Лабораторная работа VII.

Изучение статической маршрутизации для сетей
с поддержкой IPv4 и IPv6 в сетевом симуляторе

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Задачи

1) Разделить сеть на подсети в соответствии с системой адресации IPv4. Выделить достаточно адресов для размещения x+20 хостов в подсетях 1 и 2, x+10 в подсети 3, по 2 адреса интерфейса на соединения “точка-точка” между маршрутизаторами, где x - Ваш номер по списку в ЭУ

2) Настроить статическую маршрутизацию так, чтобы пинг любым хостом или маршрутизатором любого другого хоста или маршрутизатора был успешным.

3) Выделить маршрутизаторам IPv6 адреса формата 2001:x+y::z/64, где x - Ваш номер по списку в ЭУ, y - порядковый номер подсети, z - порядковый номер интерфейса

4) Установить автоконфигурирование IPv6 без отслеживания состояния (SLAAC) для интерфейсов хостов в подсетях 1 и 2. В подсети 3 использовать SLAAC +DHCPv6.

5) Настроить статическую маршрутизацию так, чтобы пинг любым хостом или маршрутизатором любого другого хоста или маршрутизатора с использованием IPv6 адреса был успешным

Разделить сеть на подсети

Подсети 1 и 2 - 16 + 20 = 36 хостов, 16 + 10 = 26 хостов в третьей подсети

192.168.16.0/24 эту сеть будем делить на подсети

36 + 2 = 38 < 2^6 = 64 -> шесть бит с конца уходит под хостовую часть

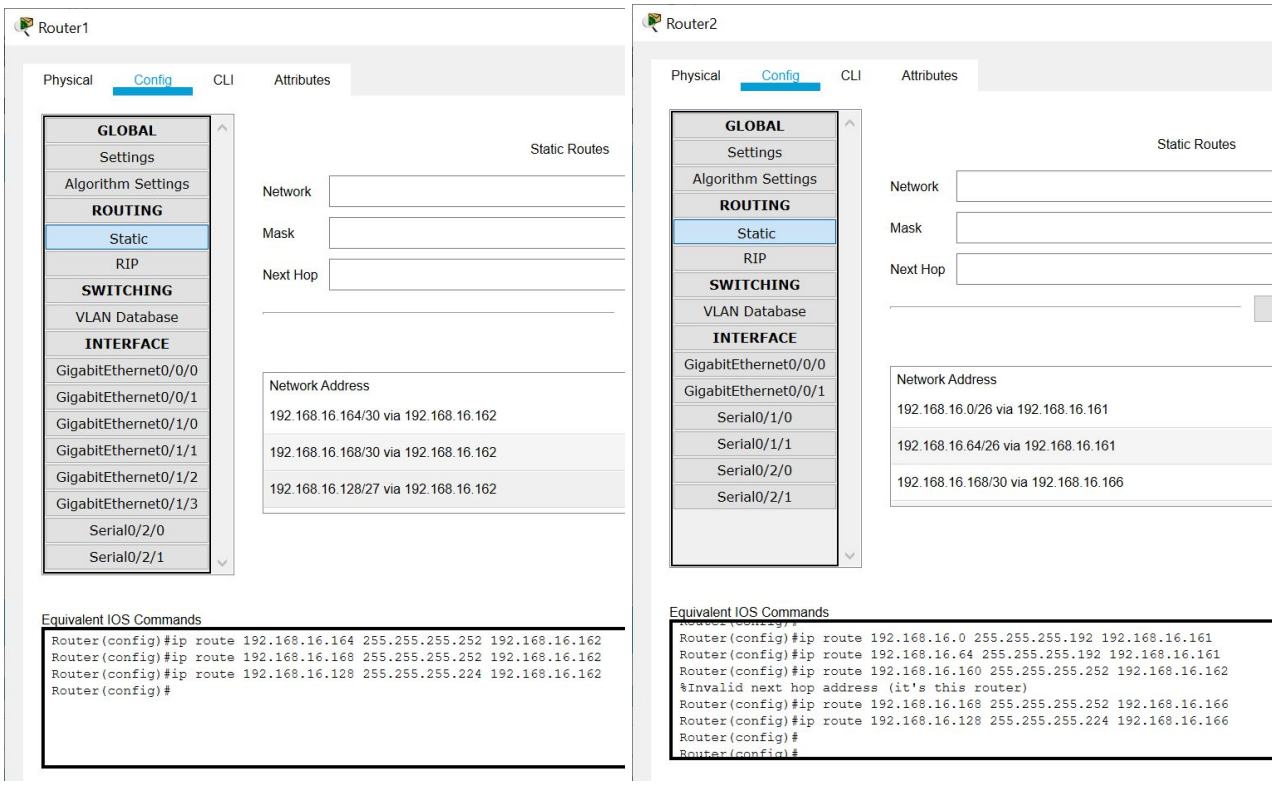
I. 192.168.16.0/26 - адрес подсети, маска - 255.255.255.192
II. 192.168.16.64/26 - адрес подсети, маска - 255.255.255.192

