

Configuring OSPF for IPv4



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OSPF Processes

A single router or layer 3 switch can have multiple OSPF processes

Each process has its own link state database (LSDB)

OSPF Processes

Each OSPF process has an assigned number that's locally significant

Processes are completely separate

OSPF Neighbor Operations

Router ID (RID)

**Used to uniquely identify
an OSPF router**

**Formatted as an IPv4
address (x.x.x.x)**

Router ID (RID)

**Uses the highest
numbered IP of
any loopback**

**Otherwise uses
the highest
numbered IP of
any interface**

**Selected when the
OSPF process
starts**

OSPF routers communicate
using IP protocol 89.

OSPF Hello Messages

**Sent to the multicast
address 224.0.0.5**

**Used for discovery
and keepalives**

OSPF Hello Messages

Broadcast and point-to-point

Sent every 10 seconds

Dead timer is 4x the hello interval =
40 seconds

All other network types

Sent every 30 seconds

Dead timer is 120 seconds

LSA Exchange

Using multicast
224.0.0.5 on a
point-to-point
network

On a broadcast
network, routers
communicate with
the designated
router (DR) using
224.0.0.6

DR communicates
with OSPF routers
using 224.0.0.5

OSPF Neighbor States

Init

2-way

Exstart

Exchange

Loading

Full



First OSPF router in a subnet becomes the designated router (DR) for the subnet

Second router becomes the backup designated router (BDR)

Designated Router Election

Each interface has
a priority
(default 1)

