Práctica 2 – Redes de computadores

Práctica 2 – Cisco Packet Tracer

Práctica realizada por Marcos Barranquero, a día 05/03/2018

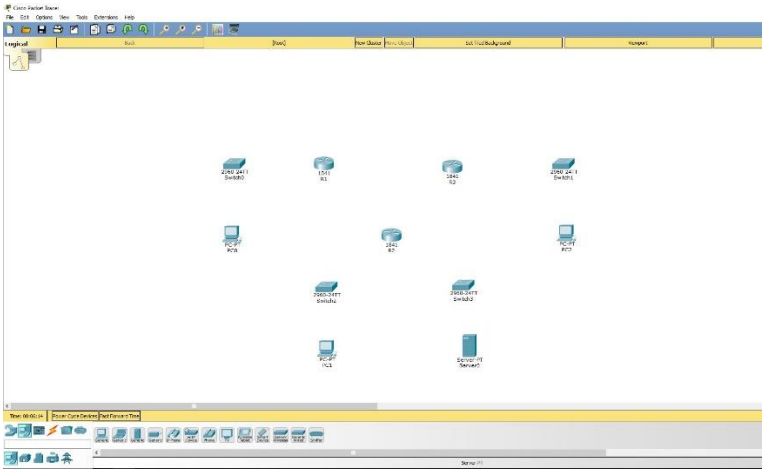
Con objetivo de realizar el mapa de red funcional de la actividad, he dividido mi recreación en varios pasos:

Nota:

A última hora me he percatado de que había contado con 3 bits la red de 7 host, cuando deberían de ser 4 bits. He corregido las tablas del documento Word y la práctica con el programa de cisco, pero NO he corregido las capturas de pantalla.

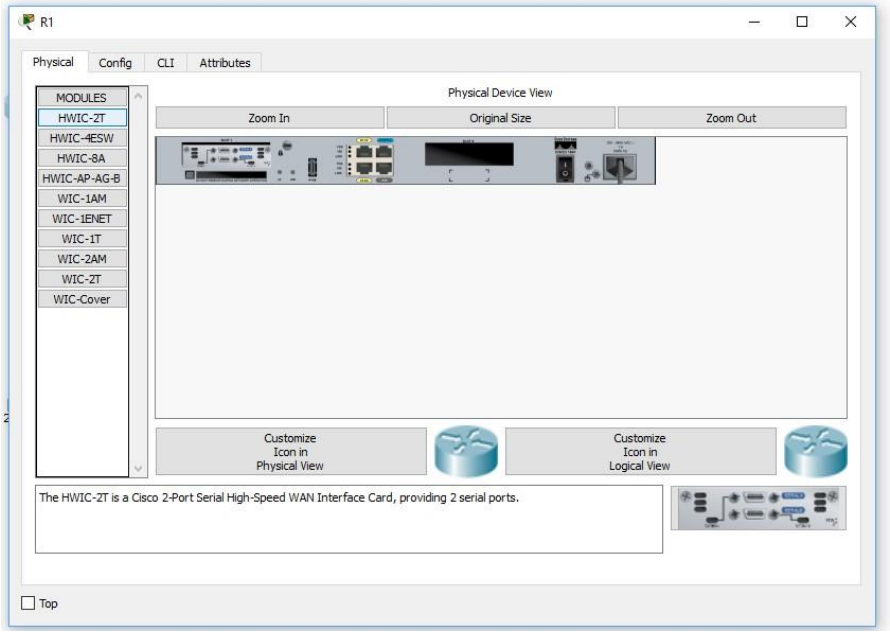
Paso 1:

Ubicaremos todos los elementos de nuestra red en el diagrama:

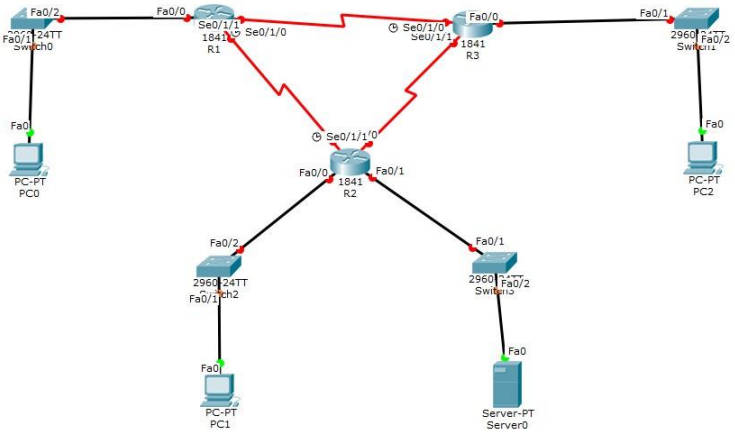


Paso 2:

Uniremos por red todos los elementos. Para unir todos los ruters por conexión DCE (SerialPort) como muestra la imagen de la actividad, tendremos que apagarlos, añadir un módulo que soporte puerto serie en cada uno de ellos (HWIC-2T), y volver a encenderlos.



Tras la conexión de todos los elementos nos quedará un diagrama así:



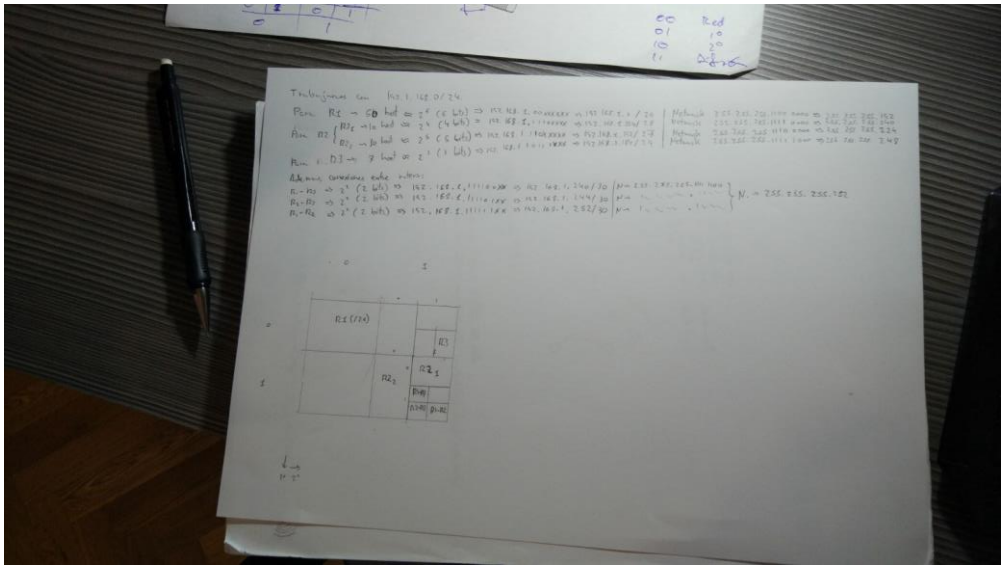
Paso 3:

Ahora debemos decidir qué direcciones IP asignar a cada router, de red, de pc's, etc.