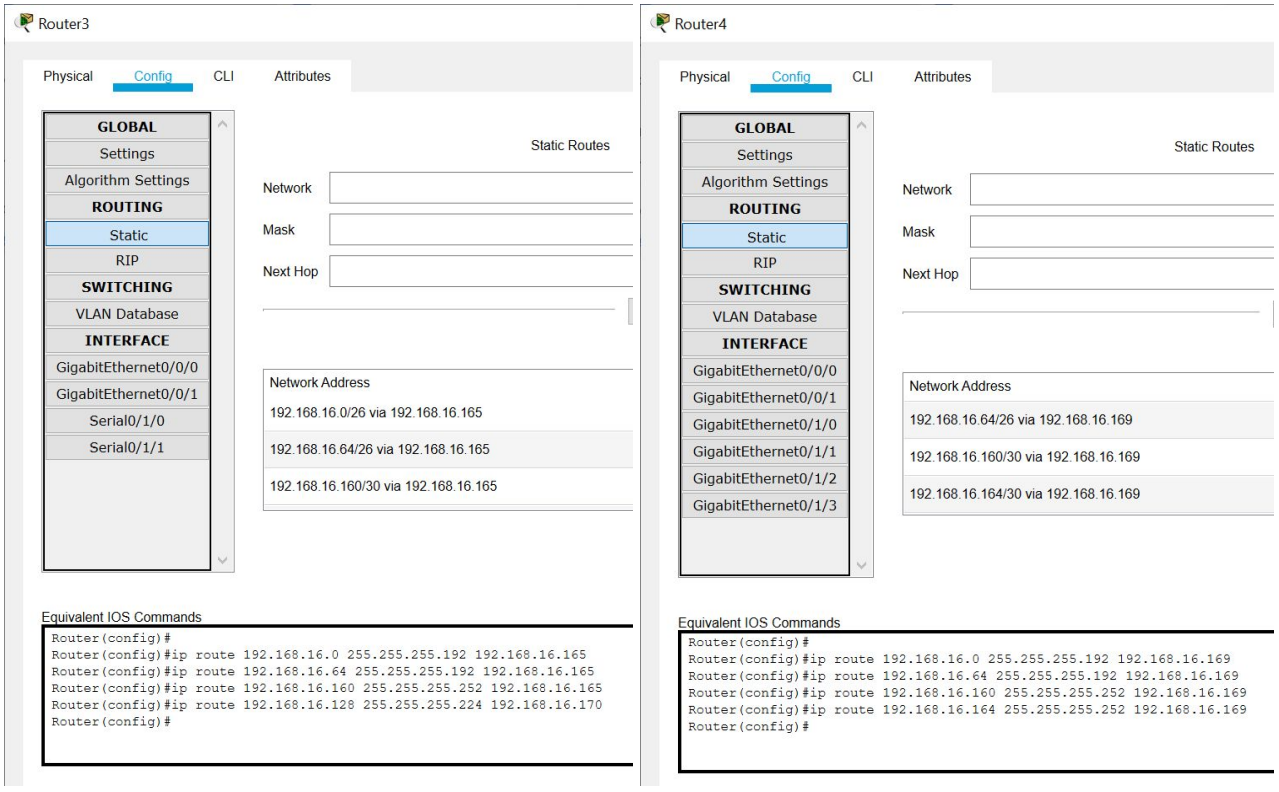
192.168.16.128/26 разделим на оставшиеся подсети