Router with the
highest priority
becomes the DR

Highest RID is
the tiebreaker

Normal Areas

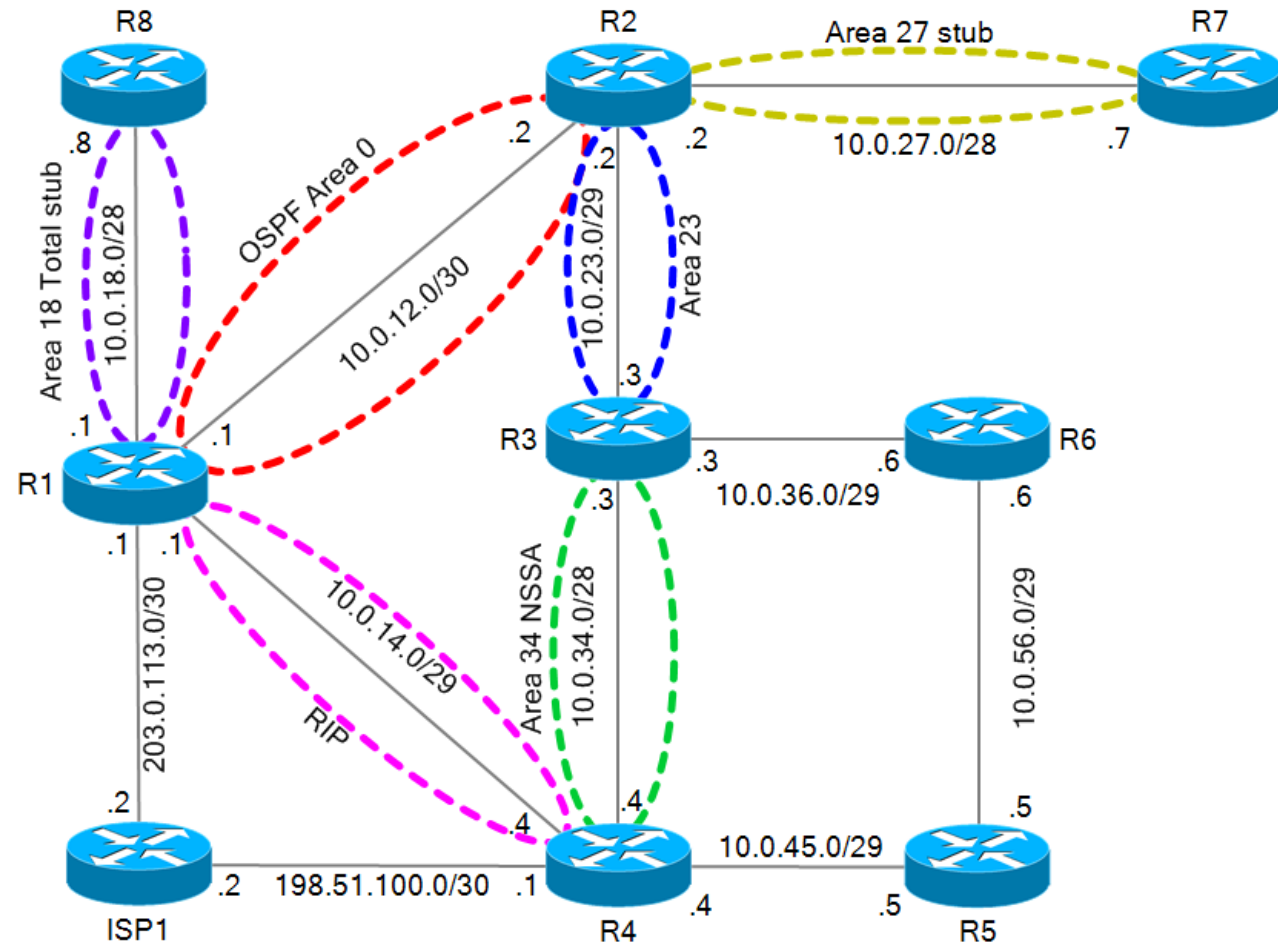
Customer Request

Configure OSPF A0 and A23 according to the IPv4 topology diagram

Use the most specific wildcard mask possible on R1

Ensure R2 uses the router ID 2.2.2.2 and R3 uses the router ID 3.3.3.3

