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.
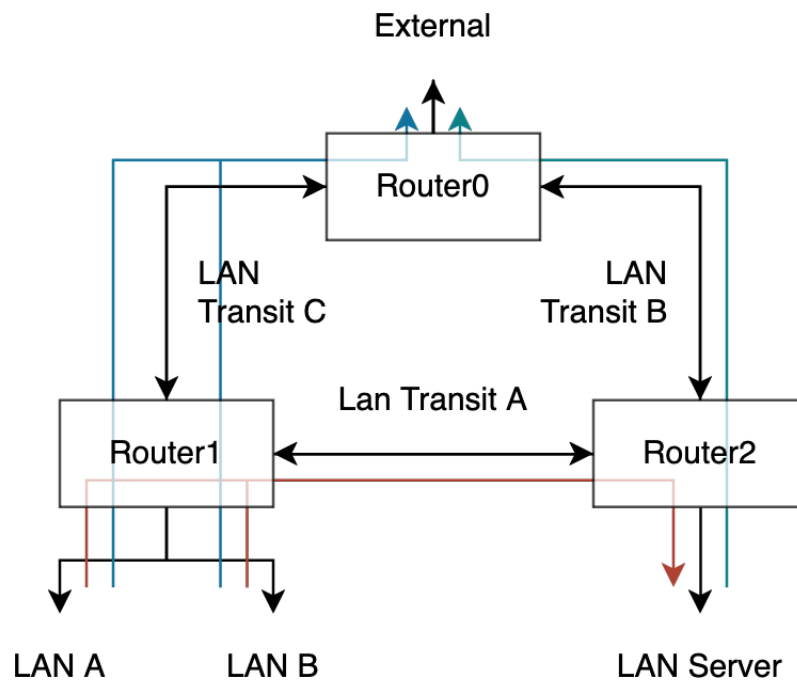- LAN server to the outside must go through router R2 and router R0.

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

2.0.1 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																
/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
/28																
/27																
/26																
/25																
																/24
																/25
Subnet visual split																/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		
R2	Fa0/0	Sw2 Fa0/4	LAN Server	126	128	
	Fa4/0	R0 Fa4/0	LAN Transit C	246		252

Table 2.4 continued from previous page

| Name	Ports Link		Network	IP	Gateway	Subnet Mask
	From	**To**		192.168.7.		255.255.255.
	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		
Sw0	Fa0/1	R1 Fa0/0				
	Fa0/2	PC0	LAN A			
	Fa0/3	Laptop0				
Sw1	Fa0/1	R1 Fa1/0				
	Fa0/2	PC1	LAN B			
	Fa0/3	Laptop1				
Sw2	Fa0/1	HTTP-Server				
	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.

2.0.2 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).	
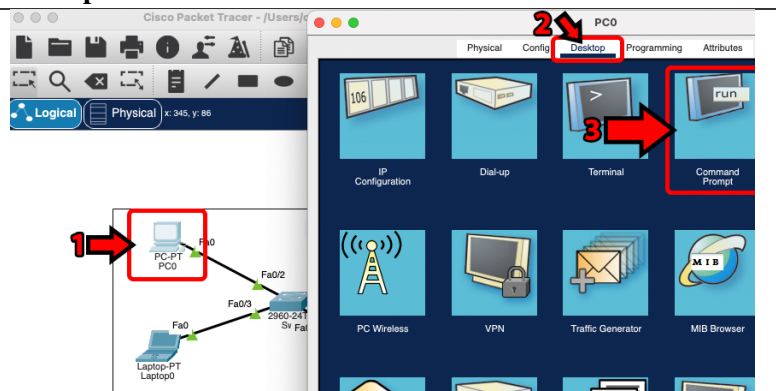
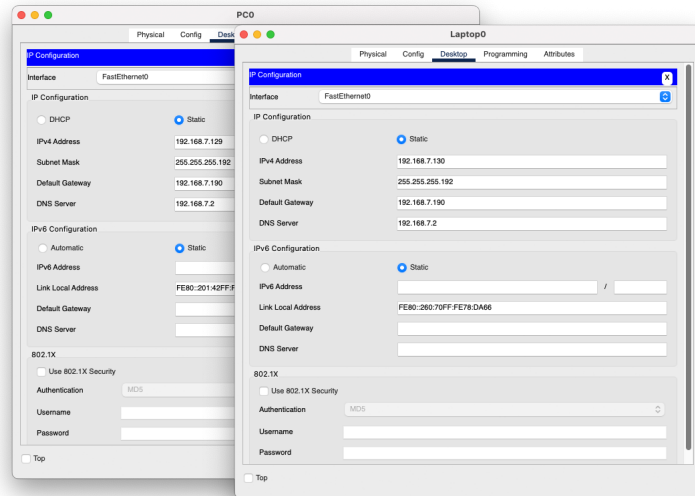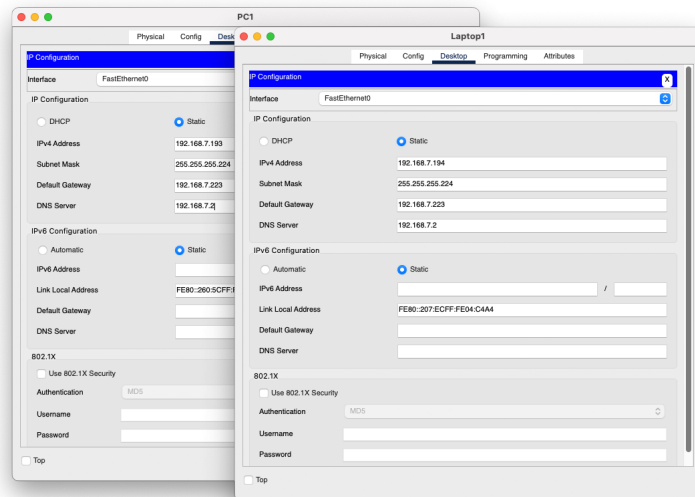Continued on next page

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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.

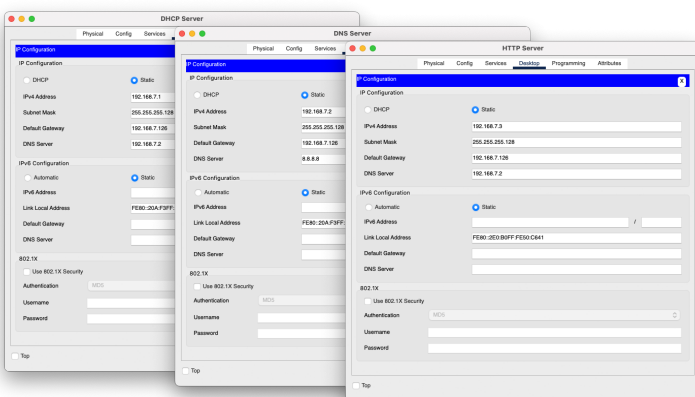IP configuration for LAN Servers, DHCP-Server, DNS-Server and HTTP-Server.

Table 2.5: Cisco Packet Tracer IP guide

2.0.3 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.

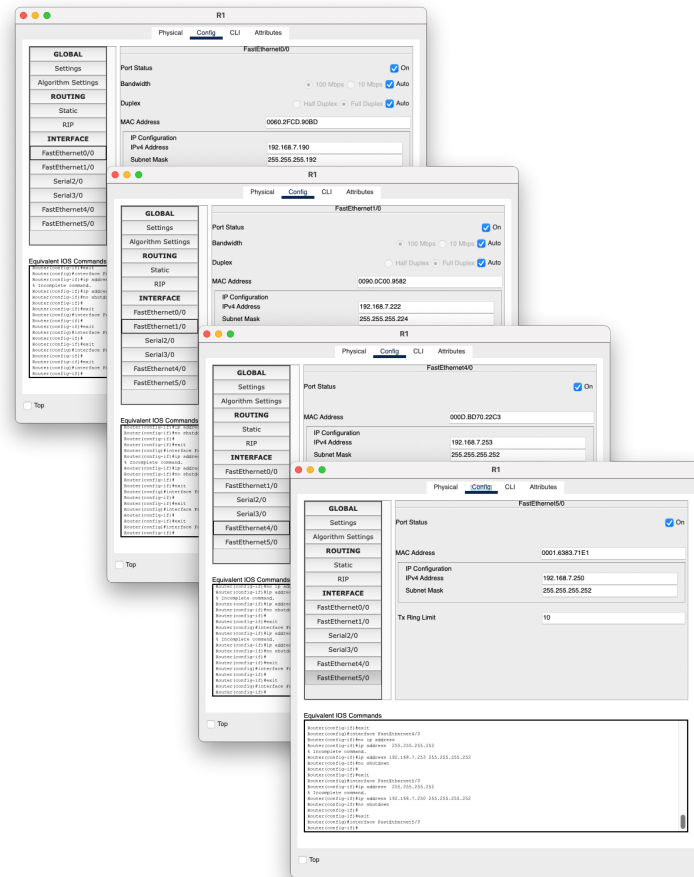| Steps	Example
IP configuration for Router 0.	
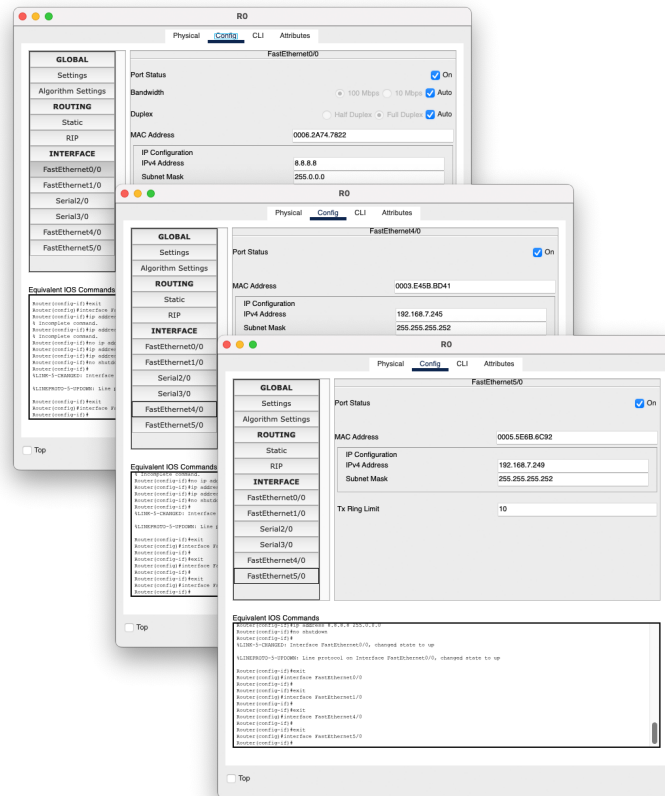
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Table 2.6 continued from previous page

Steps   **Example**

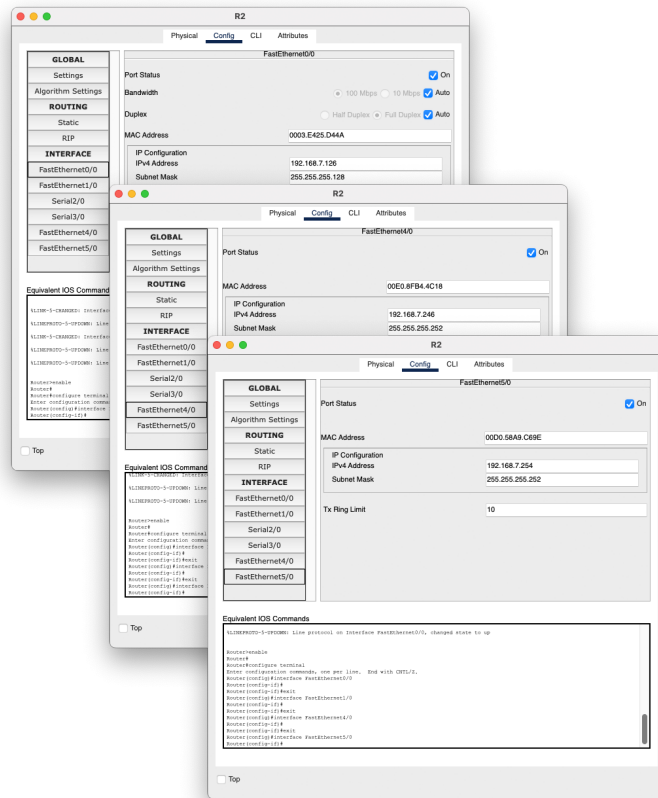IP configuration for Router 1.

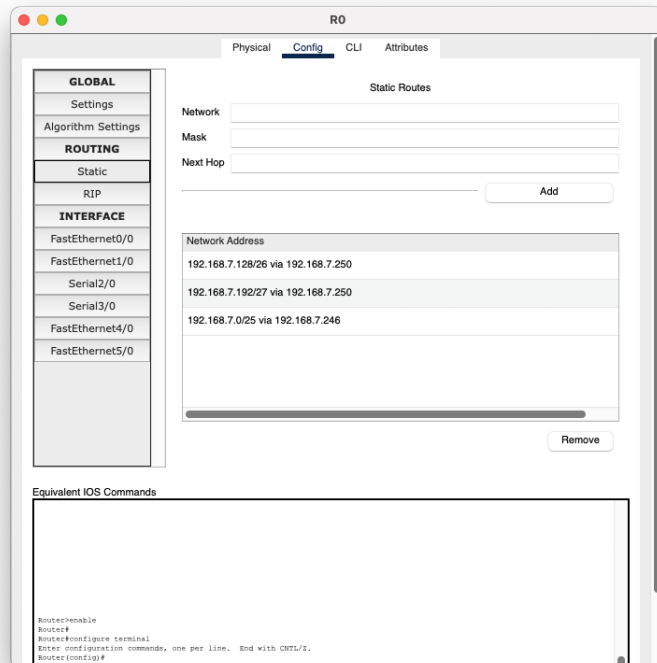Continued on next page

Table 2.6 continued from previous page

Steps   **Example**

IP configuration for Router 2.

Static routes for Router 0.

Continued on next page

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 guide

2.0.4 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).	
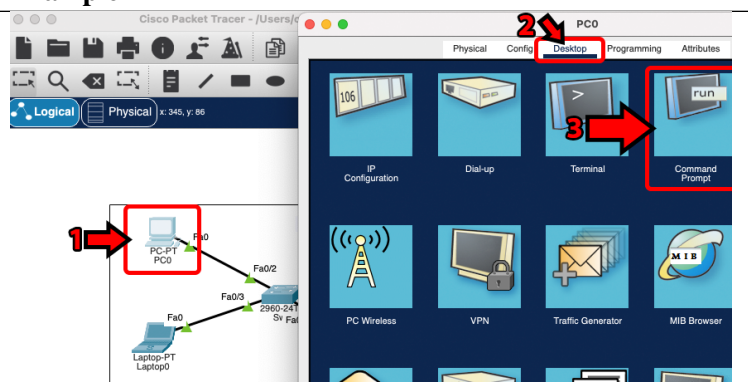
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[1]Excluding commands to the device itself.