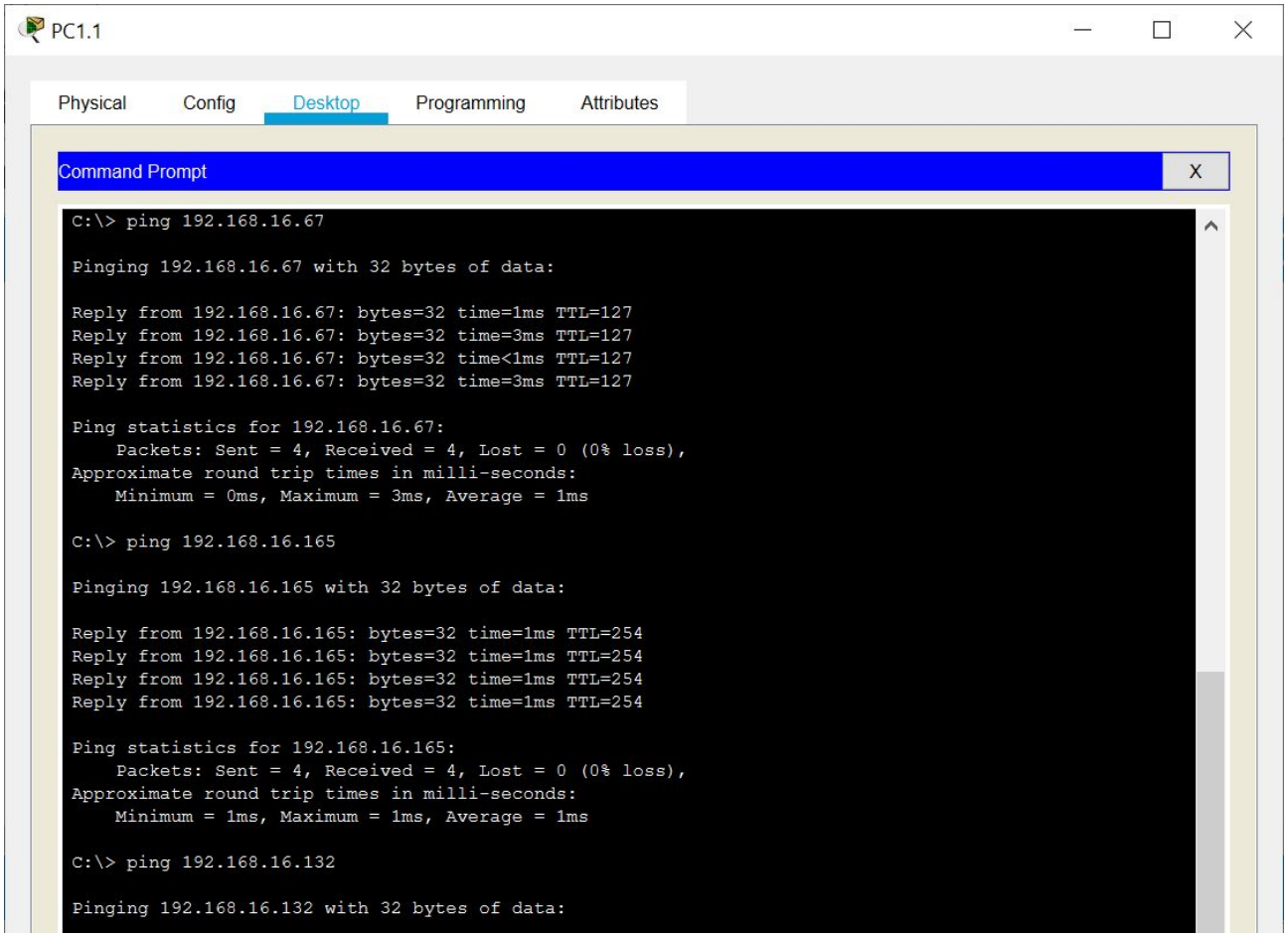
26 + 2 = 28 < 32 = 2^5 - последние пять бит на хостовую часть

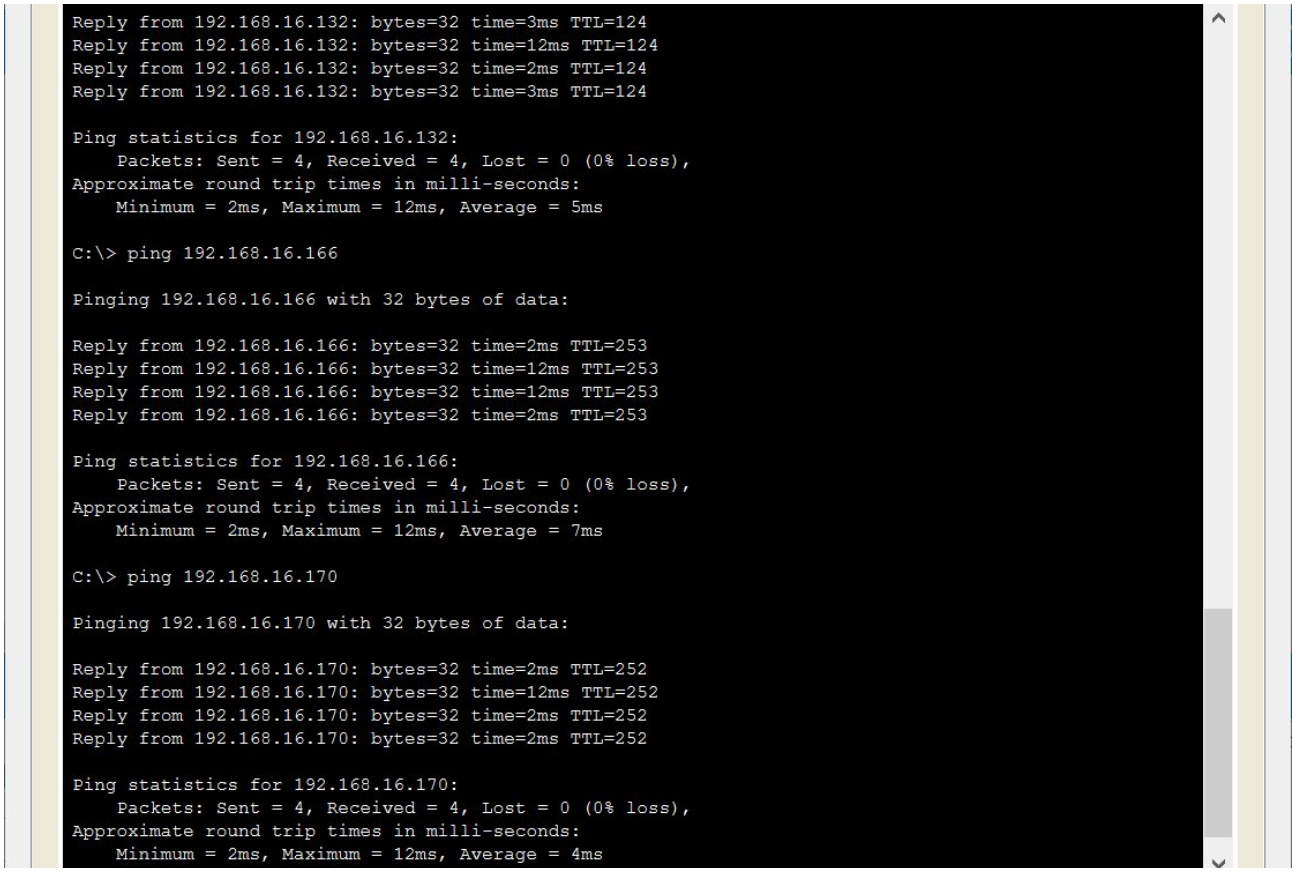
III. 192.168.16.128/27 - адрес подсети, маска - 255.255.255.224
IV. 192.168.16.160/30 - - адрес подсети, маска - 255.255.255.252
V. 192.168.16.164/30 - - адрес подсети, маска - 255.255.255.252
VI. 192.168.16.168/30 - - адрес подсети, маска - 255.255.255.252

