START FROM SCRATCH

Overview

Your instructor has deleted the configuration on all lab routers except for the firewall/r6 router. Since the lab network is not functional, you will need to access your router by telnetting from xi.cs.fsu.edu to the firewall/r6 router at ITL1.cs.fsu.edu (128.186.121.88). Once logged in, you will need to connect using reverse telnet to access your router’s console port to get basic TCP/IP with RIP v1 working. To prove you have successfully completed this assignment, submit a copy of your router’s output to the following commands: “show running-config”, “show ip interface brief”, “show cdp neighbor”, and “show ip route”.

PART0 – Numbering Convention

Each router is numbered with a small integer. Networks that tie together two routers use a network number composed of the router numbers concatenated with the lower number first. Loopback addresses are numbered with the IP network consisting of the router ID repeated. On network between routers, the last octet of the IP address is the same as the router. On serial connections between routers, the higher numbered router is always the
PART 1 – Out-Of-Band Login

Begin by logging into xi.cs.fsu.edu from a computer on a functional computer network. From xi.cs.fsu.edu, you can telnet to IT1.cs.fsu.edu (128.186.121.88). Once logged in, type the name of your router such as “r1”. Aliases are defined to connect to the appropriate console port. Routers “r1” thru “r5” correspond to lines “1” thru “5” respectively. If this does not work, you may need to enable security level 2 and clear the line manually with the command “clear line X” where X is the appropriate line. Once connected to your router, you may need to press control-C to abort an auto configuration dialog and hit return:

```
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>xi% telnet it11</td>
<td>Trying 128.186.121.88... Connected to it11. Escape character is ‘^]’. User Access Verification Password: fw/r6&gt;enable 2 Password: fw/r6#clear line 1 [confirm]y [OK] fw/r6#r1 Trying r1 (128.186.121.88, 2001)... Open User Access Verification Password: Router&gt;en Password: Router#</td>
</tr>
</tbody>
</table>
```

Use “enable” to put your router in privileged mode to allow you to make changes. Go into configuration mode and add the basic configuration information as shown below. Configuration mode is entered with the command “config term” and exited with control-Z. Notice how the prompt changes to indicate the router mode. The command “show run” displays the running configuration. “term length 24” will make the router page every 24 lines, while “term length 0” will inhibit paging. The running configuration on a router whose configuration has been erased is shown below.

```
Router>enable Router#term len 24 Router#show running-config Building configuration... Current configuration: ! version 11.1 service udp-small-servers service tcp-small-servers ! hostname Router ! ... |
```
PART2 – Enter the routine configuration.

There are some configuration parts that will be common to all routers. In this example, we are adding three passwords:
- enable password (like a superuser password)
- console password (used when logging in via RS232 console)
- vty password (used when accessed via TELNET)

Two other handy commands are “no ip domain-lookup” to prevent the router from trying to lookup any typos with DNS, and “exec-timeout 0 0” which disables a login port from logging you out automatically.

Router# config term
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# enable password cisco
Router(config)# hostname r1 ----------- USE APPROPRIATE ROUTER NAME
r1(config)# enable password cisco
r1(config)# no ip domain-lookup
r1(config)# line con 0
r1(config-line)# password cisco
r1(config-line)# login
r1(config-line)# exec-timeout 0 0
r1(config-line)# line vty 0 4
r1(config-line)# password cisco
r1(config-router)# ^Z
r1#
%SYS-5-CONFIG_I: Configured from console by console

Here is the plain text that you should be able to copy/paste:

   enable password cisco
   no ip domain-lookup
   line con 0
     password cisco
   login
     exec-timeout 0 0
   line vty 0 4
     password cisco

PART3 – Enter the router specific configuration.

Now enter the specific configuration for your router as appropriate below. I have included the “no shutdown” command because interfaces are left in a shutdown state by default.

R1:
   int loopback0
     ip address 192.168.11.1 255.255.255.0
no shutdown
int serial1/2
  ip address 192.168.12.1 255.255.255.0
  no shutdown
int serial 1/3
  ip address 192.168.13.1 255.255.255.0
  no shutdown
int ethernet 2/0
  ip address 192.168.10.1 255.255.255.0
  no shutdown
int ethernet 2/1
  ip address 192.168.20.1 255.255.255.0
  no shutdown
int ethernet 2/2
  ip address 192.168.30.1 255.255.255.0
  no shutdown
int ethernet 2/3
  ip address 192.168.40.1 255.255.255.0
  no shutdown
int ethernet 2/4
  ip address 192.168.50.1 255.255.255.0
  no shutdown
int ethernet 2/5
  ip address 192.168.60.1 255.255.255.0
  no shutdown
router rip
  network 192.168.10.0
  network 192.168.20.0
  network 192.168.30.0
  network 192.168.40.0
  network 192.168.50.0
  network 192.168.60.0
  network 192.168.12.0
  network 192.168.13.0
  network 192.168.11.0

