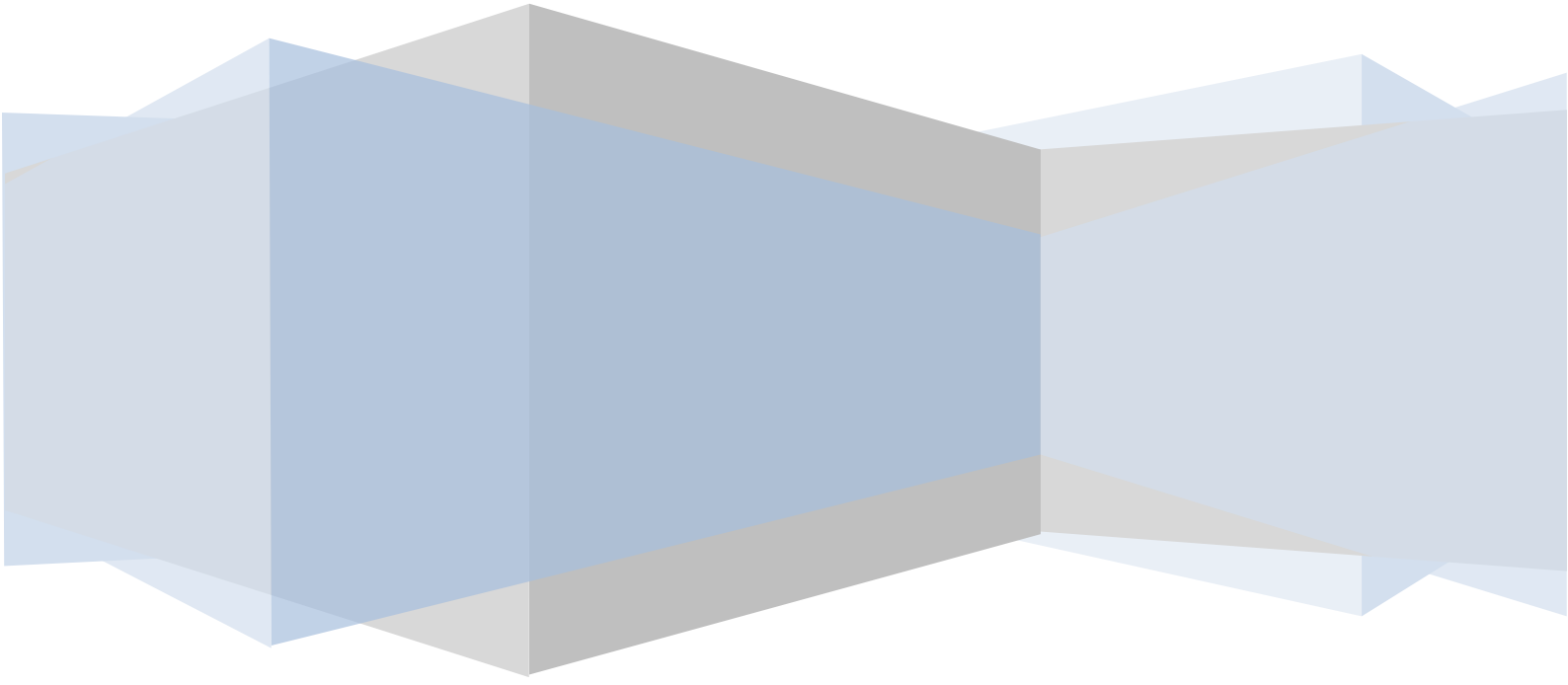
Institute of Computational Intelligence
Częstochowa University of Technology