OSPF IPv4 Topology



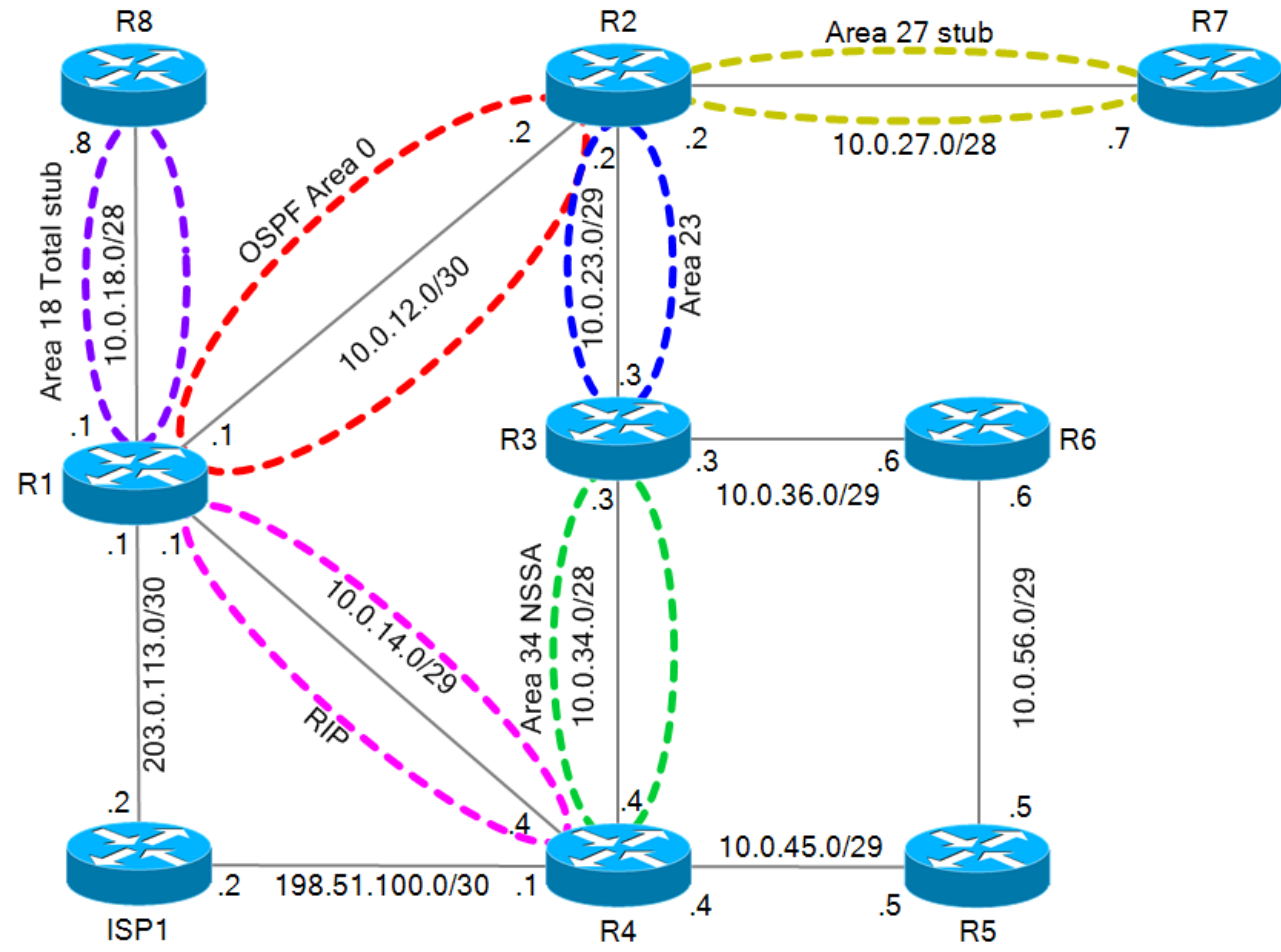
Stub Areas

Customer Request

Configure OSPF A27 as a stub area according to the IPv4 topology diagram

On R7, use OSPF process 7 and a RID of 7.7.7.7

OSPF IPv4 Topology



Totally Stubby Areas

Customer Request

Configure area 18 as a totally stubby area according to the IPv4 topology diagram