Sabemos que debemos usar el rango 192.168.1.0/24 y tenemos la siguiente información:

Redes de área local (LAN)		
Router	**Interfaz del router**	**Número de hosts previsto**
R1	Fa0/0	60
R2	Fa0/0	10
	Fa0/1	30
R3	Fa0/0	7

Para hallar IP's válidas utilizo un cuadro de bits que me permite dividir la red de forma cómoda:



Paso 4:

Una vez realizada la lógica, tan solo tenemos que asignar correctamente las IP's a los ruters y sistemas terminales.

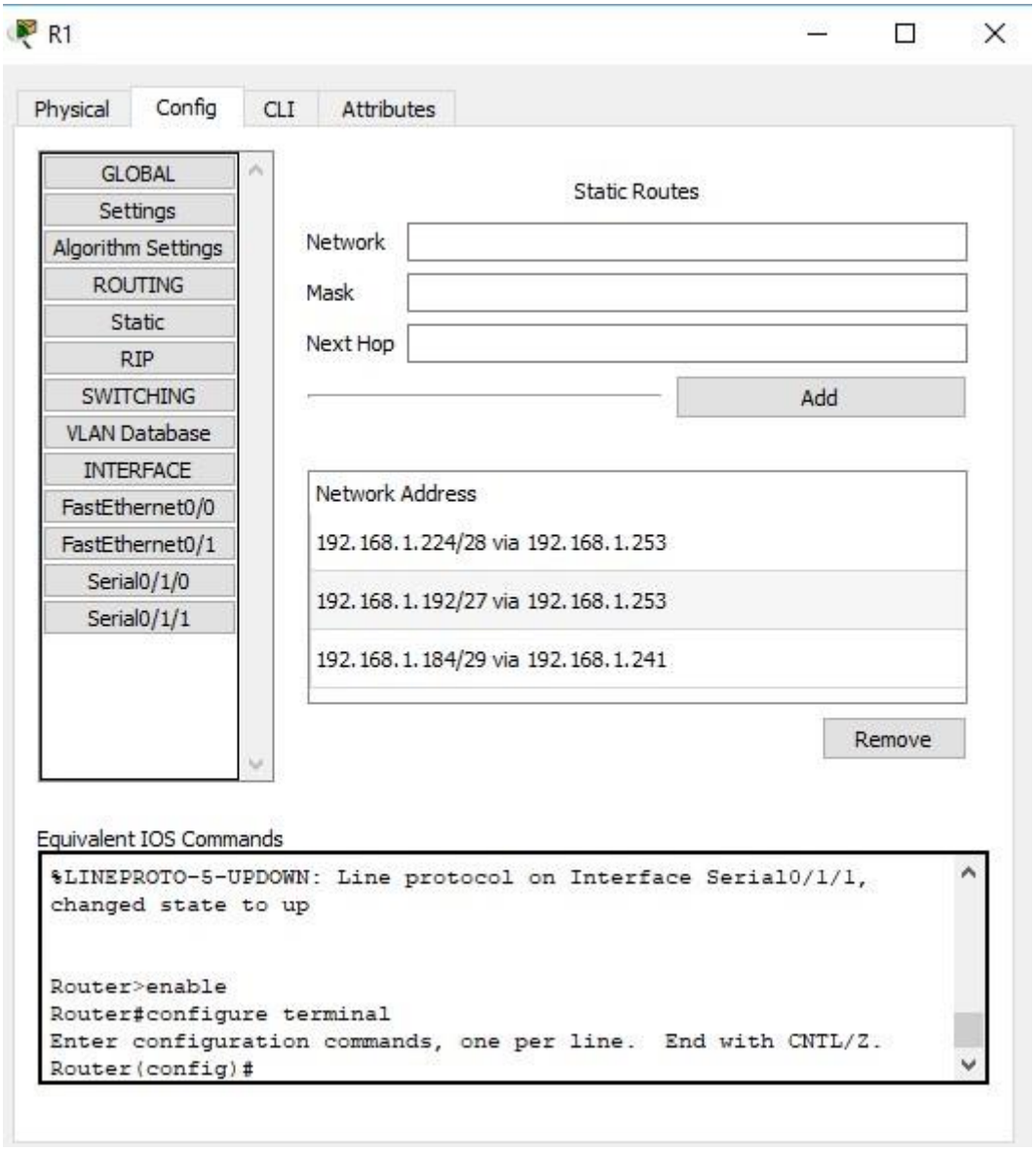
Host / Ruter	IP	Red	Netmask	Conexión/Gateway
PC0	192.168.1.2	192.168.1.0	255.255.255.192	192.168.1.1
R1	192.168.1.1	192.168.1.0	255.255.255.192	FastEthernet0/0
R1	192.168.1.254	192.168.1.252	255.255.255.252	SerialPort 0/1/0
R2	192.168.1.253	192.168.1.252	255.255.255.252	SerialPort 0/1/0
R2	192.168.1.225	192.168.1.224	255.255.255.240	FastEthernet 0/0
R2	192.168.1.193	192.168.1.192	255.255.255.224	FastEthernet 0/1
PC1	192.168.1.226	192.168.1.224	255.255.255.240	192.168.1.225
Server0	192.168.1.194	192.168.1.192	255.255.255.224	192.168.1.193
R2	192.168.1.245	192.168.1.244	255.255.255.252	SerialPort 0/1/1
R3	192.168.1.246	192.168.1.244	255.255.255.252	SerialPort 0/1/0
R3	192.168.1.177	192.168.1.176	255.255.255.240	FastEthernet 0/0
PC2	192.168.1.178	192.168.1.176	255.255.255.240	192.168.1.177
R3	192.168.1.241	192.168.1.240	255.255.255.252	SerialPort 0/1/1
R1	192.168.1.242	192.168.1.240	255.255.255.252	SerialPort 0/1/1