Table 2.8 continued from previous page

Steps **Example**

From LAN A, PC0 and Laptop0, viewpoint.
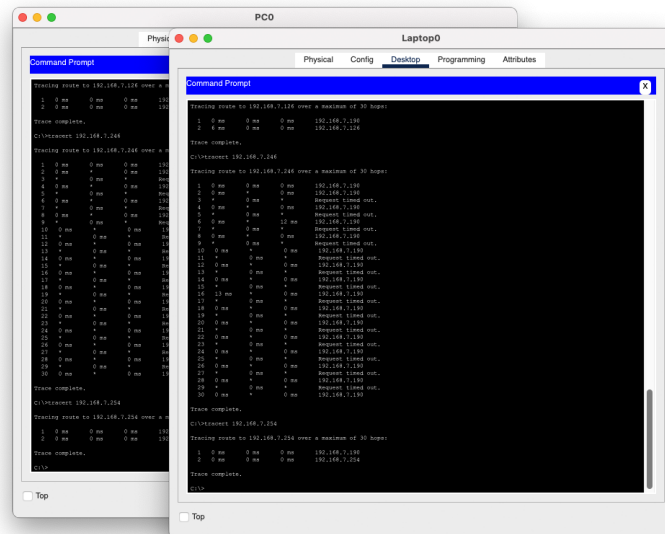
From LAN B, PC1 and Laptop1, viewpoint.
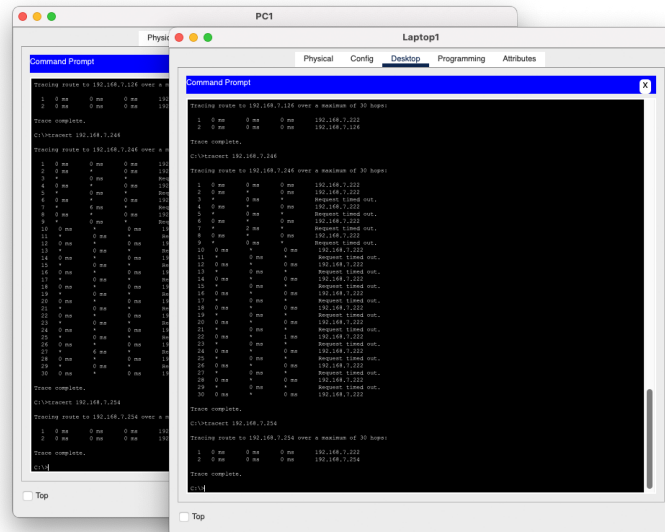
From LAN Servers, DHCP, DNS and HTTP servers, viewpoint.
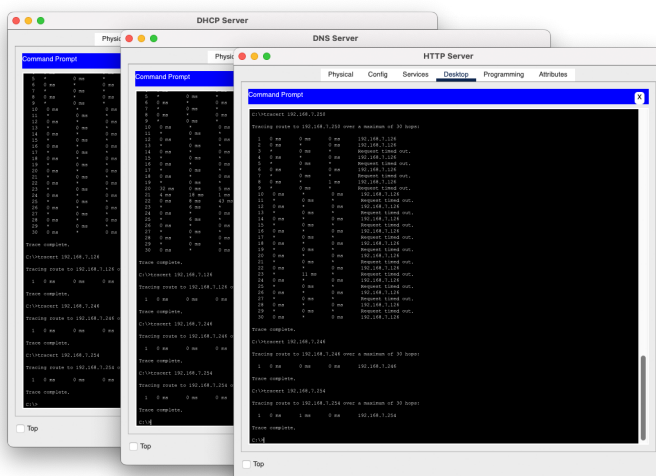
Table 2.8 continued from previous page

Steps	Example

Table 2.8: Cisco Packet Tracer CLI 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.	
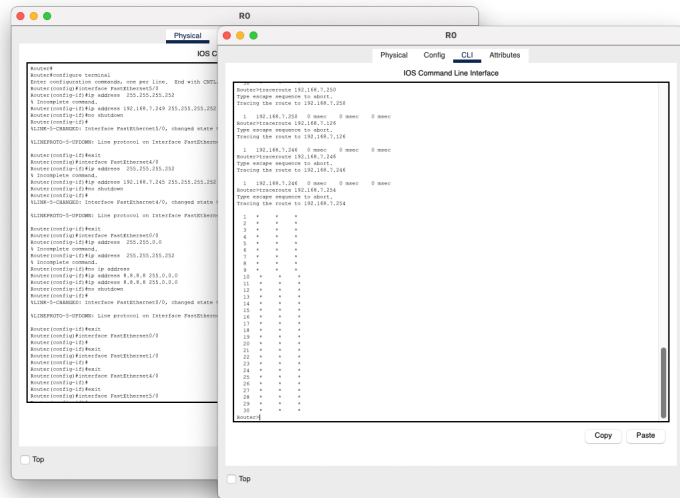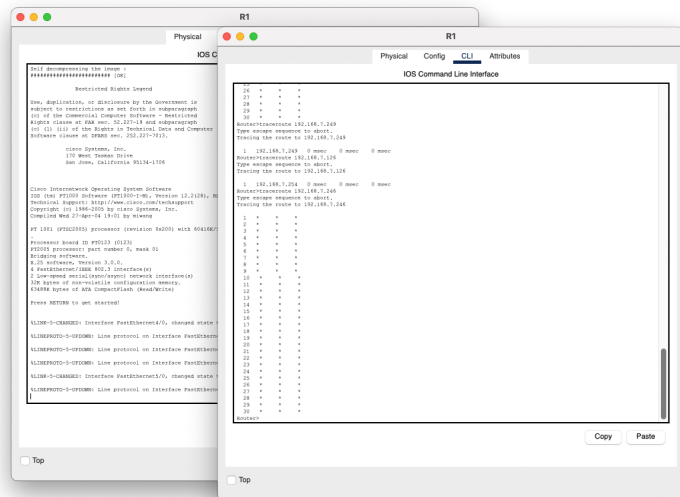
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Table 2.9 continued from previous page

Steps	Example

From router R2 viewpoint.
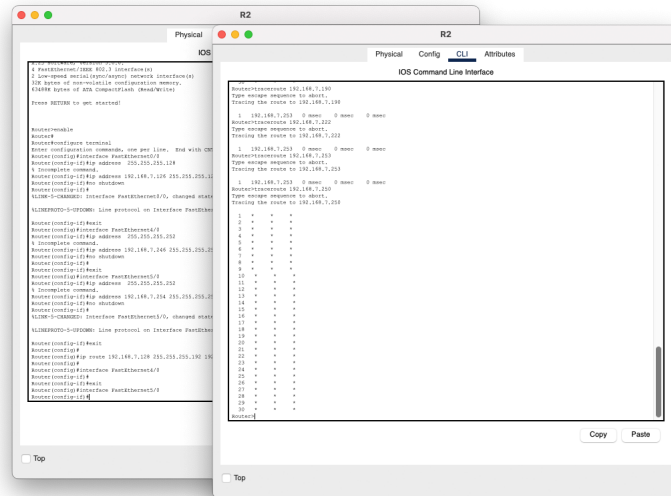
Table 2.9: Cisco Packet Tracer CLI guide

2.0.5 Command line outputs

```
1   Cisco Packet Tracer PC Command Line 1.0
2   C:\>arp -a
3   No ARP Entries Found
4
5   C:\>ping 192.168.7.130
6
7   Pinging 192.168.7.130 with 32 bytes of data:
8
9   Reply from 192.168.7.130: bytes=32 time<1ms TTL=128
10  Reply from 192.168.7.130: bytes=32 time<1ms TTL=128
11  Reply from 192.168.7.130: bytes=32 time<1ms TTL=128
12  Reply from 192.168.7.130: bytes=32 time<1ms TTL=128
13
14  Ping statistics for 192.168.7.130:
15      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
16  Approximate round trip times in milli-seconds:
17      Minimum = 0ms, Maximum = 0ms, Average = 0ms
18
19  C:\>ping 192.168.7.193
20
21  Pinging 192.168.7.193 with 32 bytes of data:
22
23  Request timed out.
24  Reply from 192.168.7.193: bytes=32 time=26ms TTL=127
25  Reply from 192.168.7.193: bytes=32 time<1ms TTL=127
26  Reply from 192.168.7.193: bytes=32 time<1ms TTL=127
27
28  Ping statistics for 192.168.7.193:
29      Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
30  Approximate round trip times in milli-seconds:
31      Minimum = 0ms, Maximum = 26ms, Average = 8ms
32
33  C:\>ping 192.168.7.194
34
35  Pinging 192.168.7.194 with 32 bytes of data:
36
```

```
37  Request timed out.
38  Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
39  Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
40  Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
41
42  Ping statistics for 192.168.7.194:
43      Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
44  Approximate round trip times in milli-seconds:
45      Minimum = 0ms, Maximum = 0ms, Average = 0ms
46
47  C:\>ping 192.168.7.1
48
49  Pinging 192.168.7.1 with 32 bytes of data:
50
51  Request timed out.
52  Request timed out.
53  Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
54  Reply from 192.168.7.1: bytes=32 time=40ms TTL=126
55
56  Ping statistics for 192.168.7.1:
57      Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
58  Approximate round trip times in milli-seconds:
59      Minimum = 0ms, Maximum = 40ms, Average = 20ms
60
61  C:\>ping 192.168.7.2
62
63  Pinging 192.168.7.2 with 32 bytes of data:
64
65  Request timed out.
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  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
69
70  Ping statistics for 192.168.7.2:
71      Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
72  Approximate round trip times in milli-seconds:
73      Minimum = 0ms, Maximum = 0ms, Average = 0ms
74
75  C:\>ping 8.8.8.8
76
77  Pinging 8.8.8.8 with 32 bytes of data:
78
79  Request timed out.
80  Reply from 8.8.8.8: bytes=32 time=1ms TTL=254
81  Reply from 8.8.8.8: bytes=32 time=23ms TTL=254
82  Reply from 8.8.8.8: bytes=32 time=1ms TTL=254
83
84  Ping statistics for 8.8.8.8:
85      Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
86  Approximate round trip times in milli-seconds:
87      Minimum = 1ms, Maximum = 23ms, Average = 8ms
88
89  C:\>ping 192.168.7.245
90
91  Pinging 192.168.7.245 with 32 bytes of data:
92
93  Reply from 192.168.7.190: Destination host unreachable.
94  Reply from 192.168.7.190: Destination host unreachable.
95  Request timed out.
96  Reply from 192.168.7.190: Destination host unreachable.
97
98  Ping statistics for 192.168.7.245:
99      Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
100
101 C:\>ping 192.168.7.249
102
103 Pinging 192.168.7.249 with 32 bytes of data:
104
105 Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
106 Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
107 Reply from 192.168.7.249: bytes=32 time=25ms TTL=254
108 Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
109
```

```
110   Ping statistics for 192.168.7.249:
111       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
112   Approximate round trip times in milli-seconds:
113       Minimum = 0ms, Maximum = 25ms, Average = 6ms
114
115   C:\>ping 192.168.7.190
116
117   Pinging 192.168.7.190 with 32 bytes of data:
118
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   Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
123
124   Ping statistics for 192.168.7.190:
125       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
126   Approximate round trip times in milli-seconds:
127       Minimum = 0ms, Maximum = 0ms, Average = 0ms
128
129   C:\>ping 192.168.7.222
130
131   Pinging 192.168.7.222 with 32 bytes of data:
132
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   Reply from 192.168.7.222: bytes=32 time<1ms TTL=255
137
138   Ping statistics for 192.168.7.222:
139       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
140   Approximate round trip times in milli-seconds:
141       Minimum = 0ms, Maximum = 0ms, Average = 0ms
142
143   C:\>ping 192.168.7.253
144
145   Pinging 192.168.7.253 with 32 bytes of data:
146
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   Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
151
152   Ping statistics for 192.168.7.253:
153       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
154   Approximate round trip times in milli-seconds:
155       Minimum = 0ms, Maximum = 0ms, Average = 0ms
156
157   C:\>ping 192.168.7.250
158
159   Pinging 192.168.7.250 with 32 bytes of data:
160
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   Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
165
166   Ping statistics for 192.168.7.250:
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 192.168.7.126
172
173   Pinging 192.168.7.126 with 32 bytes of data:
174
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   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
252  C:\>tracert 192.168.7.2
253
254  Tracing route to 192.168.7.2 over a maximum of 30 hops:
255
```

```
256    1    0 ms       0 ms       0 ms       192.168.7.190
257    2    0 ms       0 ms       0 ms       192.168.7.254
258    3    0 ms       0 ms       0 ms       192.168.7.2
259
260  Trace complete.
261
262  C:\>tracert 192.168.7.3
263
264  Tracing route to 192.168.7.3 over a maximum of 30 hops:
265
266    1    0 ms       0 ms       0 ms       192.168.7.190
267    2    0 ms       0 ms       0 ms       192.168.7.254
268    3    0 ms       0 ms       0 ms       192.168.7.3
269
270  Trace complete.
271
272  C:\>tracert 8.8.8.8
273
274  Tracing route to 8.8.8.8 over a maximum of 30 hops:
275
276    1    0 ms       0 ms       1 ms       192.168.7.190
277    2    0 ms       0 ms       0 ms       8.8.8.8
278
279  Trace complete.
280
281  C:\>tracert 192.168.7.245
282
283  Tracing route to 192.168.7.245 over a maximum of 30 hops:
284
285    1    0 ms       0 ms       0 ms       192.168.7.190
286    2    0 ms       *          0 ms       192.168.7.190
287    3    *          0 ms       *          Request timed out.
288    4    0 ms       *          0 ms       192.168.7.190
289    5    *          0 ms       *          Request timed out.
290    6    0 ms       *          0 ms       192.168.7.190
291    7    *          0 ms       *          Request timed out.
292    8    0 ms       *          0 ms       192.168.7.190
293    9    *          0 ms       *          Request timed out.
294   10    0 ms       *          0 ms       192.168.7.190
295   11    *          0 ms       *          Request timed out.
296   12    0 ms       *          0 ms       192.168.7.190
297   13    *          0 ms       *          Request timed out.
298   14    0 ms       *          0 ms       192.168.7.190
299   15    *          0 ms       *          Request timed out.
300   16    0 ms       *          0 ms       192.168.7.190
301   17    *          0 ms       *          Request timed out.
302   18    0 ms       *          0 ms       192.168.7.190
303   19    *          0 ms       *          Request timed out.
304   20    0 ms       *          0 ms       192.168.7.190
305   21    *          1 ms       *          Request timed out.
306   22    0 ms       *          0 ms       192.168.7.190
307   23    *          0 ms       *          Request timed out.
308   24    0 ms       *          0 ms       192.168.7.190
309   25    *          0 ms       *          Request timed out.
310   26    0 ms       *          0 ms       192.168.7.190
311   27    *          8 ms       *          Request timed out.
312   28    0 ms       *          0 ms       192.168.7.190
313   29    *          0 ms       *          Request timed out.
314   30    0 ms       *          0 ms       192.168.7.190
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       0 ms       0 ms       192.168.7.190
323    2    0 ms       0 ms       0 ms       192.168.7.249
324
325  Trace complete.
326
327  C:\>tracert 192.168.7.190
328
```

```
329   Tracing route to 192.168.7.190 over a maximum of 30 hops:
330
331     1    0 ms      0 ms      0 ms     192.168.7.190
332
333   Trace complete.
334
335   C:\>tracert 192.168.7.222
336
337   Tracing route to 192.168.7.222 over a maximum of 30 hops:
338
339     1    0 ms      0 ms      0 ms     192.168.7.222
340
341   Trace complete.
342
343   C:\>tracert 192.168.7.253
344
345   Tracing route to 192.168.7.253 over a maximum of 30 hops:
346
347     1    0 ms      0 ms      0 ms     192.168.7.253
348
349   Trace complete.
350
351   C:\>tracert 192.168.7.250
352
353   Tracing route to 192.168.7.250 over a maximum of 30 hops:
354
355     1    0 ms      0 ms      0 ms     192.168.7.250
356
357   Trace complete.
358
359   C:\>tracert 192.168.7.126
360
361   Tracing route to 192.168.7.126 over a maximum of 30 hops:
362
363     1    0 ms      0 ms      0 ms     192.168.7.190
364     2    0 ms      0 ms      0 ms     192.168.7.126
365
366   Trace complete.
367
368   C:\>tracert 192.168.7.246
369
370   Tracing route to 192.168.7.246 over a maximum of 30 hops:
371
372     1    0 ms      0 ms      0 ms     192.168.7.190
373     2    0 ms      *         0 ms     192.168.7.190
374     3    *         0 ms      *        Request timed out.
375     4    0 ms      *         0 ms     192.168.7.190
376     5    *         0 ms      *        Request timed out.
377     6    0 ms      *         0 ms     192.168.7.190
378     7    *         0 ms      *        Request timed out.
379     8    0 ms      *         0 ms     192.168.7.190
380     9    *         0 ms      *        Request timed out.
381    10    0 ms      *         0 ms     192.168.7.190
382    11    *         0 ms      *        Request timed out.
383    12    0 ms      *         0 ms     192.168.7.190
384    13    *         0 ms      *        Request timed out.
385    14    0 ms      *         0 ms     192.168.7.190
386    15    *         0 ms      *        Request timed out.
387    16    0 ms      *         0 ms     192.168.7.190
388    17    *         0 ms      *        Request timed out.
389    18    0 ms      *         0 ms     192.168.7.190
390    19    *         0 ms      *        Request timed out.
391    20    0 ms      *         0 ms     192.168.7.190
392    21    *         0 ms      *        Request timed out.
393    22    0 ms      *         0 ms     192.168.7.190
394    23    *         0 ms      *        Request timed out.
395    24    0 ms      *         0 ms     192.168.7.190
396    25    *         0 ms      *        Request timed out.
397    26    0 ms      *         0 ms     192.168.7.190
398    27    *         0 ms      *        Request timed out.
399    28    0 ms      *         0 ms     192.168.7.190
400    29    *         0 ms      *        Request timed out.
401    30    0 ms      *         0 ms     192.168.7.190
```

```
402
403   Trace complete.
404
405   C:\>tracert 192.168.7.254
406
407   Tracing route to 192.168.7.254 over a maximum of 30 hops:
408
409     1   0 ms      0 ms      0 ms      192.168.7.190
410     2   0 ms      0 ms      0 ms      192.168.7.254
411
412   Trace complete.
413
414   C:\>
```

