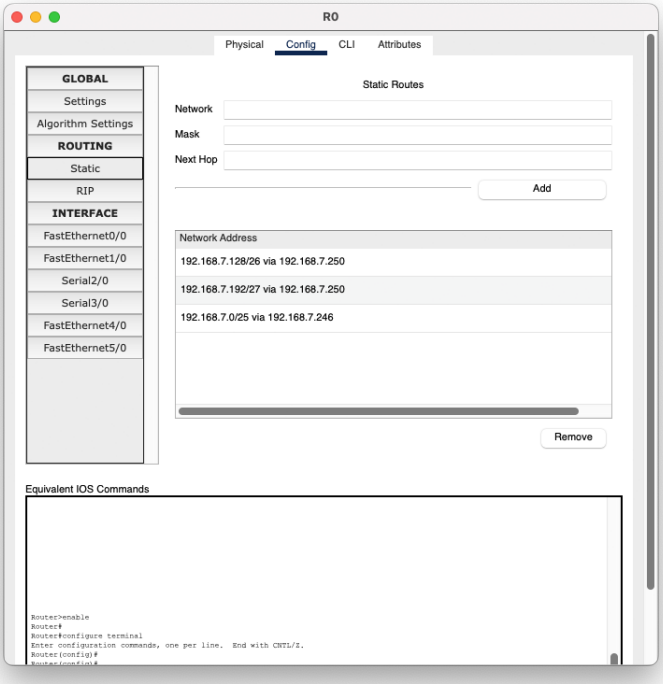
Steps	Example
IP configuration for Router 2.	
Static routes for Router 0.	

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Table 2.6 continued from previous page

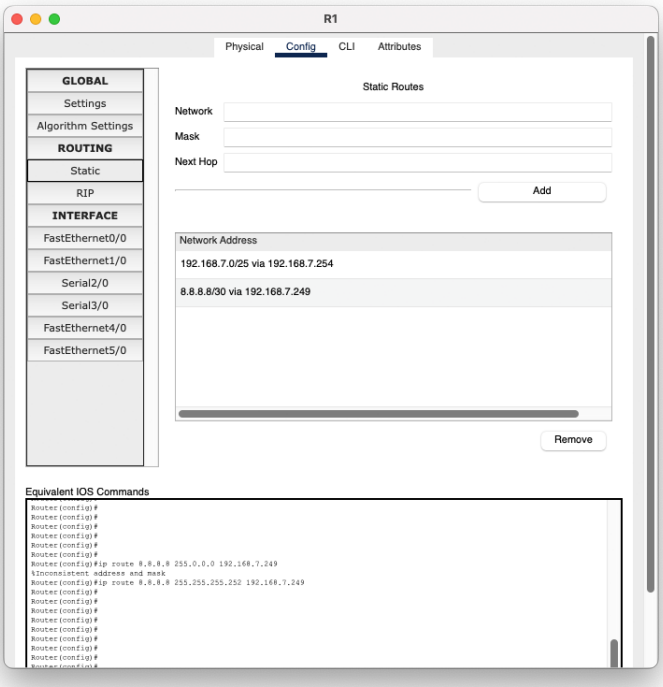
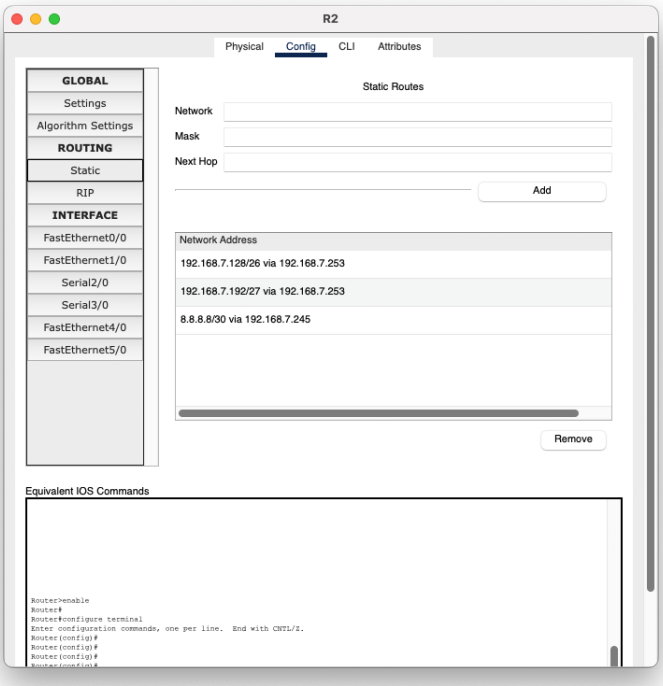
Steps	Example
Static routes for Router 1.	
Static routes for Router 2.	

Table 2.6: Cisco Packet Tracer IP router guide

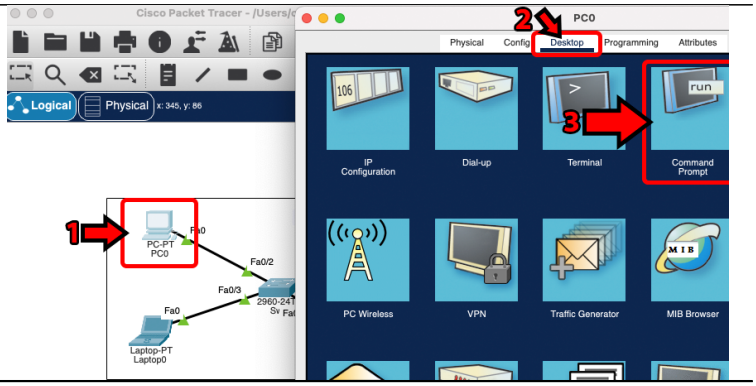
2.4 Testing connectivity

After applying the configuration, we must test our network by running diagnostic commands. First arp, then ping, then arp again and finally tracert[1]:

Ping	Trace Route	Device
arp -a	arp -a	ARP Table
ping 192.168.7.129	tracert 192.168.7.129	PC0
ping 192.168.7.130	tracert 192.168.7.130	Laptop0
ping 192.168.7.193	tracert 192.168.7.193	PC1
ping 192.168.7.194	tracert 192.168.7.194	Laptop1
ping 192.168.7.1	tracert 192.168.7.1	DHCP-Server
ping 192.168.7.2	tracert 192.168.7.2	DNS-Server
ping 192.168.7.3	tracert 192.168.7.3	HTTP-Server
ping 8.8.8.8	tracert 8.8.8.8	R0
ping 192.168.7.245	tracert 192.168.7.245	R0
ping 192.168.7.249	tracert 192.168.7.249	R0
ping 192.168.7.190	tracert 192.168.7.190	R1
ping 192.168.7.222	tracert 192.168.7.222	R1
ping 192.168.7.253	tracert 192.168.7.253	R1
ping 192.168.7.250	tracert 192.168.7.250	R1
ping 192.168.7.126	tracert 192.168.7.126	R2
ping 192.168.7.246	tracert 192.168.7.246	R2
ping 192.168.7.254	tracert 192.168.7.254	R2

Table 2.7: CLI commands

Since not everything fit in the images, their respective outputs are in the outputs subsection attesting to what was performed.

Steps	Example
To test the connection from devices we select a device by **single-clicking** it (1), go to the *desktop tab* (2) and select *Command Prompt* (3).	

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[1] Excluding commands to the device itself.

Table 2.8 continued from previous page

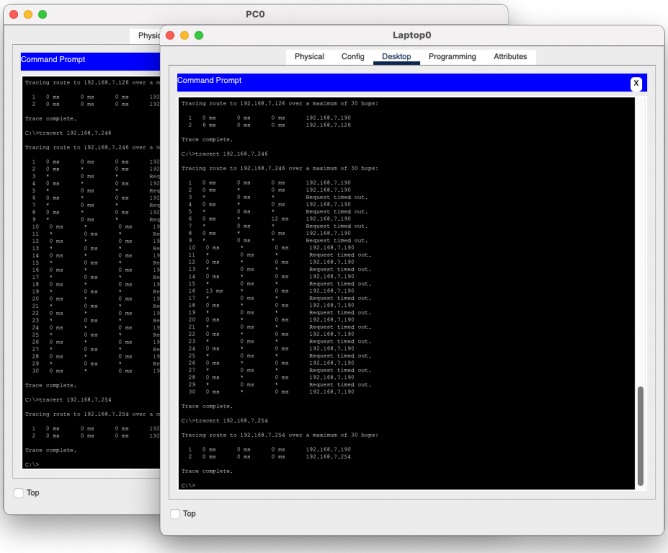
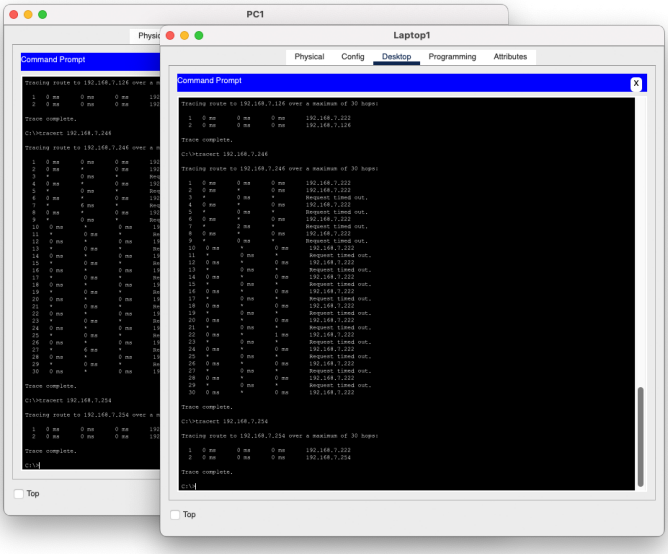
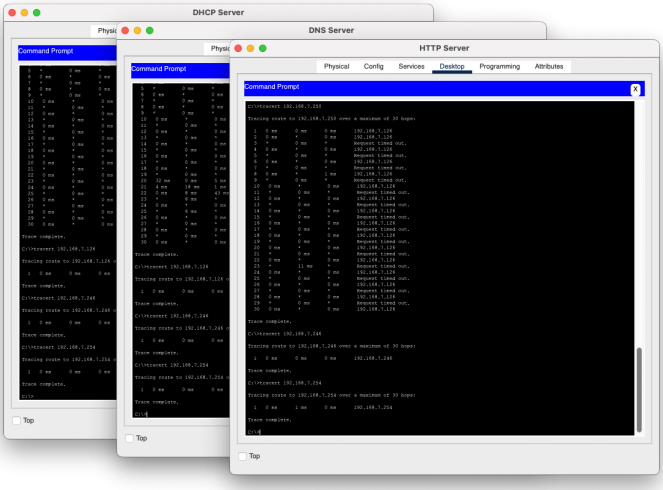
Steps	Example
From LAN A, PC0 and Laptop0, viewpoint.	
From LAN B, PC1 and Laptop1, viewpoint.	
From LAN Servers, DHCP, DNS and HTTP servers, viewpoint.	

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Table 2.8 continued from previous page

Steps	Example

Table 2.8: Cisco Packet Tracer CLI device guide

To test the connection from routers we select a router by **single-clicking**, go to the *CLI tab*, input **exit** until ***router>*** is shown, insted of ***router#***.

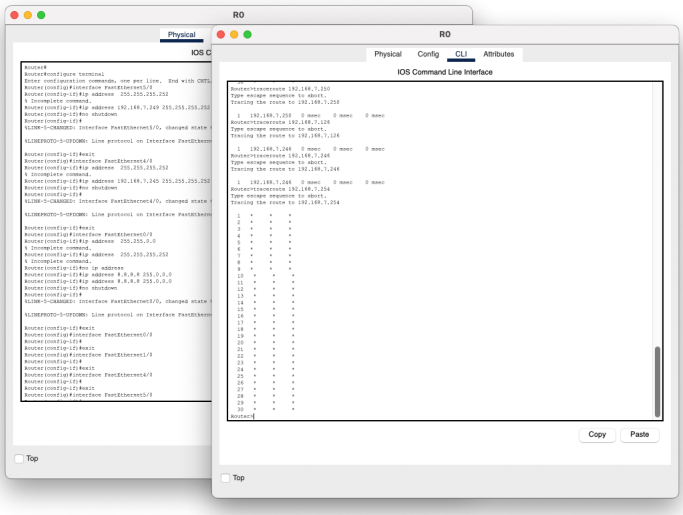
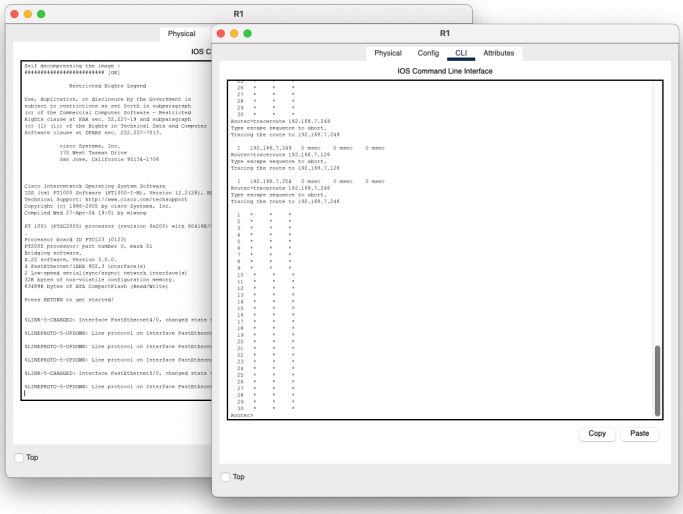
Steps	Example
From router R0 viewpoint.	
From router R1 viewpoint.	