On R8, create and advertise the loopback0 IP address 8.8.8.8/32 into the area

Ensure R8 uses a RID of 8.8.8.8 even if all loopbacks are deleted

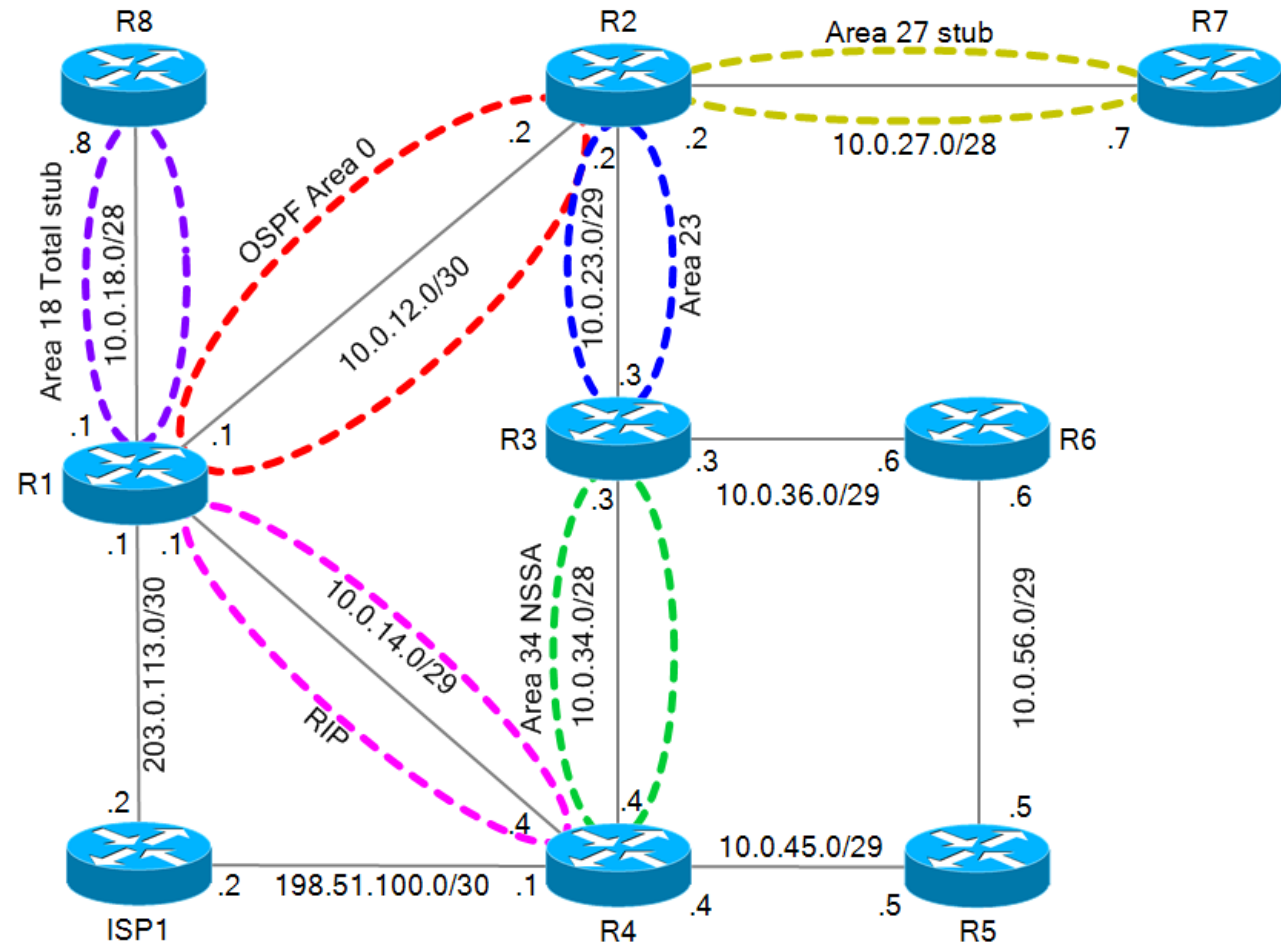
Not-so-stubby Areas (NSSA)