Listing 2.1: PC0 output

```
 1  Cisco Packet Tracer PC Command Line 1.0
 2  C:\>arp -a
 3  No ARP Entries Found
 4  C:\>ping 192.168.7.129
 5
 6  Pinging 192.168.7.129 with 32 bytes of data:
 7
 8  Request timed out.
 9  Request timed out.
10  Reply from 192.168.7.129: bytes=32 time<1ms TTL=128
11  Reply from 192.168.7.129: bytes=32 time<1ms TTL=128
12
13  Ping statistics for 192.168.7.129:
14      Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
15  Approximate round trip times in milli-seconds:
16      Minimum = 0ms, Maximum = 0ms, Average = 0ms
17
18  C:\>ping 192.168.7.193
19
20  Pinging 192.168.7.193 with 32 bytes of data:
21
22  Reply from 192.168.7.193: bytes=32 time<1ms TTL=127
23  Reply from 192.168.7.193: bytes=32 time<1ms TTL=127
24  Reply from 192.168.7.193: bytes=32 time<1ms TTL=127
25  Reply from 192.168.7.193: bytes=32 time<1ms TTL=127
26
27  Ping statistics for 192.168.7.193:
28      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
29  Approximate round trip times in milli-seconds:
30      Minimum = 0ms, Maximum = 0ms, Average = 0ms
31
32  C:\>ping 192.168.7.194
33
34  Pinging 192.168.7.194 with 32 bytes of data:
35
36  Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
37  Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
38  Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
39  Reply from 192.168.7.194: bytes=32 time<1ms TTL=127
40
41  Ping statistics for 192.168.7.194:
42      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
43  Approximate round trip times in milli-seconds:
44      Minimum = 0ms, Maximum = 0ms, Average = 0ms
45
46  C:\>ping 192.168.7.1
47
48  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),
195  Approximate round trip times in milli-seconds:
196      Minimum = 0ms, Maximum = 0ms, Average = 0ms
197
198  C:\>ping 192.168.7.246
199
200  Pinging 192.168.7.246 with 32 bytes of data:
```

```
201
202  Reply from 192.168.7.190: Destination host unreachable.
203  Reply from 192.168.7.190: Destination host unreachable.
204  Reply from 192.168.7.190: Destination host unreachable.
205  Reply from 192.168.7.190: Destination host unreachable.
206
207  Ping statistics for 192.168.7.246:
208      Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
209
210  C:\>ping 192.168.7.254
211
212  Pinging 192.168.7.254 with 32 bytes of data:
213
214  Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
215  Reply from 192.168.7.254: bytes=32 time=1ms TTL=254
216  Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
217  Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
218
219  Ping statistics for 192.168.7.254:
220      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
221  Approximate round trip times in milli-seconds:
222      Minimum = 0ms, Maximum = 1ms, Average = 0ms
223
224  C:\>arp -a
225    Internet Address      Physical Address      Type
226    192.168.7.129         0001.429b.91a6        dynamic
227    192.168.7.190         0060.2fcd.90bd        dynamic
228
229  C:\>tracert 192.168.7.129
230
231  Tracing route to 192.168.7.129 over a maximum of 30 hops:
232
233    1    0 ms      0 ms      0 ms      192.168.7.129
234
235  Trace complete.
236
237  C:\>tracert 192.168.7.193
238
239  Tracing route to 192.168.7.193 over a maximum of 30 hops:
240
241    1    0 ms      0 ms      0 ms      192.168.7.190
242    2    0 ms      0 ms      0 ms      192.168.7.193
243
244  Trace complete.
245
246  C:\>tracert 192.168.7.194
247
248  Tracing route to 192.168.7.194 over a maximum of 30 hops:
249
250    1    0 ms      0 ms      0 ms      192.168.7.190
251    2    0 ms      0 ms      0 ms      192.168.7.194
252
253  Trace complete.
254
255  C:\>tracert 192.168.7.1
256
257  Tracing route to 192.168.7.1 over a maximum of 30 hops:
258
259    1    0 ms      0 ms      0 ms      192.168.7.190
260    2    0 ms      0 ms      0 ms      192.168.7.254
261    3    0 ms      0 ms      0 ms      192.168.7.1
262
263  Trace complete.
264
265  C:\>tracert 192.168.7.2
266
267  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.
414   30   0 ms       *         0 ms      192.168.7.190
415
416  Trace complete.
417
418  C:\>tracert 192.168.7.254
419
```

```
420   Tracing route to 192.168.7.254 over a maximum of 30 hops:
421
422     1   0 ms      0 ms      0 ms      192.168.7.190
423     2   0 ms      0 ms      0 ms      192.168.7.254
424
425   Trace complete.
426
427   C:\>
```

Listing 2.2: Laptop0 output

```
1    Cisco Packet Tracer PC Command Line 1.0
2    C:\>arp -a
3    No ARP Entries Found
4    C:\>ping 192.168.7.129
5
6    Pinging 192.168.7.129 with 32 bytes of data:
7
8    Request timed out.
9    Request timed out.
10   Reply from 192.168.7.129: bytes=32 time<1ms TTL=127
11   Reply from 192.168.7.129: bytes=32 time<1ms TTL=127
12
13   Ping statistics for 192.168.7.129:
14       Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
15   Approximate round trip times in milli-seconds:
16       Minimum = 0ms, Maximum = 0ms, Average = 0ms
17
18   C:\>ping 192.168.7.130
19
20   Pinging 192.168.7.130 with 32 bytes of data:
21
22   Request timed out.
23   Reply from 192.168.7.130: bytes=32 time<1ms TTL=127
24   Reply from 192.168.7.130: bytes=32 time<1ms TTL=127
25   Reply from 192.168.7.130: bytes=32 time<1ms TTL=127
26
27   Ping statistics for 192.168.7.130:
28       Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
29   Approximate round trip times in milli-seconds:
30       Minimum = 0ms, Maximum = 0ms, Average = 0ms
31
32   C:\>ping 192.168.7.194
33
34   Pinging 192.168.7.194 with 32 bytes of data:
35
36   Reply from 192.168.7.194: bytes=32 time<1ms TTL=128
37   Reply from 192.168.7.194: bytes=32 time<1ms TTL=128
38   Reply from 192.168.7.194: bytes=32 time<1ms TTL=128
39   Reply from 192.168.7.194: bytes=32 time<1ms TTL=128
40
41   Ping statistics for 192.168.7.194:
42       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
43   Approximate round trip times in milli-seconds:
44       Minimum = 0ms, Maximum = 0ms, Average = 0ms
45
46   C:\>ping 192.168.7.1
47
48   Pinging 192.168.7.1 with 32 bytes of data:
49
50   Request timed out.
51   Request timed out.
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 = 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
200
201  C:\>tracert 192.168.7.129
202
203  Tracing route to 192.168.7.129 over a maximum of 30 hops:
204
205    1    5 ms       0 ms       0 ms       192.168.7.222
```

```
206    2   0 ms     0 ms     0 ms     192.168.7.129
207
208  Trace complete.
209
210  C:\>tracert 192.168.7.130
211
212  Tracing route to 192.168.7.130 over a maximum of 30 hops:
213
214    1   0 ms     0 ms     0 ms     192.168.7.222
215    2   0 ms     0 ms     0 ms     192.168.7.130
216
217  Trace complete.
218
219  C:\>tracert 192.168.7.194
220
221  Tracing route to 192.168.7.194 over a maximum of 30 hops:
222
223    1   0 ms     0 ms     0 ms     192.168.7.194
224
225  Trace complete.
226
227  C:\>tracert 192.168.7.1
228
229  Tracing route to 192.168.7.1 over a maximum of 30 hops:
230
231    1   0 ms     0 ms     0 ms     192.168.7.222
232    2   0 ms     0 ms     0 ms     192.168.7.254
233    3   0 ms     0 ms     0 ms     192.168.7.1
234
235  Trace complete.
236
237  C:\>tracert 192.168.7.2
238
239  Tracing route to 192.168.7.2 over a maximum of 30 hops:
240
241    1   0 ms     0 ms     0 ms     192.168.7.222
242    2   0 ms     0 ms     0 ms     192.168.7.254
243    3   0 ms     0 ms     0 ms     192.168.7.2
244
245  Trace complete.
246
247  C:\>tracert 192.168.7.3
248
249  Tracing route to 192.168.7.3 over a maximum of 30 hops:
250
251    1   0 ms     0 ms     0 ms     192.168.7.222
252    2   0 ms     0 ms     0 ms     192.168.7.254
253    3   0 ms     0 ms     0 ms     192.168.7.3
254
255  Trace complete.
256
257  C:\>tracert 8.8.8.8
258
259  Tracing route to 8.8.8.8 over a maximum of 30 hops:
260
261    1   0 ms     0 ms     0 ms     192.168.7.222
262    2   0 ms     0 ms     0 ms     8.8.8.8
263
264  Trace complete.
265
266  C:\>tracert 192.168.7.245
267
268  Tracing route to 192.168.7.245 over a maximum of 30 hops:
269
270    1   0 ms     0 ms     0 ms     192.168.7.222
271    2   0 ms     *        0 ms     192.168.7.222
272    3   *        0 ms     *        Request timed out.
273    4   0 ms     *        0 ms     192.168.7.222
274    5   *        0 ms     *        Request timed out.
275    6   0 ms     *        0 ms     192.168.7.222
276    7   *        13 ms    *        Request timed out.
277    8   0 ms     *        0 ms     192.168.7.222
278    9   *        0 ms     *        Request timed out.
```

```
279   10   0 ms       *          3 ms      192.168.7.222
280   11   *          0 ms       *         Request timed out.
281   12   0 ms       *          0 ms      192.168.7.222
282   13   *          0 ms       *         Request timed out.
283   14   0 ms       *          0 ms      192.168.7.222
284   15   *          0 ms       *         Request timed out.
285   16   0 ms       *          0 ms      192.168.7.222
286   17   *          0 ms       *         Request timed out.
287   18   0 ms       *          0 ms      192.168.7.222
288   19   *          0 ms       *         Request timed out.
289   20   0 ms       *          0 ms      192.168.7.222
290   21   *          0 ms       *         Request timed out.
291   22   0 ms       *          0 ms      192.168.7.222
292   23   *          0 ms       *         Request timed out.
293   24   0 ms       *          0 ms      192.168.7.222
294   25   *          0 ms       *         Request timed out.
295   26   0 ms       *          0 ms      192.168.7.222
296   27   *          0 ms       *         Request timed out.
297   28   0 ms       *          0 ms      192.168.7.222
298   29   *          0 ms       *         Request timed out.
299   30   0 ms       *          0 ms      192.168.7.222
300
301   Trace complete.
302
303   C:\>tracert 192.168.7.249
304
305   Tracing route to 192.168.7.249 over a maximum of 30 hops:
306
307     1   0 ms       0 ms       0 ms      192.168.7.222
308     2   0 ms       0 ms       0 ms      192.168.7.249
309
310   Trace complete.
311
312   C:\>tracert 192.168.7.190
313
314   Tracing route to 192.168.7.190 over a maximum of 30 hops:
315
316     1   0 ms       0 ms       0 ms      192.168.7.190
317
318   Trace complete.
319
320   C:\>tracert 192.168.7.222
321
322   Tracing route to 192.168.7.222 over a maximum of 30 hops:
323
324     1   0 ms       0 ms       0 ms      192.168.7.222
325
326   Trace complete.
327
328   C:\>tracert 192.168.7.253
329
330   Tracing route to 192.168.7.253 over a maximum of 30 hops:
331
332     1   0 ms       0 ms       0 ms      192.168.7.253
333
334   Trace complete.
335
336   C:\>tracert 192.168.7.250
337
338   Tracing route to 192.168.7.250 over a maximum of 30 hops:
339
340     1   0 ms       0 ms       0 ms      192.168.7.250
341
342   Trace complete.
343
344   C:\>tracert 192.168.7.126
345
346   Tracing route to 192.168.7.126 over a maximum of 30 hops:
347
348     1   0 ms       0 ms       0 ms      192.168.7.222
349     2   0 ms       0 ms       0 ms      192.168.7.126
350
351   Trace complete.
```

```
352
353  C:\>tracert 192.168.7.246
354
355  Tracing route to 192.168.7.246 over a maximum of 30 hops:
356
357    1   0 ms      0 ms      0 ms      192.168.7.222
358    2   0 ms      *         0 ms      192.168.7.222
359    3   *         0 ms      *         Request timed out.
360    4   0 ms      *         0 ms      192.168.7.222
361    5   *         0 ms      *         Request timed out.
362    6   0 ms      *         0 ms      192.168.7.222
363    7   *         6 ms      *         Request timed out.
364    8   0 ms      *         0 ms      192.168.7.222
365    9   *         0 ms      *         Request timed out.
366   10   0 ms      *         0 ms      192.168.7.222
367   11   *         0 ms      *         Request timed out.
368   12   0 ms      *         0 ms      192.168.7.222
369   13   *         0 ms      *         Request timed out.
370   14   0 ms      *         0 ms      192.168.7.222
371   15   *         0 ms      *         Request timed out.
372   16   0 ms      *         0 ms      192.168.7.222
373   17   *         0 ms      *         Request timed out.
374   18   0 ms      *         0 ms      192.168.7.222
375   19   *         0 ms      *         Request timed out.
376   20   0 ms      *         0 ms      192.168.7.222
377   21   *         0 ms      *         Request timed out.
378   22   0 ms      *         0 ms      192.168.7.222
379   23   *         0 ms      *         Request timed out.
380   24   0 ms      *         0 ms      192.168.7.222
381   25   *         0 ms      *         Request timed out.
382   26   0 ms      *         0 ms      192.168.7.222
383   27   *         6 ms      *         Request timed out.
384   28   0 ms      *         0 ms      192.168.7.222
385   29   *         0 ms      *         Request timed out.
386   30   0 ms      *         0 ms      192.168.7.222
387
388  Trace complete.
389
390  C:\>tracert 192.168.7.254
391
392  Tracing route to 192.168.7.254 over a maximum of 30 hops:
393
394    1   0 ms      0 ms      0 ms      192.168.7.222
395    2   0 ms      0 ms      0 ms      192.168.7.254
396
397  Trace complete.
398
399  C:\>
```