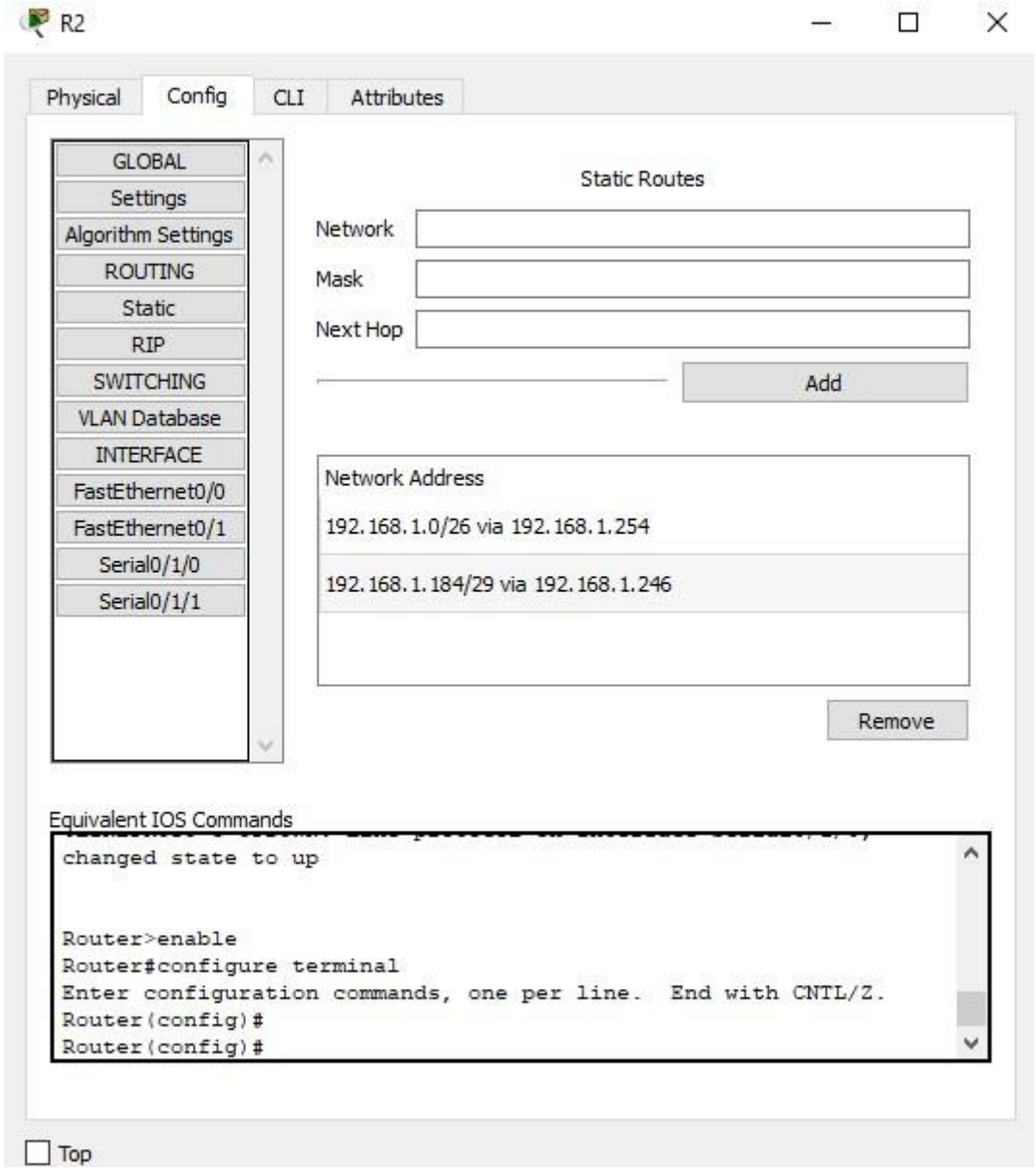
Las filas rojas indican conexiones entre ruters, mientras que las azules indican conexiones internas.

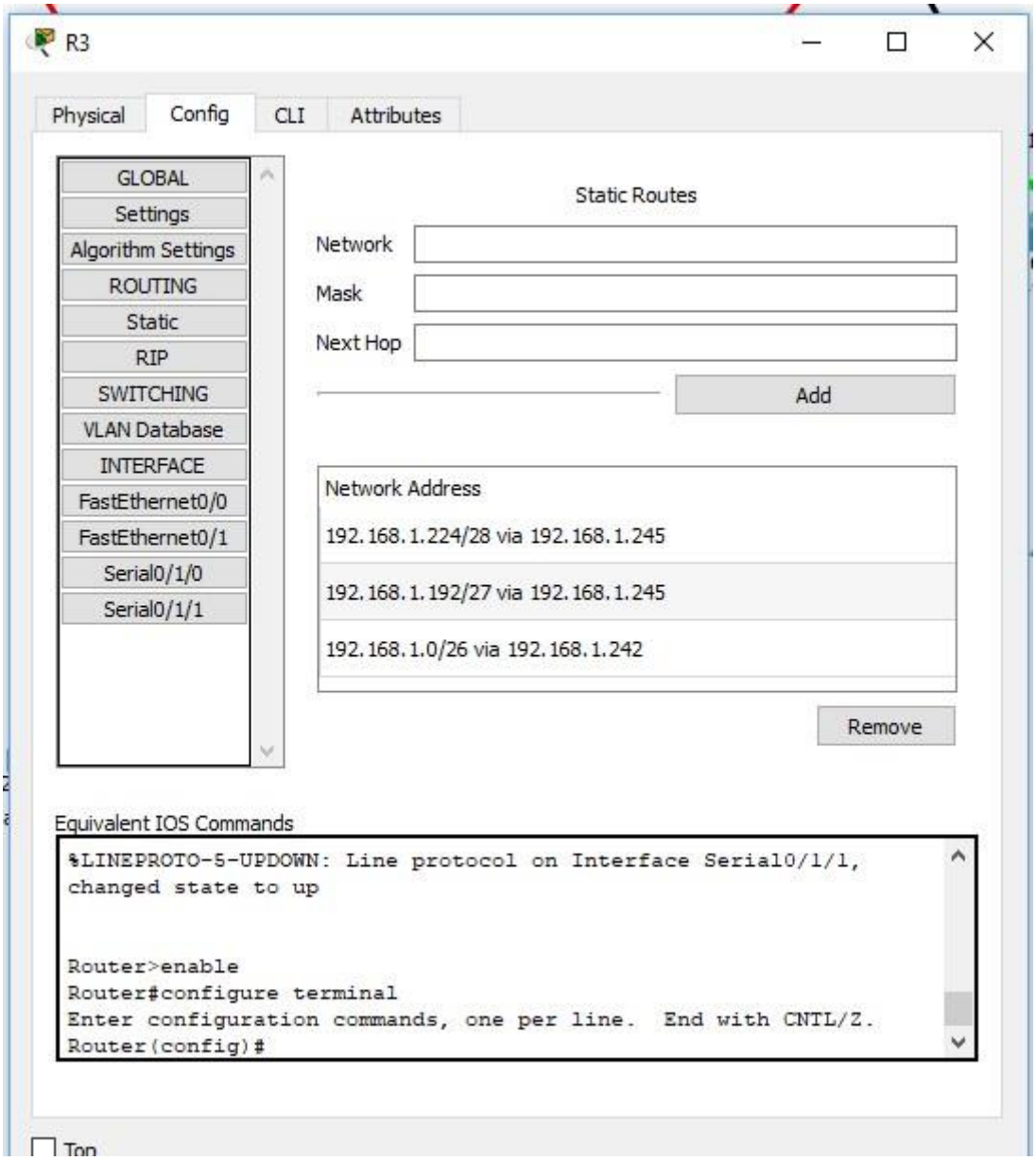
Insertando todas estas direcciones en cada elemento, conseguimos comunicar toda la red.

