Route Summarization

SDC CNW (CSE 4541)

CSE, FET, ITER

SOA University, BBSR-30

References

Glen E. Clarke & Richard Deal

CCT/CCNA

Routing & Switching Exam Guide

McGrawHll

Discussion Flow

- Introduction
- Route summarization
- Summary Route Calculation
- Example

Review Questions

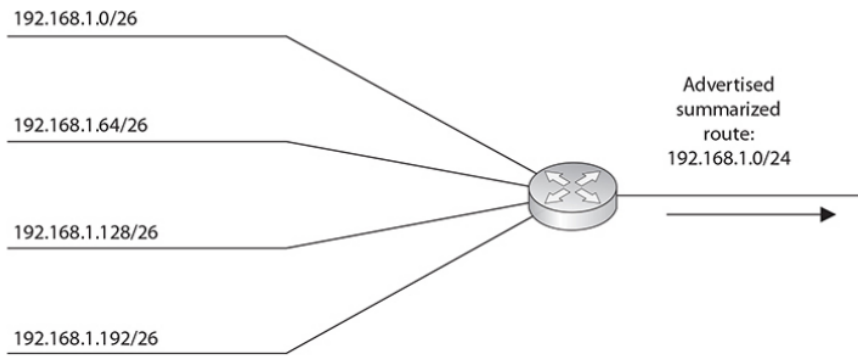
Introduction

- Route summarization is the ability to take a bunch of contiguous network numbers in your routing table and advertise these contiguous routes as a single summarized or aggregated route.
- Route summarization enables you to summarize subnetted routes back to the class boundary.
- For example:

Subnetting

```
Network ID:192.168.1.0/24
Subnetted it to: 192.168.1.0/26
Giving four networks:
(0) 192.168.1.0/26
(1) 192.168.1.64/64
(2) 192.168.1.128/26
(3) 192.168.10.192/26
```

Route summarization



- Summarize these subnets in the routing table and advertise them as the single class C network number-192.168.1.0/24

Route summarization

Summarization enables us to create a more efficient routing environment by providing the following advantages and disadvantages:

Advantages to route summarization

- It reduces the size of routing tables, requiring less memory and processing.
- It reduces the size of routing updates, requiring less bandwidth.
- It prevents routing table instability.

Disadvantages to route summarization

- The summary route may contain subnets that are not in use, and the router may receive packets for routes that are not in use, although they do mathematically fall under the summary route. In this case the router will drop those packets.
- The router may choose a different pathway for the route because the pathway is more specific than that of the summary route.

Summary Route Calculation

Summary Route Calculation

List out each of the network IDs and then convert them to their binary

192.168.1.0/26	11000000.10101000.00000001.00000000
192.168.1.64/26	11000000.10101000.00000001.01000000
192.168.1.128/26	11000000.10101000.00000001.10000000
192.168.1.192/26	11000000.10101000.00000001.11000000

Summary Route Calculation

List out each of the network IDs and then convert them to their binary

- 192.168.1.0/26 — 11000000.10101000.00000001.00000000
- 192.168.1.64/26 — 11000000.10101000.00000001.01000000
- 192.168.1.128/26 — 11000000.10101000.00000001.10000000
- 192.168.1.192/26 — 11000000.10101000.00000001.11000000

Identify, from left to right, how many of the bits are the same

- 192.168.1.0/26 — **11000000.10101000.00000001**.00000000
- 192.168.1.64/26 — **11000000.10101000.00000001**.01000000
- 192.168.1.128/26 — **11000000.10101000.00000001**.10000000
- 192.168.1.192/26 — **11000000.10101000.00000001**.11000000

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- 192.168.1.192/26 — **11000000.10101000.00000001**.11000000

Summary Network ID and Mask

- Network ID :**11000000.10101000.00000001**.00000000=192.168.10.0
- Summary mask:**11111111.11111111.1111111**.00000000=255.255.255.0

