Högskolan i Halmstad
Sektionen för Informationsvetenskap, Data- Och Elektroteknik (IDÉ)
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Written Exam in
Modern Communication Systems and Networks

May 31, 2006.

Allowed aid in addition to the attached formulae:
Calculator and writing material.

Welcome to the exam!

READ THIS FIRST:

Motivate all answers. Insufficient motivations can give reduced points even if the answer is correct. Describe all calculations in detail. You will then have chance on points even if the calculations contain careless mistakes. If required, you are allowed to make own (reasonable) assumptions. You are allowed to answer in either ENGLISH or SWEDISH.

GOOD LUCK!

Magnus

Number of exercises: 9
Maximal number of points: 60

The amount of bonus points from quizzes (in percentage) is multiplied by 0.6, rounded up to nearest "half point", and thereafter added to the exam points.

The grade limits are 30p to pass the exam (Grade 3), 42p for Grade 4, and 54p for Grade 5.

Formulae

Condition for a Clos network to be (strictly) non-blocking

$N2 \geq IN + OUT - 1$

The condition is necessary if $N1 \geq OUT$ and $N3 \geq IN$

Condition for a Clos network to be rearrangeably nonblocking

$N2 \geq \max(IN, OUT)$

Assignment 1 and 2: Select two (12+12p)

Choose **two** of the following assignments. Appropriate length of an answer/description is 1-2 pages including figures. Write clear and concise. It's more important that what you write is coherent, logical and correct than everything in the subject being included. In other words, it's more important to show that you have an overall understanding than to just mention a lot of less important details. Please use examples when appropriate.

A. BGP and the core Internet

Give an overview of the BGP protocol and other core Internet routing issues like peering, transit, and autonomous systems.

B. Mobile IP

Give an overview of Mobile IP, including examples. Examples of topics to be treated are: how packets are routed, how nodes are discovered etc.

C. Packet scheduling

Give an overview of packet-switching service disciplines including examples with explanations of both work-conserving service disciplines and non-work-conserving service disciplines.

Assignment 3: Multicast (4 p)

Explain how the shared-group tree multicast protocol "CBT – Core-Based Tree" works.

Assignment 4: Routing protocols (4 p)

Explain shortly the main difference in function between SPF (Shortest Path First) protocols and DVA (Distance Vector Algorithm) protocols.

Assignment 5: WDM networking (4 p)

Explain shortly the function of the star in a passive-star-based optical network so it is clear what happens to different wavelength channels from different nodes when passing the star.

Assignment 6: Internet QoS (6 p)

Explain the function of the following two QoS (Quality of Service) mechanisms for the Internet.

A. DiffServ (Differential Services). (3 p)

B. IntServ (Integrated Services). (3 p)

Assignment 7: TCP (7 p)

Explain how the congestion control in TCP works including, e.g. "slow start", "threshold", and "congestion window".

Assignment 8: VLAN (4 p)

    A. Give an example of what information a layer 3-based VLAN can use to determine the VLAN membership (2 p)

    B. Explain the difference in function between a switch with layer-3 based VLAN switching and an IP router (2 p)

Assignment 9: Wormhole routing (7 p)

Explain by example the function of wormhole routing. Continue by adding an explanation of virtual channels, how they are used in wormhole networks, and how/why they influence on the performance.