Freie Universität Berlin
Computer Science
Computer Systems & Telematics
Prof. Dr.-Ing. Jochen H. Schiller

Telematics – Exercises No. 11

Winter Term 2012/13, January 11th, 2013

Exercise 1, BGP Metric:

The Border Gateway Protocol applies the so called Best Path Algorithm. Explain how a BGP router determines the route when multiple paths are available.

Exercise 2, BGP and Security:

Watch the video on the following site [YouTube Hijacking: A RIPE NCC RIS case study](#) and discuss how secure the Border Gateway Protocol is.

Exercise 3, Problems of Internet Core Routing:

Read the article [Towards A New Internet Routing Architecture: Arguments for Separating Edges from Transit Core](#) by Jen et al. presented at the ACM HotNets 2008 conference.

1. What is the default-free zone and why is it an integral part of the Internet?
2. Discuss the problem of current Internet core routing?
3. Discuss the advantage and disadvantage of provider independent addresses.

Exercise 4, Clarification of Internet Backbone Terminology:

Explain the following terms:

1. Regional Internet Registry (RIR)?
2. Internet Exchange Point (IXP)?
3. Peering in the context of Internet routing?

What are upstream, downstream and transit providers?

Exercise 5, MPLS:

1. Is it possible to conduct an experiment to determine whether your ISP uses MPLS? (assume it is possible to transmit arbitrary packets.)
2. Can traceroute identify the complete path between two hosts including the routers of the MPLS domain? Read [The Traceroute Command in MPLS](#) by Cisco.
3. What is an advantage of liberal retention of labels? How could the extra labels be used?
4. What is an FEC? What can it be used for?

Exercise 6, TCP Connection:

Consider the following message sequence chart of a TCP connection. The horizontal arrows represent the transmission of segments between two hosts while the vertical arrows represent the time. The labels show an excerpt of the header fields (values and flags) of the TCP segments.
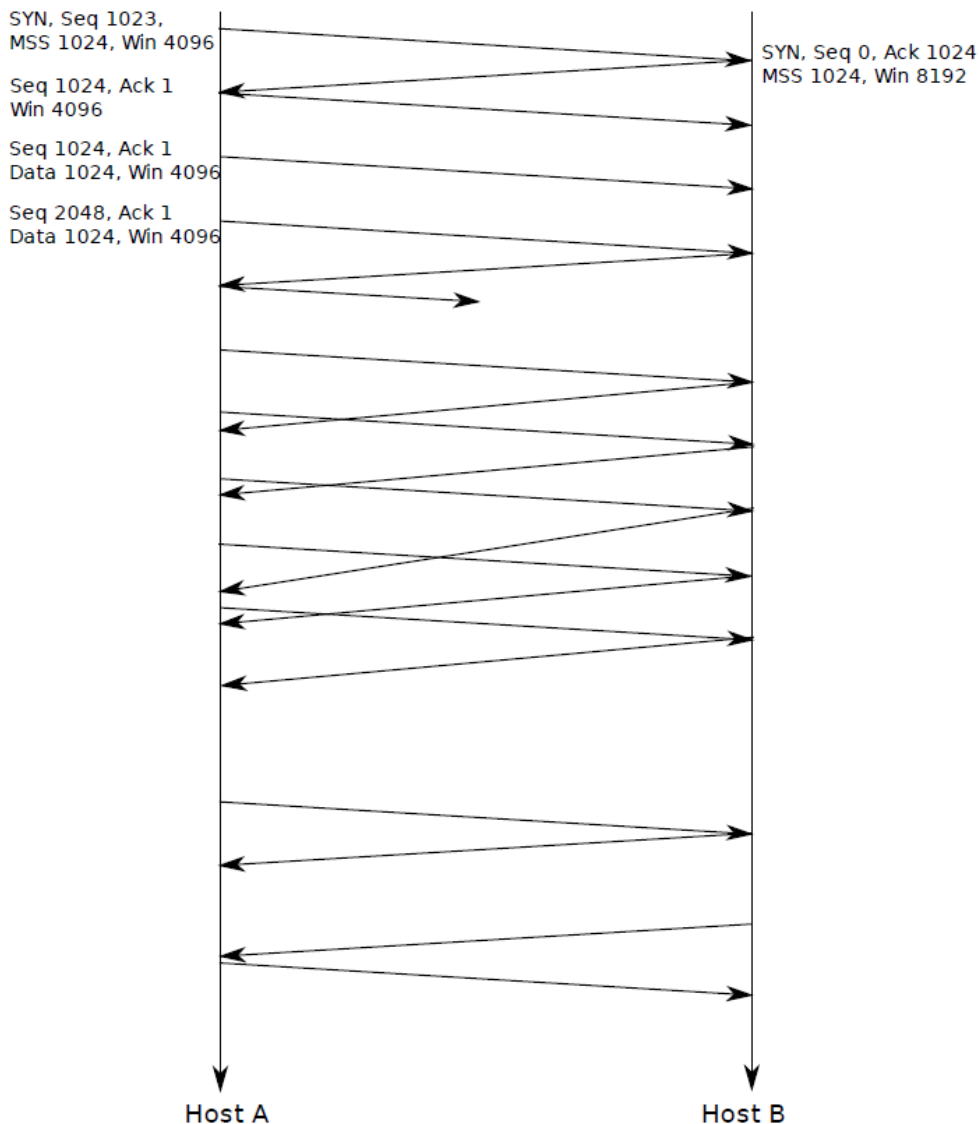
1. Discuss the exchange of the first three segments and the values of the header fields.
2. Host A transmits 7 segments with a payload size of 1024 Byte to host B and closes the connection afterwards. The first two segments carrying payload are already annotated in the message sequence chart. Label the remaining segments with the values of the headers header fields considering the following information:
   - One of the segments is lost in the network (indicated by an arrow that does not reach the right side).
   - Assume that host A supports fast retransmit and no timeouts due to the lost segment occur in A's TCP implementation.

Exercise 7, Basic TCP Features:

The TCP protocol as defined in RFC 793 specifies several features besides to provision of a reliable end-to-end connection. Explain the following features / properties:

1. Push function
2. Urgent data transport
3. TCP Options
4. Connection reset