

Basic PPP with Authentication

1. Examine the course materials (see Chapter 2 “Point-to-Point Connections”, Section 2 “PPP Operation”) and answer the following question:
 - What is the difference between LCP and NCP? How IPCP and IPv6CP are related to NCP?
2. Set up network according to topology presented at fig. 1.

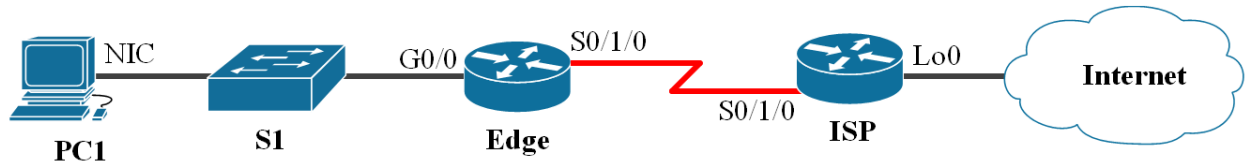


Fig. 1 Network topology

3. Configure PPP encapsulation on serial interfaces of the routers Edge and ISP. PPP configuration commands are provided in Appendix A of this document and in the course materials (see Chapter 2 “Point-to-Point Connections”, Section 3 “PPP Implementation”).
4. Configure network addressing as specified in Table 1. The network interface names in your particular setup may differ.

Table 1 Network addressing

Network node	Interface	Address, prefix length	Default gateway
Edge	G0/0	192.168.1.1/24	N/A
	S0/1/0	10.1.1.2/30	N/A
ISP	S0/1/0	10.1.1.1/30	N/A
	Lo0	209.165.200.225/27	N/A
PC1	NIC	192.168.1.3/24	192.168.1.1

5. Configure single area OSPF routing.
6. Test network connectivity. All devices should be able to ping each other.
7. Examine the course materials (see Chapter 2 “Point-to-Point Connections”, Section 3 “PPP Implementation”) and answer the following question:
 - Which authentication protocol (PAP or CHAP) is more secure? Why?
8. Configure the most secure authentication protocol of the considered in the previous step. The configuration commands are provided in Appendix A of this document and in the course materials (see Chapter 2 “Point-to-Point Connections”, Section 3 “PPP Implementation”).
9. Test network connectivity again. All devices should still be able to ping each other.
10. Analyze PPP link establishment process:
 - a) Break the connection between the routers Edge and ISP (for example, by shutting down a serial interface).
 - b) Enable debug messages by entering the following commands (in privileged EXEC mode) in the Edge router CLI:

```
debug ppp negotiation
debug ppp packet
debug ppp authentication
```
 - c) Restore the connection between the routers Edge and ISP.
 - d) Observe and save the PPP debug messages that are printed to CLI of the Edge router.

- e) Consider the saved output produced by the `debug` command. What settings are negotiated via IPCP?
- f) Disable debug messages with the following command:

`undebug all`

11. Intentionally set invalid password to test PPP authentication. Do not forget to restart serial interfaces (`shutdown/no shutdown`). How have these actions affected the OSPF protocol?

Appendix A. PPP Configuration Commands

To configure PPP encapsulation on network interface, use the following commands:

```
interface <interface name>  
  encapsulation ppp
```

To configure PAP authentication, use the following commands:

```
username <remote router hostname> password <password>  
  
interface <interface name>  
  shutdown  
  ppp authentication pap  
  ppp pap sent-username <local router hostname> password <password>  
  no shutdown
```

To configure CHAP authentication, use the following commands:

```
username <remote router hostname> password <password>  
  
interface <interface name>  
  shutdown  
  ppp authentication chap  
  no shutdown
```