Listing 2.3: PC1 output

```
 1
 2  Cisco Packet Tracer PC Command Line 1.0
 3  C:\>arp -a
 4    Internet Address      Physical Address      Type
 5    192.168.7.193         0060.5c73.18bd        dynamic
 6
 7  C:\>ping 192.168.7.129
 8
 9  Pinging 192.168.7.129 with 32 bytes of data:
10
11  Request timed out.
12  Reply from 192.168.7.129: bytes=32 time<1ms TTL=127
13  Reply from 192.168.7.129: bytes=32 time=25ms TTL=127
14  Reply from 192.168.7.129: bytes=32 time<1ms TTL=127
15
16  Ping statistics for 192.168.7.129:
17      Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
18  Approximate round trip times in milli-seconds:
19      Minimum = 0ms, Maximum = 25ms, Average = 8ms
```

```
20
21  C:\>ping 192.168.7.130
22
23  Pinging 192.168.7.130 with 32 bytes of data:
24
25  Reply from 192.168.7.130: bytes=32 time=5ms TTL=127
26  Reply from 192.168.7.130: bytes=32 time<1ms TTL=127
27  Reply from 192.168.7.130: bytes=32 time=1ms TTL=127
28  Reply from 192.168.7.130: bytes=32 time<1ms TTL=127
29
30  Ping statistics for 192.168.7.130:
31      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
32  Approximate round trip times in milli-seconds:
33      Minimum = 0ms, Maximum = 5ms, Average = 1ms
34
35  C:\>ping 192.168.7.193
36
37  Pinging 192.168.7.193 with 32 bytes of data:
38
39  Reply from 192.168.7.193: bytes=32 time<1ms TTL=128
40  Reply from 192.168.7.193: bytes=32 time<1ms TTL=128
41  Reply from 192.168.7.193: bytes=32 time<1ms TTL=128
42  Reply from 192.168.7.193: bytes=32 time=34ms TTL=128
43
44  Ping statistics for 192.168.7.193:
45      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
46  Approximate round trip times in milli-seconds:
47      Minimum = 0ms, Maximum = 34ms, Average = 8ms
48
49  C:\>ping 192.168.7.1
50
51  Pinging 192.168.7.1 with 32 bytes of data:
52
53  Reply from 192.168.7.1: bytes=32 time=8ms TTL=126
54  Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
55  Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
56  Reply from 192.168.7.1: bytes=32 time<1ms TTL=126
57
58  Ping statistics for 192.168.7.1:
59      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
60  Approximate round trip times in milli-seconds:
61      Minimum = 0ms, Maximum = 8ms, Average = 2ms
62
63  C:\>ping 192.168.7.2
64
65  Pinging 192.168.7.2 with 32 bytes of data:
66
67  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
68  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
69  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
70  Reply from 192.168.7.2: bytes=32 time<1ms TTL=126
71
72  Ping statistics for 192.168.7.2:
73      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
74  Approximate round trip times in milli-seconds:
75      Minimum = 0ms, Maximum = 0ms, Average = 0ms
76
77  C:\>ping 192.168.7.3
78
79  Pinging 192.168.7.3 with 32 bytes of data:
80
81  Reply from 192.168.7.3: bytes=32 time<1ms TTL=126
82  Reply from 192.168.7.3: bytes=32 time=5ms TTL=126
83  Reply from 192.168.7.3: bytes=32 time<1ms TTL=126
84  Reply from 192.168.7.3: bytes=32 time<1ms TTL=126
85
86  Ping statistics for 192.168.7.3:
87      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
88  Approximate round trip times in milli-seconds:
89      Minimum = 0ms, Maximum = 5ms, Average = 1ms
90
91  C:\>ping 8.8.8.8
92
```

```
93   Pinging 8.8.8.8 with 32 bytes of data:
94
95   Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
96   Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
97   Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
98   Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
99
100  Ping statistics for 8.8.8.8:
101      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
102  Approximate round trip times in milli-seconds:
103      Minimum = 0ms, Maximum = 0ms, Average = 0ms
104
105  C:\>ping 192.168.7.245
106
107  Pinging 192.168.7.245 with 32 bytes of data:
108
109  Reply from 192.168.7.222: Destination host unreachable.
110  Reply from 192.168.7.222: Destination host unreachable.
111  Reply from 192.168.7.222: Destination host unreachable.
112  Reply from 192.168.7.222: Destination host unreachable.
113
114  Ping statistics for 192.168.7.245:
115      Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
116
117  C:\>ping 192.168.7.249
118
119  Pinging 192.168.7.249 with 32 bytes of data:
120
121  Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
122  Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
123  Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
124  Reply from 192.168.7.249: bytes=32 time<1ms TTL=254
125
126  Ping statistics for 192.168.7.249:
127      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
128  Approximate round trip times in milli-seconds:
129      Minimum = 0ms, Maximum = 0ms, Average = 0ms
130
131  C:\>ping 192.168.7.190
132
133  Pinging 192.168.7.190 with 32 bytes of data:
134
135  Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
136  Reply from 192.168.7.190: bytes=32 time=6ms TTL=255
137  Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
138  Reply from 192.168.7.190: bytes=32 time<1ms TTL=255
139
140  Ping statistics for 192.168.7.190:
141      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
142  Approximate round trip times in milli-seconds:
143      Minimum = 0ms, Maximum = 6ms, Average = 1ms
144
145  C:\>ping 192.168.7.253
146
147  Pinging 192.168.7.253 with 32 bytes of data:
148
149  Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
150  Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
151  Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
152  Reply from 192.168.7.253: bytes=32 time<1ms TTL=255
153
154  Ping statistics for 192.168.7.253:
155      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
156  Approximate round trip times in milli-seconds:
157      Minimum = 0ms, Maximum = 0ms, Average = 0ms
158
159  C:\>ping 192.168.7.250
160
161  Pinging 192.168.7.250 with 32 bytes of data:
162
163  Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
164  Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
165  Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
```

```
166  Reply from 192.168.7.250: bytes=32 time<1ms TTL=255
167
168  Ping statistics for 192.168.7.250:
169      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
170  Approximate round trip times in milli-seconds:
171      Minimum = 0ms, Maximum = 0ms, Average = 0ms
172
173  C:\>ping 192.168.7.126
174
175  Pinging 192.168.7.126 with 32 bytes of data:
176
177  Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
178  Reply from 192.168.7.126: bytes=32 time=1ms TTL=254
179  Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
180  Reply from 192.168.7.126: bytes=32 time<1ms TTL=254
181
182  Ping statistics for 192.168.7.126:
183      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
184  Approximate round trip times in milli-seconds:
185      Minimum = 0ms, Maximum = 1ms, Average = 0ms
186
187  C:\>ping 192.168.7.246
188
189  Pinging 192.168.7.246 with 32 bytes of data:
190
191  Reply from 192.168.7.222: Destination host unreachable.
192  Reply from 192.168.7.222: Destination host unreachable.
193  Request timed out.
194  Reply from 192.168.7.222: Destination host unreachable.
195
196  Ping statistics for 192.168.7.246:
197      Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
198
199  C:\>ping 192.168.7.254
200
201  Pinging 192.168.7.254 with 32 bytes of data:
202
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  Reply from 192.168.7.254: bytes=32 time=26ms TTL=254
206  Reply from 192.168.7.254: bytes=32 time<1ms TTL=254
207
208  Ping statistics for 192.168.7.254:
209      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
210  Approximate round trip times in milli-seconds:
211      Minimum = 0ms, Maximum = 26ms, Average = 6ms
212
213  C:\>arp -a
214    Internet Address      Physical Address      Type
215    192.168.7.193         0060.5c73.18bd        dynamic
216    192.168.7.222         0090.0c00.9582        dynamic
217
218  C:\>tracert 192.168.7.129
219
220  Tracing route to 192.168.7.129 over a maximum of 30 hops:
221
222    1   0 ms      0 ms      0 ms      192.168.7.222
223    2   0 ms      0 ms      0 ms      192.168.7.129
224
225  Trace complete.
226
227  C:\>tracert 192.168.7.130
228
229  Tracing route to 192.168.7.130 over a maximum of 30 hops:
230
231    1   0 ms      0 ms      0 ms      192.168.7.222
232    2   0 ms      0 ms      0 ms      192.168.7.130
233
234  Trace complete.
235
236  C:\>tracert 192.168.7.193
237
238  Tracing route to 192.168.7.193 over a maximum of 30 hops:
```

```
239
240     1    0 ms      0 ms      0 ms      192.168.7.193
241
242   Trace complete.
243
244   C:\>tracert 192.168.7.1
245
246   Tracing route to 192.168.7.1 over a maximum of 30 hops:
247
248     1    0 ms      0 ms      0 ms      192.168.7.222
249     2    0 ms      0 ms      8 ms      192.168.7.254
250     3    0 ms      0 ms      17 ms     192.168.7.1
251
252   Trace complete.
253
254   C:\>tracert 192.168.7.2
255
256   Tracing route to 192.168.7.2 over a maximum of 30 hops:
257
258     1    0 ms      0 ms      0 ms      192.168.7.222
259     2    0 ms      0 ms      11 ms     192.168.7.254
260     3    0 ms      0 ms      0 ms      192.168.7.2
261
262   Trace complete.
263
264   C:\>tracert 192.168.7.3
265
266   Tracing route to 192.168.7.3 over a maximum of 30 hops:
267
268     1    0 ms      0 ms      0 ms      192.168.7.222
269     2    0 ms      0 ms      0 ms      192.168.7.254
270     3    0 ms      0 ms      0 ms      192.168.7.3
271
272   Trace complete.
273
274   C:\>tracert 8.8.8.8
275
276   Tracing route to 8.8.8.8 over a maximum of 30 hops:
277
278     1    0 ms      0 ms      0 ms      192.168.7.222
279     2    0 ms      0 ms      0 ms      8.8.8.8
280
281   Trace complete.
282
283   C:\>tracert 192.168.7.245
284
285   Tracing route to 192.168.7.245 over a maximum of 30 hops:
286
287     1    0 ms      0 ms      0 ms      192.168.7.222
288     2    0 ms      *         0 ms      192.168.7.222
289     3    *         0 ms      *         Request timed out.
290     4    0 ms      *         0 ms      192.168.7.222
291     5    *         0 ms      *         Request timed out.
292     6    0 ms      *         0 ms      192.168.7.222
293     7    *         0 ms      *         Request timed out.
294     8    0 ms      *         0 ms      192.168.7.222
295     9    *         0 ms      *         Request timed out.
296    10    0 ms      *         0 ms      192.168.7.222
297    11    *         0 ms      *         Request timed out.
298    12    0 ms      *         0 ms      192.168.7.222
299    13    *         0 ms      *         Request timed out.
300    14    0 ms      *         0 ms      192.168.7.222
301    15    *         0 ms      *         Request timed out.
302    16    15 ms     *         0 ms      192.168.7.222
303    17    *         0 ms      *         Request timed out.
304    18    0 ms      *         0 ms      192.168.7.222
305    19    *         0 ms      *         Request timed out.
306    20    0 ms      *         0 ms      192.168.7.222
307    21    *         0 ms      *         Request timed out.
308    22    0 ms      *         0 ms      192.168.7.222
309    23    *         0 ms      *         Request timed out.
310    24    0 ms      *         0 ms      192.168.7.222
311    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.
```

```
385   12   0 ms        *           0 ms      192.168.7.222
386   13   *           0 ms        *         Request timed out.
387   14   0 ms        *           0 ms      192.168.7.222
388   15   *           0 ms        *         Request timed out.
389   16   0 ms        *           0 ms      192.168.7.222
390   17   *           0 ms        *         Request timed out.
391   18   0 ms        *           0 ms      192.168.7.222
392   19   *           0 ms        *         Request timed out.
393   20   0 ms        *           0 ms      192.168.7.222
394   21   *           0 ms        *         Request timed out.
395   22   0 ms        *           1 ms      192.168.7.222
396   23   *           0 ms        *         Request timed out.
397   24   0 ms        *           0 ms      192.168.7.222
398   25   *           0 ms        *         Request timed out.
399   26   0 ms        *           0 ms      192.168.7.222
400   27   *           0 ms        *         Request timed out.
401   28   0 ms        *           0 ms      192.168.7.222
402   29   *           0 ms        *         Request timed out.
403   30   0 ms        *           0 ms      192.168.7.222
404
405   Trace complete.
406
407   C:\>tracert 192.168.7.254
408
409   Tracing route to 192.168.7.254 over a maximum of 30 hops:
410
411   1   0 ms        0 ms        0 ms      192.168.7.222
412   2   0 ms        0 ms        0 ms      192.168.7.254
413
414   Trace complete.
415
416   C:\>
```