Настроить статическую маршрутизацию


Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/1/0
GigabitEthernet0/1/1
GigabitEthernet0/1/2
GigabitEthernet0/1/3
Serial0/2/0
Serial0/2/1
Static Routes
Network
Mask
Next Hop
Network Address
192.168.16.164/30 via 192.168.16.162
192.168.16.168/30 via 192.168.16.162
192.168.16.128/27 via 192.168.16.162
Equivalent IOS Commands
Router(config)#ip route 192.168.16.164 255.255.255.252 192.168.16.162
Router(config)#ip route 192.168.16.168 255.255.255.252 192.168.16.162
Router(config)#ip route 192.168.16.128 255.255.255.224 192.168.16.162
Router(config)#
Router2
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
Serial0/1/0
Serial0/1/1
Serial0/2/0
Serial0/2/1
Static Routes
Network
Mask
Next Hop
Network Address
192.168.16.0/26 via 192.168.16.161
192.168.16.64/26 via 192.168.16.161
192.168.16.168/30 via 192.168.16.166
Equivalent IOS Commands
Router(config)#ip route 192.168.16.0 255.255.255.192 192.168.16.161
Router(config)#ip route 192.168.16.64 255.255.255.192 192.168.16.161
Router(config)#ip route 192.168.16.160 255.255.255.252 192.168.16.162
%Invalid next hop address (it's this router)
Router(config)#ip route 192.168.16.168 255.255.255.252 192.168.16.166
Router(config)#ip route 192.168.16.128 255.255.255.224 192.168.16.166
Router(config)#
Router(config)#