Summary Route Calculation

List out each of the network IDs and then convert them to their binary

- 192.168.1.0/26 — 11000000.10101000.00000001.00000000
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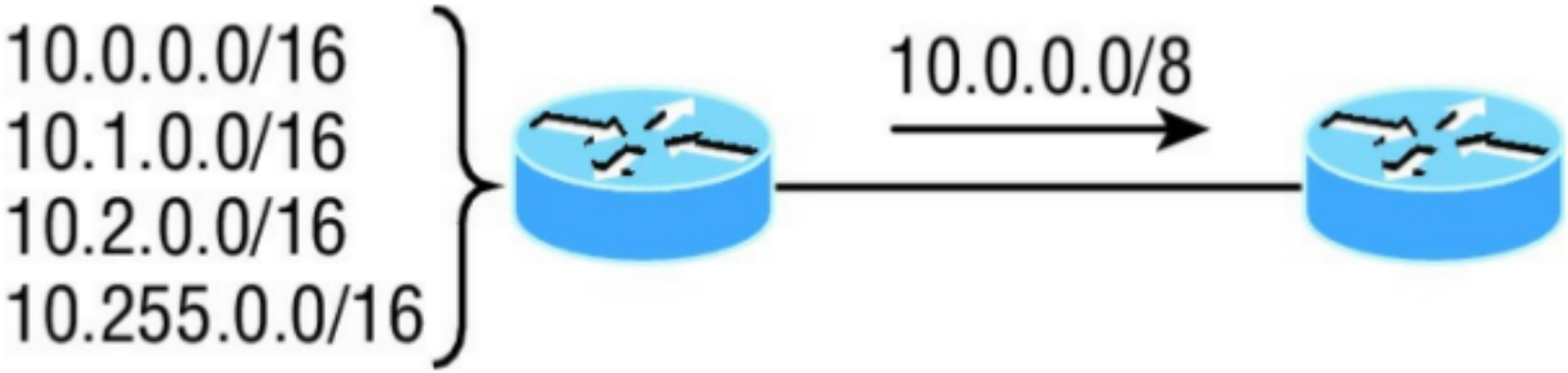
Summary Network ID and Mask

- Network ID :**11000000.10101000.00000001**.00000000=192.168.10.0
- Summary mask:**11111111.11111111.1111111**.00000000=255.255.255.0

