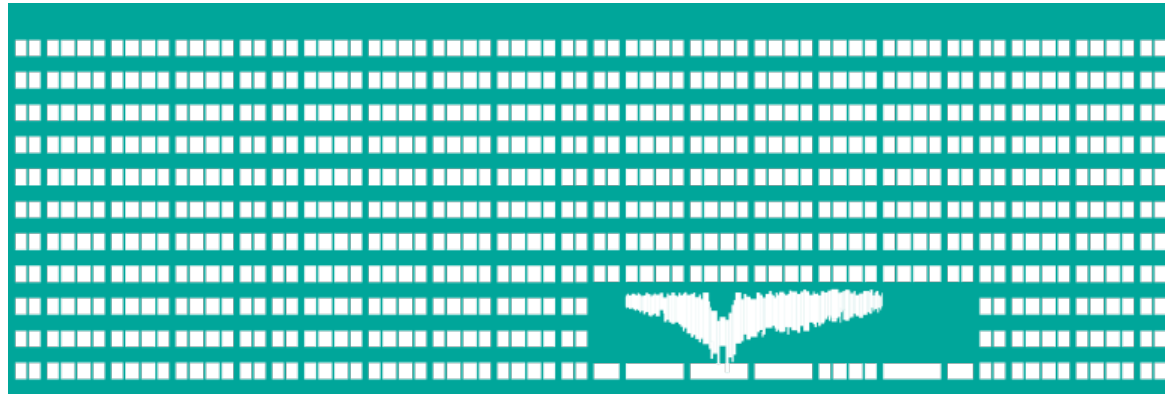


Routing protocols RIP and OSPF



Computer networks
Seminar 8

Routing table

	Type	Destination/mask	Next hop/Interface	Metrics
1.	R	10.0.0.0/16	172.16.10.1	2
2.	C	10.0.1.0/24	fa0/0	0
		...		
N.	S	0.0.0.0/0	172.16.2.2	0

↑
Default route

↑
Default gateway

Destination IP: 10.0.1.10 – matching lines 1., 2. & N.

Destination IP: 10.0.99.1 – matching lines 1. & N.

Destination IP: 158.196.149.9 – only default route → line N.

Routing table

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↑
Default route

↑
Default gateway

Destination IP: 10.0.1.10 – matching lines 1., 2. & N.

→ Line 2 will win (longest match according to the mask)

Destination IP: 10.0.99.1 – matching lines 1. & N.

→ Line 1 will win (longest match according to the mask)

Destination IP: 158.196.149.9 – only default route → line N.