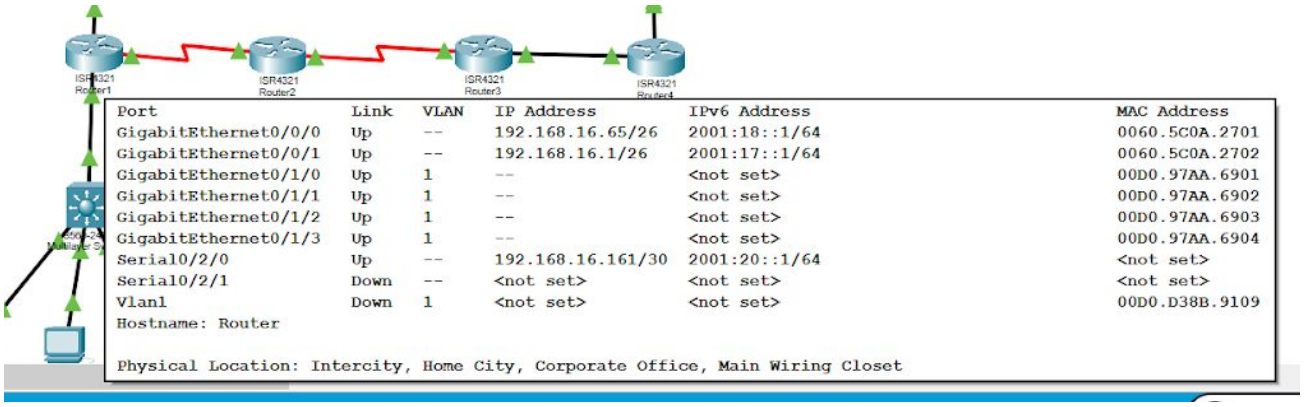

Router3
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
Serial0/1/0
Serial0/1/1
Static Routes
Network
Mask
Next Hop
Network Address
192.168.16.0/26 via 192.168.16.165
192.168.16.64/26 via 192.168.16.165
192.168.16.160/30 via 192.168.16.165
Equivalent IOS Commands
Router(config)#
Router(config)#ip route 192.168.16.0 255.255.255.192 192.168.16.165
Router(config)#ip route 192.168.16.64 255.255.255.192 192.168.16.165
Router(config)#ip route 192.168.16.160 255.255.255.252 192.168.16.165
Router(config)#ip route 192.168.16.128 255.255.255.224 192.168.16.170
Router(config)#
Router4
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/1/0
GigabitEthernet0/1/1
GigabitEthernet0/1/2
GigabitEthernet0/1/3
Static Routes
Network
Mask
Next Hop
Network Address
192.168.16.64/26 via 192.168.16.169
192.168.16.160/30 via 192.168.16.169
192.168.16.164/30 via 192.168.16.169
Equivalent IOS Commands
Router(config)#
Router(config)#ip route 192.168.16.0 255.255.255.192 192.168.16.169
Router(config)#ip route 192.168.16.64 255.255.255.192 192.168.16.169
Router(config)#ip route 192.168.16.160 255.255.255.252 192.168.16.169
Router(config)#ip route 192.168.16.164 255.255.255.252 192.168.16.169
Router(config)#

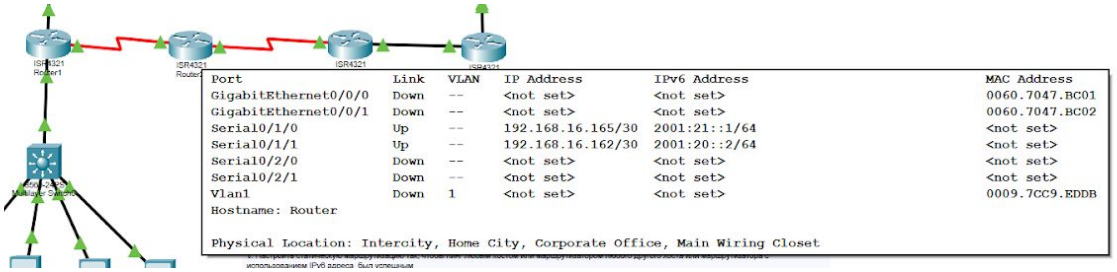


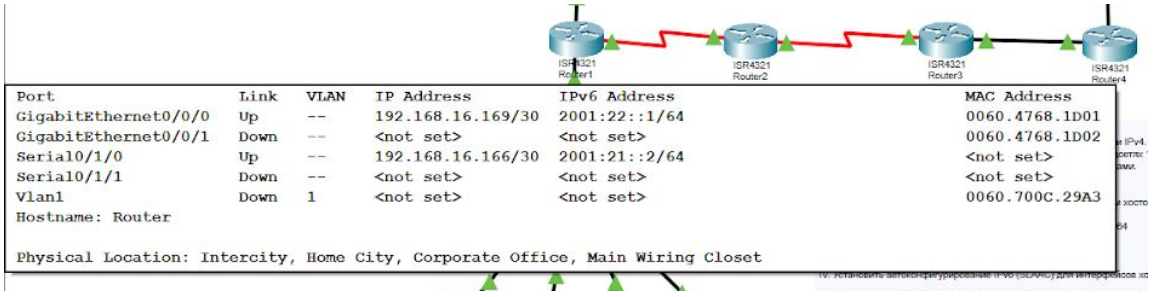


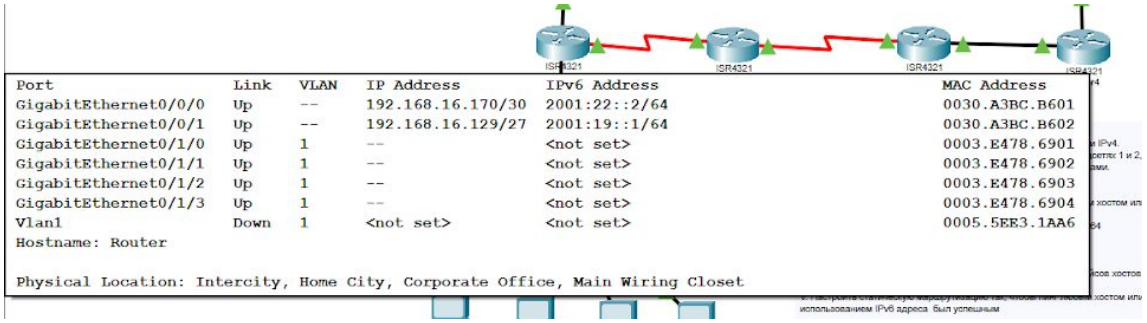
router1	Gig0/0/0	2001:18::1/64
	Gig0/0/1	2001:17::1/64

	Se0/2/0	2001:20::1/64
router2	Se0/1/0	2001:21::1/64
	Se0/1/1	2001:20::2/64
router3	Gig0/0/0	2001:22::1/64
	Se0/1/0	2001:21::2/64
router4	Gig0/0/0	2001:22::2/64
	Gig0/0/1	2001:19::1/64