R2:
  int loopback0
    ip address 192.168.22.2 255.255.255.0
    no shutdown
  int serial1/1
    ip address 192.168.12.2 255.255.255.0
    clock rate 2000000
    no shutdown
  int serial 1/3
    ip address 192.168.23.2 255.255.255.0
    no shutdown
  int serial 1/4
    ip address 192.168.24.2 255.255.255.0
    no shutdown
  router rip
    network 192.168.12.0
    network 192.168.22.0
    network 192.168.23.0
    network 192.168.24.0

R3:
  int loopback0
    ip address 192.168.33.3 255.255.255.0
    no shutdown
  int serial1/1
    ip address 192.168.13.3 255.255.255.0
    clock rate 2000000
no shutdown
int serial 1/2
  ip address 192.168.23.3 255.255.255.0
  clock rate 2000000
  no shutdown
int serial 1/4
  ip address 192.168.34.3 255.255.255.0
  no shutdown
int serial 1/6
  ip address 192.168.36.3 255.255.255.0
  no shutdown
router rip
  network 192.168.13.0
  network 192.168.23.0
  network 192.168.33.0
  network 192.168.34.0
  network 192.168.36.0

R4:
int loopback0
  ip address 192.168.44.4 255.255.255.0
  no shutdown
int serial1/2
  ip address 192.168.24.4 255.255.255.0
  clock rate 2000000
  no shutdown
int serial1/3
  ip address 192.168.34.4 255.255.255.0
  clock rate 2000000
  no shutdown
int fddi0/0
  ip address 192.168.45.4 255.255.255.0
  no shutdown
router rip
  network 192.168.24.0
  network 192.168.34.0
  network 192.168.44.0
  network 192.168.45.0

R5:
int loopback0
  ip address 192.168.55.5 255.255.255.0
  no shutdown
int FDDIO
  ip address 192.168.45.5 255.255.255.0
  no shutdown
int fastethernet 0
  ip address 192.168.70.1 255.255.255.0
  media-type 100baseX
  no shutdown
int ethernet 0
  ip address 192.168.80.1 255.255.255.0
  media-type 10baseT
  no shutdown
int ethernet 1
  ip address 192.168.90.1 255.255.255.0
  media-type 10baseT
  no shutdown
router rip
  network 192.168.45.0
  network 192.168.55.0
  network 192.168.70.0
  network 192.168.80.0
PART 4 - Test the network.

By default, Cisco routers send out Cisco Discovery Protocol (CDP) packets. As your router hears CDP packets, it maintains a table of adjacent devices. Display your CDP neighbors with the command “show cdp neighbor”. You should see a listing like this if all is working correctly.

```
r1#show cdp nei
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater

    Device ID        Local Intrfce     Holdtime    Capability Platform Port ID
  r2               Ser 1/2        179           R        RP1       Ser 1/1
  r3               Ser 1/3        149           R        RP1       Ser 1/1
  cat1             Eth 2/5        172           T S       WS-C3524-XFas 0/6
  cat1             Eth 2/4        172           T S       WS-C3524-XFas 0/5
  cat1             Eth 2/3        171           T S       WS-C3524-XFas 0/4
  cat1             Eth 2/2        171           T S       WS-C3524-XFas 0/3
  cat1             Eth 2/1        171           T S       WS-C3524-XFas 0/2
  cat1             Eth 2/0        171           T S       WS-C3524-XFas 0/1

r2#show cdp nei
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater

    Device ID        Local Intrfce     Holdtime    Capability Platform Port ID
  r3               Ser 1/3        135           R        RP1       Ser 1/2
  r1               Ser 1/1        164           R        RP1       Ser 1/2
  r4               Ser 1/4        144           R        RP1       Ser 1/2

r3#show cdp nei
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater

    Device ID        Local Intrfce     Holdtime    Capability Platform Port ID
  r2               Ser 1/2        151           R        RP1       Ser 1/3
  r1               Ser 1/1        150           R        RP1       Ser 1/3
  r4               Ser 1/4        129           R        RP1       Ser 1/3
  fw/r6           Ser 1/6        136           R        2511       Ser 1

r4#show cdp nei
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater

    Device ID        Local Intrfce     Holdtime    Capability Platform Port ID
```
<table>
<thead>
<tr>
<th>r2</th>
<th>Ser 1/2</th>
<th>139</th>
<th>R</th>
<th>RP1</th>
<th>Ser 1/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>r3</td>
<td>Ser 1/3</td>
<td>169</td>
<td>R</td>
<td>RP1</td>
<td>Ser 1/4</td>
</tr>
<tr>
<td>r5</td>
<td>Fddi0/0</td>
<td>124</td>
<td>R</td>
<td>4500</td>
<td>Fddi0</td>
</tr>
</tbody>
</table>

```
r5#show cdp nei
```
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
S - Switch, H - Host, I - IGMP, r - Repeater