RIP

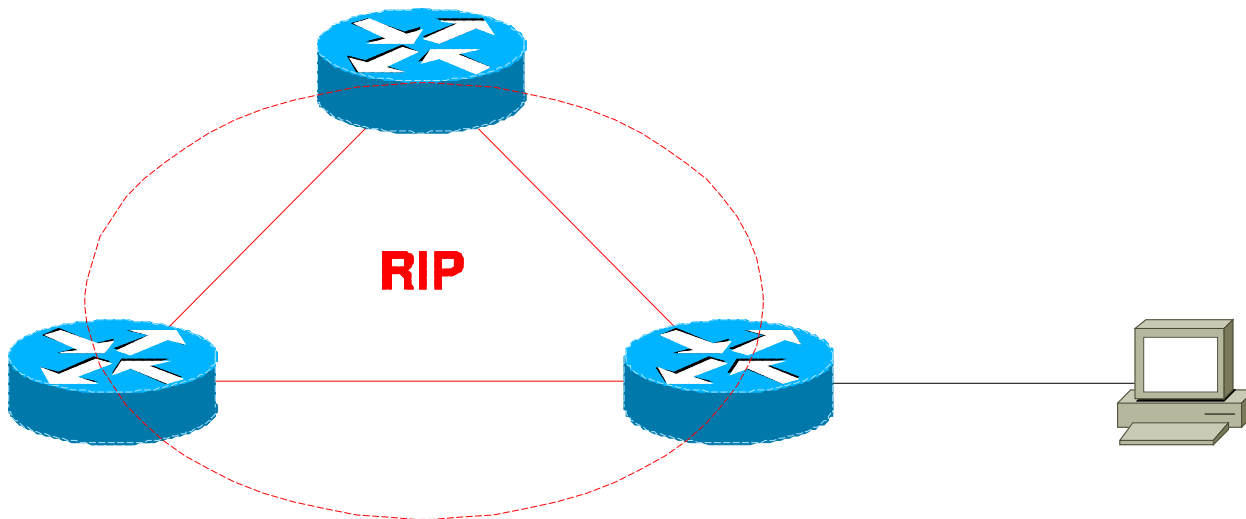
- RIP configuration:
 - **(config)# router rip**
 - **(config-router)# network <network address>**
 - enables RIP for given network
 - **(config-router)# passive-interface <interface>**
 - RIP is not distributed through this interface
 - **(config-router)# default-information originate**
 - Default gateway will be distributed over RIP, it is to be set only on one router
 - **(config-router)# version 2**
 - Enables RIPv2 which has ability to carry subnet information, thus supporting Classless Inter-Domain Routing (CIDR)
 - **(config-router)# no auto-summary**
 - Allows non-continuous subnets, disables classful n.
 - **# sh ip route**
 - **# debug ip rip**

Static default route

- Implicit (default) route is entered like **0.0.0.0 0.0.0.0**
- **(config)# ip route 0.0.0.0 0.0.0.0 <nexthop>**
- To propagate default route to RIP (OSPF)
 - **(config-router)# default-information originate**

RIP

- Triangle topology
 - Cancel static routing, establish RIP
 - Try
 - `ping`
 - `show ip route`
 - `debug ip rip`



OSPF

- Configurationg OSPF:

(config)# router ospf <process number>

- **(config-router)# network <network address> <wildcard m.> area 0**

- enables OSPF for given network

- wildcard mask - bit negation of network mask

- **(config-router)# passive-interface <interface>**

- OSPF is not distributed through this interface

- **(config-router)# default-information originate**

- Default gateway will be distributed over OSPF

- **# show ip ospf [database| neigh]**

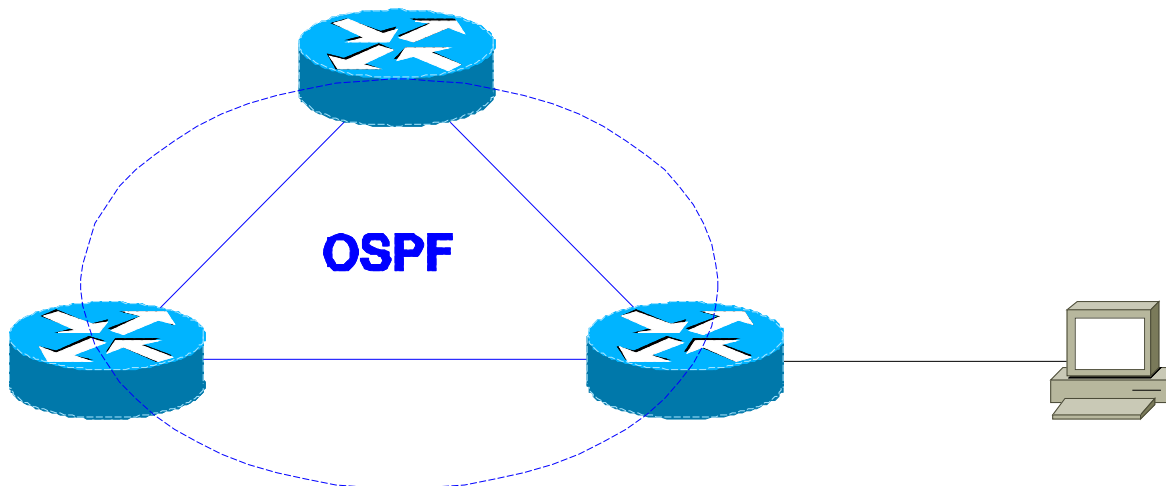
- To see ospf routing information

- **# debug ip ospf [packet | events]**

- Debugging OSPF information

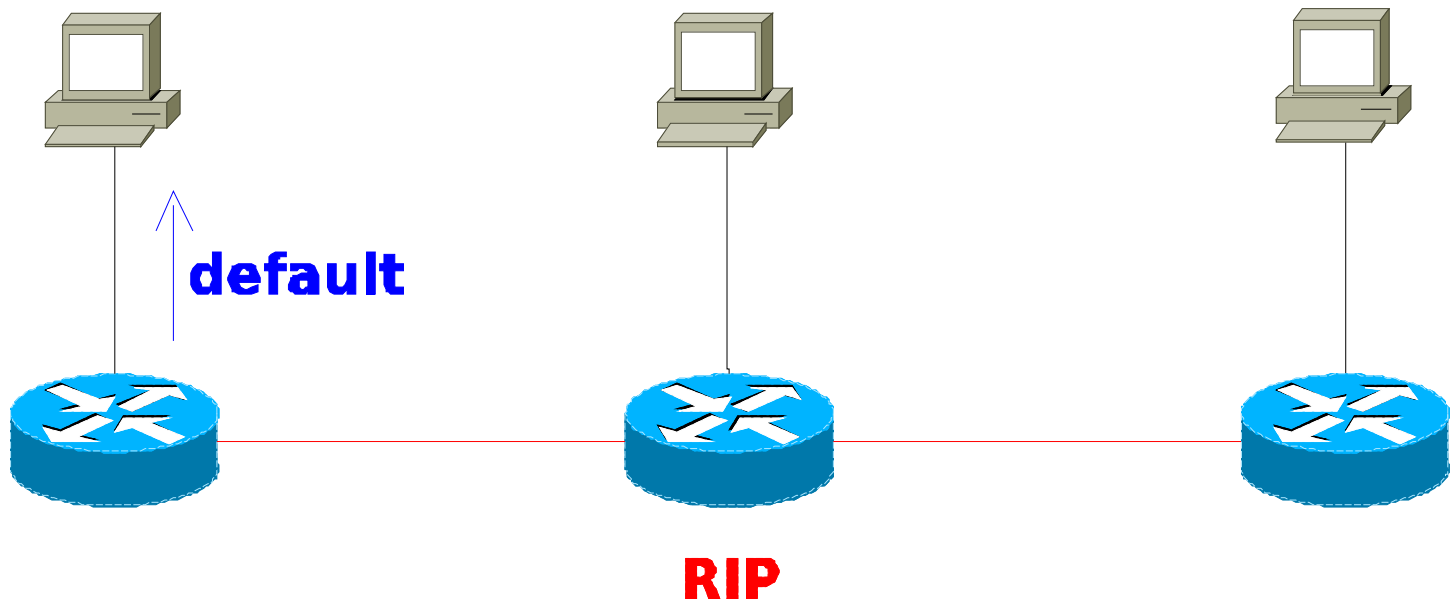
OSPF

- Triangle topology
 - Cancel RIP routing, establish OSPF
 - no router rip
 - Try
 - ping
 - show ip route
 - show ip ospf [database| neigh]
 - debug ip ospf [packet | events]