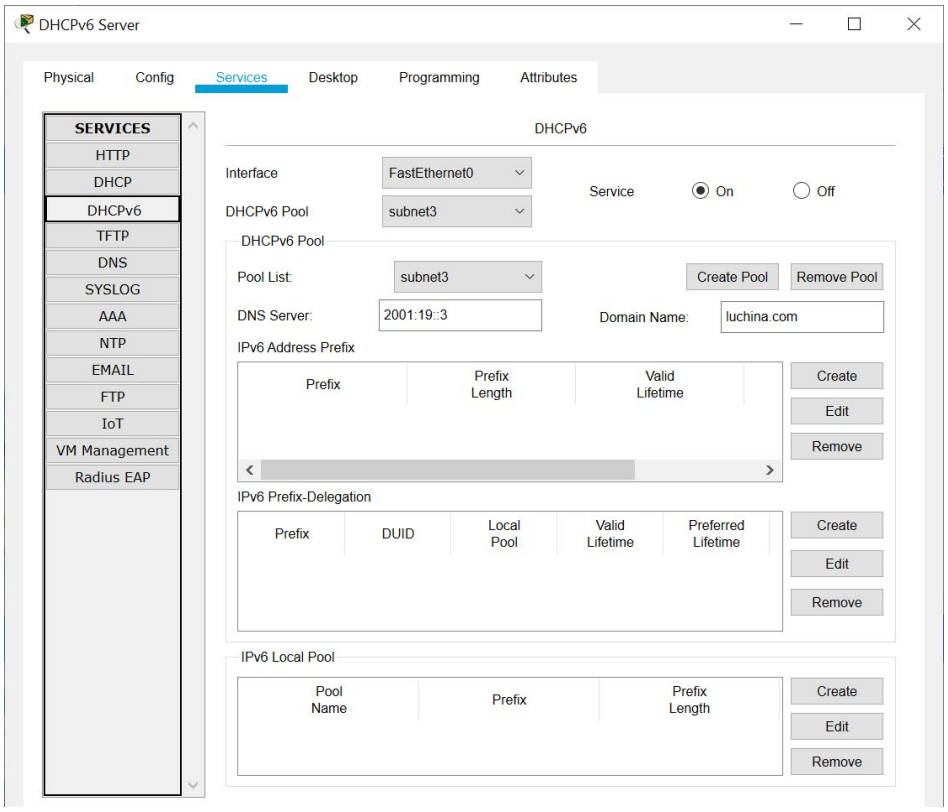


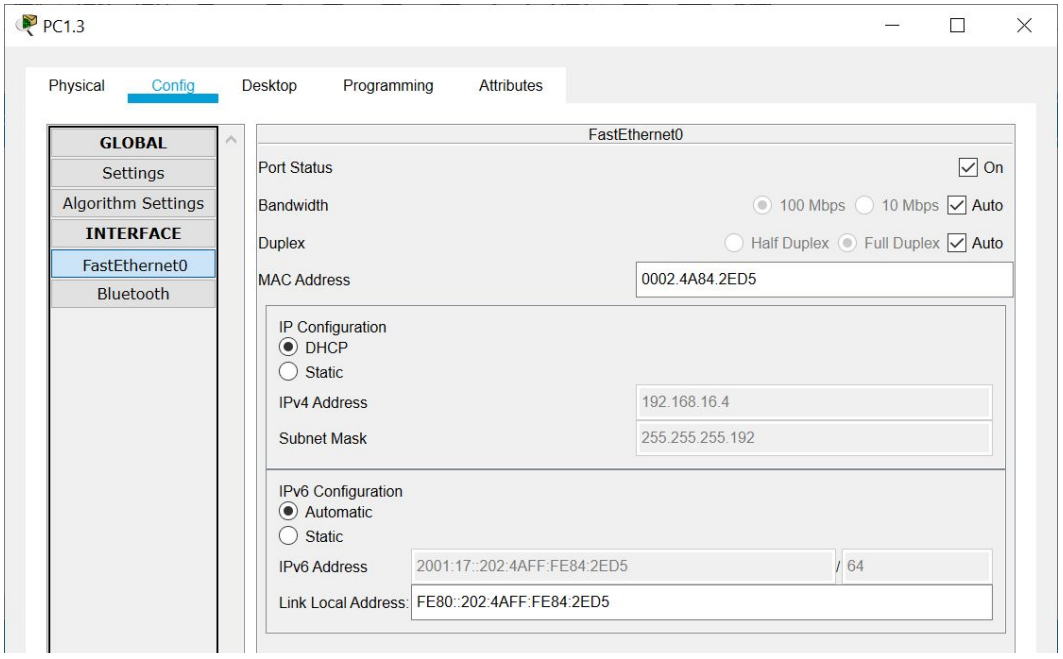




```
Router(config)#int Gig0/0/0
Router(config-if)#ipv6 enable
Router(config-if)#ipv6 address 2001:22::2/64
Router(config-if)#exit
Router(config)#int Gig0/0/1
Router(config-if)#ipv6 enable
Router(config-if)#ipv6 address 2001:19::1/64
```