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Table 2.9 continued from previous page

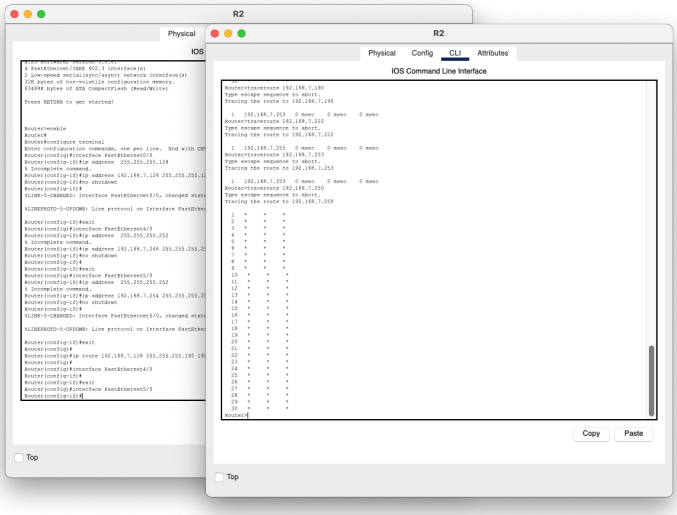
Steps	Example
From router R2 viewpoint.	

Table 2.9: Cisco Packet Tracer CLI router guide

2.5 Command line outputs

To not over saturate the report, the outputs displayed only refer to one device per network. The others are in the A.1 section from the appendix A.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found

C:\>ping 192.168.7.130

Pinging 192.168.7.130 with 32 bytes of data:

Reply from 192.168.7.130: bytes=32 time<1ms TTL=128
Reply from 192.168.7.130: bytes=32 time<1ms TTL=128
Reply from 192.168.7.130: bytes=32 time<1ms TTL=128
Reply from 192.168.7.130: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.7.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.193

Pinging 192.168.7.193 with 32 bytes of data:

Request timed out.
Reply from 192.168.7.193: bytes=32 time=26ms TTL=127
Reply from 192.168.7.193: bytes=32 time<1ms TTL=127
Reply from 192.168.7.193: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.7.193:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 26ms, Average = 8ms

```

```
C:\>ping 192.168.7.194

Pinging 192.168.7.194 with 32 bytes of data:

Request timed out.
Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
Reply from 192.168.7.194: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.7.194:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.1

Pinging 192.168.7.1 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
Reply from 192.168.7.1: bytes=32 time=40ms TTL=126

Ping statistics for 192.168.7.1:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 40ms, Average = 20ms

C:\>ping 192.168.7.2

Pinging 192.168.7.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
Reply from 192.168.7.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Request timed out.
Reply from 8.8.8.8: bytes=32 time=1ms TTL=254
Reply from 8.8.8.8: bytes=32 time=23ms TTL=254
Reply from 8.8.8.8: bytes=32 time=1ms TTL=254

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 23ms, Average = 8ms

C:\>ping 192.168.7.245

Pinging 192.168.7.245 with 32 bytes of data:

Reply from 192.168.7.190: Destination host unreachable.
Reply from 192.168.7.190: Destination host unreachable.
Request timed out.
Reply from 192.168.7.190: Destination host unreachable.

Ping statistics for 192.168.7.245:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.7.249

Pinging 192.168.7.249 with 32 bytes of data:

Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
```

```
Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
Reply from 192.168.7.249: bytes=32 time=25ms TTL=254
Reply from 192.168.7.249: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.249:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 25ms, Average = 6ms

C:\>ping 192.168.7.190

Pinging 192.168.7.190 with 32 bytes of data:

Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
Reply from 192.168.7.190: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.190:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.222

Pinging 192.168.7.222 with 32 bytes of data:

Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
Reply from 192.168.7.222: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.222:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.253

Pinging 192.168.7.253 with 32 bytes of data:

Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
Reply from 192.168.7.253: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.253:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.250

Pinging 192.168.7.250 with 32 bytes of data:

Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
Reply from 192.168.7.250: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.250:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.126

Pinging 192.168.7.126 with 32 bytes of data:

Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
Reply from 192.168.7.126: bytes=32 time=25ms TTL=254
```

```
179
180 Ping statistics for 192.168.7.126:
181     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
182 Approximate round trip times in milli-seconds:
183     Minimum = 0ms, Maximum = 25ms, Average = 6ms
184
185 C:\>ping 192.168.7.246
186
187 Pinging 192.168.7.246 with 32 bytes of data:
188
189 Reply from 192.168.7.190: Destination host unreachable.
190 Request timed out.
191 Reply from 192.168.7.190: Destination host unreachable.
192 Reply from 192.168.7.190: Destination host unreachable.
193
194 Ping statistics for 192.168.7.246:
195     Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
196
197 C:\>ping 192.168.7.254
198
199 Pinging 192.168.7.254 with 32 bytes of data:
200
201 Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
202 Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
203 Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
204 Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
205
206 Ping statistics for 192.168.7.254:
207     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
208 Approximate round trip times in milli-seconds:
209     Minimum = 0ms, Maximum = 0ms, Average = 0ms
210
211 C:\>arp -a
212   Internet Address      Physical Address      Type
213   192.168.7.130         0060.7078.da66        dynamic
214   192.168.7.190         0060.2fcd.90bd        dynamic
215
216 C:\>tracert 192.168.7.130
217
218 Tracing route to 192.168.7.130 over a maximum of 30 hops:
219
220   1   0 ms      0 ms      0 ms      192.168.7.130
221
222 Trace complete.
223
224 C:\>tracert 192.168.7.193
225
226 Tracing route to 192.168.7.193 over a maximum of 30 hops:
227
228   1   0 ms      0 ms      0 ms      192.168.7.190
229   2   0 ms      0 ms      1 ms      192.168.7.193
230
231 Trace complete.
232
233 C:\>tracert 192.168.7.194
234
235 Tracing route to 192.168.7.194 over a maximum of 30 hops:
236
237   1   0 ms      0 ms      0 ms      192.168.7.190
238   2   0 ms      0 ms      0 ms      192.168.7.194
239
240 Trace complete.
241
242 C:\>tracert 192.168.7.1
243
244 Tracing route to 192.168.7.1 over a maximum of 30 hops:
245
246   1   0 ms      0 ms      0 ms      192.168.7.190
247   2   0 ms      0 ms      0 ms      192.168.7.254
248   3   0 ms      0 ms      0 ms      192.168.7.1
249
250 Trace complete.
251
```

```
C:\>tracert 192.168.7.2

Tracing route to 192.168.7.2 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190
  2    0 ms      0 ms      0 ms      192.168.7.254
  3    0 ms      0 ms      0 ms      192.168.7.2

Trace complete.

C:\>tracert 192.168.7.3

Tracing route to 192.168.7.3 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190
  2    0 ms      0 ms      0 ms      192.168.7.254
  3    0 ms      0 ms      0 ms      192.168.7.3

Trace complete.

C:\>tracert 8.8.8.8

Tracing route to 8.8.8.8 over a maximum of 30 hops:

  1    0 ms      0 ms      1 ms      192.168.7.190
  2    0 ms      0 ms      0 ms      8.8.8.8

Trace complete.

C:\>tracert 192.168.7.245

Tracing route to 192.168.7.245 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190
  2    0 ms      *         0 ms      192.168.7.190
  3    *         0 ms      *         Request timed out.
  4    0 ms      *         0 ms      192.168.7.190
  5    *         0 ms      *         Request timed out.
  6    0 ms      *         0 ms      192.168.7.190
  7    *         0 ms      *         Request timed out.
  8    0 ms      *         0 ms      192.168.7.190
  9    *         0 ms      *         Request timed out.
  10    0 ms      *         0 ms      192.168.7.190
  11    *         0 ms      *         Request timed out.
  12    0 ms      *         0 ms      192.168.7.190
  13    *         0 ms      *         Request timed out.
  14    0 ms      *         0 ms      192.168.7.190
  15    *         0 ms      *         Request timed out.
  16    0 ms      *         0 ms      192.168.7.190
  17    *         0 ms      *         Request timed out.
  18    0 ms      *         0 ms      192.168.7.190
  19    *         0 ms      *         Request timed out.
  20    0 ms      *         0 ms      192.168.7.190
  21    *         1 ms      *         Request timed out.
  22    0 ms      *         0 ms      192.168.7.190
  23    *         0 ms      *         Request timed out.
  24    0 ms      *         0 ms      192.168.7.190
  25    *         0 ms      *         Request timed out.
  26    0 ms      *         0 ms      192.168.7.190
  27    *         8 ms      *         Request timed out.
  28    0 ms      *         0 ms      192.168.7.190
  29    *         0 ms      *         Request timed out.
  30    0 ms      *         0 ms      192.168.7.190

Trace complete.

C:\>tracert 192.168.7.249

Tracing route to 192.168.7.249 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190
  2    0 ms      0 ms      0 ms      192.168.7.249

```

```
Trace complete.

C:\>tracert 192.168.7.190

Tracing route to 192.168.7.190 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190

Trace complete.

C:\>tracert 192.168.7.222

Tracing route to 192.168.7.222 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222

Trace complete.

C:\>tracert 192.168.7.253

Tracing route to 192.168.7.253 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.253

Trace complete.

C:\>tracert 192.168.7.250

Tracing route to 192.168.7.250 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.250

Trace complete.

C:\>tracert 192.168.7.126

Tracing route to 192.168.7.126 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190
  2    0 ms      0 ms      0 ms      192.168.7.126

Trace complete.

C:\>tracert 192.168.7.246

Tracing route to 192.168.7.246 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190
  2    0 ms      *         0 ms      192.168.7.190
  3    *         0 ms      *         Request timed out.
  4    0 ms      *         0 ms      192.168.7.190
  5    *         0 ms      *         Request timed out.
  6    0 ms      *         0 ms      192.168.7.190
  7    *         0 ms      *         Request timed out.
  8    0 ms      *         0 ms      192.168.7.190
  9    *         0 ms      *         Request timed out.
  10    0 ms      *         0 ms      192.168.7.190
  11    *         0 ms      *         Request timed out.
  12    0 ms      *         0 ms      192.168.7.190
  13    *         0 ms      *         Request timed out.
  14    0 ms      *         0 ms      192.168.7.190
  15    *         0 ms      *         Request timed out.
  16    0 ms      *         0 ms      192.168.7.190
  17    *         0 ms      *         Request timed out.
  18    0 ms      *         0 ms      192.168.7.190
  19    *         0 ms      *         Request timed out.
  20    0 ms      *         0 ms      192.168.7.190
  21    *         0 ms      *         Request timed out.
  22    0 ms      *         0 ms      192.168.7.190
  23    *         0 ms      *         Request timed out.
  24    0 ms      *         0 ms      192.168.7.190
  25    *         0 ms      *         Request timed out.
  26    0 ms      *         0 ms      192.168.7.190
```

```
  27   *         0 ms      *         Request timed out.
  28   0 ms      *         0 ms      192.168.7.190
  29   *         0 ms      *         Request timed out.
  30   0 ms      *         0 ms      192.168.7.190

Trace complete.

C:\>tracert 192.168.7.254

Tracing route to 192.168.7.254 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.190
  2   0 ms      0 ms      0 ms      192.168.7.254

Trace complete.