<table>
<thead>
<tr>
<th>Device ID</th>
<th>Local Intf</th>
<th>Holdtme</th>
<th>Capability</th>
<th>Platform</th>
<th>Port ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>r4</td>
<td>Fddi0</td>
<td>153</td>
<td>R</td>
<td>RP1</td>
<td>Fddi0/0</td>
</tr>
<tr>
<td>cat1</td>
<td>Eth 1</td>
<td>168</td>
<td>T S</td>
<td>WS-C3524-XFas</td>
<td>0/9</td>
</tr>
<tr>
<td>cat1</td>
<td>Eth 0</td>
<td>167</td>
<td>T S</td>
<td>WS-C3524-XFas</td>
<td>0/8</td>
</tr>
<tr>
<td>cat1</td>
<td>Fas 0</td>
<td>167</td>
<td>T S</td>
<td>WS-C3524-XFas</td>
<td>0/7</td>
</tr>
</tbody>
</table>

```
fw/r6#show cdp nei
```
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
S - Switch, H - Host, I - IGMP, r - Repeater

<table>
<thead>
<tr>
<th>Device ID</th>
<th>Local Intf</th>
<th>Holdtme</th>
<th>Capability</th>
<th>Platform</th>
<th>Port ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>r3</td>
<td>Ser 1</td>
<td>136</td>
<td>R</td>
<td>RP1</td>
<td>Ser 1/6</td>
</tr>
<tr>
<td>c2900.cs.fsu.edu</td>
<td>Eth 0</td>
<td>179</td>
<td>S</td>
<td>WS-C2924M-Fas</td>
<td>0/2</td>
</tr>
</tbody>
</table>

You can display the status of your interfaces with “show ip int brief” for an abbreviated listing, or “show ip int” for a detailed listing. If everything is working, you should have a status of “interface up and line protocol up” on the active interfaces. If you see the status as “administratively down”, it means that your interface is shutdown which can be fixed with a “no shutdown” command issued under the appropriate interface. It is normal for interfaces not used in this lab to be in the default “shutdown” state.

```
r1#show ip int brief
```

<table>
<thead>
<tr>
<th>Interface</th>
<th>IP-Address</th>
<th>OK? Method</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fddi0/0</td>
<td>unassigned</td>
<td>YES unset</td>
<td>administratively down down</td>
</tr>
<tr>
<td>Serial1/0</td>
<td>unassigned</td>
<td>YES unset</td>
<td>administratively down down</td>
</tr>
<tr>
<td>Serial1/1</td>
<td>unassigned</td>
<td>YES unset</td>
<td>administratively down down</td>
</tr>
<tr>
<td>Serial1/2</td>
<td>192.168.12.1</td>
<td>YES manual</td>
<td>up</td>
</tr>
<tr>
<td>Serial1/3</td>
<td>192.168.13.1</td>
<td>YES manual</td>
<td>up</td>
</tr>
<tr>
<td>Serial1/4</td>
<td>unassigned</td>
<td>YES unset</td>
<td>administratively down down</td>
</tr>
<tr>
<td>Serial1/5</td>
<td>unassigned</td>
<td>YES unset</td>
<td>administratively down down</td>
</tr>
<tr>
<td>Serial1/6</td>
<td>unassigned</td>
<td>YES unset</td>
<td>administratively down down</td>
</tr>
<tr>
<td>Serial1/7</td>
<td>unassigned</td>
<td>YES unset</td>
<td>administratively down down</td>
</tr>
<tr>
<td>Ethernet2/0</td>
<td>192.168.10.1</td>
<td>YES manual</td>
<td>up</td>
</tr>
<tr>
<td>Ethernet2/1</td>
<td>192.168.20.1</td>
<td>YES manual</td>
<td>up</td>
</tr>
<tr>
<td>Ethernet2/2</td>
<td>192.168.30.1</td>
<td>YES manual</td>
<td>up</td>
</tr>
<tr>
<td>Ethernet2/3</td>
<td>192.168.40.1</td>
<td>YES manual</td>
<td>up</td>
</tr>
<tr>
<td>Ethernet2/4</td>
<td>192.168.50.1</td>
<td>YES manual</td>
<td>up</td>
</tr>
<tr>
<td>Ethernet2/5</td>
<td>192.168.60.1</td>
<td>YES manual</td>
<td>up</td>
</tr>
<tr>
<td>Loopback0</td>
<td>192.168.11.1</td>
<td>YES manual</td>
<td>up</td>
</tr>
</tbody>
</table>

```
r1#show int ethernet2/0
```

