

Högskolan i Halmstad
Sektionen för Informationsvetenskap, Data- Och Elektroteknik (IDÉ)
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**Written Exam in
Advanced Applied Routing
May 29, 2008**

Allowed aid in addition to the attached formulae:
Writing material.

Welcome to the exam!

READ THIS FIRST:

Motivate all answers. Insufficient motivation can give reduced points even if the answer is correct. If required, you are allowed to make own (reasonable) assumptions. You are allowed to answer in either ENGLISH or SWEDISH but do not mix languages in the same answer.

GOOD LUCK!

Number of exercises: 10

Maximal number of points: 60

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

Assignment 1: Select one of two (12 p)

Choose **one** 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. OSPF

B. IS-IS

Assignment 2: IPv6 (10p)

Describe IPv6 and compare with IPv4. Explain IPv6 address, IPv6 Packet format, transition from IPv4 to IPv6 and main advantages.

Assignment 3: BGP (10p)

Explain Path Vector Routing. What is the BGP Path attributes? Why and how BGP use Path attributes?

Assignment 4: Routing tables (7p)

A network has three routers. Three routing tables are listed below. Based on the routing tables, draw the network connectivity.

R1# show ip route

Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is not set

D EX 192.168.40.0/24 [165/40537600] via 172.16.12.2, 00:11:55, Serial0/0
172.16.0.0/24 is subnetted, 6 subnets

D 172.16.23.0 [95/41024000] via 172.16.12.2, 00:11:55, Serial0/0

C 172.16.12.0 is directly connected, Serial0/0

C 172.16.1.0 is directly connected, Loopback0

D 172.16.2.0 [95/40640000] via 172.16.12.2, 00:11:55, Serial0/0

D EX 172.16.3.0 [165/40537600] via 172.16.12.2, 00:11:55, Serial0/0

D 172.16.100.0 [95/40640000] via 172.16.12.2, 00:11:55, Serial0/0

D EX 192.168.20.0/24 [165/40537600] via 172.16.12.2, 00:11:55, Serial0/0

C 192.168.51.0/24 is directly connected, Loopback51

C 192.168.50.0/24 is directly connected, Loopback50

D EX 192.168.35.0/24 [165/40537600] via 172.16.12.2, 00:11:55, Serial0/0

C 192.168.49.0/24 is directly connected, Loopback49

C 192.168.70.0/24 is directly connected, Loopback70

```
C 192.168.48.0/24 is directly connected, Loopback48
D EX 192.168.8.0/22 [165/40537600] via 172.16.12.2, 00:11:57, Serial0/0
D 192.168.48.0/23 is a summary, 02:48:33, Null0
D EX 192.168.48.0/22 [165/40537600] via 172.16.12.2, 00:11:47, Serial0/0
```

R2# show ip route

Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is not set

```
O 192.168.30.0/24 [110/782] via 172.16.23.3, 00:54:45, Serial0/1
O 192.168.25.0/24 [110/782] via 172.16.23.3, 00:54:45, Serial0/1
O 192.168.40.0/24 [110/782] via 172.16.23.3, 00:54:45, Serial0/1
172.16.0.0/24 is subnetted, 6 subnets
C 172.16.23.0 is directly connected, Serial0/1
C 172.16.12.0 is directly connected, Serial0/0
D 172.16.1.0 [90/40640000] via 172.16.12.1, 00:09:02, Serial0/0
C 172.16.2.0 is directly connected, Loopback0
O 172.16.3.0 [110/782] via 172.16.23.3, 00:54:46, Serial0/1
C 172.16.100.0 is directly connected, Loopback100
O 192.168.20.0/24 [110/782] via 172.16.23.3, 00:54:46, Serial0/1
D 192.168.51.0/24 [90/40640000] via 172.16.12.1, 00:09:03, Serial0/0
D 192.168.50.0/24 [90/40640000] via 172.16.12.1, 00:09:03, Serial0/0
O 192.168.35.0/24 [110/782] via 172.16.23.3, 00:54:48, Serial0/1
D 192.168.70.0/24 [90/40640000] via 172.16.12.1, 00:09:05, Serial0/0
O IA 192.168.8.0/22 [110/782] via 172.16.23.3, 00:54:48, Serial0/1
D 192.168.48.0/23 [90/40640000] via 172.16.12.1, 00:09:05, Serial0/0
O 192.168.48.0/22 is a summary, 00:08:56, Null0
```

R3#show ip route

Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP

Gateway of last resort is not set

```
C 192.168.30.0/24 is directly connected, Loopback30
C 192.168.8.0/24 is directly connected, Loopback8
C 192.168.25.0/24 is directly connected, Loopback25
C 192.168.9.0/24 is directly connected, Loopback9
C 192.168.10.0/24 is directly connected, Loopback10
C 192.168.40.0/24 is directly connected, Loopback40
172.16.0.0/24 is subnetted, 6 subnets
C 172.16.23.0 is directly connected, Serial0/1
O E2 172.16.12.0 [175/20] via 172.16.23.2, 00:06:54, Serial0/1
O E2 172.16.1.0 [175/20] via 172.16.23.2, 00:06:54, Serial0/1
O E2 172.16.2.0 [175/20] via 172.16.23.2, 00:06:54, Serial0/1
C 172.16.3.0 is directly connected, Loopback0
O IA 172.16.100.0 [115/782] via 172.16.23.2, 00:06:54, Serial0/1
C 192.168.11.0/24 is directly connected, Loopback11
C 192.168.20.0/24 is directly connected, Loopback20
C 192.168.35.0/24 is directly connected, Loopback35
O E2 192.168.70.0/24 [175/20] via 172.16.23.2, 00:06:55, Serial0/1
O 192.168.8.0/22 is a summary, 00:06:55, Null0
O E2 192.168.48.0/22 [175/20] via 172.16.23.2, 00:06:55, Serial0/1
```

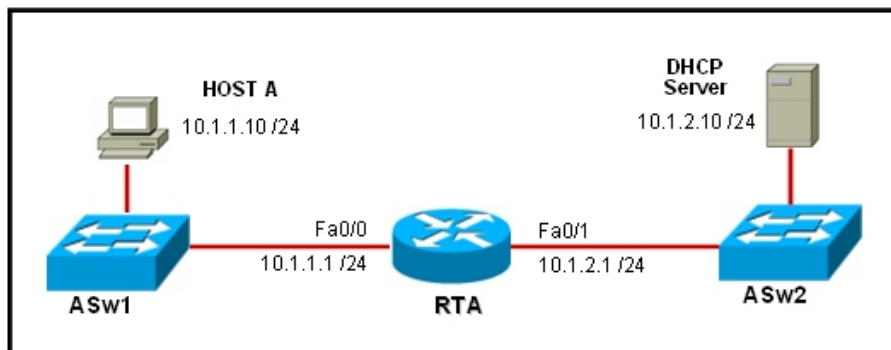
Assignment 5: OSPF (6p)

What are the purposes of stub area and NSSA in OSPF network? Explain the differences between stub and NSSA OSPF areas (make picture).

Assignment 6: IS-IS (3p)

In IS-IS, what does Level 1 routing mean?

Assignment 7: DHCP (3p)



Refer to the exhibit. Can Host A obtain an IP address from the DHCP server? Motivate your answer.

Assignment 8: Multicasting (3p)

How to determine the Multicast Ethernet Address?

Assignment 9: Route optimization (3p)

Describe short how to control routing update traffic.

Assignment 10: Multicasting (3p)

What means PIM-DM and PIM-SM?

Explain short the difference between PIM-DM and PIM-SM.