C:\>
```

Listing 2.1: PC0 output (LAN A)

```

Cisco Packet Tracer PC Command Line 1.0
C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.7.193         0060.5c73.18bd        dynamic

C:\>ping 192.168.7.129

Pinging 192.168.7.129 with 32 bytes of data:

Request timed out.
Reply from 192.168.7.129: bytes=32 time<1ms TTL=127
Reply from 192.168.7.129: bytes=32 time=25ms TTL=127
Reply from 192.168.7.129: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.7.129:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 25ms, Average = 8ms

C:\>ping 192.168.7.130

Pinging 192.168.7.130 with 32 bytes of data:

Reply from 192.168.7.130: bytes=32 time=5ms TTL=127
Reply from 192.168.7.130: bytes=32 time<1ms TTL=127
Reply from 192.168.7.130: bytes=32 time=1ms TTL=127
Reply from 192.168.7.130: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.7.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 5ms, Average = 1ms

C:\>ping 192.168.7.193

Pinging 192.168.7.193 with 32 bytes of data:

Reply from 192.168.7.193: bytes=32 time<1ms TTL=128
Reply from 192.168.7.193: bytes=32 time<1ms TTL=128
Reply from 192.168.7.193: bytes=32 time<1ms TTL=128
Reply from 192.168.7.193: bytes=32 time=34ms TTL=128

Ping statistics for 192.168.7.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 34ms, Average = 8ms

C:\>ping 192.168.7.1

```

```
Pinging 192.168.7.1 with 32 bytes of data:

Reply from 192.168.7.1: bytes=32 time=8ms TTL=126
Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
Reply from 192.168.7.1: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 2ms

C:\>ping 192.168.7.2

Pinging 192.168.7.2 with 32 bytes of data:

Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
Reply from 192.168.7.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.3

Pinging 192.168.7.3 with 32 bytes of data:

Reply from 192.168.7.3: bytes=32 time<1ms TTL=126
Reply from 192.168.7.3: bytes=32 time=5ms TTL=126
Reply from 192.168.7.3: bytes=32 time<1ms TTL=126
Reply from 192.168.7.3: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 5ms, Average = 1ms

C:\>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.245

Pinging 192.168.7.245 with 32 bytes of data:

Reply from 192.168.7.222: Destination host unreachable.
Reply from 192.168.7.222: Destination host unreachable.
Reply from 192.168.7.222: Destination host unreachable.
Reply from 192.168.7.222: Destination host unreachable.

Ping statistics for 192.168.7.245:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.7.249

Pinging 192.168.7.249 with 32 bytes of data:

Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
```

```
Reply from 192.168.7.249: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.249:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.190

Pinging 192.168.7.190 with 32 bytes of data:

Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
Reply from 192.168.7.190: bytes=32 time=6ms TTL=255
Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
Reply from 192.168.7.190: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.190:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 1ms

C:\>ping 192.168.7.253

Pinging 192.168.7.253 with 32 bytes of data:

Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
Reply from 192.168.7.253: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.253:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.250

Pinging 192.168.7.250 with 32 bytes of data:

Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
Reply from 192.168.7.250: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.250:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.126

Pinging 192.168.7.126 with 32 bytes of data:

Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
Reply from 192.168.7.126: bytes=32 time=1ms TTL=254
Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
Reply from 192.168.7.126: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.7.246

Pinging 192.168.7.246 with 32 bytes of data:

Reply from 192.168.7.222: Destination host unreachable.
Reply from 192.168.7.222: Destination host unreachable.
Request timed out.
Reply from 192.168.7.222: Destination host unreachable.

Ping statistics for 192.168.7.246:
```

```
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.7.254

Pinging 192.168.7.254 with 32 bytes of data:

Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
Reply from 192.168.7.254: bytes=32 time=26ms TTL=254
Reply from 192.168.7.254: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 26ms, Average = 6ms

C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.7.193         0060.5c73.18bd        dynamic
  192.168.7.222         0090.0c00.9582        dynamic

C:\>tracert 192.168.7.129

Tracing route to 192.168.7.129 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.222
  2   0 ms      0 ms      0 ms      192.168.7.129

Trace complete.

C:\>tracert 192.168.7.130

Tracing route to 192.168.7.130 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.222
  2   0 ms      0 ms      0 ms      192.168.7.130

Trace complete.

C:\>tracert 192.168.7.193

Tracing route to 192.168.7.193 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.193

Trace complete.

C:\>tracert 192.168.7.1

Tracing route to 192.168.7.1 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.222
  2   0 ms      0 ms      8 ms      192.168.7.254
  3   0 ms      0 ms      17 ms     192.168.7.1

Trace complete.

C:\>tracert 192.168.7.2

Tracing route to 192.168.7.2 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.222
  2   0 ms      0 ms      11 ms     192.168.7.254
  3   0 ms      0 ms      0 ms      192.168.7.2

Trace complete.

C:\>tracert 192.168.7.3

Tracing route to 192.168.7.3 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.222
  2   0 ms      0 ms      0 ms      192.168.7.254
```

```
  3    0 ms      0 ms      0 ms      192.168.7.3

Trace complete.

C:\>tracert 8.8.8.8

Tracing route to 8.8.8.8 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      8.8.8.8

Trace complete.

C:\>tracert 192.168.7.245

Tracing route to 192.168.7.245 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      *         0 ms      192.168.7.222
  3    *         0 ms      *         Request timed out.
  4    0 ms      *         0 ms      192.168.7.222
  5    *         0 ms      *         Request timed out.
  6    0 ms      *         0 ms      192.168.7.222
  7    *         0 ms      *         Request timed out.
  8    0 ms      *         0 ms      192.168.7.222
  9    *         0 ms      *         Request timed out.
  10    0 ms      *         0 ms      192.168.7.222
  11    *         0 ms      *         Request timed out.
  12    0 ms      *         0 ms      192.168.7.222
  13    *         0 ms      *         Request timed out.
  14    0 ms      *         0 ms      192.168.7.222
  15    *         0 ms      *         Request timed out.
  16    15 ms     *         0 ms      192.168.7.222
  17    *         0 ms      *         Request timed out.
  18    0 ms      *         0 ms      192.168.7.222
  19    *         0 ms      *         Request timed out.
  20    0 ms      *         0 ms      192.168.7.222
  21    *         0 ms      *         Request timed out.
  22    0 ms      *         0 ms      192.168.7.222
  23    *         0 ms      *         Request timed out.
  24    0 ms      *         0 ms      192.168.7.222
  25    *         0 ms      *         Request timed out.
  26    0 ms      *         0 ms      192.168.7.222
  27    *         0 ms      *         Request timed out.
  28    0 ms      *         0 ms      192.168.7.222
  29    *         0 ms      *         Request timed out.
  30    0 ms      *         0 ms      192.168.7.222

Trace complete.

C:\>tracert 192.168.7.249

Tracing route to 192.168.7.249 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.249

Trace complete.

C:\>tracert 192.168.7.190

Tracing route to 192.168.7.190 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190

Trace complete.

C:\>tracert 192.168.7.222

Tracing route to 192.168.7.222 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222

```

```
Trace complete.

C:\>tracert 192.168.7.253

Tracing route to 192.168.7.253 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.253

Trace complete.

C:\>tracert 192.168.7.250

Tracing route to 192.168.7.250 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.250

Trace complete.

C:\>tracert 192.168.7.126

Tracing route to 192.168.7.126 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.126

Trace complete.

C:\>tracert 192.168.7.246

Tracing route to 192.168.7.246 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      *         0 ms      192.168.7.222
  3    *         0 ms      *         Request timed out.
  4    0 ms      *         0 ms      192.168.7.222
  5    *         0 ms      *         Request timed out.
  6    0 ms      *         0 ms      192.168.7.222
  7    *         2 ms      *         Request timed out.
  8    0 ms      *         0 ms      192.168.7.222
  9    *         0 ms      *         Request timed out.
  10    0 ms      *         0 ms      192.168.7.222
  11    *         0 ms      *         Request timed out.
  12    0 ms      *         0 ms      192.168.7.222
  13    *         0 ms      *         Request timed out.
  14    0 ms      *         0 ms      192.168.7.222
  15    *         0 ms      *         Request timed out.
  16    0 ms      *         0 ms      192.168.7.222
  17    *         0 ms      *         Request timed out.
  18    0 ms      *         0 ms      192.168.7.222
  19    *         0 ms      *         Request timed out.
  20    0 ms      *         0 ms      192.168.7.222
  21    *         0 ms      *         Request timed out.
  22    0 ms      *         1 ms      192.168.7.222
  23    *         0 ms      *         Request timed out.
  24    0 ms      *         0 ms      192.168.7.222
  25    *         0 ms      *         Request timed out.
  26    0 ms      *         0 ms      192.168.7.222
  27    *         0 ms      *         Request timed out.
  28    0 ms      *         0 ms      192.168.7.222
  29    *         0 ms      *         Request timed out.
  30    0 ms      *         0 ms      192.168.7.222

Trace complete.

C:\>tracert 192.168.7.254

Tracing route to 192.168.7.254 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.254

Trace complete.

```

```
C:\>
```

Listing 2.2: Laptop1 output (LAN B)

```
Cisco Packet Tracer SERVER Command Line 1.0
C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.7.126         0003.e425.d44a        dynamic

C:\>ping 192.168.7.129

Pinging 192.168.7.129 with 32 bytes of data:

Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
Reply from 192.168.7.129: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.130

Pinging 192.168.7.130 with 32 bytes of data:

Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
Reply from 192.168.7.130: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.7.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.7.193

Pinging 192.168.7.193 with 32 bytes of data:

Reply from 192.168.7.193: bytes=32 time=1ms TTL=126
Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
Reply from 192.168.7.193: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.7.194

Pinging 192.168.7.194 with 32 bytes of data:

Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
Reply from 192.168.7.194: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.194:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.2

Pinging 192.168.7.2 with 32 bytes of data:

Reply from 192.168.7.2: bytes=32 time=12ms TTL=128
```

```
Reply from 192.168.7.2: bytes=32 time=4ms TTL=128
Reply from 192.168.7.2: bytes=32 time<1ms TTL=128
Reply from 192.168.7.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.7.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 12ms, Average = 4ms

C:\>ping 192.168.7.3

Pinging 192.168.7.3 with 32 bytes of data:

Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
Reply from 192.168.7.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.7.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Request timed out.
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.245

Pinging 192.168.7.245 with 32 bytes of data:

Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
Reply from 192.168.7.245: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.245:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.249

Pinging 192.168.7.249 with 32 bytes of data:

Reply from 192.168.7.126: Destination host unreachable.
Request timed out.
Reply from 192.168.7.126: Destination host unreachable.
Request timed out.

Ping statistics for 192.168.7.249:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.7.190

Pinging 192.168.7.190 with 32 bytes of data:

Reply from 192.168.7.190: bytes=32 time=5ms TTL=254
Reply from 192.168.7.190: bytes=32 time=1ms TTL=254
Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
Reply from 192.168.7.190: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.190:
```

```
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 5ms, Average = 1ms

C:\>ping 192.168.7.222

Pinging 192.168.7.222 with 32 bytes of data:

Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
Reply from 192.168.7.222: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.222:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.253

Pinging 192.168.7.253 with 32 bytes of data:

Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
Reply from 192.168.7.253: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.253:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.250

Pinging 192.168.7.250 with 32 bytes of data:

Reply from 192.168.7.126: Destination host unreachable.
Request timed out.
Reply from 192.168.7.126: Destination host unreachable.
Reply from 192.168.7.126: Destination host unreachable.

Ping statistics for 192.168.7.250:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.7.126

Pinging 192.168.7.126 with 32 bytes of data:

Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
Reply from 192.168.7.126: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.246

Pinging 192.168.7.246 with 32 bytes of data:

Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
Reply from 192.168.7.246: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.246:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.254
```

```
213
214  Pinging 192.168.7.254 with 32 bytes of data:
215
216  Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
217  Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
218  Reply from 192.168.7.254: bytes=32 time=7ms TTL=255
219  Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
220
221  Ping statistics for 192.168.7.254:
222      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
223  Approximate round trip times in milli-seconds:
224      Minimum = 0ms, Maximum = 7ms, Average = 1ms
225
226  C:\>arp -a
227    Internet Address      Physical Address      Type
228    192.168.7.2           000a.f362.26dd        dynamic
229    192.168.7.3           00e0.b050.c641        dynamic
230    192.168.7.126         0003.e425.d44a        dynamic
231
232  C:\>tracert 192.168.7.129
233
234  Tracing route to 192.168.7.129 over a maximum of 30 hops:
235
236    1   0 ms      0 ms      0 ms      192.168.7.126
237    2   0 ms      0 ms      0 ms      192.168.7.253
238    3   0 ms      0 ms      0 ms      192.168.7.129
239
240  Trace complete.
241
242  C:\>tracert 192.168.7.130
243
244  Tracing route to 192.168.7.130 over a maximum of 30 hops:
245
246    1   0 ms      0 ms      0 ms      192.168.7.126
247    2   0 ms      0 ms      0 ms      192.168.7.253
248    3   0 ms      0 ms      0 ms      192.168.7.130
249
250  Trace complete.
251
252  C:\>tracert 192.168.7.193
253
254  Tracing route to 192.168.7.193 over a maximum of 30 hops:
255
256    1   0 ms      0 ms      0 ms      192.168.7.126
257    2   0 ms      0 ms      0 ms      192.168.7.253
258    3   0 ms      0 ms      0 ms      192.168.7.193
259
260  Trace complete.
261
262  C:\>tracert 192.168.7.194
263
264  Tracing route to 192.168.7.194 over a maximum of 30 hops:
265
266    1   0 ms      0 ms      0 ms      192.168.7.126
267    2   0 ms      0 ms      0 ms      192.168.7.253
268    3   0 ms      0 ms      0 ms      192.168.7.194
269
270  Trace complete.
271
272  C:\>tracert 192.168.7.2
273
274  Tracing route to 192.168.7.2 over a maximum of 30 hops:
275
276    1   0 ms      0 ms      0 ms      192.168.7.2
277
278  Trace complete.
279
280  C:\>tracert 192.168.7.3
281
282  Tracing route to 192.168.7.3 over a maximum of 30 hops:
283
284    1   0 ms      0 ms      0 ms      192.168.7.3
285
```

```
Trace complete.