Ethernet2/0 is up, line protocol is up

Hardware is cxBus Ethernet, address is 0000.0c39.dfc4 (bia 0000.0c39.dfc4)
Internet address is 192.168.10.1/24
MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
Encapsulation ARPA, loopback not set, keepalive set (10 sec)
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:05, output 00:00:05, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
Verify that everything is working by trying to PING each router IP address from both your router and PC. By default, Ping will send 5 ICMP echo packets. If the destination responds, exclamation marks “!” are displayed, otherwise a timeout is indicated by a period “.” Try using the TRACEROUTE utility to trace the path to the other routers. Both the Ping and TRACEROUTE commands can be entered without the destination argument to give you extended option choices such as changing the packet size, number of packets, source interface, etc.

```
r1#ping 192.168.11.1
Sending 5, 100-byte ICMP Echoes to 192.168.11.1, timeout is 2 seconds:
!!!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
r1#ping 192.168.22.2
Sending 5, 100-byte ICMP Echoes to 192.168.22.2, timeout is 2 seconds:
!!!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
r1#ping 192.168.33.3
Sending 5, 100-byte ICMP Echoes to 192.168.33.3, timeout is 2 seconds:
!!!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
r1#ping 192.168.44.4
Sending 5, 100-byte ICMP Echoes to 192.168.44.4, timeout is 2 seconds:
!!!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/6/8 ms
r1#ping 192.168.55.5
Sending 5, 100-byte ICMP Echoes to 192.168.55.5, timeout is 2 seconds:
!!!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/5/8 ms
r1#traceroute 192.168.55.5
Type escape sequence to abort.
Tracing the route to 192.168.55.5
  1 192.168.13.2  0 msec
  2 192.168.12.2  0 msec
  3 192.168.13.2  0 msec
  1 192.168.24.4  8 msec
  2 192.168.34.2  4 msec
  3 192.168.24.4  4 msec
  1 192.168.45.5  4 msec *  0 msec
```

Display the routing table with “show ip route” and verify you have a route to each IP network.
r3#show ip route
Codes:  C - connected,  S - static,  I - IGRP,  R - RIP,  M - mobile,  B - BGP
       D - EIGRP,  EX - EIGRP external,  O - OSPF,  IA - OSPF inter area
       E1 - OSPF external type 1,  E2 - OSPF external type 2,  E - EGP
       i - IS-IS,  L1 - IS-IS level-1,  L2 - IS-IS level-2,
* - candidate default,  U - per-user static route
Gateway of last resort is 192.168.36.6 to network 0.0.0.0
R    192.168.70.0/24 [120/2] via 192.168.34.2, 00:00:24, Serial1/4
R    192.168.90.0/24 [120/2] via 192.168.34.2, 00:00:24, Serial1/4
R    192.168.80.0/24 [120/2] via 192.168.34.2, 00:00:25, Serial1/4
R    192.168.40.0/24 [120/1] via 192.168.13.1, 00:00:00, Serial1/1
R    192.168.44.0/24 [120/1] via 192.168.34.2, 00:00:25, Serial1/4
R    192.168.45.0/24 [120/1] via 192.168.34.2, 00:00:25, Serial1/4
C    192.168.33.0/24 is directly connected, Loopback0
C    192.168.34.0/24 is directly connected, Serial1/4
...

When you have everything working, save the configuration.  Cisco routers have both a running configuration and startup configuration.  Issue the command:
“copy running-config startup-config” to save your configuration in non-volatile memory so it will retain the configuration upon rebooting.  You should also capture your configuration to a text file on your PC using your terminal emulator’s logging function.  The command “show running-config” will display the config to your screen.  To prevent the screen from paging every 24 lines, you may want to first set the terminal length to zero, display the config, then set it back to 24 lines.

Router# term length 0
Router# show running-config
...lots of config displayed here...
Router# term length 24