Listing 2.4: Laptop1 output

```
1    Cisco Packet Tracer SERVER Command Line 1.0
2    C:\>arp -a
3      Internet Address      Physical Address      Type
4      192.168.7.126         0003.e425.d44a        dynamic
5
6    C:\>ping 192.168.7.129
7
8    Pinging 192.168.7.129 with 32 bytes of data:
9
10   Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
11   Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
12   Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
13   Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
14
15   Ping statistics for 192.168.7.129:
16       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
17   Approximate round trip times in milli-seconds:
18       Minimum = 0ms, Maximum = 0ms, Average = 0ms
19
20   C:\>ping 192.168.7.130
21
22   Pinging 192.168.7.130 with 32 bytes of data:
23
24   Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
25   Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
26   Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
27   Reply from 192.168.7.130: bytes=32 time=1ms TTL=126
28
29   Ping statistics for 192.168.7.130:
30       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
31   Approximate round trip times in milli-seconds:
32       Minimum = 0ms, Maximum = 1ms, Average = 0ms
33
34   C:\>ping 192.168.7.193
35
```

```
36   Pinging 192.168.7.193 with 32 bytes of data:
37
38   Reply from 192.168.7.193: bytes=32 time=1ms TTL=126
39   Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
40   Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
41   Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
42
43   Ping statistics for 192.168.7.193:
44       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
45   Approximate round trip times in milli-seconds:
46       Minimum = 0ms, Maximum = 1ms, Average = 0ms
47
48   C:\>ping 192.168.7.194
49
50   Pinging 192.168.7.194 with 32 bytes of data:
51
52   Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
53   Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
54   Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
55   Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
56
57   Ping statistics for 192.168.7.194:
58       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
59   Approximate round trip times in milli-seconds:
60       Minimum = 0ms, Maximum = 0ms, Average = 0ms
61
62   C:\>ping 192.168.7.2
63
64   Pinging 192.168.7.2 with 32 bytes of data:
65
66   Reply from 192.168.7.2: bytes=32 time=12ms TTL=128
67   Reply from 192.168.7.2: bytes=32 time=4ms TTL=128
68   Reply from 192.168.7.2: bytes=32 time<1ms TTL=128
69   Reply from 192.168.7.2: bytes=32 time<1ms TTL=128
70
71   Ping statistics for 192.168.7.2:
72       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
73   Approximate round trip times in milli-seconds:
74       Minimum = 0ms, Maximum = 12ms, Average = 4ms
75
76   C:\>ping 192.168.7.3
77
78   Pinging 192.168.7.3 with 32 bytes of data:
79
80   Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
81   Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
82   Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
83   Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
84
85   Ping statistics for 192.168.7.3:
86       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
87   Approximate round trip times in milli-seconds:
88       Minimum = 0ms, Maximum = 0ms, Average = 0ms
89
90   C:\>ping 8.8.8.8
91
92   Pinging 8.8.8.8 with 32 bytes of data:
93
94   Request timed out.
95   Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
96   Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
97   Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
98
99   Ping statistics for 8.8.8.8:
100      Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
101  Approximate round trip times in milli-seconds:
102      Minimum = 0ms, Maximum = 0ms, Average = 0ms
103
104  C:\>ping 192.168.7.245
105
106  Pinging 192.168.7.245 with 32 bytes of data:
107
108  Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
```

```
109  Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
110  Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
111  Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
112
113  Ping statistics for 192.168.7.245:
114      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
115  Approximate round trip times in milli-seconds:
116      Minimum = 0ms, Maximum = 0ms, Average = 0ms
117
118  C:\>ping 192.168.7.249
119
120  Pinging 192.168.7.249 with 32 bytes of data:
121
122  Reply from 192.168.7.126: Destination host unreachable.
123  Request timed out.
124  Reply from 192.168.7.126: Destination host unreachable.
125  Request timed out.
126
127  Ping statistics for 192.168.7.249:
128      Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
129
130  C:\>ping 192.168.7.190
131
132  Pinging 192.168.7.190 with 32 bytes of data:
133
134  Reply from 192.168.7.190: bytes=32 time=5ms TTL=254
135  Reply from 192.168.7.190: bytes=32 time=1ms TTL=254
136  Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
137  Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
138
139  Ping statistics for 192.168.7.190:
140      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
141  Approximate round trip times in milli-seconds:
142      Minimum = 0ms, Maximum = 5ms, Average = 1ms
143
144  C:\>ping 192.168.7.222
145
146  Pinging 192.168.7.222 with 32 bytes of data:
147
148  Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
149  Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
150  Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
151  Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
152
153  Ping statistics for 192.168.7.222:
154      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
155  Approximate round trip times in milli-seconds:
156      Minimum = 0ms, Maximum = 0ms, Average = 0ms
157
158  C:\>ping 192.168.7.253
159
160  Pinging 192.168.7.253 with 32 bytes of data:
161
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  Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
166
167  Ping statistics for 192.168.7.253:
168      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
169  Approximate round trip times in milli-seconds:
170      Minimum = 0ms, Maximum = 0ms, Average = 0ms
171
172  C:\>ping 192.168.7.250
173
174  Pinging 192.168.7.250 with 32 bytes of data:
175
176  Reply from 192.168.7.126: Destination host unreachable.
177  Request timed out.
178  Reply from 192.168.7.126: Destination host unreachable.
179  Reply from 192.168.7.126: Destination host unreachable.
180
181  Ping statistics for 192.168.7.250:
```

```
182     Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
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=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  Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
192
193  Ping statistics for 192.168.7.126:
194     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
195  Approximate round trip times in milli-seconds:
196     Minimum = 0ms, Maximum = 0ms, Average = 0ms
197
198  C:\>ping 192.168.7.246
199
200  Pinging 192.168.7.246 with 32 bytes of data:
201
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  Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
206
207  Ping statistics for 192.168.7.246:
208     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
209  Approximate round trip times in milli-seconds:
210     Minimum = 0ms, Maximum = 0ms, Average = 0ms
211
212  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
286   Trace complete.
287
288   C:\>tracert 8.8.8.8
289
290   Tracing route to 8.8.8.8 over a maximum of 30 hops:
291
292    1   0 ms      0 ms      0 ms      192.168.7.126
293    2   0 ms      0 ms      0 ms      8.8.8.8
294
295   Trace complete.
296
297   C:\>tracert 192.168.7.245
298
299   Tracing route to 192.168.7.245 over a maximum of 30 hops:
300
301    1   0 ms      0 ms      1 ms      192.168.7.126
302    2   0 ms      0 ms      0 ms      192.168.7.245
303
304   Trace complete.
305
306   C:\>tracert 192.168.7.249
307
308   Tracing route to 192.168.7.249 over a maximum of 30 hops:
309
310    1   0 ms      0 ms      0 ms      192.168.7.126
311    2   0 ms      *         0 ms      192.168.7.126
312    3   *         0 ms      *         Request timed out.
313    4   0 ms      *         0 ms      192.168.7.126
314    5   *         0 ms      *         Request timed out.
315    6   0 ms      *         0 ms      192.168.7.126
316    7   *         0 ms      *         Request timed out.
317    8   0 ms      *         0 ms      192.168.7.126
318    9   *         0 ms      *         Request timed out.
319   10   0 ms      *         0 ms      192.168.7.126
320   11   *         0 ms      *         Request timed out.
321   12   0 ms      *         0 ms      192.168.7.126
322   13   *         0 ms      *         Request timed out.
323   14   0 ms      *         0 ms      192.168.7.126
324   15   *         0 ms      *         Request timed out.
325   16   0 ms      *         0 ms      192.168.7.126
326   17   *         0 ms      *         Request timed out.
327   18   0 ms      *         0 ms      192.168.7.126
```

```
328    19    *           0 ms        *            Request timed out.
329    20    0 ms        *            0 ms        192.168.7.126
330    21    *           0 ms        *            Request timed out.
331    22    0 ms        *            0 ms        192.168.7.126
332    23    *           0 ms        *            Request timed out.
333    24    0 ms        *            0 ms        192.168.7.126
334    25    *           0 ms        *            Request timed out.
335    26    0 ms        *            0 ms        192.168.7.126
336    27    *           0 ms        *            Request timed out.
337    28    14 ms       *            0 ms        192.168.7.126
338    29    *           0 ms        *            Request timed out.
339    30    0 ms        *            0 ms        192.168.7.126
340
341    Trace complete.
342
343    C:\>tracert 192.168.7.190
344
345    Tracing route to 192.168.7.190 over a maximum of 30 hops:
346
347    1    0 ms        0 ms        0 ms        192.168.7.126
348    2    0 ms        0 ms        0 ms        192.168.7.190
349
350    Trace complete.
351
352    C:\>tracert 192.168.7.222
353
354    Tracing route to 192.168.7.222 over a maximum of 30 hops:
355
356    1    0 ms        0 ms        0 ms        192.168.7.126
357    2    0 ms        0 ms        0 ms        192.168.7.222
358
359    Trace complete.
360
361    C:\>tracert 192.168.7.253
362
363    Tracing route to 192.168.7.253 over a maximum of 30 hops:
364
365    1    0 ms        0 ms        0 ms        192.168.7.126
366    2    0 ms        0 ms        0 ms        192.168.7.253
367
368    Trace complete.
369
370    C:\>tracert 192.168.7.250
371
372    Tracing route to 192.168.7.250 over a maximum of 30 hops:
373
374    1    0 ms        1 ms        0 ms        192.168.7.126
375    2    0 ms        *            0 ms        192.168.7.126
376    3    *           0 ms        *            Request timed out.
377    4    0 ms        *            0 ms        192.168.7.126
378    5    *           0 ms        *            Request timed out.
379    6    0 ms        *            0 ms        192.168.7.126
380    7    *           0 ms        *            Request timed out.
381    8    0 ms        *            0 ms        192.168.7.126
382    9    *           0 ms        *            Request timed out.
383    10   0 ms        *            0 ms        192.168.7.126
384    11   *           0 ms        *            Request timed out.
385    12   0 ms        *            0 ms        192.168.7.126
386    13   *           0 ms        *            Request timed out.
387    14   0 ms        *            0 ms        192.168.7.126
388    15   *           0 ms        *            Request timed out.
389    16   0 ms        *            0 ms        192.168.7.126
390    17   *           0 ms        *            Request timed out.
391    18   0 ms        *            0 ms        192.168.7.126
392    19   *           0 ms        *            Request timed out.
393    20   0 ms        *            0 ms        192.168.7.126
394    21   *           0 ms        *            Request timed out.
395    22   0 ms        *            0 ms        192.168.7.126
396    23   *           0 ms        *            Request timed out.
397    24   0 ms        *            0 ms        192.168.7.126
398    25   *           0 ms        *            Request timed out.
399    26   0 ms        *            0 ms        192.168.7.126
400    27   *           0 ms        *            Request timed out.
```

```
401   28   0 ms       *            0 ms       192.168.7.126
402   29   *            0 ms       *            Request timed out.
403   30   0 ms       *            0 ms       192.168.7.126
404
405 Trace complete.
406
407 C:\>tracert 192.168.7.126
408
409 Tracing route to 192.168.7.126 over a maximum of 30 hops:
410
411   1    0 ms        0 ms        0 ms       192.168.7.126
412
413 Trace complete.
414
415 C:\>tracert 192.168.7.246
416
417 Tracing route to 192.168.7.246 over a maximum of 30 hops:
418
419   1    0 ms        0 ms        0 ms       192.168.7.246
420
421 Trace complete.
422
423 C:\>tracert 192.168.7.254
424
425 Tracing route to 192.168.7.254 over a maximum of 30 hops:
426
427   1    0 ms        0 ms        0 ms       192.168.7.254
428
429 Trace complete.
430
431 C:\>
```