C:\>tracert 8.8.8.8

Tracing route to 8.8.8.8 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.126
  2    0 ms      0 ms      0 ms      8.8.8.8

Trace complete.

C:\>tracert 192.168.7.245

Tracing route to 192.168.7.245 over a maximum of 30 hops:

  1    0 ms      0 ms      1 ms      192.168.7.126
  2    0 ms      0 ms      0 ms      192.168.7.245

Trace complete.

C:\>tracert 192.168.7.249

Tracing route to 192.168.7.249 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.126
  2    0 ms      *         0 ms      192.168.7.126
  3    *         0 ms      *         Request timed out.
  4    0 ms      *         0 ms      192.168.7.126
  5    *         0 ms      *         Request timed out.
  6    0 ms      *         0 ms      192.168.7.126
  7    *         0 ms      *         Request timed out.
  8    0 ms      *         0 ms      192.168.7.126
  9    *         0 ms      *         Request timed out.
  10    0 ms      *         0 ms      192.168.7.126
  11    *         0 ms      *         Request timed out.
  12    0 ms      *         0 ms      192.168.7.126
  13    *         0 ms      *         Request timed out.
  14    0 ms      *         0 ms      192.168.7.126
  15    *         0 ms      *         Request timed out.
  16    0 ms      *         0 ms      192.168.7.126
  17    *         0 ms      *         Request timed out.
  18    0 ms      *         0 ms      192.168.7.126
  19    *         0 ms      *         Request timed out.
  20    0 ms      *         0 ms      192.168.7.126
  21    *         0 ms      *         Request timed out.
  22    0 ms      *         0 ms      192.168.7.126
  23    *         0 ms      *         Request timed out.
  24    0 ms      *         0 ms      192.168.7.126
  25    *         0 ms      *         Request timed out.
  26    0 ms      *         0 ms      192.168.7.126
  27    *         0 ms      *         Request timed out.
  28    14 ms     *         0 ms      192.168.7.126
  29    *         0 ms      *         Request timed out.
  30    0 ms      *         0 ms      192.168.7.126

Trace complete.

C:\>tracert 192.168.7.190

Tracing route to 192.168.7.190 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.126
  2    0 ms      0 ms      0 ms      192.168.7.190

Trace complete.

C:\>tracert 192.168.7.222

Tracing route to 192.168.7.222 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.126
  2    0 ms      0 ms      0 ms      192.168.7.222

```

```
Trace complete.

C:\>tracert 192.168.7.253

Tracing route to 192.168.7.253 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.126
  2    0 ms      0 ms      0 ms      192.168.7.253

Trace complete.

C:\>tracert 192.168.7.250

Tracing route to 192.168.7.250 over a maximum of 30 hops:

  1    0 ms      1 ms      0 ms      192.168.7.126
  2    0 ms      *         0 ms      192.168.7.126
  3    *         0 ms      *         Request timed out.
  4    0 ms      *         0 ms      192.168.7.126
  5    *         0 ms      *         Request timed out.
  6    0 ms      *         0 ms      192.168.7.126
  7    *         0 ms      *         Request timed out.
  8    0 ms      *         0 ms      192.168.7.126
  9    *         0 ms      *         Request timed out.
  10    0 ms      *         0 ms      192.168.7.126
  11    *         0 ms      *         Request timed out.
  12    0 ms      *         0 ms      192.168.7.126
  13    *         0 ms      *         Request timed out.
  14    0 ms      *         0 ms      192.168.7.126
  15    *         0 ms      *         Request timed out.
  16    0 ms      *         0 ms      192.168.7.126
  17    *         0 ms      *         Request timed out.
  18    0 ms      *         0 ms      192.168.7.126
  19    *         0 ms      *         Request timed out.
  20    0 ms      *         0 ms      192.168.7.126
  21    *         0 ms      *         Request timed out.
  22    0 ms      *         0 ms      192.168.7.126
  23    *         0 ms      *         Request timed out.
  24    0 ms      *         0 ms      192.168.7.126
  25    *         0 ms      *         Request timed out.
  26    0 ms      *         0 ms      192.168.7.126
  27    *         0 ms      *         Request timed out.
  28    0 ms      *         0 ms      192.168.7.126
  29    *         0 ms      *         Request timed out.
  30    0 ms      *         0 ms      192.168.7.126

Trace complete.

C:\>tracert 192.168.7.126

Tracing route to 192.168.7.126 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.126

Trace complete.

C:\>tracert 192.168.7.246

Tracing route to 192.168.7.246 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.246

Trace complete.

C:\>tracert 192.168.7.254

Tracing route to 192.168.7.254 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.254

Trace complete.

C:\>
```

Listing 2.3: DHCP-Server output (LAN Servers)

```
System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)
Copyright (c) 2000 by cisco Systems, Inc.
PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory

Readonly ROMMON initialized

Self decompressing the image :
######################### [OK]

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(c) of the Commercial Computer Software - Restricted
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           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706



Cisco Internetwork Operating System Software
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 27-Apr-04 19:01 by miwang

PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
.
Processor board ID PT0123 (0123)
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

Press RETURN to get started!



Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet5/0
Router(config-if)#ip address 192.168.7.249 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet5/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet4/0
Router(config-if)#ip address 192.168.7.245 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet4/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0, changed state to up

Router(config-if)#exit
```

```
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 8.8.8.8 255.0.0.0
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config)#ip route 192.168.7.128 255.255.255.192 192.168.7.250
Router(config)#ip route 192.168.7.192 255.255.255.224 192.168.7.250
Router(config)#ip route 192.168.7.0 255.255.255.128 192.168.7.246
Router(config)#

Router>ping 192.168.7.129

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.129, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/1/6 ms

Router>ping 192.168.7.130

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.130, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.193

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.193, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.194

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.194, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms

Router>ping 192.168.7.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/8/35 ms

Router>ping 192.168.7.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.190

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.190, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.222

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.222, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/7/36 ms
```

```
141
142 Router>ping 192.168.7.253
143
144 Type escape sequence to abort.
145 Sending 5, 100-byte ICMP Echos to 192.168.7.253, timeout is 2 seconds:
146 .....
147 Success rate is 0 percent (0/5)
148
149 Router>ping 192.168.7.250
150
151 Type escape sequence to abort.
152 Sending 5, 100-byte ICMP Echos to 192.168.7.250, timeout is 2 seconds:
153 !!!!!
154 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
155
156 Router>ping 192.168.7.126
157
158 Type escape sequence to abort.
159 Sending 5, 100-byte ICMP Echos to 192.168.7.126, timeout is 2 seconds:
160 !!!!!
161 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
162
163 Router>ping 192.168.7.246
164
165 Type escape sequence to abort.
166 Sending 5, 100-byte ICMP Echos to 192.168.7.246, timeout is 2 seconds:
167 !!!!!
168 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
169
170 Router>ping 192.168.7.254
171
172 Type escape sequence to abort.
173 Sending 5, 100-byte ICMP Echos to 192.168.7.254, timeout is 2 seconds:
174 .....
175 Success rate is 0 percent (0/5)
176
177 Router>traceroute 192.168.7.129
178 Type escape sequence to abort.
179 Tracing the route to 192.168.7.129
180
181   1   192.168.7.250   0 msec    0 msec    0 msec
182   2   192.168.7.129   0 msec    0 msec    0 msec
183 Router>traceroute 192.168.7.130
184 Type escape sequence to abort.
185 Tracing the route to 192.168.7.130
186
187   1   192.168.7.250   6 msec    0 msec    0 msec
188   2   192.168.7.130   0 msec    0 msec    0 msec
189 Router>traceroute 192.168.7.193
190 Type escape sequence to abort.
191 Tracing the route to 192.168.7.193
192
193   1   192.168.7.250   0 msec    0 msec    0 msec
194   2   192.168.7.193   0 msec    0 msec    0 msec
195 Router>traceroute 192.168.7.194
196 Type escape sequence to abort.
197 Tracing the route to 192.168.7.194
198
199   1   192.168.7.250   0 msec    0 msec    0 msec
200   2   192.168.7.194   0 msec    0 msec    0 msec
201 Router>traceroute 192.168.7.1
202 Type escape sequence to abort.
203 Tracing the route to 192.168.7.1
204
205   1   192.168.7.246   0 msec    0 msec    0 msec
206   2   192.168.7.1     0 msec    0 msec    0 msec
207 Router>traceroute 192.168.7.2
208 Type escape sequence to abort.
209 Tracing the route to 192.168.7.2
210
211   1   192.168.7.246   0 msec    0 msec    0 msec
212   2   192.168.7.2     0 msec    0 msec    0 msec
213 Router>traceroute 192.168.7.3
```

```
Type escape sequence to abort.
Tracing the route to 192.168.7.3

  1   192.168.7.246   0 msec    0 msec    0 msec
  2   192.168.7.3     0 msec    0 msec    0 msec
Router>traceroute 192.168.7.190
Type escape sequence to abort.
Tracing the route to 192.168.7.190

  1   192.168.7.250   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.222
Type escape sequence to abort.
Tracing the route to 192.168.7.222

  1   192.168.7.250   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.253
Type escape sequence to abort.
Tracing the route to 192.168.7.253

  1   *     *     *
  2   *     *     *
  3   *     *     *
  4   *     *     *
  5   *     *     *
  6   *     *     *
  7   *     *     *
  8   *     *     *
  9   *     *     *
  10   *     *     *
  11   *     *     *
  12   *     *     *
  13   *     *     *
  14   *     *     *
  15   *     *     *
  16   *     *     *
  17   *     *     *
  18   *     *     *
  19   *     *     *
  20   *     *     *
  21   *     *     *
  22   *     *     *
  23   *     *     *
  24   *     *     *
  25   *     *     *
  26   *     *     *
  27   *     *     *
  28   *     *     *
  29   *     *     *
  30   *     *     *
Router>traceroute 192.168.7.250
Type escape sequence to abort.
Tracing the route to 192.168.7.250

  1   192.168.7.250   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.126
Type escape sequence to abort.
Tracing the route to 192.168.7.126

  1   192.168.7.246   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.246
Type escape sequence to abort.
Tracing the route to 192.168.7.246

  1   192.168.7.246   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.254
Type escape sequence to abort.
Tracing the route to 192.168.7.254

  1   *     *     *
  2   *     *     *
  3   *     *     *
  4   *     *     *
  5   *     *     *
```

```
  6   *     *     *
  7   *     *     *
  8   *     *     *
  9   *     *     *
  10   *     *     *
  11   *     *     *
  12   *     *     *
  13   *     *     *
  14   *     *     *
  15   *     *     *
  16   *     *     *
  17   *     *     *
  18   *     *     *
  19   *     *     *
  20   *     *     *
  21   *     *     *
  22   *     *     *
  23   *     *     *
  24   *     *     *
  25   *     *     *
  26   *     *     *
  27   *     *     *
  28   *     *     *
  29   *     *     *
  30   *     *     *
Router>
```

Listing 2.4: Router 0 output

```
System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)
Copyright (c) 2000 by cisco Systems, Inc.
PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory

Readonly ROMMON initialized

Self decompressing the image :
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           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706



Cisco Internetwork Operating System Software
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 27-Apr-04 19:01 by miwang

PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
.
Processor board ID PT0123 (0123)
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

```

```
Press RETURN to get started!



Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.7.190 255.255.255.192
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#ip address 192.168.7.222 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet4/0
Router(config-if)#ip address 192.168.7.253 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet4/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet5/0
Router(config-if)#ip address 192.168.7.250 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet5/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/0, changed state to up

Router(config)#
Router(config)#ip route 192.168.7.0 255.255.255.128 192.168.7.254
Router(config)#ip route 8.8.8.8 255.255.255.252 192.168.7.249

Router>ping 192.168.7.129

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.129, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.130

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.130, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/1 ms

Router>ping 192.168.7.193

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.193, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.194

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.194, timeout is 2 seconds:
.!!!!
```

```
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.1, timeout is 2 seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/1/5 ms

Router>ping 192.168.7.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 8.8.8.8

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 8.8.8.8, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.245

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.245, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

Router>ping 192.168.7.249

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.249, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.126

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.126, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.246

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.246, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

Router>traceroute 192.168.7.129
Type escape sequence to abort.
Tracing the route to 192.168.7.129

  1   192.168.7.129   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.130
Type escape sequence to abort.
Tracing the route to 192.168.7.130

  1   192.168.7.130   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.193
Type escape sequence to abort.
Tracing the route to 192.168.7.193

  1   192.168.7.193   0 msec    0 msec    0 msec
```

```
Router>traceroute 192.168.7.194
Type escape sequence to abort.
Tracing the route to 192.168.7.194

  1   192.168.7.194   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.1
Type escape sequence to abort.
Tracing the route to 192.168.7.1

  1   192.168.7.254   0 msec    0 msec    0 msec
  2   192.168.7.1     0 msec    0 msec    0 msec
Router>traceroute 192.168.7.2
Type escape sequence to abort.
Tracing the route to 192.168.7.2

  1   192.168.7.254   0 msec    0 msec    0 msec
  2   192.168.7.2     0 msec    0 msec    0 msec
Router>traceroute 192.168.7.3
Type escape sequence to abort.
Tracing the route to 192.168.7.3

  1   192.168.7.254   0 msec    0 msec    19 msec
  2   192.168.7.3     0 msec    0 msec    0 msec
Router>traceroute 8.8.8.8
Type escape sequence to abort.
Tracing the route to 8.8.8.8

  1   192.168.7.249   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.245
Type escape sequence to abort.
Tracing the route to 192.168.7.245

  1   *     *     *
  2   *     *     *
  3   *     *     *
  4   *     *     *
  5   *     *     *
  6   *     *     *
  7   *     *     *
  8   *     *     *
  9   *     *     *
  10   *     *     *
  11   *     *     *
  12   *     *     *
  13   *     *     *
  14   *     *     *
  15   *     *     *
  16   *     *     *
  17   *     *     *
  18   *     *     *
  19   *     *     *
  20   *     *     *
  21   *     *     *
  22   *     *     *
  23   *     *     *
  24   *     *     *
  25   *     *     *
  26   *     *     *
  27   *     *     *
  28   *     *     *
  29   *     *     *
  30   *     *     *
Router>traceroute 192.168.7.249
Type escape sequence to abort.
Tracing the route to 192.168.7.249

  1   192.168.7.249   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.126
Type escape sequence to abort.
Tracing the route to 192.168.7.126

  1   192.168.7.254   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.246
```

```
Type escape sequence to abort.
Tracing the route to 192.168.7.246

  1   *     *     *
  2   *     *     *
  3   *     *     *
  4   *     *     *
  5   *     *     *
  6   *     *     *
  7   *     *     *
  8   *     *     *
  9   *     *     *
  10   *     *     *
  11   *     *     *
  12   *     *     *
  13   *     *     *
  14   *     *     *
  15   *     *     *
  16   *     *     *
  17   *     *     *
  18   *     *     *
  19   *     *     *
  20   *     *     *
  21   *     *     *
  22   *     *     *
  23   *     *     *
  24   *     *     *
  25   *     *     *
  26   *     *     *
  27   *     *     *
  28   *     *     *
  29   *     *     *
  30   *     *     *
Router>
```

Listing 2.5: Router 1 output

```
System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)
Copyright (c) 2000 by cisco Systems, Inc.
PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory

Readonly ROMMON initialized

Self decompressing the image :
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Software clause at DFARS sec. 252.227-7013.

           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706



Cisco Internetwork Operating System Software
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 27-Apr-04 19:01 by miwang

PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
.
Processor board ID PT0123 (0123)
```

```
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

Press RETURN to get started!



Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.7.126 255.255.255.128
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet4/0
Router(config-if)#ip address 192.168.7.246 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet5/0
Router(config-if)#ip address 192.168.7.254 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet5/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/0, changed state to up
Router(config-if)#exit
Router(config)#
Router(config)#ip route 192.168.7.128 255.255.255.192 192.168.7.253
Router(config)#ip route 192.168.7.192 255.255.255.224 192.168.7.253
Router(config)#ip route 8.8.8.8 255.255.255.252 192.168.7.245
Router(config)#

Router>ping 192.168.7.129

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.129, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/4/24 ms

Router>ping 192.168.7.130

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.130, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.193

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.193, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.194

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.194, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.7.1
```

```
107
108 Type escape sequence to abort.
109 Sending 5, 100-byte ICMP Echos to 192.168.7.1, timeout is 2 seconds:
110 !!!!!
111 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms
112
113 Router>ping 192.168.7.2
114
115 Type escape sequence to abort.
116 Sending 5, 100-byte ICMP Echos to 192.168.7.2, timeout is 2 seconds:
117 !!!!!
118 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
119
120 Router>ping 192.168.7.3
121
122 Type escape sequence to abort.
123 Sending 5, 100-byte ICMP Echos to 192.168.7.3, timeout is 2 seconds:
124 !!!!!
125 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
126
127 Router>ping 8.8.8.8
128
129 Type escape sequence to abort.
130 Sending 5, 100-byte ICMP Echos to 8.8.8.8, timeout is 2 seconds:
131 !!!!!
132 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
133
134 Router>ping 192.168.7.245
135
136 Type escape sequence to abort.
137 Sending 5, 100-byte ICMP Echos to 192.168.7.245, timeout is 2 seconds:
138 !!!!!
139 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/3/18 ms
140
141 Router>ping 192.168.7.249
142
143 Type escape sequence to abort.
144 Sending 5, 100-byte ICMP Echos to 192.168.7.249, timeout is 2 seconds:
145 .....
146 Success rate is 0 percent (0/5)
147
148 Router>ping 192.168.7.190
149
150 Type escape sequence to abort.
151 Sending 5, 100-byte ICMP Echos to 192.168.7.190, timeout is 2 seconds:
152 !!!!!
153 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
154
155 Router>ping 192.168.7.222
156
157 Type escape sequence to abort.
158 Sending 5, 100-byte ICMP Echos to 192.168.7.222, timeout is 2 seconds:
159 !!!!!
160 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
161
162 Router>ping 192.168.7.253
163
164 Type escape sequence to abort.
165 Sending 5, 100-byte ICMP Echos to 192.168.7.253, timeout is 2 seconds:
166 !!!!!
167 Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
168
169 Router>ping 192.168.7.250
170
171 Type escape sequence to abort.
172 Sending 5, 100-byte ICMP Echos to 192.168.7.250, timeout is 2 seconds:
173 .....
174 Success rate is 0 percent (0/5)
175
176 Router>traceroute 192.168.7.129
177 Type escape sequence to abort.
178 Tracing the route to 192.168.7.129
179
```

```
  1   192.168.7.253   0 msec    0 msec    0 msec
  2   192.168.7.129   0 msec    7 msec    0 msec
Router>traceroute 192.168.7.130
Type escape sequence to abort.
Tracing the route to 192.168.7.130

  1   192.168.7.253   0 msec    0 msec    0 msec
  2   192.168.7.130   7 msec    0 msec    0 msec
Router>traceroute 192.168.7.193
Type escape sequence to abort.
Tracing the route to 192.168.7.193

  1   192.168.7.253   0 msec    0 msec    0 msec
  2   192.168.7.193   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.194
Type escape sequence to abort.
Tracing the route to 192.168.7.194

  1   192.168.7.253   14 msec   0 msec    16 msec
  2   192.168.7.194   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.1
Type escape sequence to abort.
Tracing the route to 192.168.7.1

  1   192.168.7.1     0 msec    14 msec   17 msec
Router>traceroute 192.168.7.2
Type escape sequence to abort.
Tracing the route to 192.168.7.2

  1   192.168.7.2     0 msec    0 msec    0 msec
Router>traceroute 192.168.7.3
Type escape sequence to abort.
Tracing the route to 192.168.7.3

  1   192.168.7.3     0 msec    0 msec    0 msec
Router>traceroute 8.8.8.8
Type escape sequence to abort.
Tracing the route to 8.8.8.8

  1   192.168.7.245   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.245
Type escape sequence to abort.
Tracing the route to 192.168.7.245

  1   192.168.7.245   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.249
Type escape sequence to abort.
Tracing the route to 192.168.7.249

  1   *     *     *
  2   *     *     *
  3   *     *     *
  4   *     *     *
  5   *     *     *
  6   *     *     *
  7   *     *     *
  8   *     *     *
  9   *     *     *
  10   *     *     *
  11   *     *     *
  12   *     *     *
  13   *     *     *
  14   *     *     *
  15   *     *     *
  16   *     *     *
  17   *     *     *
  18   *     *     *
  19   *     *     *
  20   *     *     *
  21   *     *     *
  22   *     *     *
  23   *     *     *
  24   *     *     *
```

```
  25   *      *      *
  26   *      *      *
  27   *      *      *
  28   *      *      *
  29   *      *      *
  30   *      *      *
Router>traceroute 192.168.7.190
Type escape sequence to abort.
Tracing the route to 192.168.7.190

  1   192.168.7.253   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.222
Type escape sequence to abort.
Tracing the route to 192.168.7.222

  1   192.168.7.253   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.253
Type escape sequence to abort.
Tracing the route to 192.168.7.253

  1   192.168.7.253   0 msec    0 msec    0 msec
Router>traceroute 192.168.7.250
Type escape sequence to abort.
Tracing the route to 192.168.7.250

  1   *      *      *
  2   *      *      *
  3   *      *      *
  4   *      *      *
  5   *      *      *
  6   *      *      *
  7   *      *      *
  8   *      *      *
  9   *      *      *
  10   *      *      *
  11   *      *      *
  12   *      *      *
  13   *      *      *
  14   *      *      *
  15   *      *      *
  16   *      *      *
  17   *      *      *
  18   *      *      *
  19   *      *      *
  20   *      *      *
  21   *      *      *
  22   *      *      *
  23   *      *      *
  24   *      *      *
  25   *      *      *
  26   *      *      *
  27   *      *      *
  28   *      *      *
  29   *      *      *
  30   *      *      *
Router>
```

Listing 2.6: Router 2 output

Chapter 3

Issues and fixes

Cisco Packet Tracer in MacOS:

STILL no solution was found to deal with those annoying popups that takes primary focus over other windows, even using the latest version.

Misenterpretation of NATs:

Initially thought that static routes were meant to allow a certain network to go through another address. As it turned out it's quite the opposite, it should be understood as ***I want to access LAN X from Router Y going through Router Z***.

Chapter 4

Conclusions

We can actually see that everything complies with what was required.
LAN A and B can only reach LAN Servers going through Router 1 and Router 2. They reach the outside through Router 1 and Router 0.
LAN Servers reach LANs A and B through Router 2 and Router 1. External connections go over Router 2 and Router 0.
This is possible because there isn't a static router designed to allow Router 1 to communicate with Router 0 with the intent to connect to LAN Servers.
All of this is clear when reviewing the outputs. Most prominent with the *Destination host unreachable* from ping and tracert's thirty retries outputing *Request timed out* (or even the unmistakable hops taken when tracert is successful).

Appendix A

Outputs

A.1 Command line encore

```
Cisco Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found
C:\>ping 192.168.7.129

Pinging 192.168.7.129 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.7.129: bytes=32 time<1ms TTL=128
Reply from 192.168.7.129: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.7.129:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.193

Pinging 192.168.7.193 with 32 bytes of data:

Reply from 192.168.7.193: bytes=32 time<1ms TTL=127
Reply from 192.168.7.193: bytes=32 time<1ms TTL=127
Reply from 192.168.7.193: bytes=32 time<1ms TTL=127
Reply from 192.168.7.193: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.7.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.194

Pinging 192.168.7.194 with 32 bytes of data:

Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
Reply from 192.168.7.194: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.7.194:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.1

Pinging 192.168.7.1 with 32 bytes of data:
```

```
49
50  Reply from 192.168.7.1: bytes=32 time=1ms TTL=126
51  Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
52  Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
53  Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
54
55  Ping statistics for 192.168.7.1:
56      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
57  Approximate round trip times in milli-seconds:
58      Minimum = 0ms, Maximum = 1ms, Average = 0ms
59
60  C:\>ping 192.168.7.2
61
62  Pinging 192.168.7.2 with 32 bytes of data:
63
64  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
65  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
66  Reply from 192.168.7.2: bytes=32 time=24ms TTL=126
67  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
68
69  Ping statistics for 192.168.7.2:
70      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
71  Approximate round trip times in milli-seconds:
72      Minimum = 0ms, Maximum = 24ms, Average = 6ms
73
74  C:\>ping 192.168.7.3
75
76  Pinging 192.168.7.3 with 32 bytes of data:
77
78  Request timed out.
79  Reply from 192.168.7.3: bytes=32 time=24ms TTL=126
80  Reply from 192.168.7.3: bytes=32 time<1ms TTL=126
81  Reply from 192.168.7.3: bytes=32 time<1ms TTL=126
82
83  Ping statistics for 192.168.7.3:
84      Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
85  Approximate round trip times in milli-seconds:
86      Minimum = 0ms, Maximum = 24ms, Average = 8ms
87
88  C:\>ping 8.8.8.8
89
90  Pinging 8.8.8.8 with 32 bytes of data:
91
92  Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
93  Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
94  Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
95  Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
96
97  Ping statistics for 8.8.8.8:
98      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
99  Approximate round trip times in milli-seconds:
100     Minimum = 0ms, Maximum = 0ms, Average = 0ms
101
102 C:\>ping 192.168.7.245
103
104 Pinging 192.168.7.245 with 32 bytes of data:
105
106 Reply from 192.168.7.190: Destination host unreachable.
107 Reply from 192.168.7.190: Destination host unreachable.
108 Request timed out.
109 Reply from 192.168.7.190: Destination host unreachable.
110
111 Ping statistics for 192.168.7.245:
112     Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
113
114 C:\>ping 192.168.7.249
115
116 Pinging 192.168.7.249 with 32 bytes of data:
117
118 Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
119 Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
120 Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
121 Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
```