IP configuration

Foundations of computer networks laboratory

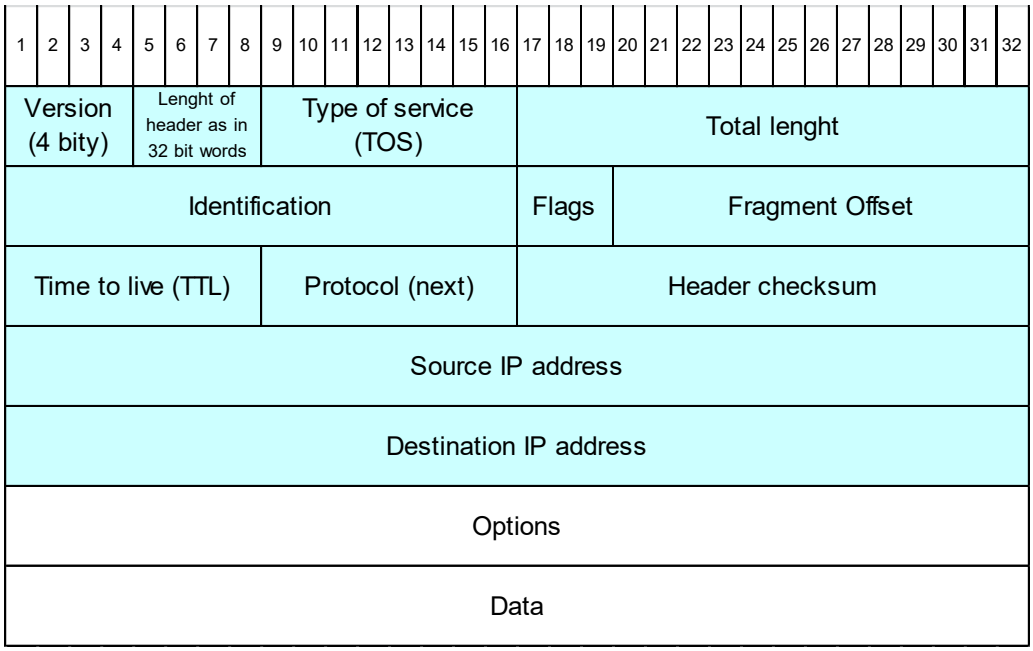


The objective of the exercises

The aim of the exercise is to familiarize with Internet Protocol and configuration of it.

Introduction

IP (Internet Protocol) is the most commonly used protocol of network layer. The structure of IP datagram in version 4 has shown below.



In planned experiments the following fields of the IP header will be used:

- **Flags**
  - **reserved** – not in use,
  - **don't fragment** – when the flag is set, the fragmentation of datagram by the routers is forbidden. In such case, when fragmentation is needed, e.g. is too long, the datagram is dropped and router sends to sender of dropped datagram the ICMP message about the occurrence.
  - **more fragments** – in the case of fragmentation, this flag is set for all parts of fragmented datagram except the last one.
- **Time to live (TTL)** – historically, every router should decrease the value of the field of the time (in seconds) spent in the routing of the datagram. Nowadays, every router decreases the field of one. When the value of field riches zero, the datagram is dropped. The router sends to sender of dropped datagram the ICMP message about the occurrence.
- **Source IP address** – the address (32 bits) of the sender.
- **Destination IP address** – the address (32 bits) of the addressee (recipient). The address consists of two parts – address of target network and address of target node (e.g. computer) in target network.

Usually, the following parameters must be assigned for each node (e.g. computer) in the IP network:

- address,
- mask,
- getaway address,
- DNS address.

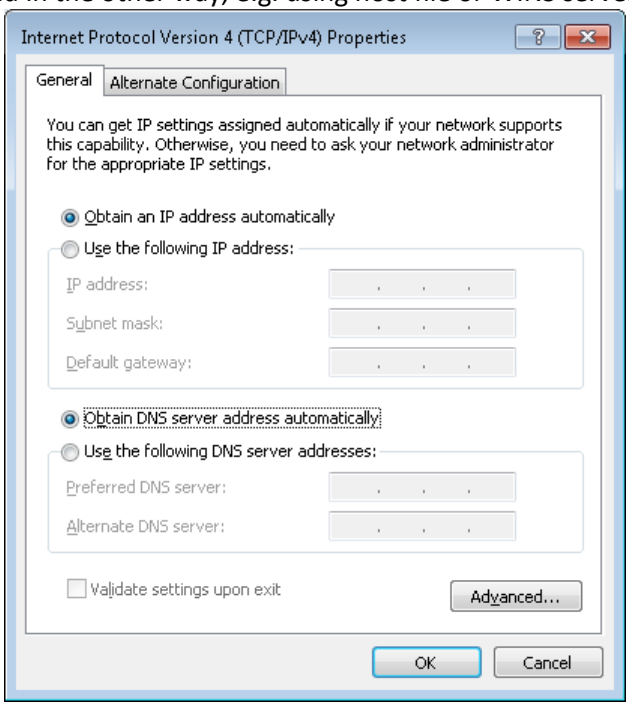
IP address of the node is individual and unique. More than one address could be assigned to single node. The IP address is written down in form a.b.c.d, where a, b, c, and d are decimal values between 0 and 255 – e.g. 213.250.0.12.

The mask divides the address into two parts – address of the network and address of the node (host). The network address is common for all nodes in local network.

Getaway address is an address of the router leads to the other networks. More than one getaway could be defined in the network.

DSN address is the address of a name server, which can translate the mnemonic addresses into IP and IP address into the mnemonic. At least two addresses of name servers should be defined.

The all above parameters can define manually or automatically, using DHCP (Dynamic Host Configuration Protocol) server. The gateway address can be omitted if communication outside the local network is not allowed. The DNS address can be omitted if mnemonic addresses are not in use or the translation is realised in the other way, e.g. using host file or WINS server.



Course of exercise

Using IPv4 properties window check the current IP configuration of the computer. Based on this information propose other addresses available in current local network. Check if they are in use, using ping command.

Check the current IP configuration using ipconfig command. Compare the results.

Ask the other students about theirs IP configurations. Check the communication between computers in laboratory using ping command.

Together with other students organise the new IP configuration for laboratory network. Check the communication between computers. Check the communication outside local network.

Divide the laboratory network into two or more IP network. Check the communication between computers. Check the communication outside local network.

Capture the traffic (Wireshark) during above experiments. Compare destination IP and MAC addresses in datagrams and frames. What is the difference when destination computer is in and outside the local network?

Set all IP parameters as obtained automatically. Capture and analyse communication with DHCP server. Check the IP and MAC addresses in first frame of this communication.

The raport

In the report should contain the results obtained during classes and the comments.