Paso 5:

Una vez asignadas las IPs, tenemos que completar la tabla de routing de cada ruter. Para ello, indicaremos que para alcanzar una red con una netmask concreta, se deberá enviar el paquete por un ruter concreto. Así, nos quedan estas tablas de routing:

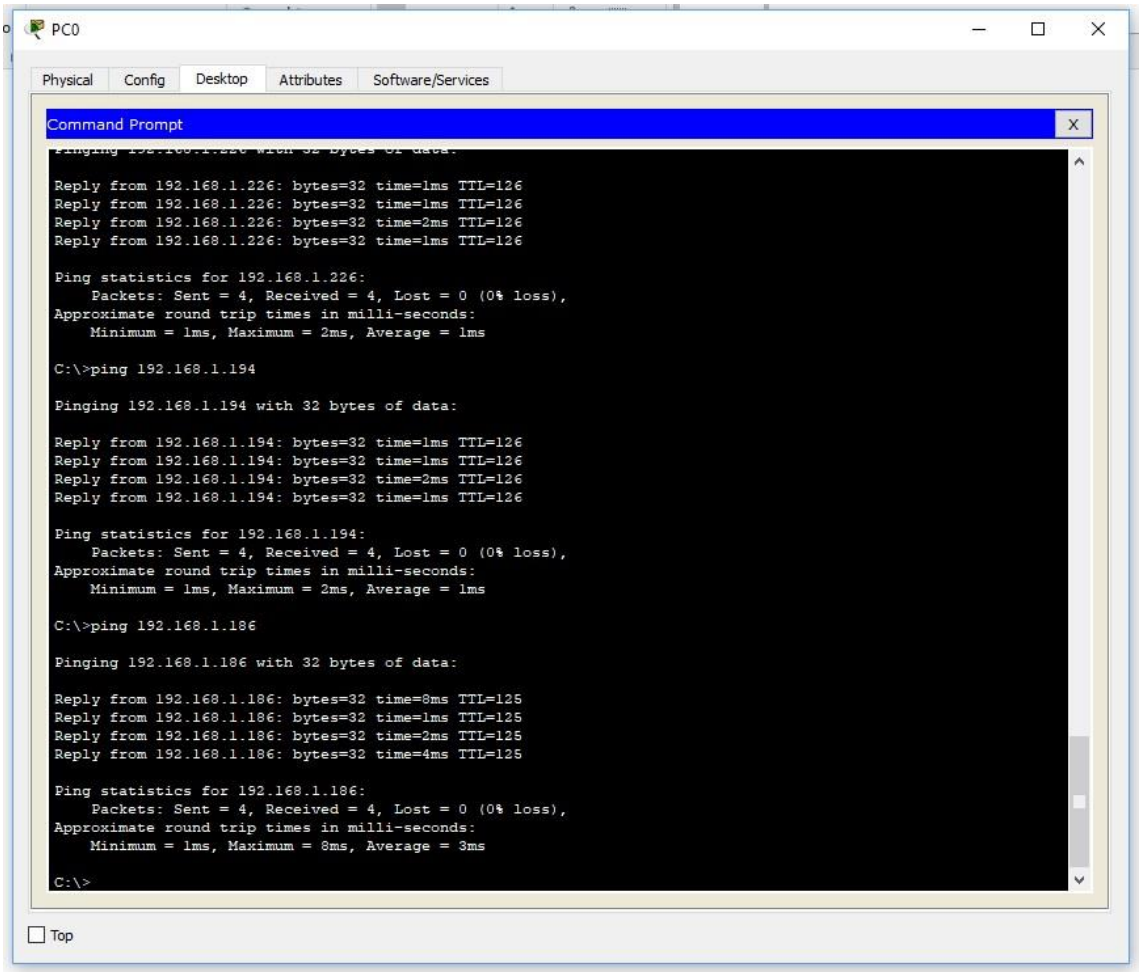

R1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1
Static Routes
Network
Mask
Next Hop
Add
Network Address
192.168.1.224/28 via 192.168.1.253
192.168.1.192/27 via 192.168.1.253
192.168.1.184/29 via 192.168.1.241
Remove
Equivalent IOS Commands
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1,
changed state to up
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#