```
122
123 Ping statistics for 192.168.7.249:
124     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
125 Approximate round trip times in milli-seconds:
126     Minimum = 0ms, Maximum = 0ms, Average = 0ms
127
128 C:\>ping 192.168.7.190
129
130 Pinging 192.168.7.190 with 32 bytes of data:
131
132 Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
133 Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
134 Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
135 Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
136
137 Ping statistics for 192.168.7.190:
138     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
139 Approximate round trip times in milli-seconds:
140     Minimum = 0ms, Maximum = 0ms, Average = 0ms
141
142 C:\>ping 192.168.7.222
143
144 Pinging 192.168.7.222 with 32 bytes of data:
145
146 Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
147 Reply from 192.168.7.222: bytes=32 time=7ms TTL=255
148 Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
149 Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
150
151 Ping statistics for 192.168.7.222:
152     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
153 Approximate round trip times in milli-seconds:
154     Minimum = 0ms, Maximum = 7ms, Average = 1ms
155
156 C:\>ping 192.168.7.253
157
158 Pinging 192.168.7.253 with 32 bytes of data:
159
160 Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
161 Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
162 Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
163 Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
164
165 Ping statistics for 192.168.7.253:
166     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
167 Approximate round trip times in milli-seconds:
168     Minimum = 0ms, Maximum = 0ms, Average = 0ms
169
170 C:\>ping 192.168.7.250
171
172 Pinging 192.168.7.250 with 32 bytes of data:
173
174 Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
175 Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
176 Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
177 Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
178
179 Ping statistics for 192.168.7.250:
180     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
181 Approximate round trip times in milli-seconds:
182     Minimum = 0ms, Maximum = 0ms, Average = 0ms
183
184 C:\>ping 192.168.7.126
185
186 Pinging 192.168.7.126 with 32 bytes of data:
187
188 Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
189 Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
190 Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
191 Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
192
193 Ping statistics for 192.168.7.126:
194     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

```
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.246

Pinging 192.168.7.246 with 32 bytes of data:

Reply from 192.168.7.190: Destination host unreachable.
Reply from 192.168.7.190: Destination host unreachable.
Reply from 192.168.7.190: Destination host unreachable.
Reply from 192.168.7.190: Destination host unreachable.

Ping statistics for 192.168.7.246:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.7.254

Pinging 192.168.7.254 with 32 bytes of data:

Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
Reply from 192.168.7.254: bytes=32 time=1ms TTL=254
Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
Reply from 192.168.7.254: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.7.129         0001.429b.91a6        dynamic
  192.168.7.190         0060.2fcd.90bd        dynamic

C:\>tracert 192.168.7.129

Tracing route to 192.168.7.129 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.129

Trace complete.

C:\>tracert 192.168.7.193

Tracing route to 192.168.7.193 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190
  2    0 ms      0 ms      0 ms      192.168.7.193

Trace complete.

C:\>tracert 192.168.7.194

Tracing route to 192.168.7.194 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190
  2    0 ms      0 ms      0 ms      192.168.7.194

Trace complete.

C:\>tracert 192.168.7.1

Tracing route to 192.168.7.1 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190
  2    0 ms      0 ms      0 ms      192.168.7.254
  3    0 ms      0 ms      0 ms      192.168.7.1

Trace complete.

C:\>tracert 192.168.7.2

Tracing route to 192.168.7.2 over a maximum of 30 hops:
```

```
268
269    1    0 ms      0 ms      0 ms      192.168.7.190
270    2    0 ms      0 ms      0 ms      192.168.7.254
271    3    0 ms      0 ms      0 ms      192.168.7.2
272
273  Trace complete.
274
275  C:\>tracert 192.168.7.3
276
277  Tracing route to 192.168.7.3 over a maximum of 30 hops:
278
279    1    0 ms      0 ms      18 ms     192.168.7.190
280    2    1 ms      0 ms      0 ms      192.168.7.254
281    3    0 ms      0 ms      0 ms      192.168.7.3
282
283  Trace complete.
284
285  C:\>tracert 8.8.8.8
286
287  Tracing route to 8.8.8.8 over a maximum of 30 hops:
288
289    1    0 ms      0 ms      0 ms      192.168.7.190
290    2    0 ms      0 ms      0 ms      8.8.8.8
291
292  Trace complete.
293
294  C:\>tracert 192.168.7.245
295
296  Tracing route to 192.168.7.245 over a maximum of 30 hops:
297
298    1    0 ms      0 ms      0 ms      192.168.7.190
299    2    0 ms      *         0 ms      192.168.7.190
300    3    *         0 ms      *         Request timed out.
301    4    0 ms      *         0 ms      192.168.7.190
302    5    *         0 ms      *         Request timed out.
303    6    0 ms      *         0 ms      192.168.7.190
304    7    *         0 ms      *         Request timed out.
305    8    0 ms      *         7 ms      192.168.7.190
306    9    *         0 ms      *         Request timed out.
307    10    0 ms      *         0 ms      192.168.7.190
308    11    *         0 ms      *         Request timed out.
309    12    0 ms      *         0 ms      192.168.7.190
310    13    *         0 ms      *         Request timed out.
311    14    0 ms      *         0 ms      192.168.7.190
312    15    *         0 ms      *         Request timed out.
313    16    0 ms      *         0 ms      192.168.7.190
314    17    *         0 ms      *         Request timed out.
315    18    0 ms      *         0 ms      192.168.7.190
316    19    *         0 ms      *         Request timed out.
317    20    0 ms      *         0 ms      192.168.7.190
318    21    *         0 ms      *         Request timed out.
319    22    0 ms      *         0 ms      192.168.7.190
320    23    *         0 ms      *         Request timed out.
321    24    0 ms      *         0 ms      192.168.7.190
322    25    *         0 ms      *         Request timed out.
323    26    0 ms      *         0 ms      192.168.7.190
324    27    *         0 ms      *         Request timed out.
325    28    0 ms      *         0 ms      192.168.7.190
326    29    *         0 ms      *         Request timed out.
327    30    0 ms      *         0 ms      192.168.7.190
328
329  Trace complete.
330
331  C:\>tracert 192.168.7.249
332
333  Tracing route to 192.168.7.249 over a maximum of 30 hops:
334
335    1    0 ms      0 ms      3 ms      192.168.7.190
336    2    0 ms      1 ms      0 ms      192.168.7.249
337
338  Trace complete.
339
340  C:\>tracert 192.168.7.190
```

```
341
342  Tracing route to 192.168.7.190 over a maximum of 30 hops:
343
344    1   0 ms      0 ms      0 ms      192.168.7.190
345
346  Trace complete.
347
348  C:\>tracert 192.168.7.222
349
350  Tracing route to 192.168.7.222 over a maximum of 30 hops:
351
352    1   0 ms      17 ms     0 ms      192.168.7.222
353
354  Trace complete.
355
356  C:\>tracert 192.168.7.253
357
358  Tracing route to 192.168.7.253 over a maximum of 30 hops:
359
360    1   0 ms      0 ms      0 ms      192.168.7.253
361
362  Trace complete.
363
364  C:\>tracert 192.168.7.250
365
366  Tracing route to 192.168.7.250 over a maximum of 30 hops:
367
368    1   0 ms      0 ms      0 ms      192.168.7.250
369
370  Trace complete.
371
372  C:\>tracert 192.168.7.126
373
374  Tracing route to 192.168.7.126 over a maximum of 30 hops:
375
376    1   0 ms      0 ms      0 ms      192.168.7.190
377    2   6 ms      0 ms      0 ms      192.168.7.126
378
379  Trace complete.
380
381  C:\>tracert 192.168.7.246
382
383  Tracing route to 192.168.7.246 over a maximum of 30 hops:
384
385    1   0 ms      0 ms      0 ms      192.168.7.190
386    2   0 ms      *         0 ms      192.168.7.190
387    3   *         0 ms      *         Request timed out.
388    4   0 ms      *         0 ms      192.168.7.190
389    5   *         0 ms      *         Request timed out.
390    6   0 ms      *         12 ms     192.168.7.190
391    7   *         0 ms      *         Request timed out.
392    8   0 ms      *         0 ms      192.168.7.190
393    9   *         0 ms      *         Request timed out.
394    10   0 ms      *         0 ms      192.168.7.190
395    11   *         0 ms      *         Request timed out.
396    12   0 ms      *         0 ms      192.168.7.190
397    13   *         0 ms      *         Request timed out.
398    14   0 ms      *         0 ms      192.168.7.190
399    15   *         0 ms      *         Request timed out.
400    16   13 ms     *         0 ms      192.168.7.190
401    17   *         0 ms      *         Request timed out.
402    18   0 ms      *         0 ms      192.168.7.190
403    19   *         0 ms      *         Request timed out.
404    20   0 ms      *         0 ms      192.168.7.190
405    21   *         0 ms      *         Request timed out.
406    22   0 ms      *         0 ms      192.168.7.190
407    23   *         0 ms      *         Request timed out.
408    24   0 ms      *         0 ms      192.168.7.190
409    25   *         0 ms      *         Request timed out.
410    26   0 ms      *         0 ms      192.168.7.190
411    27   *         0 ms      *         Request timed out.
412    28   0 ms      *         0 ms      192.168.7.190
413    29   *         0 ms      *         Request timed out.
```

```
  30    0 ms      *         0 ms      192.168.7.190

Trace complete.

C:\>tracert 192.168.7.254

Tracing route to 192.168.7.254 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190
  2    0 ms      0 ms      0 ms      192.168.7.254

Trace complete.

C:\>
```

Listing A.1: Laptop0 output

```
Cisco Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found
C:\>ping 192.168.7.129

Pinging 192.168.7.129 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.7.129: bytes=32 time<1ms TTL=127
Reply from 192.168.7.129: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.7.129:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.130

Pinging 192.168.7.130 with 32 bytes of data:

Request timed out.
Reply from 192.168.7.130: bytes=32 time<1ms TTL=127
Reply from 192.168.7.130: bytes=32 time<1ms TTL=127
Reply from 192.168.7.130: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.7.130:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.194

Pinging 192.168.7.194 with 32 bytes of data:

Reply from 192.168.7.194: bytes=32 time<1ms TTL=128
Reply from 192.168.7.194: bytes=32 time<1ms TTL=128
Reply from 192.168.7.194: bytes=32 time<1ms TTL=128
Reply from 192.168.7.194: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.7.194:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.1

Pinging 192.168.7.1 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
```

```
54
55  Ping statistics for 192.168.7.1:
56      Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
57  Approximate round trip times in milli-seconds:
58      Minimum = 0ms, Maximum = 0ms, Average = 0ms
59
60  C:\>ping 192.168.7.2
61
62  Pinging 192.168.7.2 with 32 bytes of data:
63
64  Request timed out.
65  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
66  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
67  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
68
69  Ping statistics for 192.168.7.2:
70      Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
71  Approximate round trip times in milli-seconds:
72      Minimum = 0ms, Maximum = 0ms, Average = 0ms
73
74  C:\>ping 192.168.7.3
75
76  Pinging 192.168.7.3 with 32 bytes of data:
77
78  Request timed out.
79  Reply from 192.168.7.3: bytes=32 time<1ms TTL=126
80  Reply from 192.168.7.3: bytes=32 time<1ms TTL=126
81  Reply from 192.168.7.3: bytes=32 time<1ms TTL=126
82
83  Ping statistics for 192.168.7.3:
84      Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
85  Approximate round trip times in milli-seconds:
86      Minimum = 0ms, Maximum = 0ms, Average = 0ms
87
88  C:\>ping 192.168.7.245
89
90  Pinging 192.168.7.245 with 32 bytes of data:
91
92  Reply from 192.168.7.222: Destination host unreachable.
93  Reply from 192.168.7.222: Destination host unreachable.
94  Request timed out.
95  Reply from 192.168.7.222: Destination host unreachable.
96
97  Ping statistics for 192.168.7.245:
98      Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
99
100 C:\>ping 192.168.7.249
101
102 Pinging 192.168.7.249 with 32 bytes of data:
103
104 Request timed out.
105 Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
106 Reply from 192.168.7.249: bytes=32 time=26ms TTL=254
107 Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
108
109 Ping statistics for 192.168.7.249:
110     Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
111 Approximate round trip times in milli-seconds:
112     Minimum = 0ms, Maximum = 26ms, Average = 8ms
113
114 C:\>ping 192.168.7.190
115
116 Pinging 192.168.7.190 with 32 bytes of data:
117
118 Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
119 Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
120 Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
121 Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
122
123 Ping statistics for 192.168.7.190:
124     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
125 Approximate round trip times in milli-seconds:
126     Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

```
127
128 C:\>ping 192.168.7.222
129
130 Pinging 192.168.7.222 with 32 bytes of data:
131
132 Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
133 Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
134 Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
135 Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
136
137 Ping statistics for 192.168.7.222:
138     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
139 Approximate round trip times in milli-seconds:
140     Minimum = 0ms, Maximum = 0ms, Average = 0ms
141
142 C:\>ping 192.168.7.253
143
144 Pinging 192.168.7.253 with 32 bytes of data:
145
146 Reply from 192.168.7.253: bytes=32 time=5ms TTL=255
147 Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
148 Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
149 Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
150
151 Ping statistics for 192.168.7.253:
152     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
153 Approximate round trip times in milli-seconds:
154     Minimum = 0ms, Maximum = 5ms, Average = 1ms
155
156 C:\>ping 192.168.7.250
157
158 Pinging 192.168.7.250 with 32 bytes of data:
159
160 Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
161 Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
162 Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
163 Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
164
165 Ping statistics for 192.168.7.250:
166     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
167 Approximate round trip times in milli-seconds:
168     Minimum = 0ms, Maximum = 0ms, Average = 0ms
169
170 C:\>ping 192.168.7.126
171
172 Pinging 192.168.7.126 with 32 bytes of data:
173
174 Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
175 Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
176 Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
177 Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
178
179 Ping statistics for 192.168.7.126:
180     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
181 Approximate round trip times in milli-seconds:
182     Minimum = 0ms, Maximum = 0ms, Average = 0ms
183
184 C:\>ping 192.168.7.246
185
186 Pinging 192.168.7.246 with 32 bytes of data:
187
188 Reply from 192.168.7.222: Destination host unreachable.
189 Request timed out.
190 Reply from 192.168.7.222: Destination host unreachable.
191 Request timed out.
192
193 Ping statistics for 192.168.7.246:
194     Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
195
196 C:\>arp -a
197   Internet Address      Physical Address      Type
198   192.168.7.194         0007.ec04.c4a4        dynamic
199   192.168.7.222         0090.0c00.9582        dynamic
```

```
C:\>tracert 192.168.7.129

Tracing route to 192.168.7.129 over a maximum of 30 hops:

  1    5 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.129

Trace complete.