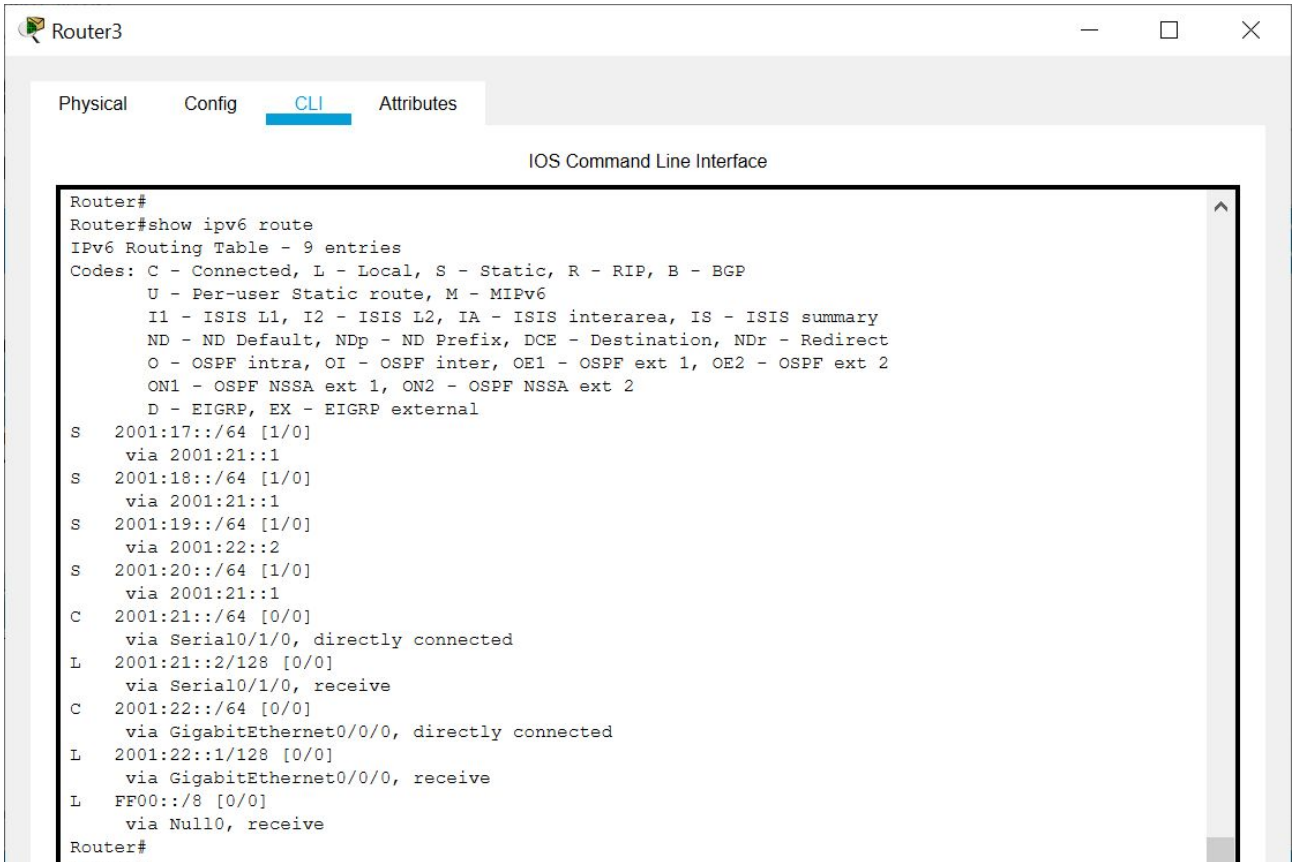
Установить автоконфигурирование IPv6

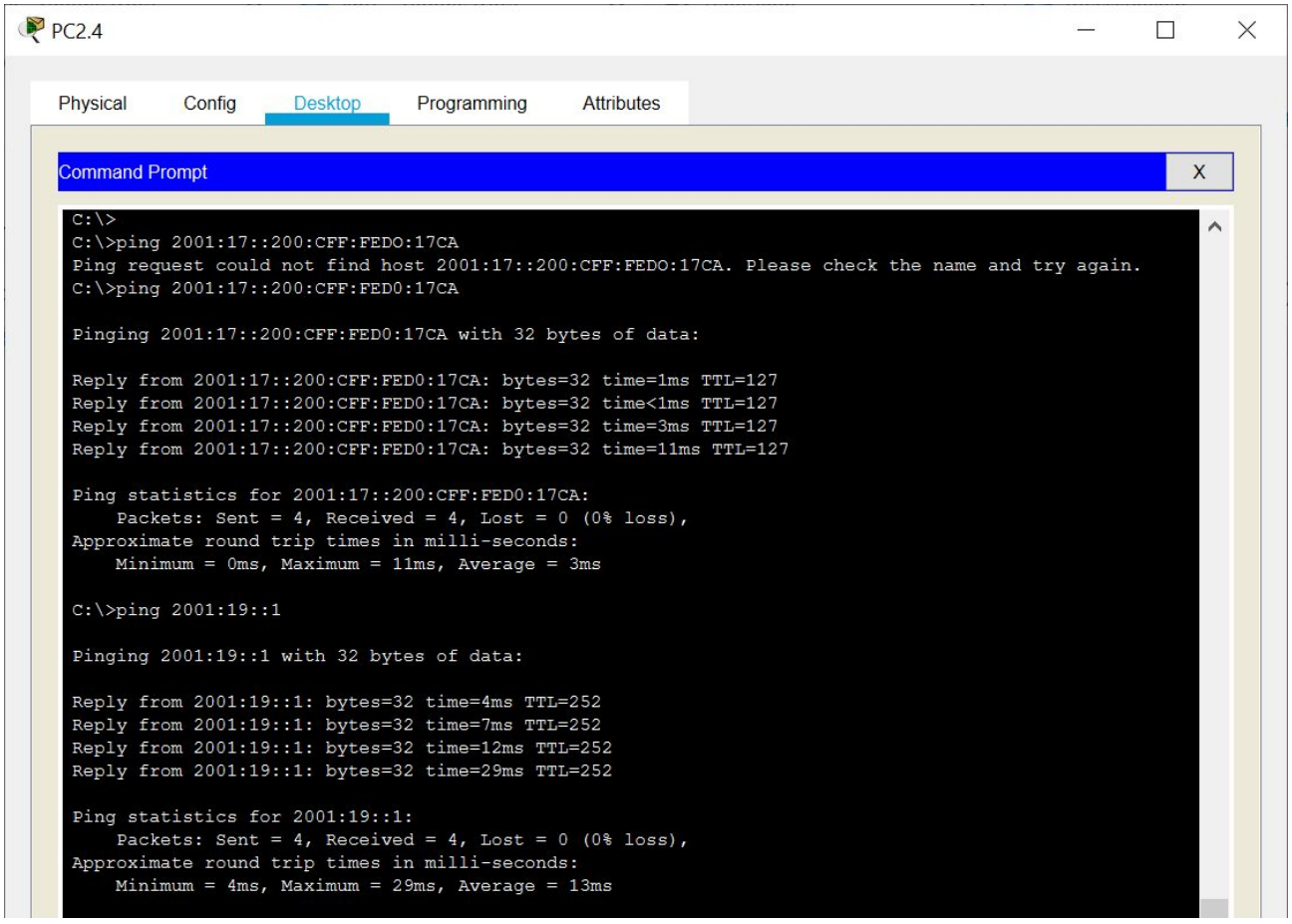




Настроить статическую маршрутизацию с использованием ipv6


Router3
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ipv6 route 2001:17::1/64 2001:21::1
Router(config)#ipv6 route 2001:18::1/64 2001:21::1
Router(config)#ipv6 route 2001:20::1/64 2001:21::1
Router(config)#ipv6 route 2001:19::1/64 2001:22::2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console


Router3
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router#
Router#show ipv6 route
IPv6 Routing Table - 9 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
U - Per-user Static route, M - MIPv6
I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
D - EIGRP, EX - EIGRP external
S 2001:17::/64 [1/0]
via 2001:21::1
S 2001:18::/64 [1/0]
via 2001:21::1
S 2001:19::/64 [1/0]
via 2001:22::2
S 2001:20::/64 [1/0]
via 2001:21::1
C 2001:21::/64 [0/0]
via Serial0/1/0, directly connected
L 2001:21::2/128 [0/0]
via Serial0/1/0, receive
C 2001:22::/64 [0/0]
via GigabitEthernet0/0/0, directly connected
L 2001:22::1/128 [0/0]
