Högskolan i Halmstad
Sektionen för Informationsvetenskap, Data- Och Elektroteknik (IDÉ)
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Written Exam in
Advanced Applied Routing
March 13, 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. IPv 6 (IPv6 address, IPv6 Packet format, transition from IPv4 to IPv6, main advantages)

B. Protocol independent Multicast Routing Protocol (Dense mode , Sparse mode, how it work and when it will be used Dense mode or Sparse mode)

Assignment 2: OSPF & IS-IS (10p)

Describe and compare OSPF and IS-IS and explain advantages of both protocols. When and why should we use these protocols?

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 (8 p)

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

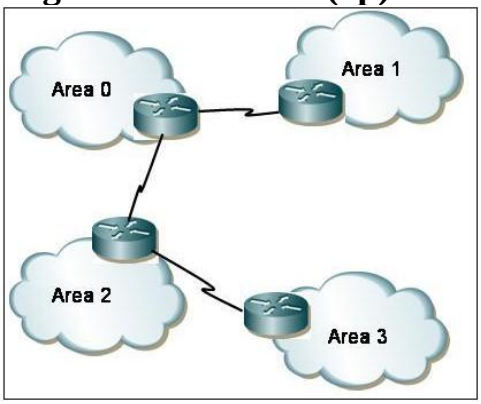
```
R1#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is not set

     172.30.0.0/30 is subnetted, 1 subnets
C       172.30.30.0 is directly connected, Loopback30
     10.0.0.0/24 is subnetted, 5 subnets
C       10.1.12.0 is directly connected, Serial0/0/0
O IA    10.1.3.0 [110/129] via 10.1.12.2, 00:01:59, Serial0/0/0
O       10.1.2.0 [110/65] via 10.1.12.2, 00:01:59, Serial0/0/0
C       10.1.1.0 is directly connected, Loopback1
O IA    10.1.23.0 [110/128] via 10.1.12.2, 00:01:59, Serial0/0/0
O IA 192.168.100.0/22 [110/129] via 10.1.12.2, 00:01:59, Serial0/0/0
```

```
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
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is 10.1.12.1 to network 0.0.0.0

     10.0.0.0/24 is subnetted, 5 subnets
C       10.1.12.0 is directly connected, Serial0/0/0
O       10.1.3.0 [110/65] via 10.1.23.3, 00:26:20, Serial0/0/1
C       10.1.2.0 is directly connected, Loopback2
O       10.1.1.0 [110/65] via 10.1.12.1, 00:05:49, Serial0/0/0
C       10.1.23.0 is directly connected, Serial0/0/1
O*E2 0.0.0.0/0 [110/1] via 10.1.12.1, 00:05:39, Serial0/0/0
O IA 192.168.100.0/22 [110/65] via 10.1.23.3, 00:05:49, Serial0/0/1


R3#   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
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is 10.1.23.2 to network 0.0.0.0

     10.0.0.0/24 is subnetted, 5 subnets
O       10.1.12.0 [110/128] via 10.1.23.2, 00:06:56, Serial0/1/1
C       10.1.3.0 is directly connected, Loopback3
O       10.1.2.0 [110/65] via 10.1.23.2, 00:06:56, Serial0/1/1
O       10.1.1.0 [110/129] via 10.1.23.2, 00:06:56, Serial0/1/1
C       10.1.23.0 is directly connected, Serial0/1/1
C    192.168.102.0/24 is directly connected, Loopback102
C    192.168.103.0/24 is directly connected, Loopback103
C    192.168.100.0/24 is directly connected, Loopback100
C    192.168.101.0/24 is directly connected, Loopback101
O*E2 0.0.0.0/0 [110/1] via 10.1.23.2, 00:06:56, Serial0/1/1
O    192.168.100.0/22 is a summary, 00:20:07, Null0
```

Assignment 5: OSPF (6p)

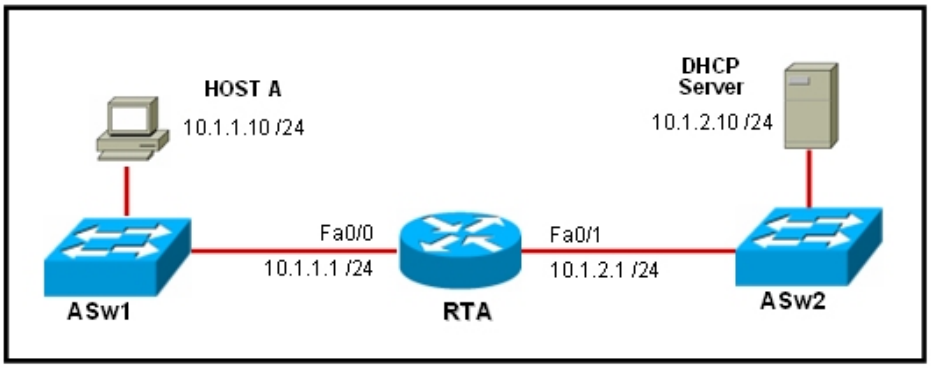
What are the purposes of areas in OSPF network? Which OSPF area type can be used? Explain the differences between OSPF areas (make picture).

Assignment 6: OSPF (3p)



A network administrator has recently added a new area, Area 3, to the OSPF internetwork. Due to physical limitations, it is not possible to provide Area 3 with direct access to the backbone. What must the administrator configure to ensure continuity in the OSPF network? Motive you answer.

Assignment 7: DHCP (3p)



Refer to the exhibit. Why Host A is unable to obtain an IP address from the DHCP server. Which procedure would solve this problem?

Assignment 8: Multicasting (3p)

Which advantages has multicasting? Compare multicasting to unicasting and broadcasting. Make examples.

Assignment 9: Route optimization (3p)

Explain the difference between policy based routing and router redistribution.

Assignment 10: IPv6 (2p)

Which three addresses defines IPv6? Explain the difference between these addresses.