Customer
Request

Configure A34 as a not-so-stubby area

Virtual Links

OSPF IPv4 Topology



Virtual Links

**Must be configured on
both ABRs**

**The transit area cannot be a
stub area**

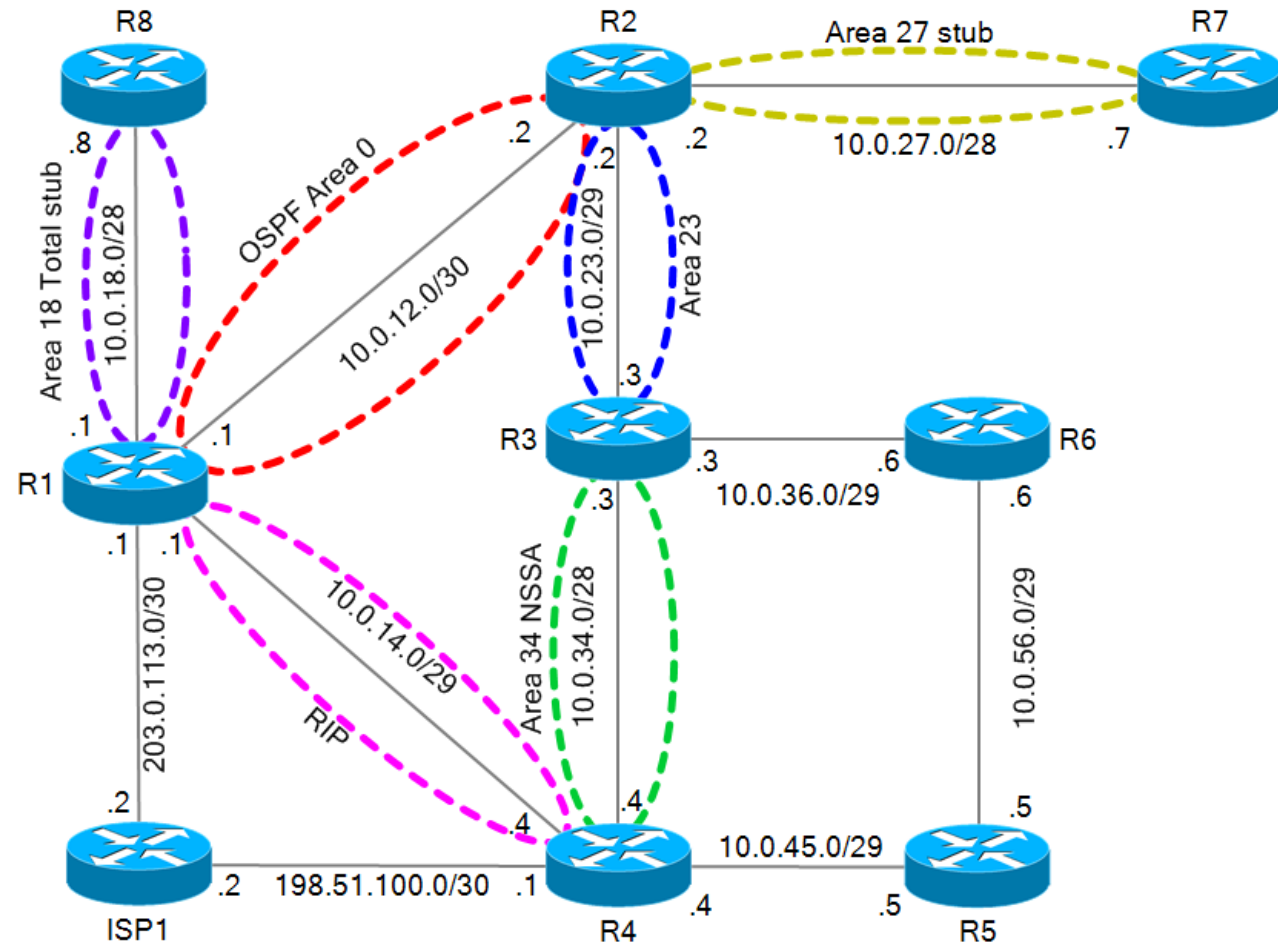
Designated Router Election

Customer Request

Configure R3 as the designated router on the network between R3 and R4

Ensure R4 never becomes the DR

OSPF IPv4 Topology

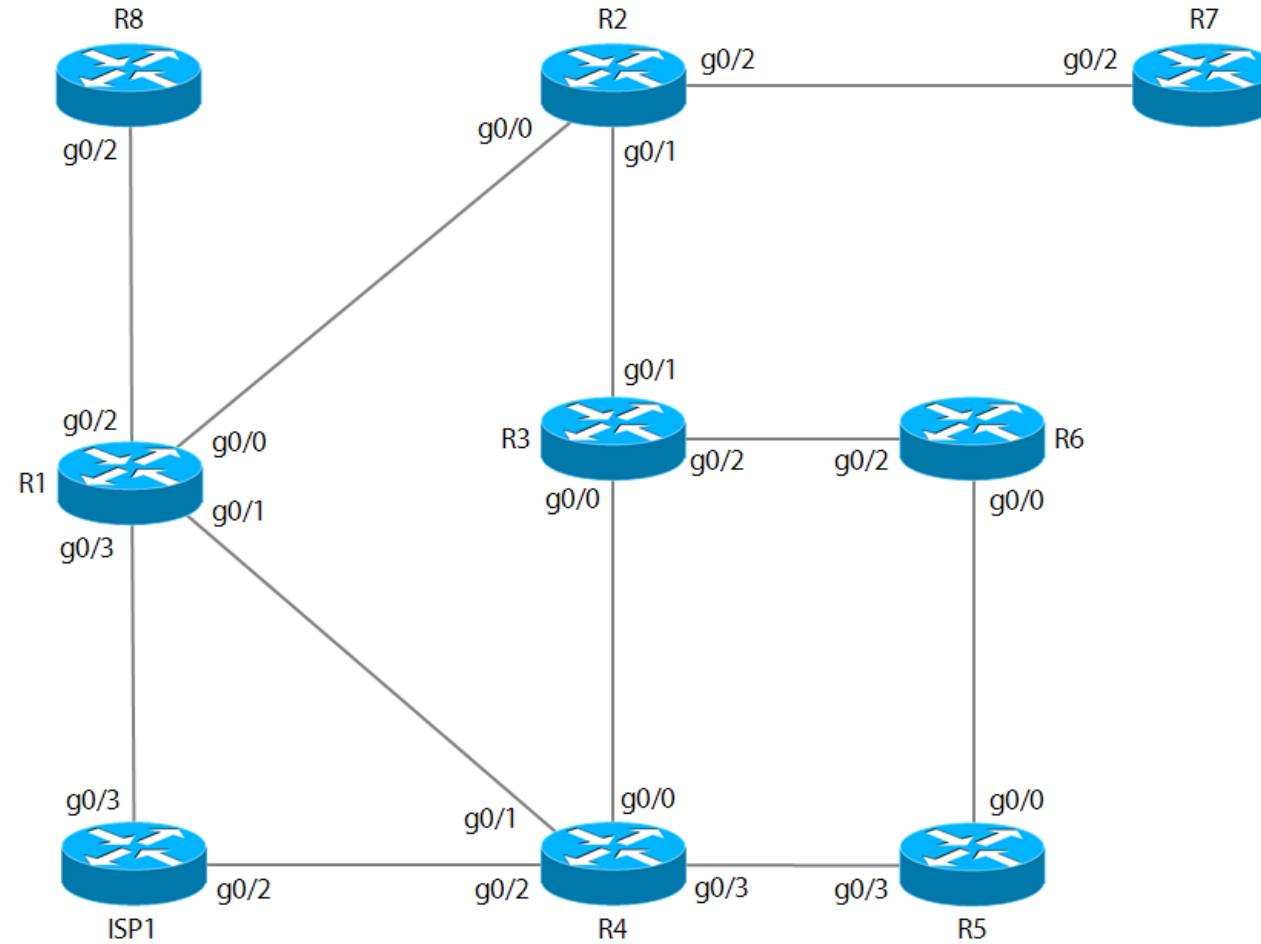


OSPF Network Types