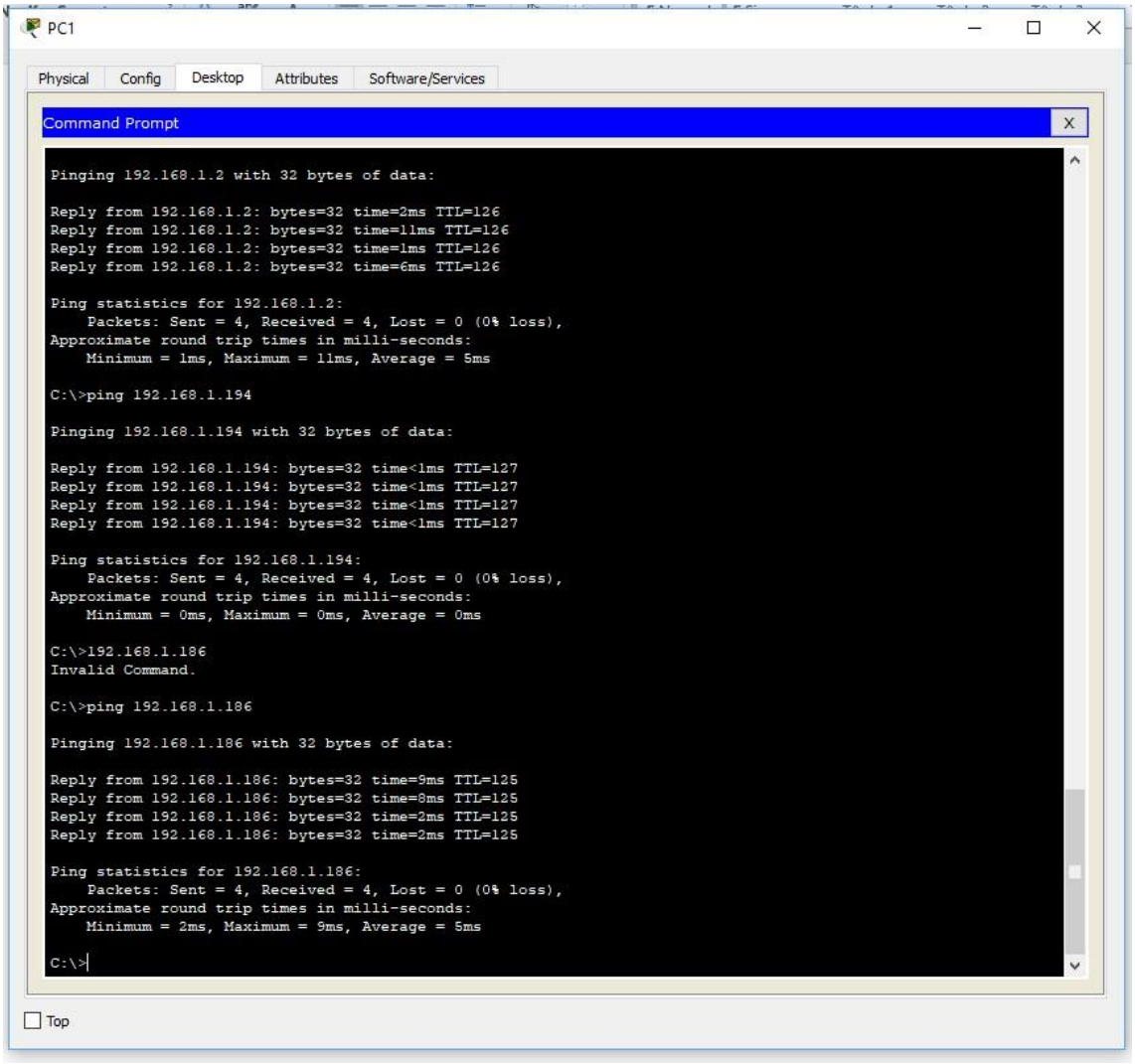

R2
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1
Static Routes
Network
Mask
Next Hop
Add
Network Address
192.168.1.0/26 via 192.168.1.254
192.168.1.184/29 via 192.168.1.246
Remove
Equivalent IOS Commands
changed state to up
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Top