via GigabitEthernet0/0/0, receive
L FF00::/8 [0/0]
via Null0, receive
Router#


PC2.4
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
C:\>
C:\>ping 2001:17::200:CFF:FEDO:17CA
Ping request could not find host 2001:17::200:CFF:FEDO:17CA. Please check the name and try again.
C:\>ping 2001:17::200:CFF:FED0:17CA
Pinging 2001:17::200:CFF:FED0:17CA with 32 bytes of data:
Reply from 2001:17::200:CFF:FED0:17CA: bytes=32 time=1ms TTL=127
Reply from 2001:17::200:CFF:FED0:17CA: bytes=32 time<1ms TTL=127
Reply from 2001:17::200:CFF:FED0:17CA: bytes=32 time=3ms TTL=127
Reply from 2001:17::200:CFF:FED0:17CA: bytes=32 time=11ms TTL=127
Ping statistics for 2001:17::200:CFF:FED0:17CA:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 11ms, Average = 3ms
C:\>ping 2001:19::1
Pinging 2001:19::1 with 32 bytes of data:
Reply from 2001:19::1: bytes=32 time=4ms TTL=252
Reply from 2001:19::1: bytes=32 time=7ms TTL=252
Reply from 2001:19::1: bytes=32 time=12ms TTL=252
Reply from 2001:19::1: bytes=32 time=29ms TTL=252
Ping statistics for 2001:19::1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 29ms, Average = 13ms