C:\>tracert 192.168.7.130

Tracing route to 192.168.7.130 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.130

Trace complete.

C:\>tracert 192.168.7.194

Tracing route to 192.168.7.194 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.194

Trace complete.

C:\>tracert 192.168.7.1

Tracing route to 192.168.7.1 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.254
  3    0 ms      0 ms      0 ms      192.168.7.1

Trace complete.

C:\>tracert 192.168.7.2

Tracing route to 192.168.7.2 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.254
  3    0 ms      0 ms      0 ms      192.168.7.2

Trace complete.

C:\>tracert 192.168.7.3

Tracing route to 192.168.7.3 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.254
  3    0 ms      0 ms      0 ms      192.168.7.3

Trace complete.

C:\>tracert 8.8.8.8

Tracing route to 8.8.8.8 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      8.8.8.8

Trace complete.

C:\>tracert 192.168.7.245

Tracing route to 192.168.7.245 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      *         0 ms      192.168.7.222
  3    *         0 ms      *         Request timed out.
```

```
  4    0 ms      *         0 ms      192.168.7.222
  5    *         0 ms      *         Request timed out.
  6    0 ms      *         0 ms      192.168.7.222
  7    *         13 ms     *         Request timed out.
  8    0 ms      *         0 ms      192.168.7.222
  9    *         0 ms      *         Request timed out.
  10    0 ms      *         3 ms      192.168.7.222
  11    *         0 ms      *         Request timed out.
  12    0 ms      *         0 ms      192.168.7.222
  13    *         0 ms      *         Request timed out.
  14    0 ms      *         0 ms      192.168.7.222
  15    *         0 ms      *         Request timed out.
  16    0 ms      *         0 ms      192.168.7.222
  17    *         0 ms      *         Request timed out.
  18    0 ms      *         0 ms      192.168.7.222
  19    *         0 ms      *         Request timed out.
  20    0 ms      *         0 ms      192.168.7.222
  21    *         0 ms      *         Request timed out.
  22    0 ms      *         0 ms      192.168.7.222
  23    *         0 ms      *         Request timed out.
  24    0 ms      *         0 ms      192.168.7.222
  25    *         0 ms      *         Request timed out.
  26    0 ms      *         0 ms      192.168.7.222
  27    *         0 ms      *         Request timed out.
  28    0 ms      *         0 ms      192.168.7.222
  29    *         0 ms      *         Request timed out.
  30    0 ms      *         0 ms      192.168.7.222

Trace complete.

C:\>tracert 192.168.7.249

Tracing route to 192.168.7.249 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.249

Trace complete.

C:\>tracert 192.168.7.190

Tracing route to 192.168.7.190 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.190

Trace complete.

C:\>tracert 192.168.7.222

Tracing route to 192.168.7.222 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222

Trace complete.

C:\>tracert 192.168.7.253

Tracing route to 192.168.7.253 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.253

Trace complete.

C:\>tracert 192.168.7.250

Tracing route to 192.168.7.250 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.250

Trace complete.

C:\>tracert 192.168.7.126

```

```
Tracing route to 192.168.7.126 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.126

Trace complete.

C:\>tracert 192.168.7.246

Tracing route to 192.168.7.246 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      *         0 ms      192.168.7.222
  3    *         0 ms      *         Request timed out.
  4    0 ms      *         0 ms      192.168.7.222
  5    *         0 ms      *         Request timed out.
  6    0 ms      *         0 ms      192.168.7.222
  7    *         6 ms      *         Request timed out.
  8    0 ms      *         0 ms      192.168.7.222
  9    *         0 ms      *         Request timed out.
  10    0 ms      *         0 ms      192.168.7.222
  11    *         0 ms      *         Request timed out.
  12    0 ms      *         0 ms      192.168.7.222
  13    *         0 ms      *         Request timed out.
  14    0 ms      *         0 ms      192.168.7.222
  15    *         0 ms      *         Request timed out.
  16    0 ms      *         0 ms      192.168.7.222
  17    *         0 ms      *         Request timed out.
  18    0 ms      *         0 ms      192.168.7.222
  19    *         0 ms      *         Request timed out.
  20    0 ms      *         0 ms      192.168.7.222
  21    *         0 ms      *         Request timed out.
  22    0 ms      *         0 ms      192.168.7.222
  23    *         0 ms      *         Request timed out.
  24    0 ms      *         0 ms      192.168.7.222
  25    *         0 ms      *         Request timed out.
  26    0 ms      *         0 ms      192.168.7.222
  27    *         6 ms      *         Request timed out.
  28    0 ms      *         0 ms      192.168.7.222
  29    *         0 ms      *         Request timed out.
  30    0 ms      *         0 ms      192.168.7.222

Trace complete.

C:\>tracert 192.168.7.254

Tracing route to 192.168.7.254 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.222
  2    0 ms      0 ms      0 ms      192.168.7.254

Trace complete.

C:\>
```

Listing A.2: PC1 output

```
Cisco Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found

C:\>ping 192.168.7.129

Pinging 192.168.7.129 with 32 bytes of data:

Reply from 192.168.7.129: bytes=32 time=7ms TTL=126
Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
Reply from 192.168.7.129: bytes=32 time<1ms TTL=126

```

```
Ping statistics for 192.168.7.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 7ms, Average = 1ms

C:\>ping 192.168.7.130

Pinging 192.168.7.130 with 32 bytes of data:

Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
Reply from 192.168.7.130: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.7.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.7.193

Pinging 192.168.7.193 with 32 bytes of data:

Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
Reply from 192.168.7.193: bytes=32 time=1ms TTL=126
Reply from 192.168.7.193: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.7.194

Pinging 192.168.7.194 with 32 bytes of data:

Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
Reply from 192.168.7.194: bytes=32 time=7ms TTL=126
Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
Reply from 192.168.7.194: bytes=32 time=32ms TTL=126

Ping statistics for 192.168.7.194:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 32ms, Average = 9ms

C:\>ping 192.168.7.1

Pinging 192.168.7.1 with 32 bytes of data:

Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
Reply from 192.168.7.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.7.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.3

Pinging 192.168.7.3 with 32 bytes of data:

Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
Reply from 192.168.7.3: bytes=32 time=31ms TTL=128

Ping statistics for 192.168.7.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
```

```
    Minimum = 0ms, Maximum = 31ms, Average = 7ms

C:\>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Reply from 8.8.8.8: bytes=32 time=5ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time=6ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 2ms

C:\>ping 192.168.7.245

Pinging 192.168.7.245 with 32 bytes of data:

Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
Reply from 192.168.7.245: bytes=32 time=6ms TTL=254
Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
Reply from 192.168.7.245: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.245:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 1ms

C:\>ping 192.168.7.249

Pinging 192.168.7.249 with 32 bytes of data:

Reply from 192.168.7.126: Destination host unreachable.
Reply from 192.168.7.126: Destination host unreachable.
Request timed out.
Reply from 192.168.7.126: Destination host unreachable.

Ping statistics for 192.168.7.249:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.7.190

Pinging 192.168.7.190 with 32 bytes of data:

Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
Reply from 192.168.7.190: bytes=32 time=37ms TTL=254

Ping statistics for 192.168.7.190:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 37ms, Average = 9ms

C:\>ping 192.168.7.222

Pinging 192.168.7.222 with 32 bytes of data:

Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
Reply from 192.168.7.222: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.222:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.253

Pinging 192.168.7.253 with 32 bytes of data:
```

```
160
161  Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
162  Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
163  Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
164  Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
165
166  Ping statistics for 192.168.7.253:
167      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
168  Approximate round trip times in milli-seconds:
169      Minimum = 0ms, Maximum = 0ms, Average = 0ms
170
171  C:\>ping 192.168.7.250
172
173  Pinging 192.168.7.250 with 32 bytes of data:
174
175  Reply from 192.168.7.126: Destination host unreachable.
176  Reply from 192.168.7.126: Destination host unreachable.
177  Reply from 192.168.7.126: Destination host unreachable.
178  Reply from 192.168.7.126: Destination host unreachable.
179
180  Ping statistics for 192.168.7.250:
181      Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
182
183  C:\>ping 192.168.7.126
184
185  Pinging 192.168.7.126 with 32 bytes of data:
186
187  Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
188  Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
189  Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
190  Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
191
192  Ping statistics for 192.168.7.126:
193      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
194  Approximate round trip times in milli-seconds:
195      Minimum = 0ms, Maximum = 0ms, Average = 0ms
196
197  C:\>ping 192.168.7.246
198
199  Pinging 192.168.7.246 with 32 bytes of data:
200
201  Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
202  Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
203  Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
204  Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
205
206  Ping statistics for 192.168.7.246:
207      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
208  Approximate round trip times in milli-seconds:
209      Minimum = 0ms, Maximum = 0ms, Average = 0ms
210
211  C:\>ping 192.168.7.254
212
213  Pinging 192.168.7.254 with 32 bytes of data:
214
215  Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
216  Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
217  Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
218  Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
219
220  Ping statistics for 192.168.7.254:
221      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
222  Approximate round trip times in milli-seconds:
223      Minimum = 0ms, Maximum = 0ms, Average = 0ms
224
225  C:\>
226
227
228
229
230
231
232
```

```
C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.7.1           000a.f36e.27e5        dynamic
  192.168.7.3           00e0.b050.c641        dynamic
  192.168.7.126         0003.e425.d44a        dynamic

C:\>tracert 192.168.7.129

Tracing route to 192.168.7.129 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      192.168.7.253
  3   0 ms      0 ms      0 ms      192.168.7.129

Trace complete.

C:\>tracert 192.168.7.130

Tracing route to 192.168.7.130 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      192.168.7.253
  3   1 ms      0 ms      0 ms      192.168.7.130

Trace complete.

C:\>tracert 192.168.7.193

Tracing route to 192.168.7.193 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      192.168.7.253
  3   0 ms      0 ms      0 ms      192.168.7.193

Trace complete.

C:\>tracert 192.168.7.194

Tracing route to 192.168.7.194 over a maximum of 30 hops:

  1   0 ms      17 ms     0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      192.168.7.253
  3   0 ms      0 ms      0 ms      192.168.7.194

Trace complete.

C:\>tracert 192.168.7.1

Tracing route to 192.168.7.1 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.1

Trace complete.

C:\>tracert 192.168.7.3

Tracing route to 192.168.7.3 over a maximum of 30 hops:

  1   0 ms      0 ms      14 ms     192.168.7.3

Trace complete.

