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

Telematics – Exercises No. 7

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Exercise 1, Collision Detection and Frame Size:

Consider a 20 Mbit/s CSMA/CD LAN with a bus topology of 50 m diameter. The signal propagates with $2 * 10^8$ m/s in the medium.

1. Calculate the upper bound of the collision detection time.
2. Calculate the minimum frame length that is required to detect a collision.

Exercise 2, Fast(er) Ethernet:

You want to increase the data rate of the classical Ethernet (10 Mbit/s) by a factor of 10. What are the consequences and what are possible solutions? Think of minimum listening time, min. frame length, max. network diameter. Now increase again by a factor of 10…

Exercise 3, Long Range Ethernet

Why can an IEEE standard extend the range of Ethernet far beyond the max. diameter of a classical CSMA/CD network? What are the consequences for the topology?

Exercise 4, Packets and Cells:

1. Discuss the difference between packet and cell switching.
2. What are switched circuits, virtual switched circuits and why they are required in some scenarios?
3. What are the differences between SVC and PVC?
4. Why do VPIs and VCIs only have a “local” relevance (i.e. they are valid only between two systems within a longer transmission path via several systems)?

Exercise 5, ATM:

1. The size of an ATM cell is a compromise between the requirements of voice and data communication. Assume that ATM has cells of 1500 bytes. Calculate the time between two successive cells, if data is generated at a rate of 64 kbit/s. How large is the time for the normal ATM cell size?
2. The ATM checksum protects only the cell header. How many bit errors can be corrected with this checksum and why?

Exercise 6, AAL:

What is the motivation for an AAL? Check out where AAL 2 and 5 are used today (hint: UMTS, DSL).

Exercise 7, SDH:

Name key features of SDH. Why is the clock so important in SDH? What is an add-drop Multiplexer?