Customer
Request

Ensure neither R1 nor R8 is a designated router on the 10.0.18.0/28 network

Layer 2 Topology



Authentication

OSPF Authentication

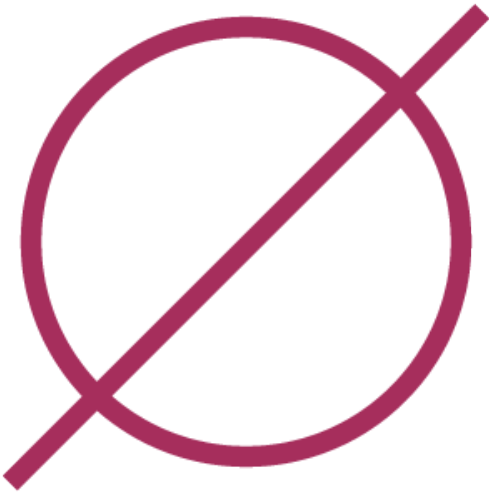
Interface authentication

Requires authentication for adjacent routers

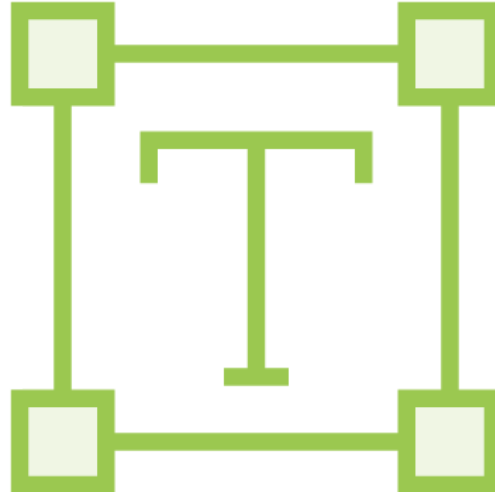
Area authentication

Enables interface authentication on all interfaces in an area

Authentication Methods



Null



Clear text



Cryptographic (MD5)