Listing 2.5: DHCP-Server output

```
 1 Cisco Packet Tracer PC Command Line 1.0
 2 C:\>arp -a
 3 No ARP Entries Found
 4
 5 C:\>ping 192.168.7.129
 6
 7 Pinging 192.168.7.129 with 32 bytes of data:
 8
 9 Reply from 192.168.7.129: bytes=32 time=7ms TTL=126
10 Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
11 Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
12 Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
13
14 Ping statistics for 192.168.7.129:
15     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
16 Approximate round trip times in milli-seconds:
17     Minimum = 0ms, Maximum = 7ms, Average = 1ms
18
19 C:\>ping 192.168.7.130
20
21 Pinging 192.168.7.130 with 32 bytes of data:
22
23 Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
24 Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
25 Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
26 Reply from 192.168.7.130: bytes=32 time=1ms TTL=126
27
28 Ping statistics for 192.168.7.130:
29     Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
30 Approximate round trip times in milli-seconds:
31     Minimum = 0ms, Maximum = 1ms, Average = 0ms
32
33 C:\>ping 192.168.7.193
34
35 Pinging 192.168.7.193 with 32 bytes of data:
36
```

```
37  Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
38  Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
39  Reply from 192.168.7.193: bytes=32 time=1ms TTL=126
40  Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
41
42  Ping statistics for 192.168.7.193:
43      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
44  Approximate round trip times in milli-seconds:
45      Minimum = 0ms, Maximum = 1ms, Average = 0ms
46
47  C:\>ping 192.168.7.194
48
49  Pinging 192.168.7.194 with 32 bytes of data:
50
51  Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
52  Reply from 192.168.7.194: bytes=32 time=7ms TTL=126
53  Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
54  Reply from 192.168.7.194: bytes=32 time=32ms TTL=126
55
56  Ping statistics for 192.168.7.194:
57      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
58  Approximate round trip times in milli-seconds:
59      Minimum = 0ms, Maximum = 32ms, Average = 9ms
60
61  C:\>ping 192.168.7.1
62
63  Pinging 192.168.7.1 with 32 bytes of data:
64
65  Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
66  Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
67  Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
68  Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
69
70  Ping statistics for 192.168.7.1:
71      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
72  Approximate round trip times in milli-seconds:
73      Minimum = 0ms, Maximum = 0ms, Average = 0ms
74
75  C:\>ping 192.168.7.3
76
77  Pinging 192.168.7.3 with 32 bytes of data:
78
79  Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
80  Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
81  Reply from 192.168.7.3: bytes=32 time<1ms TTL=128
82  Reply from 192.168.7.3: bytes=32 time=31ms TTL=128
83
84  Ping statistics for 192.168.7.3:
85      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
86  Approximate round trip times in milli-seconds:
87      Minimum = 0ms, Maximum = 31ms, Average = 7ms
88
89  C:\>ping 8.8.8.8
90
91  Pinging 8.8.8.8 with 32 bytes of data:
92
93  Reply from 8.8.8.8: bytes=32 time=5ms 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=6ms TTL=254
96  Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
97
98  Ping statistics for 8.8.8.8:
99      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
100 Approximate round trip times in milli-seconds:
101     Minimum = 0ms, Maximum = 6ms, Average = 2ms
102
103 C:\>ping 192.168.7.245
104
105 Pinging 192.168.7.245 with 32 bytes of data:
106
107 Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
108 Reply from 192.168.7.245: bytes=32 time=6ms TTL=254
109 Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
```

```
110  Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
111
112  Ping statistics for 192.168.7.245:
113      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
114  Approximate round trip times in milli-seconds:
115      Minimum = 0ms, Maximum = 6ms, Average = 1ms
116
117  C:\>ping 192.168.7.249
118
119  Pinging 192.168.7.249 with 32 bytes of data:
120
121  Reply from 192.168.7.126: Destination host unreachable.
122  Reply from 192.168.7.126: Destination host unreachable.
123  Request timed out.
124  Reply from 192.168.7.126: Destination host unreachable.
125
126  Ping statistics for 192.168.7.249:
127      Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
128
129  C:\>ping 192.168.7.190
130
131  Pinging 192.168.7.190 with 32 bytes of data:
132
133  Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
134  Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
135  Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
136  Reply from 192.168.7.190: bytes=32 time=37ms TTL=254
137
138  Ping statistics for 192.168.7.190:
139      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
140  Approximate round trip times in milli-seconds:
141      Minimum = 0ms, Maximum = 37ms, Average = 9ms
142
143  C:\>ping 192.168.7.222
144
145  Pinging 192.168.7.222 with 32 bytes of data:
146
147  Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
148  Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
149  Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
150  Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
151
152  Ping statistics for 192.168.7.222:
153      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
154  Approximate round trip times in milli-seconds:
155      Minimum = 0ms, Maximum = 0ms, Average = 0ms
156
157  C:\>ping 192.168.7.253
158
159  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
233
234
235
236
237
238  C:\>arp -a
239    Internet Address      Physical Address      Type
240    192.168.7.1           000a.f36e.27e5        dynamic
241    192.168.7.3           00e0.b050.c641        dynamic
242    192.168.7.126         0003.e425.d44a        dynamic
243
244  C:\>tracert 192.168.7.129
245
246  Tracing route to 192.168.7.129 over a maximum of 30 hops:
247
248    1   0 ms      0 ms      0 ms      192.168.7.126
249    2   0 ms      0 ms      0 ms      192.168.7.253
250    3   0 ms      0 ms      0 ms      192.168.7.129
251
252  Trace complete.
253
254  C:\>tracert 192.168.7.130
255
```

```
256  Tracing route to 192.168.7.130 over a maximum of 30 hops:
257
258    1    0 ms      0 ms      0 ms      192.168.7.126
259    2    0 ms      0 ms      0 ms      192.168.7.253
260    3    1 ms      0 ms      0 ms      192.168.7.130
261
262  Trace complete.
263
264  C:\>tracert 192.168.7.193
265
266  Tracing route to 192.168.7.193 over a maximum of 30 hops:
267
268    1    0 ms      0 ms      0 ms      192.168.7.126
269    2    0 ms      0 ms      0 ms      192.168.7.253
270    3    0 ms      0 ms      0 ms      192.168.7.193
271
272  Trace complete.
273
274  C:\>tracert 192.168.7.194
275
276  Tracing route to 192.168.7.194 over a maximum of 30 hops:
277
278    1    0 ms     17 ms      0 ms      192.168.7.126
279    2    0 ms      0 ms      0 ms      192.168.7.253
280    3    0 ms      0 ms      0 ms      192.168.7.194
281
282  Trace complete.
283
284  C:\>tracert 192.168.7.1
285
286  Tracing route to 192.168.7.1 over a maximum of 30 hops:
287
288    1    0 ms      0 ms      0 ms      192.168.7.1
289
290  Trace complete.
291
292  C:\>tracert 192.168.7.3
293
294  Tracing route to 192.168.7.3 over a maximum of 30 hops:
295
296    1    0 ms      0 ms     14 ms      192.168.7.3
297
298  Trace complete.
299
300  C:\>tracert 8.8.8.8
301
302  Tracing route to 8.8.8.8 over a maximum of 30 hops:
303
304    1    0 ms      0 ms      0 ms      192.168.7.126
305    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.
```

```
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       *          10 ms     192.168.7.126
25   *          10 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   *          13 ms      *         Request timed out.
30   0 ms       *          0 ms      192.168.7.126

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       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   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.
```

```
402  26   0 ms      *           0 ms        192.168.7.126
403  27   *         0 ms        *           Request timed out.
404  28   0 ms      *           0 ms        192.168.7.126
405  29   *         0 ms        *           Request timed out.
406  30   0 ms      *           0 ms        192.168.7.126
407
408  Trace complete.
409
410  C:\>tracert 192.168.7.126
411
412  Tracing route to 192.168.7.126 over a maximum of 30 hops:
413
414    1   0 ms      0 ms        0 ms        192.168.7.126
415
416  Trace complete.
417
418  C:\>tracert 192.168.7.246
419
420  Tracing route to 192.168.7.246 over a maximum of 30 hops:
421
422    1   0 ms      0 ms        0 ms        192.168.7.246
423
424  Trace complete.
425
426  C:\>tracert 192.168.7.254
427
428  Tracing route to 192.168.7.254 over a maximum of 30 hops:
429
430    1   0 ms      0 ms        0 ms        192.168.7.254
431
432  Trace complete.
433
434  C:\>
```

Listing 2.6: DNS-Server output

```
1   Cisco Packet Tracer SERVER Command Line 1.0
2   C:\>arp -a
3     Internet Address      Physical Address      Type
4     192.168.7.1           000a.f36e.27e5        dynamic
5     192.168.7.2           000a.f362.26dd        dynamic
6     192.168.7.126         0003.e425.d44a        dynamic
7
8   C:\>ping 192.168.7.129
9
10  Pinging 192.168.7.129 with 32 bytes of data:
11
12  Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
13  Reply from 192.168.7.129: bytes=32 time=1ms TTL=126
14  Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
15  Reply from 192.168.7.129: bytes=32 time<1ms TTL=126
16
17  Ping statistics for 192.168.7.129:
18      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
19  Approximate round trip times in milli-seconds:
20      Minimum = 0ms, Maximum = 1ms, Average = 0ms
21
22  C:\>ping 192.168.7.130
23
24  Pinging 192.168.7.130 with 32 bytes of data:
25
26  Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
27  Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
28  Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
29  Reply from 192.168.7.130: bytes=32 time<1ms TTL=126
30
31  Ping statistics for 192.168.7.130:
32      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
33  Approximate round trip times in milli-seconds:
34      Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

```
35
36  C:\>ping 192.168.7.193
37
38  Pinging 192.168.7.193 with 32 bytes of data:
39
40  Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
41  Reply from 192.168.7.193: bytes=32 time=1ms TTL=126
42  Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
43  Reply from 192.168.7.193: bytes=32 time<1ms TTL=126
44
45  Ping statistics for 192.168.7.193:
46      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
47  Approximate round trip times in milli-seconds:
48      Minimum = 0ms, Maximum = 1ms, Average = 0ms
49
50  C:\>ping 192.168.7.194
51
52  Pinging 192.168.7.194 with 32 bytes of data:
53
54  Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
55  Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
56  Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
57  Reply from 192.168.7.194: bytes=32 time<1ms TTL=126
58
59  Ping statistics for 192.168.7.194:
60      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
61  Approximate round trip times in milli-seconds:
62      Minimum = 0ms, Maximum = 0ms, Average = 0ms
63
64  C:\>ping 192.168.7.1
65
66  Pinging 192.168.7.1 with 32 bytes of data:
67
68  Reply from 192.168.7.1: bytes=32 time=26ms TTL=128
69  Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
70  Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
71  Reply from 192.168.7.1: bytes=32 time<1ms TTL=128
72
73  Ping statistics for 192.168.7.1:
74      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
75  Approximate round trip times in milli-seconds:
76      Minimum = 0ms, Maximum = 26ms, Average = 6ms
77
78  C:\>ping 192.168.7.2
79
80  Pinging 192.168.7.2 with 32 bytes of data:
81
82  Reply from 192.168.7.2: bytes=32 time=21ms TTL=128
83  Reply from 192.168.7.2: bytes=32 time<1ms TTL=128
84  Reply from 192.168.7.2: bytes=32 time<1ms TTL=128
85  Reply from 192.168.7.2: bytes=32 time<1ms TTL=128
86
87  Ping statistics for 192.168.7.2:
88      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
89  Approximate round trip times in milli-seconds:
90      Minimum = 0ms, Maximum = 21ms, Average = 5ms
91
92  C:\>ping 8.8.8.8
93
94  Pinging 8.8.8.8 with 32 bytes of data:
95
96  Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
97  Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
98  Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
99  Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
100
101  Ping statistics for 8.8.8.8:
102      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
103  Approximate round trip times in milli-seconds:
104      Minimum = 0ms, Maximum = 0ms, Average = 0ms
105
106  C:\>ping 192.168.7.245
107
```

```
108   Pinging 192.168.7.245 with 32 bytes of data:
109
110   Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
111   Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
112   Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
113   Reply from 192.168.7.245: bytes=32 time<1ms TTL=254
114
115   Ping statistics for 192.168.7.245:
116       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
117   Approximate round trip times in milli-seconds:
118       Minimum = 0ms, Maximum = 0ms, Average = 0ms
119
120   C:\>ping 192.168.7.249
121
122   Pinging 192.168.7.249 with 32 bytes of data:
123
124   Reply from 192.168.7.126: Destination host unreachable.
125   Request timed out.
126   Reply from 192.168.7.126: Destination host unreachable.
127   Reply from 192.168.7.126: Destination host unreachable.
128
129   Ping statistics for 192.168.7.249:
130       Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
131
132   C:\>ping 192.168.7.190
133
134   Pinging 192.168.7.190 with 32 bytes of data:
135
136   Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
137   Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
138   Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
139   Reply from 192.168.7.190: bytes=32 time<1ms TTL=254
140
141   Ping statistics for 192.168.7.190:
142       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
143   Approximate round trip times in milli-seconds:
144       Minimum = 0ms, Maximum = 0ms, Average = 0ms
145
146   C:\>ping 192.168.7.222
147
148   Pinging 192.168.7.222 with 32 bytes of data:
149
150   Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
151   Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
152   Reply from 192.168.7.222: bytes=32 time=1ms TTL=254
153   Reply from 192.168.7.222: bytes=32 time<1ms TTL=254
154
155   Ping statistics for 192.168.7.222:
156       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
157   Approximate round trip times in milli-seconds:
158       Minimum = 0ms, Maximum = 1ms, Average = 0ms
159
160   C:\>ping 192.168.7.253
161
162   Pinging 192.168.7.253 with 32 bytes of data:
163
164   Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
165   Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
166   Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
167   Reply from 192.168.7.253: bytes=32 time<1ms TTL=254
168
169   Ping statistics for 192.168.7.253:
170       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
171   Approximate round trip times in milli-seconds:
172       Minimum = 0ms, Maximum = 0ms, Average = 0ms
173
174   C:\>ping 192.168.7.250
175
176   Pinging 192.168.7.250 with 32 bytes of data:
177
178   Reply from 192.168.7.126: Destination host unreachable.
179   Reply from 192.168.7.126: Destination host unreachable.
180   Request timed out.
```

```
181   Reply from 192.168.7.126: Destination host unreachable.
182
183   Ping statistics for 192.168.7.250:
184       Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
185
186   C:\>ping 192.168.7.126
187
188   Pinging 192.168.7.126 with 32 bytes of data:
189
190   Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
191   Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
192   Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
193   Reply from 192.168.7.126: bytes=32 time<1ms TTL=255
194
195   Ping statistics for 192.168.7.126:
196       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
197   Approximate round trip times in milli-seconds:
198       Minimum = 0ms, Maximum = 0ms, Average = 0ms
199
200   C:\>ping 192.168.7.246
201
202   Pinging 192.168.7.246 with 32 bytes of data:
203
204   Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
205   Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
206   Reply from 192.168.7.246: bytes=32 time<1ms TTL=255
207   Reply from 192.168.7.246: bytes=32 time=34ms TTL=255
208
209   Ping statistics for 192.168.7.246:
210       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
211   Approximate round trip times in milli-seconds:
212       Minimum = 0ms, Maximum = 34ms, Average = 8ms
213
214   C:\>ping 192.168.7.254
215
216   Pinging 192.168.7.254 with 32 bytes of data:
217
218   Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
219   Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
220   Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
221   Reply from 192.168.7.254: bytes=32 time<1ms TTL=255
222
223   Ping statistics for 192.168.7.254:
224       Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
225   Approximate round trip times in milli-seconds:
226       Minimum = 0ms, Maximum = 0ms, Average = 0ms
227
228   C:\>arp -a
229     Internet Address      Physical Address      Type
230     192.168.7.1           000a.f36e.27e5        dynamic
231     192.168.7.2           000a.f362.26dd        dynamic
232     192.168.7.126         0003.e425.d44a        dynamic
233
234   C:\>tracert 192.168.7.129
235
236   Tracing route to 192.168.7.129 over a maximum of 30 hops:
237
238     1    0 ms      0 ms      0 ms      192.168.7.126
239     2    0 ms      0 ms      0 ms      192.168.7.253
240     3    0 ms      0 ms      0 ms      192.168.7.129
241
242   Trace complete.
243
244   C:\>tracert 192.168.7.130
245
246   Tracing route to 192.168.7.130 over a maximum of 30 hops:
247
248     1   14 ms      0 ms      0 ms      192.168.7.126
249     2    0 ms      0 ms      0 ms      192.168.7.253
250     3    0 ms      0 ms      0 ms      192.168.7.130
251
252   Trace complete.
253
```

```
254  C:\>tracert 192.168.7.193
255
256  Tracing route to 192.168.7.193 over a maximum of 30 hops:
257
258    1   0 ms      0 ms      0 ms      192.168.7.126
259    2   0 ms      0 ms      0 ms      192.168.7.253
260    3   0 ms      0 ms      0 ms      192.168.7.193
261
262  Trace complete.
263
264  C:\>tracert 192.168.7.194
265
266  Tracing route to 192.168.7.194 over a maximum of 30 hops:
267
268    1   0 ms      0 ms      0 ms      192.168.7.126
269    2   0 ms      0 ms      0 ms      192.168.7.253
270    3   0 ms      0 ms      0 ms      192.168.7.194
271
272  Trace complete.
273
274  C:\>tracert 192.168.7.1
275
276  Tracing route to 192.168.7.1 over a maximum of 30 hops:
277
278    1   0 ms      0 ms      0 ms      192.168.7.1
279
280  Trace complete.
281
282  C:\>tracert 192.168.7.2
283
284  Tracing route to 192.168.7.2 over a maximum of 30 hops:
285
286    1   0 ms      0 ms      0 ms      192.168.7.2
287
288  Trace complete.
289
290  C:\>tracert 8.8.8.8
291
292  Tracing route to 8.8.8.8 over a maximum of 30 hops:
293
294    1   0 ms      0 ms      0 ms      192.168.7.126
295    2   0 ms      0 ms      0 ms      8.8.8.8
296
297  Trace complete.
298
299  C:\>tracert 192.168.7.245
300
301  Tracing route to 192.168.7.245 over a maximum of 30 hops:
302
303    1   0 ms      0 ms      0 ms      192.168.7.126
304    2   0 ms      0 ms      0 ms      192.168.7.245
305
306  Trace complete.
307
308  C:\>tracert 192.168.7.249
309
310  Tracing route to 192.168.7.249 over a maximum of 30 hops:
311
312    1   0 ms      0 ms      0 ms      192.168.7.126
313    2   0 ms      *         0 ms      192.168.7.126
314    3   *         0 ms      *         Request timed out.
315    4   0 ms      *         0 ms      192.168.7.126
316    5   *         0 ms      *         Request timed out.
317    6   0 ms      *         0 ms      192.168.7.126
318    7   *         0 ms      *         Request timed out.
319    8   0 ms      *         0 ms      192.168.7.126
320    9   *         0 ms      *         Request timed out.
321   10   0 ms      *        11 ms      192.168.7.126
322   11   *         0 ms      *         Request timed out.
323   12   0 ms      *         0 ms      192.168.7.126
324   13   *         0 ms      *         Request timed out.
325   14   0 ms      *         0 ms      192.168.7.126
326   15   *         0 ms      *         Request timed out.
```