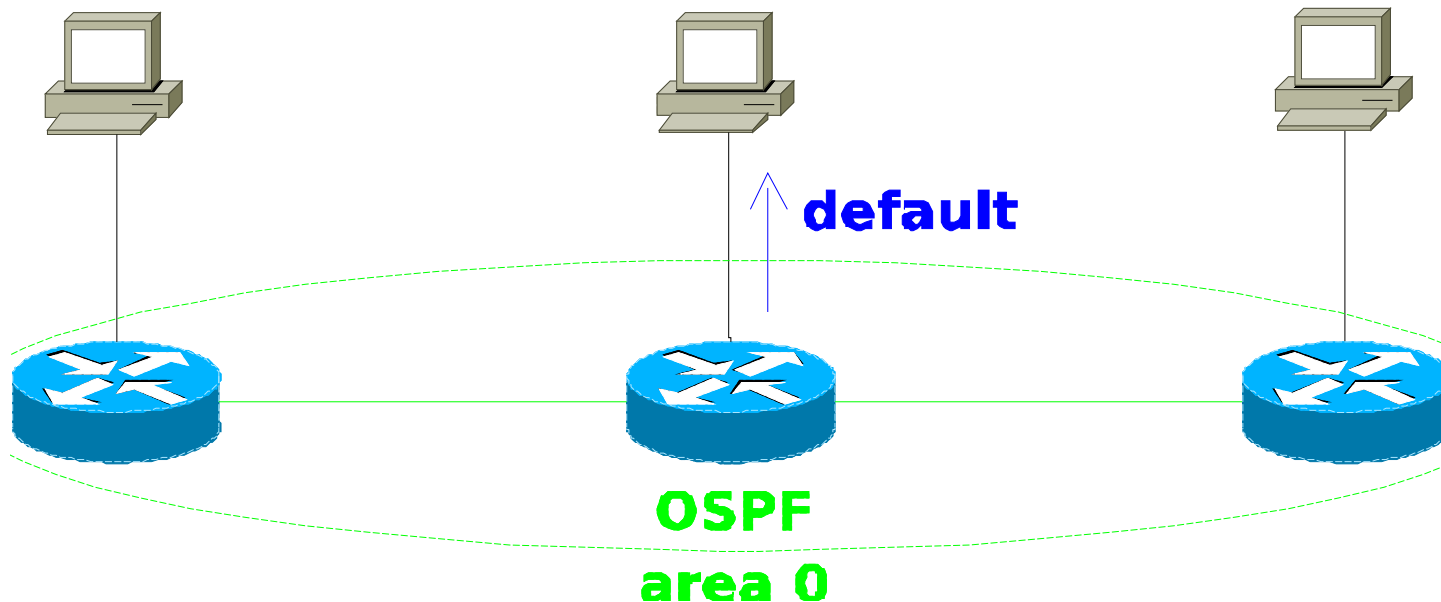
Assignment - RIP

- Linear topology of 3 routers
 - Establish RIP
 - Propagate default route
 - Try (ping + show ip route)



Assignment - OSPF

- Topology like in previous assignment
 - Cancel routing protocol RIP
 - Establish OSPF
 - Propagate default route
 - Try (ping + show ip route)



RIP-ng/OSPFv3 and IPv6

- RIP-ng configuration:

- `(config)# ipv6 router rip <ID>`
`redistribute connected` – will use directly c. nets
`redistribute static metric 1` – static routes (e.g. `::/0`)
`exit`
- `(config-router)# interface XY/Z`
`(config-if)# ipv6 rip <ID> enable` – enables RIP on XY/Z
`(config-if)# ipv6 rip <ID> default-information originate`

- OSPF(v3) configuration:

- `(config)# ipv6 router ospf <process #>`
`redistribute static metric 1 ! or connected`
`router-id X.Y.Z.A` – router ID for IPv6-only networks
`passive-interface AB/C`
`default-information originate`
`exit`
- `(config-router)# interface XY/Z`
`(config-if)# ipv6 ospf <process #> area 0`

- `# show ipv6 route`

Remote access to Router

- It can be realized by protocol **telnet**:
 - **(config)# enable password cisco**
 - Activates the password to privileged mode (enable) and allows its usage for remote access
 - **(config)# line vty 0 4**
password cisco
login
 - Enables remote access to router