So, the summary route is 192.168.1.0/24

Example-1

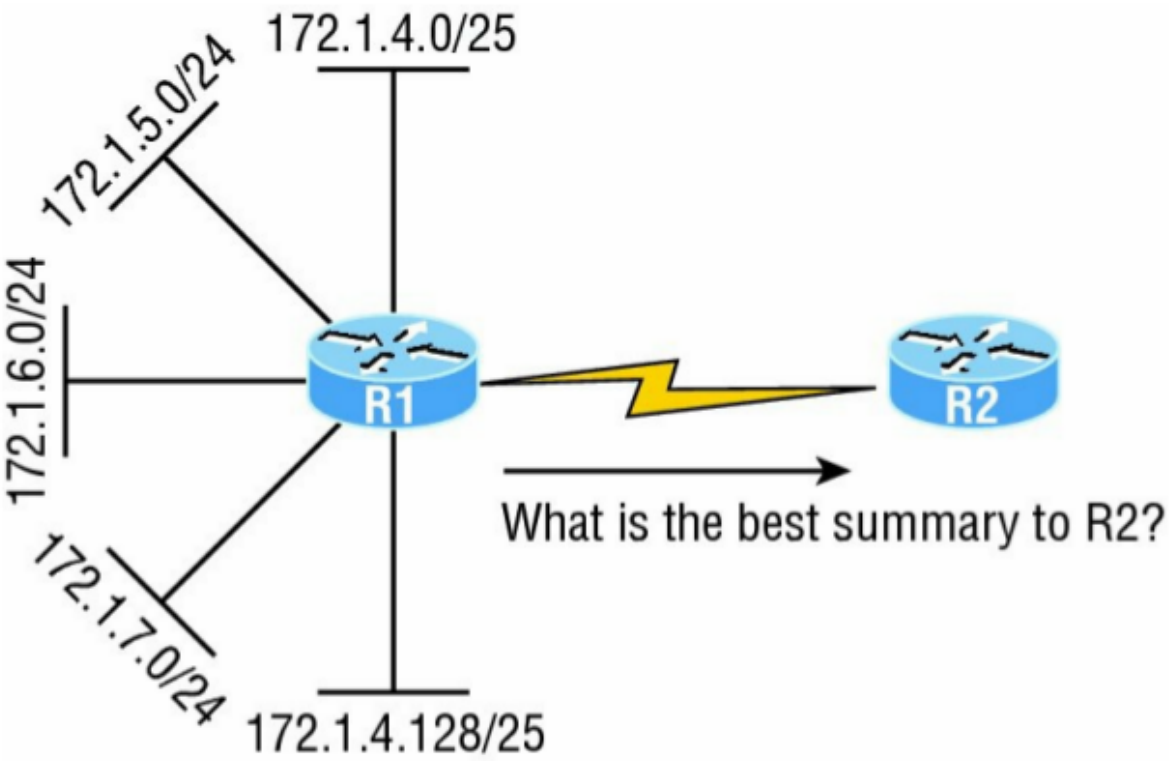


Example-2

(1) 192.168.16.0 through network 192.168.31.0

(2) Networks 172.16.32.0 through 172.16.50.0

Example-3


172.1.4.0/25
172.1.5.0/24
172.1.6.0/24
R1
R2
What is the best summary to R2?
172.1.7.0/24
172.1.4.128/25

Review Questions

Review Questions

- 192.168.1.0/24 through 192.168.12.0/24

Review Questions

- 192.168.1.0/24 through 192.168.12.0/24 **192.168.0.0/20**

Review Questions

- 192.168.1.0/24 through 192.168.12.0/24 **192.168.0.0/20**
- 172.144.0.0 through 172.159.0.0

Review Questions

- 192.168.1.0/24 through 192.168.12.0/24 **192.168.0.0/20**
- 172.144.0.0 through 172.159.0.0 **172.144.0.0 255.240.0.0**

Review Questions

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- 192.168.32.0 through 192.168.63.0

Review Questions

- 192.168.1.0/24 through 192.168.12.0/24 **192.168.0.0/20**
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- 192.168.32.0 through 192.168.63.0 **192.168.32.0 255.255.224.0**

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- 192.168.96.0 through 192.168.111.0

Review Questions

- 192.168.1.0/24 through 192.168.12.0/24 **192.168.0.0/20**
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- 192.168.96.0 through 192.168.111.0 **192.168.96.0 255.255.240.0**
- 66.66.0.0 through 66.66.15.0

Review Questions

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- 66.66.0.0 through 66.66.15.0 **66.66.0.0 255.255.240.0**
- 192.168.1.0 through 192.168.120.0

Review Questions

- 192.168.1.0/24 through 192.168.12.0/24 **192.168.0.0/20**
- 172.144.0.0 through 172.159.0.0 **172.144.0.0 255.240.0.0**
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- 66.66.0.0 through 66.66.15.0 **66.66.0.0 255.255.240.0**
- 192.168.1.0 through 192.168.120.0 **192.168.0.0/17**

Review Questions

- 192.168.1.0/24 through 192.168.12.0/24 **192.168.0.0/20**
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- 192.168.1.0 through 192.168.120.0 **192.168.0.0/17**
- 172.16.1.0 through 172.16.7.0

Review Questions

- 192.168.1.0/24 through 192.168.12.0/24 — **192.168.0.0/20**
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- 192.168.1.0 through 192.168.120.0 — **192.168.0.0/17**
- 172.16.1.0 through 172.16.7.0 — **172.16.0.0 255.255.248.0**

Review Questions

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- 66.66.0.0 through 66.66.15.0 **66.66.0.0 255.255.240.0**
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- 172.16.1.0 through 172.16.7.0 **172.16.0.0 255.255.248.0**
- 192.168.128.0 through 192.168.190.0

Review Questions

- 192.168.1.0/24 through 192.168.12.0/24 **192.168.0.0/20**
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- 192.168.128.0 through 192.168.190.0 — **192.168.128.0 255.255.192.0**
- 53.60.96.0 through 53.60.127.0

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- 172.16.10.0 through 172.16.63.0 — **172.16.0.0 255.255.192.0**

Review Questions

1. On a VLSM network, which mask should you use on point-to-point WAN links in order to reduce the waste of IP addresses?

   (A) /27
   (B) /28
   (C) /29
   (D) /30
   (E) /31

2. If a host, A, is configured with an incorrect default gateway and all the other computers and router are known to be configured correctly, which of the following statements is TRUE?

   (A) Host A cannot communicate with the router.
   (B) Host A can communicate with other hosts in the same subnet.
   (C) Host A can communicate with hosts in other subnets.
   (D) Host A can communicate with no other systems.

3. You are configuring the gigabit interface on the Cisco router with the last valid IP address of the 131.107.48.0/20 network. What address would you use?

   (A) 131.107.48.254
   (B) 131.107.255.254
   (C) 131.107.64.254
   (D) 131.107.63.254

THANK YOU