```
327    16    0 ms       *          0 ms     192.168.7.126
328    17    *          0 ms       *        Request timed out.
329    18    0 ms       *          0 ms     192.168.7.126
330    19    *          0 ms       *        Request timed out.
331    20    0 ms       *          0 ms     192.168.7.126
332    21    *          0 ms       *        Request timed out.
333    22   11 ms       *          0 ms     192.168.7.126
334    23    *          0 ms       *        Request timed out.
335    24    0 ms       *         11 ms     192.168.7.126
336    25    *          0 ms       *        Request timed out.
337    26    0 ms       *          0 ms     192.168.7.126
338    27    *          0 ms       *        Request timed out.
339    28    0 ms       *          0 ms     192.168.7.126
340    29    *          0 ms       *        Request timed out.
341    30    0 ms       *          0 ms     192.168.7.126
342
343  Trace complete.
344
345  C:\>tracert 192.168.7.190
346
347  Tracing route to 192.168.7.190 over a maximum of 30 hops:
348
349    1    0 ms       0 ms       0 ms     192.168.7.126
350    2    0 ms       0 ms       1 ms     192.168.7.190
351
352  Trace complete.
353
354  C:\>tracert 192.168.7.222
355
356  Tracing route to 192.168.7.222 over a maximum of 30 hops:
357
358    1   12 ms       0 ms       0 ms     192.168.7.126
359    2    0 ms       0 ms       0 ms     192.168.7.222
360
361  Trace complete.
362
363  C:\>tracert 192.168.7.253
364
365  Tracing route to 192.168.7.253 over a maximum of 30 hops:
366
367    1    0 ms       0 ms       0 ms     192.168.7.126
368    2    0 ms       0 ms       0 ms     192.168.7.253
369
370  Trace complete.
371
372  C:\>tracert 192.168.7.250
373
374  Tracing route to 192.168.7.250 over a maximum of 30 hops:
375
376    1    0 ms       0 ms       0 ms     192.168.7.126
377    2    0 ms       *          0 ms     192.168.7.126
378    3    *          0 ms       *        Request timed out.
379    4    0 ms       *          0 ms     192.168.7.126
380    5    *          0 ms       *        Request timed out.
381    6    0 ms       *          0 ms     192.168.7.126
382    7    *          0 ms       *        Request timed out.
383    8    0 ms       *          1 ms     192.168.7.126
384    9    *          0 ms       *        Request timed out.
385    10   0 ms       *          0 ms     192.168.7.126
386    11   *          0 ms       *        Request timed out.
387    12   0 ms       *          0 ms     192.168.7.126
388    13   *          0 ms       *        Request timed out.
389    14   0 ms       *          0 ms     192.168.7.126
390    15   *          0 ms       *        Request timed out.
391    16   0 ms       *          0 ms     192.168.7.126
392    17   *          0 ms       *        Request timed out.
393    18   0 ms       *          0 ms     192.168.7.126
394    19   *          0 ms       *        Request timed out.
395    20   0 ms       *          0 ms     192.168.7.126
396    21   *          0 ms       *        Request timed out.
397    22   0 ms       *          0 ms     192.168.7.126
398    23   *         11 ms       *        Request timed out.
399    24   0 ms       *          0 ms     192.168.7.126
```

```
400    25   *            0 ms        *            Request timed out.
401    26   0 ms         *           0 ms         192.168.7.126
402    27   *            0 ms        *            Request timed out.
403    28   0 ms         *           0 ms         192.168.7.126
404    29   *            0 ms        *            Request timed out.
405    30   0 ms         *           0 ms         192.168.7.126
406
407 Trace complete.
408
409 C:\>tracert 192.168.7.246
410
411 Tracing route to 192.168.7.246 over a maximum of 30 hops:
412
413    1    0 ms         0 ms        0 ms         192.168.7.246
414
415 Trace complete.
416
417 C:\>tracert 192.168.7.254
418
419 Tracing route to 192.168.7.254 over a maximum of 30 hops:
420
421    1    0 ms         1 ms        0 ms         192.168.7.254
422
423 Trace complete.
424
425 C:\>
```

Listing 2.7: HTTP-Server output

```
 1 System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)
 2 Copyright (c) 2000 by cisco Systems, Inc.
 3 PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
 4
 5 Readonly ROMMON initialized
 6
 7 Self decompressing the image :
 8 ######################### [OK]
 9
10               Restricted Rights Legend
11
12 Use, duplication, or disclosure by the Government is
13 subject to restrictions as set forth in subparagraph
14 (c) of the Commercial Computer Software - Restricted
15 Rights clause at FAR sec. 52.227-19 and subparagraph
16 (c) (1) (ii) of the Rights in Technical Data and Computer
17 Software clause at DFARS sec. 252.227-7013.
18
19              cisco Systems, Inc.
20              170 West Tasman Drive
21              San Jose, California 95134-1706
22
23
24
25 Cisco Internetwork Operating System Software
26 IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
27 Technical Support: http://www.cisco.com/techsupport
28 Copyright (c) 1986-2005 by cisco Systems, Inc.
29 Compiled Wed 27-Apr-04 19:01 by miwang
30
31 PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
32 .
33 Processor board ID PT0123 (0123)
34 PT2005 processor: part number 0, mask 01
35 Bridging software.
36 X.25 software, Version 3.0.0.
37 4 FastEthernet/IEEE 802.3 interface(s)
38 2 Low-speed serial(sync/async) network interface(s)
39 32K bytes of non-volatile configuration memory.
40 63488K bytes of ATA CompactFlash (Read/Write)
41
```

```
42   Press RETURN to get started!
43
44
45
46   Router>enable
47   Router#
48   Router#configure terminal
49   Enter configuration commands, one per line.  End with CNTL/Z.
50   Router(config)#interface FastEthernet5/0
51   Router(config-if)#ip address 192.168.7.249 255.255.255.252
52   Router(config-if)#no shutdown
53   Router(config-if)#
54   %LINK-5-CHANGED: Interface FastEthernet5/0, changed state to up
55
56   %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/0, changed state to up
57
58   Router(config-if)#exit
59   Router(config)#interface FastEthernet4/0
60   Router(config-if)#ip address 192.168.7.245 255.255.255.252
61   Router(config-if)#no shutdown
62   Router(config-if)#
63   %LINK-5-CHANGED: Interface FastEthernet4/0, changed state to up
64
65   %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0, changed state to up
66
67   Router(config-if)#exit
68   Router(config)#interface FastEthernet0/0
69   Router(config-if)#ip address 8.8.8.8 255.0.0.0
70   Router(config-if)#no shutdown
71   %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
72
73   %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
74   Router(config)#ip route 192.168.7.128 255.255.255.192 192.168.7.250
75   Router(config)#ip route 192.168.7.192 255.255.255.224 192.168.7.250
76   Router(config)#ip route 192.168.7.0 255.255.255.128 192.168.7.246
77   Router(config)#
78
79   Router>ping 192.168.7.129
80
81   Type escape sequence to abort.
82   Sending 5, 100-byte ICMP Echos to 192.168.7.129, timeout is 2 seconds:
83   !!!!!
84   Success rate is 100 percent (5/5), round-trip min/avg/max = 0/1/6 ms
85
86   Router>ping 192.168.7.130
87
88   Type escape sequence to abort.
89   Sending 5, 100-byte ICMP Echos to 192.168.7.130, timeout is 2 seconds:
90   !!!!!
91   Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
92
93   Router>ping 192.168.7.193
94
95   Type escape sequence to abort.
96   Sending 5, 100-byte ICMP Echos to 192.168.7.193, timeout is 2 seconds:
97   !!!!!
98   Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
99
100  Router>ping 192.168.7.194
101
102  Type escape sequence to abort.
103  Sending 5, 100-byte ICMP Echos to 192.168.7.194, timeout is 2 seconds:
104  !!!!!
105  Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms
106
107  Router>ping 192.168.7.1
108
109  Type escape sequence to abort.
110  Sending 5, 100-byte ICMP Echos to 192.168.7.1, timeout is 2 seconds:
111  .!!!!
112  Success rate is 80 percent (4/5), round-trip min/avg/max = 0/8/35 ms
113
114  Router>ping 192.168.7.2
```

```
115
116  Type escape sequence to abort.
117  Sending 5, 100-byte ICMP Echos to 192.168.7.2, timeout is 2 seconds:
118  !!!!!
119  Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
120
121  Router>ping 192.168.7.3
122
123  Type escape sequence to abort.
124  Sending 5, 100-byte ICMP Echos to 192.168.7.3, timeout is 2 seconds:
125  !!!!!
126  Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
127
128  Router>ping 192.168.7.190
129
130  Type escape sequence to abort.
131  Sending 5, 100-byte ICMP Echos to 192.168.7.190, timeout is 2 seconds:
132  !!!!!
133  Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
134
135  Router>ping 192.168.7.222
136
137  Type escape sequence to abort.
138  Sending 5, 100-byte ICMP Echos to 192.168.7.222, timeout is 2 seconds:
139  !!!!!
140  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
214   Type escape sequence to abort.
215   Tracing the route to 192.168.7.3
216
217     1   192.168.7.246   0 msec    0 msec    0 msec
218     2   192.168.7.3     0 msec    0 msec    0 msec
219   Router>traceroute 192.168.7.190
220   Type escape sequence to abort.
221   Tracing the route to 192.168.7.190
222
223     1   192.168.7.250   0 msec    0 msec    0 msec
224   Router>traceroute 192.168.7.222
225   Type escape sequence to abort.
226   Tracing the route to 192.168.7.222
227
228     1   192.168.7.250   0 msec    0 msec    0 msec
229   Router>traceroute 192.168.7.253
230   Type escape sequence to abort.
231   Tracing the route to 192.168.7.253
232
233     1   *       *       *
234     2   *       *       *
235     3   *       *       *
236     4   *       *       *
237     5   *       *       *
238     6   *       *       *
239     7   *       *       *
240     8   *       *       *
241     9   *       *       *
242    10   *       *       *
243    11   *       *       *
244    12   *       *       *
245    13   *       *       *
246    14   *       *       *
247    15   *       *       *
248    16   *       *       *
249    17   *       *       *
250    18   *       *       *
251    19   *       *       *
252    20   *       *       *
253    21   *       *       *
254    22   *       *       *
255    23   *       *       *
256    24   *       *       *
257    25   *       *       *
258    26   *       *       *
259    27   *       *       *
260    28   *       *       *
```

```
261    29    *       *       *
262    30    *       *       *
263  Router>traceroute 192.168.7.250
264  Type escape sequence to abort.
265  Tracing the route to 192.168.7.250
266
267    1   192.168.7.250   0 msec    0 msec    0 msec
268  Router>traceroute 192.168.7.126
269  Type escape sequence to abort.
270  Tracing the route to 192.168.7.126
271
272    1   192.168.7.246   0 msec    0 msec    0 msec
273  Router>traceroute 192.168.7.246
274  Type escape sequence to abort.
275  Tracing the route to 192.168.7.246
276
277    1   192.168.7.246   0 msec    0 msec    0 msec
278  Router>traceroute 192.168.7.254
279  Type escape sequence to abort.
280  Tracing the route to 192.168.7.254
281
282    1    *       *       *
283    2    *       *       *
284    3    *       *       *
285    4    *       *       *
286    5    *       *       *
287    6    *       *       *
288    7    *       *       *
289    8    *       *       *
290    9    *       *       *
291    10   *       *       *
292    11   *       *       *
293    12   *       *       *
294    13   *       *       *
295    14   *       *       *
296    15   *       *       *
297    16   *       *       *
298    17   *       *       *
299    18   *       *       *
300    19   *       *       *
301    20   *       *       *
302    21   *       *       *
303    22   *       *       *
304    23   *       *       *
305    24   *       *       *
306    25   *       *       *
307    26   *       *       *
308    27   *       *       *
309    28   *       *       *
310    29   *       *       *
311    30   *       *       *
312  Router>
```

Listing 2.8: Router 0 output

```
1   System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)
2   Copyright (c) 2000 by cisco Systems, Inc.
3   PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
4
5   Readonly ROMMON initialized
6
7   Self decompressing the image :
8   ######################### [OK]
9
10               Restricted Rights Legend
11
12  Use, duplication, or disclosure by the Government is
13  subject to restrictions as set forth in subparagraph
14  (c) of the Commercial Computer Software - Restricted
15  Rights clause at FAR sec. 52.227-19 and subparagraph
```

```
16  (c) (1) (ii) of the Rights in Technical Data and Computer
17  Software clause at DFARS sec. 252.227-7013.
18
19            cisco Systems, Inc.
20            170 West Tasman Drive
21            San Jose, California 95134-1706
22
23
24
25  Cisco Internetwork Operating System Software
26  IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
27  Technical Support: http://www.cisco.com/techsupport
28  Copyright (c) 1986-2005 by cisco Systems, Inc.
29  Compiled Wed 27-Apr-04 19:01 by miwang
30
31  PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
32  .
33  Processor board ID PT0123 (0123)
34  PT2005 processor: part number 0, mask 01
35  Bridging software.
36  X.25 software, Version 3.0.0.
37  4 FastEthernet/IEEE 802.3 interface(s)
38  2 Low-speed serial(sync/async) network interface(s)
39  32K bytes of non-volatile configuration memory.
40  63488K bytes of ATA CompactFlash (Read/Write)
41
42  Press RETURN to get started!
43
44
45
46  Router>enable
47  Router#
48  Router#configure terminal
49  Enter configuration commands, one per line.  End with CNTL/Z.
50  Router(config)#interface FastEthernet0/0
51  Router(config-if)#ip address 192.168.7.190 255.255.255.192
52  Router(config-if)#no shutdown
53  Router(config-if)#
54  %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
55
56  %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
57
58  Router(config-if)#exit
59  Router(config)#interface FastEthernet1/0
60  Router(config-if)#ip address 192.168.7.222 255.255.255.224
61  Router(config-if)#no shutdown
62  Router(config-if)#
63  %LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up
64
65  %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
66
67  Router(config-if)#exit
68  Router(config)#interface FastEthernet4/0
69  Router(config-if)#ip address 192.168.7.253 255.255.255.252
70  Router(config-if)#no shutdown
71  Router(config-if)#
72  %LINK-5-CHANGED: Interface FastEthernet4/0, changed state to up
73
74  %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet4/0, changed state to up
75
76  Router(config-if)#exit
77  Router(config)#interface FastEthernet5/0
78  Router(config-if)#ip address 192.168.7.250 255.255.255.252
79  Router(config-if)#no shutdown
80  Router(config-if)#
81  %LINK-5-CHANGED: Interface FastEthernet5/0, changed state to up
82
83  %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/0, changed state to up
84
85  Router(config)#
86  Router(config)#ip route 192.168.7.0 255.255.255.128 192.168.7.254
87  Router(config)#ip route 8.8.8.8 255.255.255.252 192.168.7.249
88
```