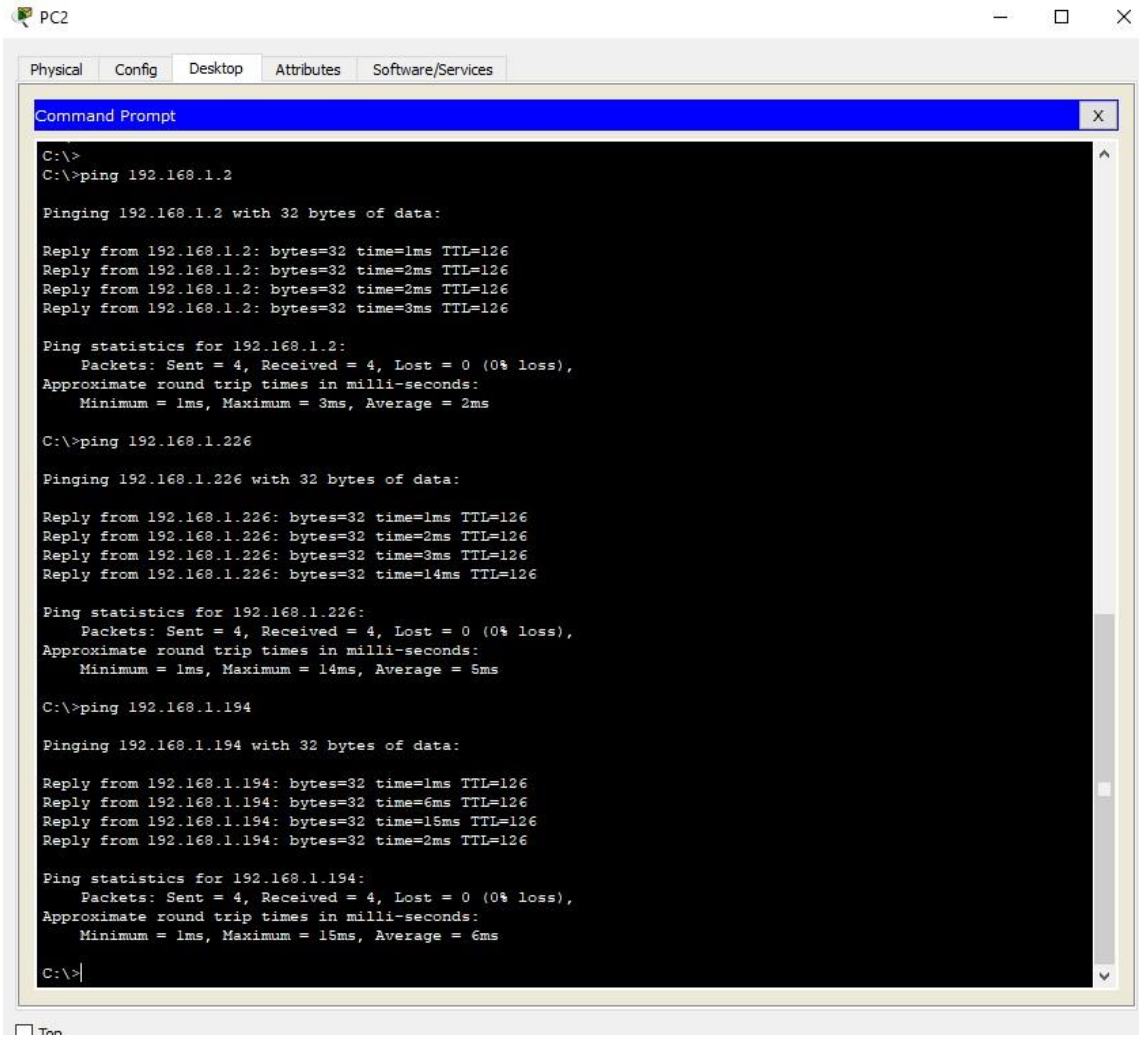


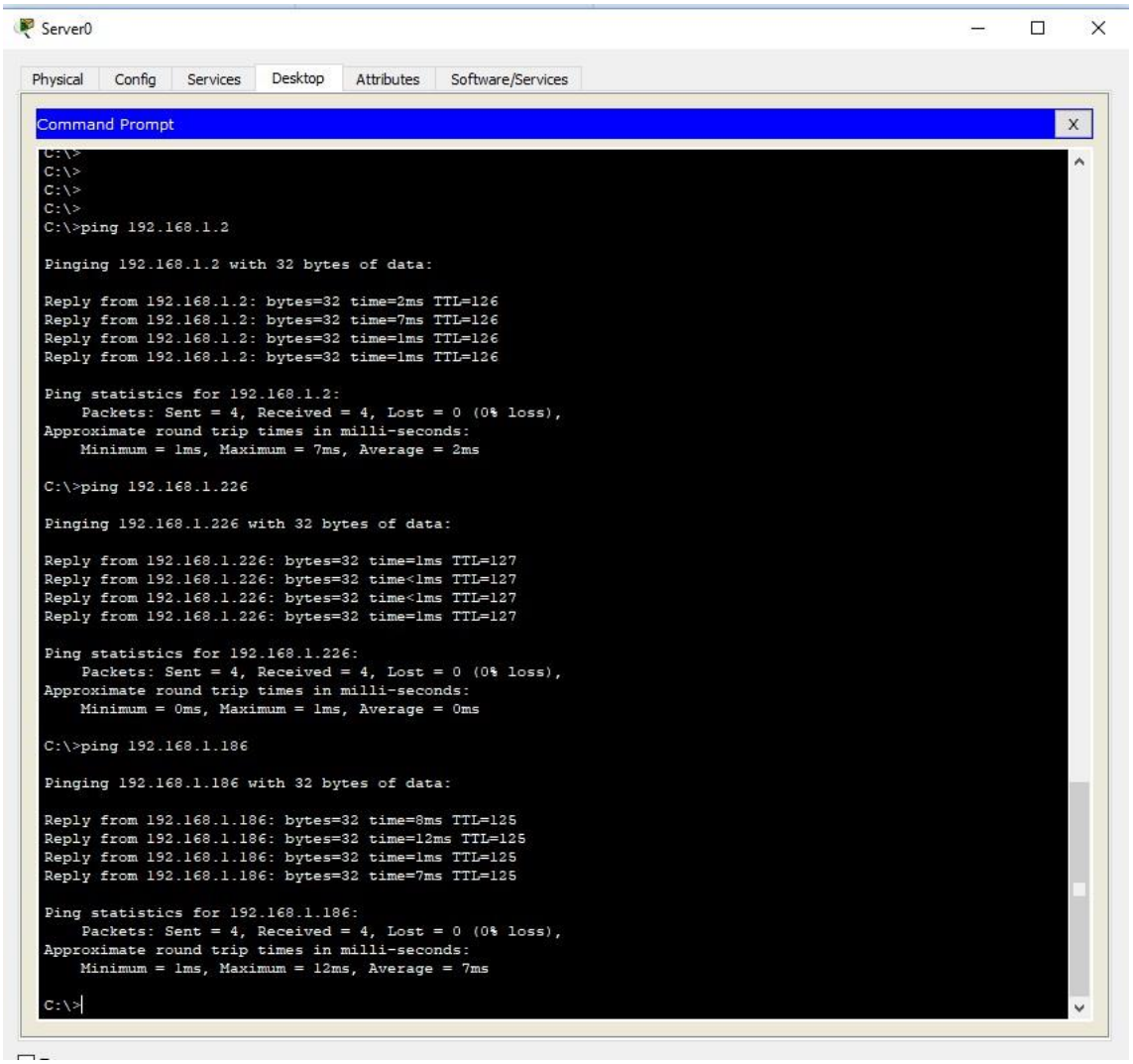
Paso 6:

Como demostración de que todo funciona, hago un ping de cada elemento de una red a un elemento de otra:

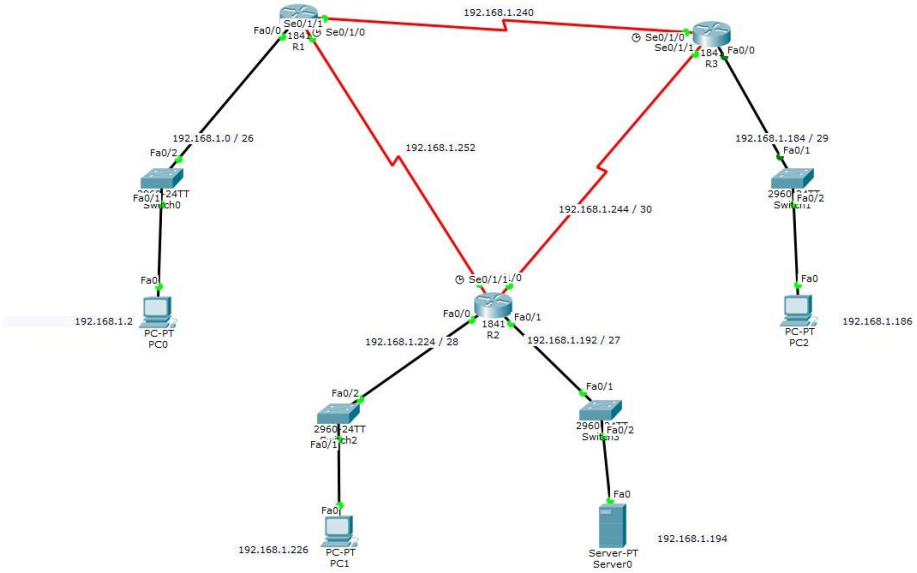

PC0
Physical
Config
Desktop
Attributes
Software/Services
Command Prompt
X
Reply from 192.168.1.226: bytes=32 time=1ms TTL=126
Reply from 192.168.1.226: bytes=32 time=1ms TTL=126
Reply from 192.168.1.226: bytes=32 time=2ms TTL=126
Reply from 192.168.1.226: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.1.226:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 2ms, Average = 1ms
C:\>ping 192.168.1.194
Pinging 192.168.1.194 with 32 bytes of data:
Reply from 192.168.1.194: bytes=32 time=1ms TTL=126
Reply from 192.168.1.194: bytes=32 time=1ms TTL=126
Reply from 192.168.1.194: bytes=32 time=2ms TTL=126
Reply from 192.168.1.194: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.1.194:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 2ms, Average = 1ms
C:\>ping 192.168.1.186
Pinging 192.168.1.186 with 32 bytes of data:
Reply from 192.168.1.186: bytes=32 time=8ms TTL=125
Reply from 192.168.1.186: bytes=32 time=1ms TTL=125
Reply from 192.168.1.186: bytes=32 time=2ms TTL=125
Reply from 192.168.1.186: bytes=32 time=4ms TTL=125
Ping statistics for 192.168.1.186:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 8ms, Average = 3ms
C:\>
Top


PC1
Physical
Config
Desktop
Attributes
Software/Services
Command Prompt
X
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time=2ms TTL=126
Reply from 192.168.1.2: bytes=32 time=11ms TTL=126
Reply from 192.168.1.2: bytes=32 time=1ms TTL=126
Reply from 192.168.1.2: bytes=32 time=6ms TTL=126
Ping statistics for 192.168.1.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 11ms, Average = 5ms
C:\>ping 192.168.1.194
Pinging 192.168.1.194 with 32 bytes of data:
Reply from 192.168.1.194: bytes=32 time<1ms TTL=127
Reply from 192.168.1.194: bytes=32 time<1ms TTL=127
Reply from 192.168.1.194: bytes=32 time<1ms TTL=127
Reply from 192.168.1.194: bytes=32 time<1ms TTL=127
Ping statistics for 192.168.1.194:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>192.168.1.186
Invalid Command.
C:\>ping 192.168.1.186
Pinging 192.168.1.186 with 32 bytes of data:
Reply from 192.168.1.186: bytes=32 time=9ms TTL=125
Reply from 192.168.1.186: bytes=32 time=8ms TTL=125
Reply from 192.168.1.186: bytes=32 time=2ms TTL=125
Reply from 192.168.1.186: bytes=32 time=2ms TTL=125
Ping statistics for 192.168.1.186:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 9ms, Average = 5ms
C:\>
Top


PC2
Physical
Config
Desktop
Attributes
Software/Services
Command Prompt
C:\>
C:\>ping 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time=1ms TTL=126
Reply from 192.168.1.2: bytes=32 time=2ms TTL=126
Reply from 192.168.1.2: bytes=32 time=2ms TTL=126
Reply from 192.168.1.2: bytes=32 time=3ms TTL=126
Ping statistics for 192.168.1.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 3ms, Average = 2ms
C:\>ping 192.168.1.226
Pinging 192.168.1.226 with 32 bytes of data:
Reply from 192.168.1.226: bytes=32 time=1ms TTL=126
Reply from 192.168.1.226: bytes=32 time=2ms TTL=126
Reply from 192.168.1.226: bytes=32 time=3ms TTL=126
Reply from 192.168.1.226: bytes=32 time=14ms TTL=126
Ping statistics for 192.168.1.226:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 14ms, Average = 5ms
C:\>ping 192.168.1.194
Pinging 192.168.1.194 with 32 bytes of data:
Reply from 192.168.1.194: bytes=32 time=1ms TTL=126
Reply from 192.168.1.194: bytes=32 time=6ms TTL=126
Reply from 192.168.1.194: bytes=32 time=15ms TTL=126
Reply from 192.168.1.194: bytes=32 time=2ms TTL=126
Ping statistics for 192.168.1.194:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 15ms, Average = 6ms
C:\>



Finalmente, añado una imagen de cómo queda el diagrama final:



La tabla de IP's completa se puede observar más arriba.

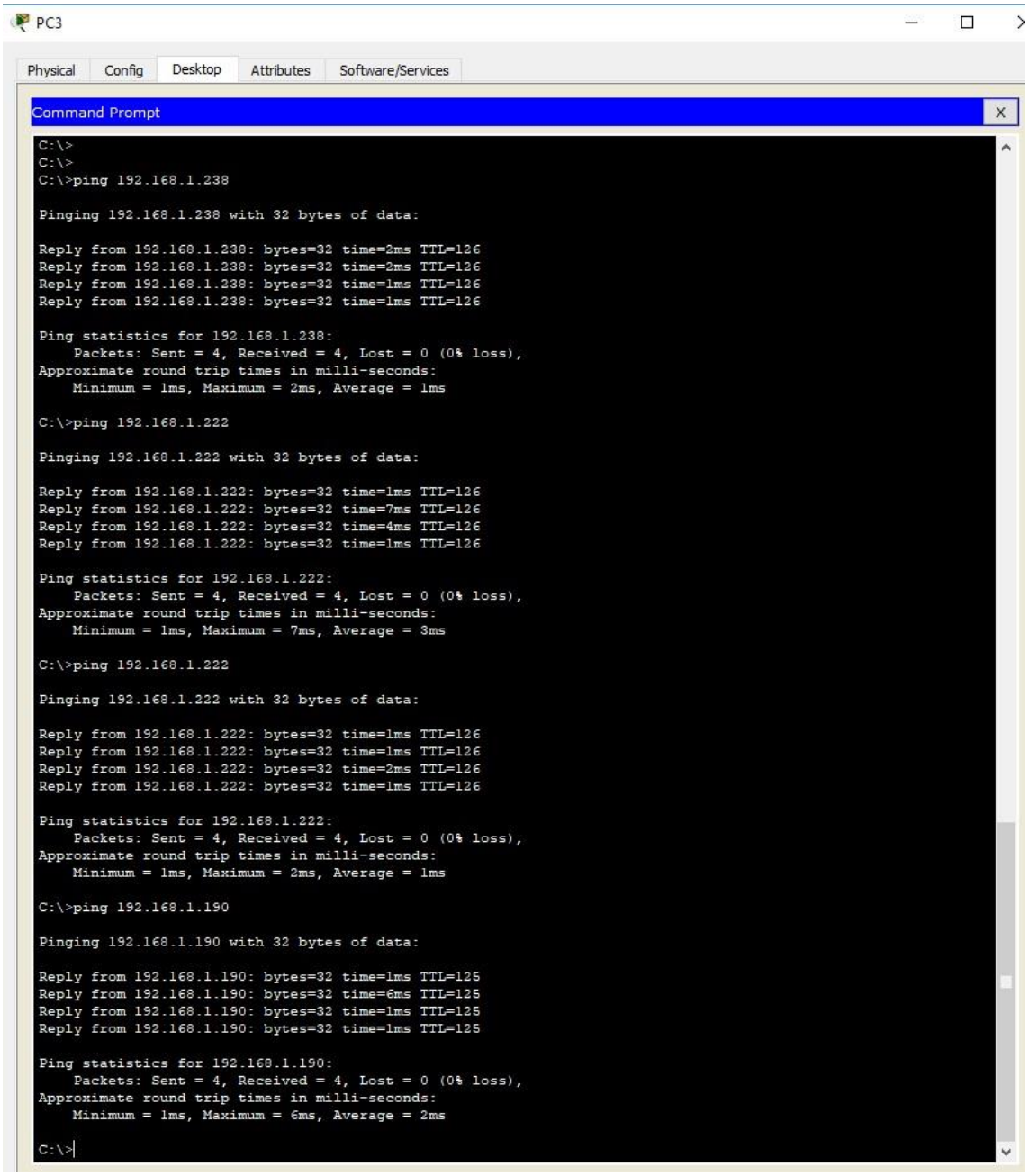
Paso 7 (Paso 2.3 de la práctica)