C:\>tracert 8.8.8.8

Tracing route to 8.8.8.8 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      8.8.8.8
```

```
306
307  Trace complete.
308
309  C:\>tracert 192.168.7.245
310
311  Tracing route to 192.168.7.245 over a maximum of 30 hops:
312
313    1   0 ms      0 ms      0 ms      192.168.7.126
314    2   1 ms      0 ms      0 ms      192.168.7.245
315
316  Trace complete.
317
318  C:\>tracert 192.168.7.249
319
320  Tracing route to 192.168.7.249 over a maximum of 30 hops:
321
322    1   0 ms      2 ms      0 ms      192.168.7.126
323    2   0 ms      *         0 ms      192.168.7.126
324    3   *         0 ms      *         Request timed out.
325    4   15 ms     *         0 ms      192.168.7.126
326    5   *         18 ms     *         Request timed out.
327    6   0 ms      *         0 ms      192.168.7.126
328    7   *         0 ms      *         Request timed out.
329    8   0 ms      *         0 ms      192.168.7.126
330    9   *         0 ms      *         Request timed out.
331    10   0 ms      *         0 ms      192.168.7.126
332    11   *         0 ms      *         Request timed out.
333    12   0 ms      *         0 ms      192.168.7.126
334    13   *         0 ms      *         Request timed out.
335    14   0 ms      *         0 ms      192.168.7.126
336    15   *         0 ms      *         Request timed out.
337    16   0 ms      *         0 ms      192.168.7.126
338    17   *         0 ms      *         Request timed out.
339    18   0 ms      *         0 ms      192.168.7.126
340    19   *         0 ms      *         Request timed out.
341    20   0 ms      *         0 ms      192.168.7.126
342    21   *         0 ms      *         Request timed out.
343    22   0 ms      *         0 ms      192.168.7.126
344    23   *         0 ms      *         Request timed out.
345    24   0 ms      *         10 ms     192.168.7.126
346    25   *         10 ms     *         Request timed out.
347    26   0 ms      *         0 ms      192.168.7.126
348    27   *         0 ms      *         Request timed out.
349    28   0 ms      *         0 ms      192.168.7.126
350    29   *         13 ms     *         Request timed out.
351    30   0 ms      *         0 ms      192.168.7.126
352
353  Trace complete.
354
355  C:\>tracert 192.168.7.222
356
357  Tracing route to 192.168.7.222 over a maximum of 30 hops:
358
359    1   0 ms      0 ms      0 ms      192.168.7.126
360    2   0 ms      0 ms      0 ms      192.168.7.222
361
362  Trace complete.
363
364  C:\>tracert 192.168.7.253
365
366  Tracing route to 192.168.7.253 over a maximum of 30 hops:
367
368    1   0 ms      0 ms      0 ms      192.168.7.126
369    2   0 ms      0 ms      0 ms      192.168.7.253
370
371  Trace complete.
372
373  C:\>tracert 192.168.7.250
374
375  Tracing route to 192.168.7.250 over a maximum of 30 hops:
376
377    1   0 ms      0 ms      0 ms      192.168.7.126
378    2   0 ms      *         0 ms      192.168.7.126
```

```
  3    *          0 ms       *          Request timed out.
  4    0 ms       *          0 ms       192.168.7.126
  5    *          0 ms       *          Request timed out.
  6    0 ms       *          0 ms       192.168.7.126
  7    *          0 ms       *          Request timed out.
  8    0 ms       *          0 ms       192.168.7.126
  9    *          0 ms       *          Request timed out.
  10    0 ms       *          0 ms       192.168.7.126
  11    *          0 ms       *          Request timed out.
  12    0 ms       *          0 ms       192.168.7.126
  13    *          0 ms       *          Request timed out.
  14    0 ms       *          0 ms       192.168.7.126
  15    *          0 ms       *          Request timed out.
  16    0 ms       *          0 ms       192.168.7.126
  17    *          0 ms       *          Request timed out.
  18    0 ms       *          0 ms       192.168.7.126
  19    *          0 ms       *          Request timed out.
  20    32 ms      0 ms       5 ms       192.168.7.126
  21    4 ms       18 ms      1 ms       192.168.7.126
  22    0 ms       8 ms       43 ms      192.168.7.126
  23    *          6 ms       *          Request timed out.
  24    0 ms       *          0 ms       192.168.7.126
  25    *          6 ms       *          Request timed out.
  26    0 ms       *          0 ms       192.168.7.126
  27    *          0 ms       *          Request timed out.
  28    0 ms       *          0 ms       192.168.7.126
  29    *          0 ms       *          Request timed out.
  30    0 ms       *          0 ms       192.168.7.126

Trace complete.

C:\>tracert 192.168.7.126

Tracing route to 192.168.7.126 over a maximum of 30 hops:

  1    0 ms       0 ms       0 ms       192.168.7.126

Trace complete.

C:\>tracert 192.168.7.246

Tracing route to 192.168.7.246 over a maximum of 30 hops:

  1    0 ms       0 ms       0 ms       192.168.7.246

Trace complete.

C:\>tracert 192.168.7.254

Tracing route to 192.168.7.254 over a maximum of 30 hops:

  1    0 ms       0 ms       0 ms       192.168.7.254

Trace complete.

C:\>
```

Listing A.3: DNS-Server output

```
Cisco Packet Tracer SERVER Command Line 1.0
C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.7.1           000a.f36e.27e5        dynamic
  192.168.7.2           000a.f362.26dd        dynamic
  192.168.7.126         0003.e425.d44a        dynamic

C:\>ping 192.168.7.129

Pinging 192.168.7.129 with 32 bytes of data:

```

```
Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
Reply from 192.168.7.129: bytes=32 time=1ms TTL=126
Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
Reply from 192.168.7.129: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.7.130

Pinging 192.168.7.130 with 32 bytes of data:

Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
Reply from 192.168.7.130: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.193

Pinging 192.168.7.193 with 32 bytes of data:

Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
Reply from 192.168.7.193: bytes=32 time=1ms TTL=126
Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
Reply from 192.168.7.193: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.7.194

Pinging 192.168.7.194 with 32 bytes of data:

Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
Reply from 192.168.7.194: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.7.194:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.1

Pinging 192.168.7.1 with 32 bytes of data:

Reply from 192.168.7.1: bytes=32 time=26ms TTL=128
Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
Reply from 192.168.7.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.7.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 26ms, Average = 6ms

C:\>ping 192.168.7.2

Pinging 192.168.7.2 with 32 bytes of data:

Reply from 192.168.7.2: bytes=32 time=21ms TTL=128
Reply from 192.168.7.2: bytes=32 time<1ms TTL=128
Reply from 192.168.7.2: bytes=32 time<1ms TTL=128
```

```
Reply from 192.168.7.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.7.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 21ms, Average = 5ms

C:\>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.245

Pinging 192.168.7.245 with 32 bytes of data:

Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
Reply from 192.168.7.245: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.245:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.249

Pinging 192.168.7.249 with 32 bytes of data:

Reply from 192.168.7.126: Destination host unreachable.
Request timed out.
Reply from 192.168.7.126: Destination host unreachable.
Reply from 192.168.7.126: Destination host unreachable.

Ping statistics for 192.168.7.249:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.7.190

Pinging 192.168.7.190 with 32 bytes of data:

Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
Reply from 192.168.7.190: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.190:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.222

Pinging 192.168.7.222 with 32 bytes of data:

Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
Reply from 192.168.7.222: bytes=32 time=1ms TTL=254
Reply from 192.168.7.222: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.222:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
```

```
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.7.253

Pinging 192.168.7.253 with 32 bytes of data:

Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
Reply from 192.168.7.253: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.7.253:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.250

Pinging 192.168.7.250 with 32 bytes of data:

Reply from 192.168.7.126: Destination host unreachable.
Reply from 192.168.7.126: Destination host unreachable.
Request timed out.
Reply from 192.168.7.126: Destination host unreachable.

Ping statistics for 192.168.7.250:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.7.126

Pinging 192.168.7.126 with 32 bytes of data:

Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
Reply from 192.168.7.126: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.7.246

Pinging 192.168.7.246 with 32 bytes of data:

Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
Reply from 192.168.7.246: bytes=32 time=34ms TTL=255

Ping statistics for 192.168.7.246:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 34ms, Average = 8ms

C:\>ping 192.168.7.254

Pinging 192.168.7.254 with 32 bytes of data:

Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
Reply from 192.168.7.254: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.7.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.7.1           000a.f36e.27e5        dynamic
```

```
  192.168.7.2           000a.f362.26dd        dynamic
  192.168.7.126         0003.e425.d44a        dynamic

C:\>tracert 192.168.7.129

Tracing route to 192.168.7.129 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      192.168.7.253
  3   0 ms      0 ms      0 ms      192.168.7.129

Trace complete.

C:\>tracert 192.168.7.130

Tracing route to 192.168.7.130 over a maximum of 30 hops:

  1   14 ms     0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      192.168.7.253
  3   0 ms      0 ms      0 ms      192.168.7.130

Trace complete.

C:\>tracert 192.168.7.193

Tracing route to 192.168.7.193 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      192.168.7.253
  3   0 ms      0 ms      0 ms      192.168.7.193

Trace complete.

C:\>tracert 192.168.7.194

Tracing route to 192.168.7.194 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      192.168.7.253
  3   0 ms      0 ms      0 ms      192.168.7.194

Trace complete.

C:\>tracert 192.168.7.1

Tracing route to 192.168.7.1 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.1

Trace complete.

C:\>tracert 192.168.7.2

Tracing route to 192.168.7.2 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.2

Trace complete.

C:\>tracert 8.8.8.8

Tracing route to 8.8.8.8 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      8.8.8.8

Trace complete.

C:\>tracert 192.168.7.245

Tracing route to 192.168.7.245 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
```

```
  2   0 ms      0 ms      0 ms      192.168.7.245

Trace complete.

C:\>tracert 192.168.7.249

Tracing route to 192.168.7.249 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      *         0 ms      192.168.7.126
  3   *         0 ms      *         Request timed out.
  4   0 ms      *         0 ms      192.168.7.126
  5   *         0 ms      *         Request timed out.
  6   0 ms      *         0 ms      192.168.7.126
  7   *         0 ms      *         Request timed out.
  8   0 ms      *         0 ms      192.168.7.126
  9   *         0 ms      *         Request timed out.
  10   0 ms      *         11 ms     192.168.7.126
  11   *         0 ms      *         Request timed out.
  12   0 ms      *         0 ms      192.168.7.126
  13   *         0 ms      *         Request timed out.
  14   0 ms      *         0 ms      192.168.7.126
  15   *         0 ms      *         Request timed out.
  16   0 ms      *         0 ms      192.168.7.126
  17   *         0 ms      *         Request timed out.
  18   0 ms      *         0 ms      192.168.7.126
  19   *         0 ms      *         Request timed out.
  20   0 ms      *         0 ms      192.168.7.126
  21   *         0 ms      *         Request timed out.
  22   11 ms     *         0 ms      192.168.7.126
  23   *         0 ms      *         Request timed out.
  24   0 ms      *         11 ms     192.168.7.126
  25   *         0 ms      *         Request timed out.
  26   0 ms      *         0 ms      192.168.7.126
  27   *         0 ms      *         Request timed out.
  28   0 ms      *         0 ms      192.168.7.126
  29   *         0 ms      *         Request timed out.
  30   0 ms      *         0 ms      192.168.7.126

Trace complete.

C:\>tracert 192.168.7.190

Tracing route to 192.168.7.190 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      1 ms      192.168.7.190

Trace complete.

C:\>tracert 192.168.7.222

Tracing route to 192.168.7.222 over a maximum of 30 hops:

  1   12 ms     0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      192.168.7.222

Trace complete.

C:\>tracert 192.168.7.253

Tracing route to 192.168.7.253 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
  2   0 ms      0 ms      0 ms      192.168.7.253

Trace complete.

C:\>tracert 192.168.7.250

Tracing route to 192.168.7.250 over a maximum of 30 hops:

  1   0 ms      0 ms      0 ms      192.168.7.126
```

```
  2    0 ms      *         0 ms      192.168.7.126
  3    *         0 ms      *         Request timed out.
  4    0 ms      *         0 ms      192.168.7.126
  5    *         0 ms      *         Request timed out.
  6    0 ms      *         0 ms      192.168.7.126
  7    *         0 ms      *         Request timed out.
  8    0 ms      *         1 ms      192.168.7.126
  9    *         0 ms      *         Request timed out.
  10    0 ms      *         0 ms      192.168.7.126
  11    *         0 ms      *         Request timed out.
  12    0 ms      *         0 ms      192.168.7.126
  13    *         0 ms      *         Request timed out.
  14    0 ms      *         0 ms      192.168.7.126
  15    *         0 ms      *         Request timed out.
  16    0 ms      *         0 ms      192.168.7.126
  17    *         0 ms      *         Request timed out.
  18    0 ms      *         0 ms      192.168.7.126
  19    *         0 ms      *         Request timed out.
  20    0 ms      *         0 ms      192.168.7.126
  21    *         0 ms      *         Request timed out.
  22    0 ms      *         0 ms      192.168.7.126
  23    *         11 ms     *         Request timed out.
  24    0 ms      *         0 ms      192.168.7.126
  25    *         0 ms      *         Request timed out.
  26    0 ms      *         0 ms      192.168.7.126
  27    *         0 ms      *         Request timed out.
  28    0 ms      *         0 ms      192.168.7.126
  29    *         0 ms      *         Request timed out.
  30    0 ms      *         0 ms      192.168.7.126

Trace complete.

C:\>tracert 192.168.7.246

Tracing route to 192.168.7.246 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.7.246

Trace complete.

C:\>tracert 192.168.7.254

Tracing route to 192.168.7.254 over a maximum of 30 hops:

  1    0 ms      1 ms      0 ms      192.168.7.254

Trace complete.

C:\>
```

Listing A.4: HTTP-Server output