Customer Request

Configure OSPF authentication for area 0

Ensure the authentication key is never sent in the clear

OSPF Route Summarization

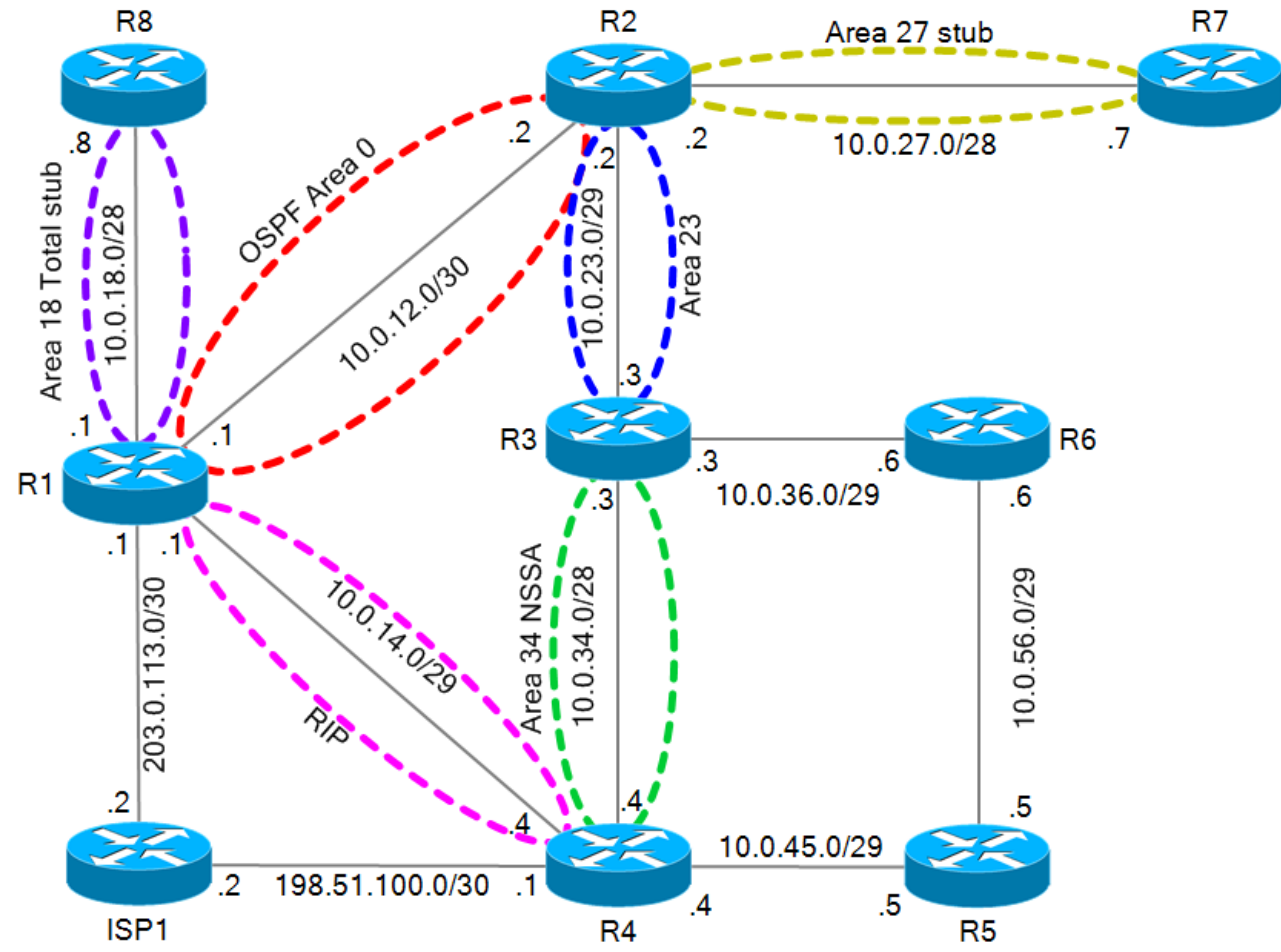
Summarization must occur
on an ABR or ASBR.