Añado 1 host más a cada red de router, con el último valor del rango disponible.

Host	Ip	Red	Netmask	Gateway (Ruter)
PC3	192.168.1.62	192.168.1.0/26	255.255.255.192	192.168.1.1
PC4	192.168.1.238	192.168.1.224/28	255.255.255.240	192.168.1.225
PC5	192.168.1.222	192.168.1.192/27	255.255.255.224	192.168.1.193
PC6	192.168.1.190	192.168.1.176/28	255.255.255.240	192.168.1.176

Nótese que la IP de estos ordenadores es la IP de la red + nº máximo de host - 1.

Como prueba de que todo está comunicado, si puedo pingear con pc3 a el resto de PC's, todos deberían poder pingarse entre sí:

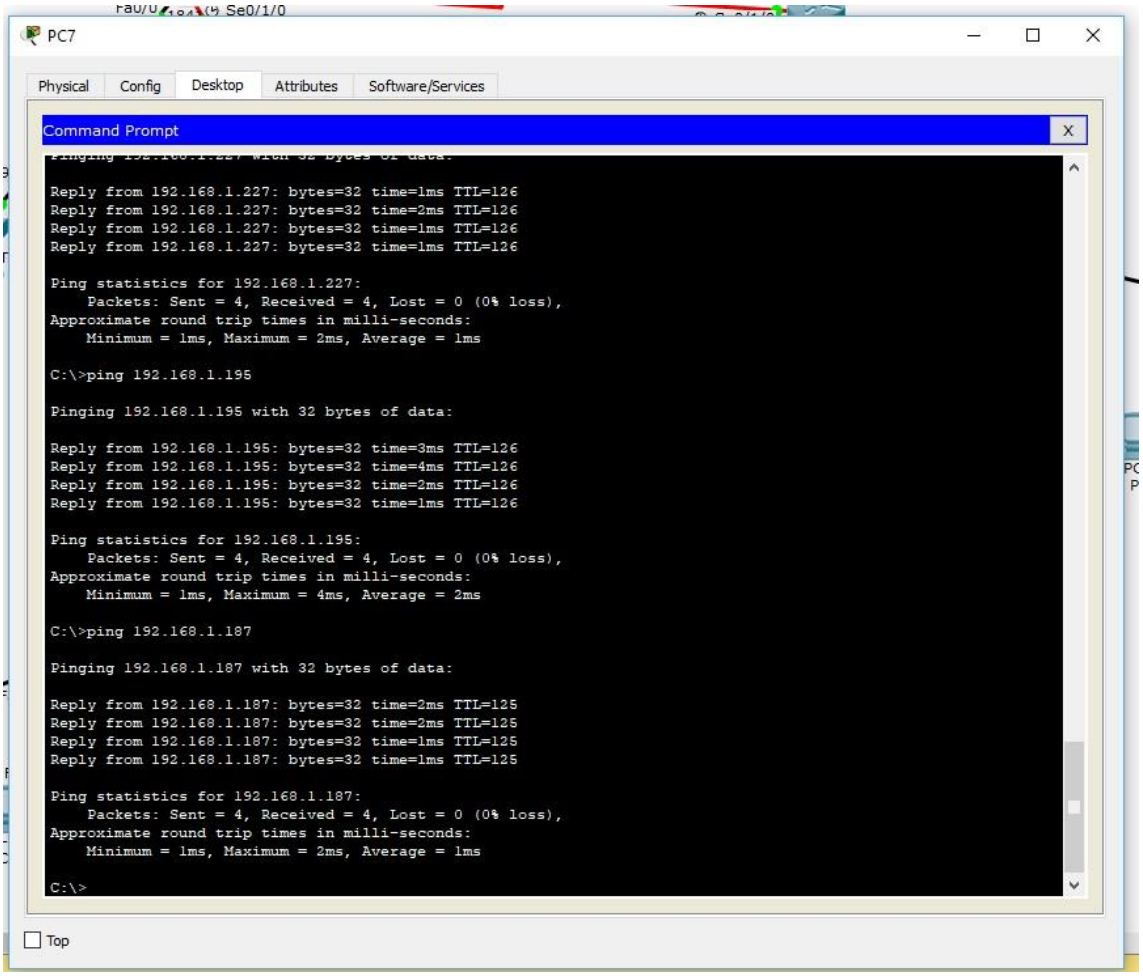


Paso 8: (2.5 de los apuntes)

Añado 1 host más a cada red y compruebo que sigue funcionando:

Host	Ip	Red	Netmask	Gateway (Ruter)
PC7	192.168.1.3	192.168.1.0/26	255.255.255.192	192.168.1.1
PC8	192.168.1.227	192.168.1.224/28	255.255.255.240	192.168.1.225
PC9	192.168.1.195	192.168.1.192/27	255.255.255.224	192.168.1.193
PC10	192.168.1.179	192.168.1.176/28	255.255.255.240	192.168.1.176

Demostración de que todo funciona:



Se puede comprobar consultando el archivo adjuntado p2_2.pkt. Se ha realizado sobre **Windows 10 x64 con la versión 7 de Cisco Packet Tracer.**