Modify the program ping.c, so that, instead of sending a request of the icmp echo request type on an IP packet, it sends a request for TCP connection to a web service on an IP packet addressed to 147.162..X, waits for and processes the reply.

The TCP connection request has the following format:

0 1 2 3

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

| Source Port | Destination Port |

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

| Sequence Number |

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

| Acknowledgment Number |

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

| Data | |U|A|P|R|S|F| |

| Offset| Reserved |R|C|S|S|Y|I| Window |

| | |G|K|H|T|N|N| |

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

| Checksum | Urgent Pointer |

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

| Options | Padding |

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

| data |

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

TCP Header Format

Note that one tick mark represents one bit position.

With the following requirements

* The SYN flag is set to 1 to indicate the connection request
* The destination port is the standard web service
* port The source port is an arbitrary number that is always different for each connection request
* The Sequence field contains an always different arbitrary number for each connection request.
* The Acknowledgment field is irrelevant
* The checksum field is calculated using the same checksum algorithm as the IP packet, and applied to the following fields: source IP address (contained in the IP packet), IP address (contained in the IP packet) destination source port and destination port (contained in the TCP segment).
* The urgent pointer field is set to 0.
* The advertised window0xFFFF
* The payload field is empty.
* No options/padding.

To verify correct operation, automatically check that a TCP segment is received in response with the following requirements:

* That the source port corresponds to the standard port of the web service
* That the destination port corresponds to the source port indicated in the request
* That the Acknowledgment field carry an equal to the Sequence number shown on the request increased by 1
* Have the SYN and ACK flags set to 1.