Customer Request

Configure loopback addresses 8.0.0.1/32
and 8.0.0.2/32 on R8

Summarize the 8.0.0.0/8 major network as
close to R8 as possible

OSPF IPv4 Topology



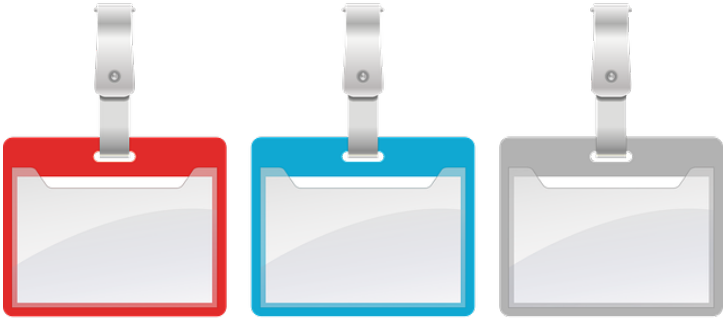
Summary

Summary



OSPF routes have an administrative distance of 110

Summary



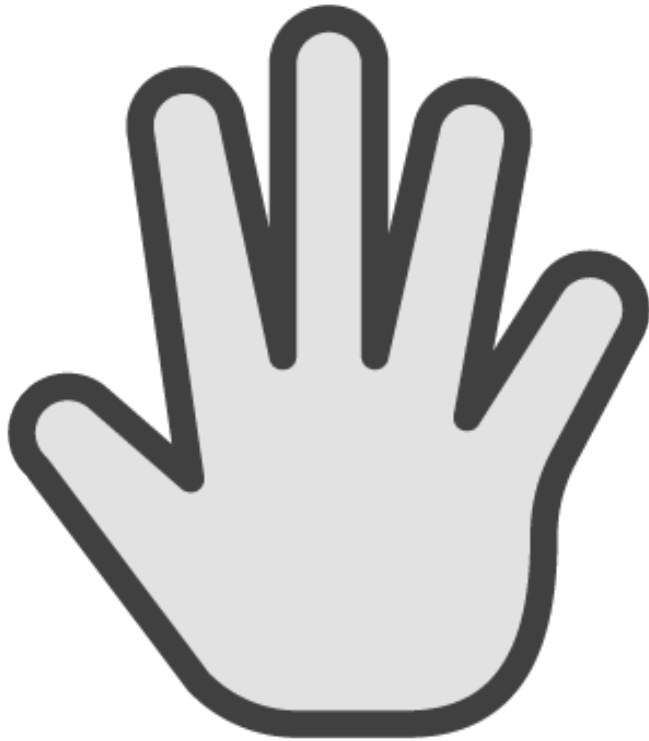
Each OSPF router has a unique router ID

Summary



OSPF uses IP protocol 89, not TCP or UDP

Summary



**OSPF routers discover and maintain
adjacencies using Hello messages**

Summary



Dead timer is $4 \times$ Hello interval

Summary



On a broadcast network, OSPF routers elect a designated router

Summary



Virtual links allow areas not bordering area 0 to connect to area 0 through a transit area

Summary



**Authentication can be configured per area
or per interface**

Summary



OSPF can summarize

- Inter-area routes at an area border router (ABR)
- External routes at an autonomous system boundary router (ASBR)

In the Next Module



We're going to configure route redistribution, IP prefix lists, and route maps!