```
 89  Router>ping 192.168.7.129
 90
 91  Type escape sequence to abort.
 92  Sending 5, 100-byte ICMP Echos to 192.168.7.129, timeout is 2 seconds:
 93  .!!!!
 94  Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
 95
 96  Router>ping 192.168.7.130
 97
 98  Type escape sequence to abort.
 99  Sending 5, 100-byte ICMP Echos to 192.168.7.130, timeout is 2 seconds:
100  .!!!!
101  Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/1 ms
102
103  Router>ping 192.168.7.193
104
105  Type escape sequence to abort.
106  Sending 5, 100-byte ICMP Echos to 192.168.7.193, timeout is 2 seconds:
107  .!!!!
108  Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
109
110  Router>ping 192.168.7.194
111
112  Type escape sequence to abort.
113  Sending 5, 100-byte ICMP Echos to 192.168.7.194, timeout is 2 seconds:
114  .!!!!
115  Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
116
117  Router>ping 192.168.7.1
118
119  Type escape sequence to abort.
120  Sending 5, 100-byte ICMP Echos to 192.168.7.1, timeout is 2 seconds:
121  ..!!!
122  Success rate is 60 percent (3/5), round-trip min/avg/max = 0/0/0 ms
123
124  Router>ping 192.168.7.2
125
126  Type escape sequence to abort.
127  Sending 5, 100-byte ICMP Echos to 192.168.7.2, timeout is 2 seconds:
128  .!!!!
129  Success rate is 80 percent (4/5), round-trip min/avg/max = 0/1/5 ms
130
131  Router>ping 192.168.7.3
132
133  Type escape sequence to abort.
134  Sending 5, 100-byte ICMP Echos to 192.168.7.3, timeout is 2 seconds:
135  .!!!!
136  Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
137
138  Router>ping 8.8.8.8
139
140  Type escape sequence to abort.
141  Sending 5, 100-byte ICMP Echos to 8.8.8.8, timeout is 2 seconds:
142  .!!!!
143  Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
144
145  Router>ping 192.168.7.245
146
147  Type escape sequence to abort.
148  Sending 5, 100-byte ICMP Echos to 192.168.7.245, timeout is 2 seconds:
149  .....
150  Success rate is 0 percent (0/5)
151
152  Router>ping 192.168.7.249
153
154  Type escape sequence to abort.
155  Sending 5, 100-byte ICMP Echos to 192.168.7.249, timeout is 2 seconds:
156  !!!!!
157  Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
158
159  Router>ping 192.168.7.126
160
161  Type escape sequence to abort.
```

```
162  Sending 5, 100-byte ICMP Echos to 192.168.7.126, timeout is 2 seconds:
163  !!!!!
164  Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
165
166  Router>ping 192.168.7.246
167
168  Type escape sequence to abort.
169  Sending 5, 100-byte ICMP Echos to 192.168.7.246, timeout is 2 seconds:
170  .....
171  Success rate is 0 percent (0/5)
172
173  Router>traceroute 192.168.7.129
174  Type escape sequence to abort.
175  Tracing the route to 192.168.7.129
176
177    1   192.168.7.129   0 msec    0 msec    0 msec
178  Router>traceroute 192.168.7.130
179  Type escape sequence to abort.
180  Tracing the route to 192.168.7.130
181
182    1   192.168.7.130   0 msec    0 msec    0 msec
183  Router>traceroute 192.168.7.193
184  Type escape sequence to abort.
185  Tracing the route to 192.168.7.193
186
187    1   192.168.7.193   0 msec    0 msec    0 msec
188  Router>traceroute 192.168.7.194
189  Type escape sequence to abort.
190  Tracing the route to 192.168.7.194
191
192    1   192.168.7.194   0 msec    0 msec    0 msec
193  Router>traceroute 192.168.7.1
194  Type escape sequence to abort.
195  Tracing the route to 192.168.7.1
196
197    1   192.168.7.254   0 msec    0 msec    0 msec
198    2   192.168.7.1     0 msec    0 msec    0 msec
199  Router>traceroute 192.168.7.2
200  Type escape sequence to abort.
201  Tracing the route to 192.168.7.2
202
203    1   192.168.7.254   0 msec    0 msec    0 msec
204    2   192.168.7.2     0 msec    0 msec    0 msec
205  Router>traceroute 192.168.7.3
206  Type escape sequence to abort.
207  Tracing the route to 192.168.7.3
208
209    1   192.168.7.254   0 msec    0 msec    19 msec
210    2   192.168.7.3     0 msec    0 msec    0 msec
211  Router>traceroute 8.8.8.8
212  Type escape sequence to abort.
213  Tracing the route to 8.8.8.8
214
215    1   192.168.7.249   0 msec    0 msec    0 msec
216  Router>traceroute 192.168.7.245
217  Type escape sequence to abort.
218  Tracing the route to 192.168.7.245
219
220    1   *       *       *
221    2   *       *       *
222    3   *       *       *
223    4   *       *       *
224    5   *       *       *
225    6   *       *       *
226    7   *       *       *
227    8   *       *       *
228    9   *       *       *
229    10  *       *       *
230    11  *       *       *
231    12  *       *       *
232    13  *       *       *
233    14  *       *       *
234    15  *       *       *
```

```
235    16    *       *       *
236    17    *       *       *
237    18    *       *       *
238    19    *       *       *
239    20    *       *       *
240    21    *       *       *
241    22    *       *       *
242    23    *       *       *
243    24    *       *       *
244    25    *       *       *
245    26    *       *       *
246    27    *       *       *
247    28    *       *       *
248    29    *       *       *
249    30    *       *       *
250 Router>traceroute 192.168.7.249
251 Type escape sequence to abort.
252 Tracing the route to 192.168.7.249
253
254    1    192.168.7.249   0 msec    0 msec    0 msec
255 Router>traceroute 192.168.7.126
256 Type escape sequence to abort.
257 Tracing the route to 192.168.7.126
258
259    1    192.168.7.254   0 msec    0 msec    0 msec
260 Router>traceroute 192.168.7.246
261 Type escape sequence to abort.
262 Tracing the route to 192.168.7.246
263
264    1    *       *       *
265    2    *       *       *
266    3    *       *       *
267    4    *       *       *
268    5    *       *       *
269    6    *       *       *
270    7    *       *       *
271    8    *       *       *
272    9    *       *       *
273    10   *       *       *
274    11   *       *       *
275    12   *       *       *
276    13   *       *       *
277    14   *       *       *
278    15   *       *       *
279    16   *       *       *
280    17   *       *       *
281    18   *       *       *
282    19   *       *       *
283    20   *       *       *
284    21   *       *       *
285    22   *       *       *
286    23   *       *       *
287    24   *       *       *
288    25   *       *       *
289    26   *       *       *
290    27   *       *       *
291    28   *       *       *
292    29   *       *       *
293    30   *       *       *
294 Router>
```

Listing 2.9: Router 1 output

```
1 System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)
2 Copyright (c) 2000 by cisco Systems, Inc.
3 PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
4
5 Readonly ROMMON initialized
6
7 Self decompressing the image :
```

```
 8  ######################### [OK]
 9
10              Restricted Rights Legend
11
12  Use, duplication, or disclosure by the Government is
13  subject to restrictions as set forth in subparagraph
14  (c) of the Commercial Computer Software - Restricted
15  Rights clause at FAR sec. 52.227-19 and subparagraph
16  (c) (1) (ii) of the Rights in Technical Data and Computer
17  Software clause at DFARS sec. 252.227-7013.
18
19              cisco Systems, Inc.
20              170 West Tasman Drive
21              San Jose, California 95134-1706
22
23
24
25  Cisco Internetwork Operating System Software
26  IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
27  Technical Support: http://www.cisco.com/techsupport
28  Copyright (c) 1986-2005 by cisco Systems, Inc.
29  Compiled Wed 27-Apr-04 19:01 by miwang
30
31  PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
32  .
33  Processor board ID PT0123 (0123)
34  PT2005 processor: part number 0, mask 01
35  Bridging software.
36  X.25 software, Version 3.0.0.
37  4 FastEthernet/IEEE 802.3 interface(s)
38  2 Low-speed serial(sync/async) network interface(s)
39  32K bytes of non-volatile configuration memory.
40  63488K bytes of ATA CompactFlash (Read/Write)
41
42  Press RETURN to get started!
43
44
45
46  Router>enable
47  Router#
48  Router#configure terminal
49  Enter configuration commands, one per line.  End with CNTL/Z.
50  Router(config)#interface FastEthernet0/0
51  Router(config-if)#ip address 192.168.7.126 255.255.255.128
52  Router(config-if)#no shutdown
53  Router(config-if)#
54  %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
55
56  %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
57
58  Router(config-if)#exit
59  Router(config)#interface FastEthernet4/0
60  Router(config-if)#ip address 192.168.7.246 255.255.255.252
61  Router(config-if)#no shutdown
62  Router(config-if)#
63  Router(config-if)#exit
64  Router(config)#interface FastEthernet5/0
65  Router(config-if)#ip address 192.168.7.254 255.255.255.252
66  Router(config-if)#no shutdown
67  Router(config-if)#
68  %LINK-5-CHANGED: Interface FastEthernet5/0, changed state to up
69
70  %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/0, changed state to up
71  Router(config-if)#exit
72  Router(config)#
73  Router(config)#ip route 192.168.7.128 255.255.255.192 192.168.7.253
74  Router(config)#ip route 192.168.7.192 255.255.255.224 192.168.7.253
75  Router(config)#ip route 8.8.8.8 255.255.255.252 192.168.7.245
76  Router(config)#
77
78  Router>ping 192.168.7.129
79
80  Type escape sequence to abort.
```

```
81   Sending 5, 100-byte ICMP Echos to 192.168.7.129, timeout is 2 seconds:
82   !!!!!
83   Success rate is 100 percent (5/5), round-trip min/avg/max = 0/4/24 ms
84
85   Router>ping 192.168.7.130
86
87   Type escape sequence to abort.
88   Sending 5, 100-byte ICMP Echos to 192.168.7.130, timeout is 2 seconds:
89   !!!!!
90   Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
91
92   Router>ping 192.168.7.193
93
94   Type escape sequence to abort.
95   Sending 5, 100-byte ICMP Echos to 192.168.7.193, timeout is 2 seconds:
96   !!!!!
97   Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
98
99   Router>ping 192.168.7.194
100
101  Type escape sequence to abort.
102  Sending 5, 100-byte ICMP Echos to 192.168.7.194, timeout is 2 seconds:
103  !!!!!
104  Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
105
106  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
180     1   192.168.7.253   0 msec    0 msec     0 msec
181     2   192.168.7.129   0 msec    7 msec     0 msec
182   Router>traceroute 192.168.7.130
183   Type escape sequence to abort.
184   Tracing the route to 192.168.7.130
185
186     1   192.168.7.253   0 msec    0 msec     0 msec
187     2   192.168.7.130   7 msec    0 msec     0 msec
188   Router>traceroute 192.168.7.193
189   Type escape sequence to abort.
190   Tracing the route to 192.168.7.193
191
192     1   192.168.7.253   0 msec    0 msec     0 msec
193     2   192.168.7.193   0 msec    0 msec     0 msec
194   Router>traceroute 192.168.7.194
195   Type escape sequence to abort.
196   Tracing the route to 192.168.7.194
197
198     1   192.168.7.253   14 msec   0 msec    16 msec
199     2   192.168.7.194   0 msec    0 msec     0 msec
200   Router>traceroute 192.168.7.1
201   Type escape sequence to abort.
202   Tracing the route to 192.168.7.1
203
204     1   192.168.7.1     0 msec   14 msec    17 msec
205   Router>traceroute 192.168.7.2
206   Type escape sequence to abort.
207   Tracing the route to 192.168.7.2
208
209     1   192.168.7.2     0 msec    0 msec     0 msec
210   Router>traceroute 192.168.7.3
211   Type escape sequence to abort.
212   Tracing the route to 192.168.7.3
213
214     1   192.168.7.3     0 msec    0 msec     0 msec
215   Router>traceroute 8.8.8.8
216   Type escape sequence to abort.
217   Tracing the route to 8.8.8.8
218
219     1   192.168.7.245   0 msec    0 msec     0 msec
220   Router>traceroute 192.168.7.245
221   Type escape sequence to abort.
222   Tracing the route to 192.168.7.245
223
224     1   192.168.7.245   0 msec    0 msec     0 msec
225   Router>traceroute 192.168.7.249
226   Type escape sequence to abort.
```

```
227  Tracing the route to 192.168.7.249
228
229    1    *       *       *
230    2    *       *       *
231    3    *       *       *
232    4    *       *       *
233    5    *       *       *
234    6    *       *       *
235    7    *       *       *
236    8    *       *       *
237    9    *       *       *
238   10    *       *       *
239   11    *       *       *
240   12    *       *       *
241   13    *       *       *
242   14    *       *       *
243   15    *       *       *
244   16    *       *       *
245   17    *       *       *
246   18    *       *       *
247   19    *       *       *
248   20    *       *       *
249   21    *       *       *
250   22    *       *       *
251   23    *       *       *
252   24    *       *       *
253   25    *       *       *
254   26    *       *       *
255   27    *       *       *
256   28    *       *       *
257   29    *       *       *
258   30    *       *       *
259  Router>traceroute 192.168.7.190
260  Type escape sequence to abort.
261  Tracing the route to 192.168.7.190
262
263    1    192.168.7.253   0 msec    0 msec    0 msec
264  Router>traceroute 192.168.7.222
265  Type escape sequence to abort.
266  Tracing the route to 192.168.7.222
267
268    1    192.168.7.253   0 msec    0 msec    0 msec
269  Router>traceroute 192.168.7.253
270  Type escape sequence to abort.
271  Tracing the route to 192.168.7.253
272
273    1    192.168.7.253   0 msec    0 msec    0 msec
274  Router>traceroute 192.168.7.250
275  Type escape sequence to abort.
276  Tracing the route to 192.168.7.250
277
278    1    *       *       *
279    2    *       *       *
280    3    *       *       *
281    4    *       *       *
282    5    *       *       *
283    6    *       *       *
284    7    *       *       *
285    8    *       *       *
286    9    *       *       *
287   10    *       *       *
288   11    *       *       *
289   12    *       *       *
290   13    *       *       *
291   14    *       *       *
292   15    *       *       *
293   16    *       *       *
294   17    *       *       *
295   18    *       *       *
296   19    *       *       *
297   20    *       *       *
298   21    *       *       *
299   22    *       *       *
```

```
300     23    *    *    *
301     24    *    *    *
302     25    *    *    *
303     26    *    *    *
304     27    *    *    *
305     28    *    *    *
306     29    *    *    *
307     30    *    *    *
308  Router>
```

Listing 2.10: 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:

Chapter 4

Conclusions

As we could corroborate We can actually see that everything complies with what was required. PC0 can only reach blabla bla...

Appendix A

Appendix