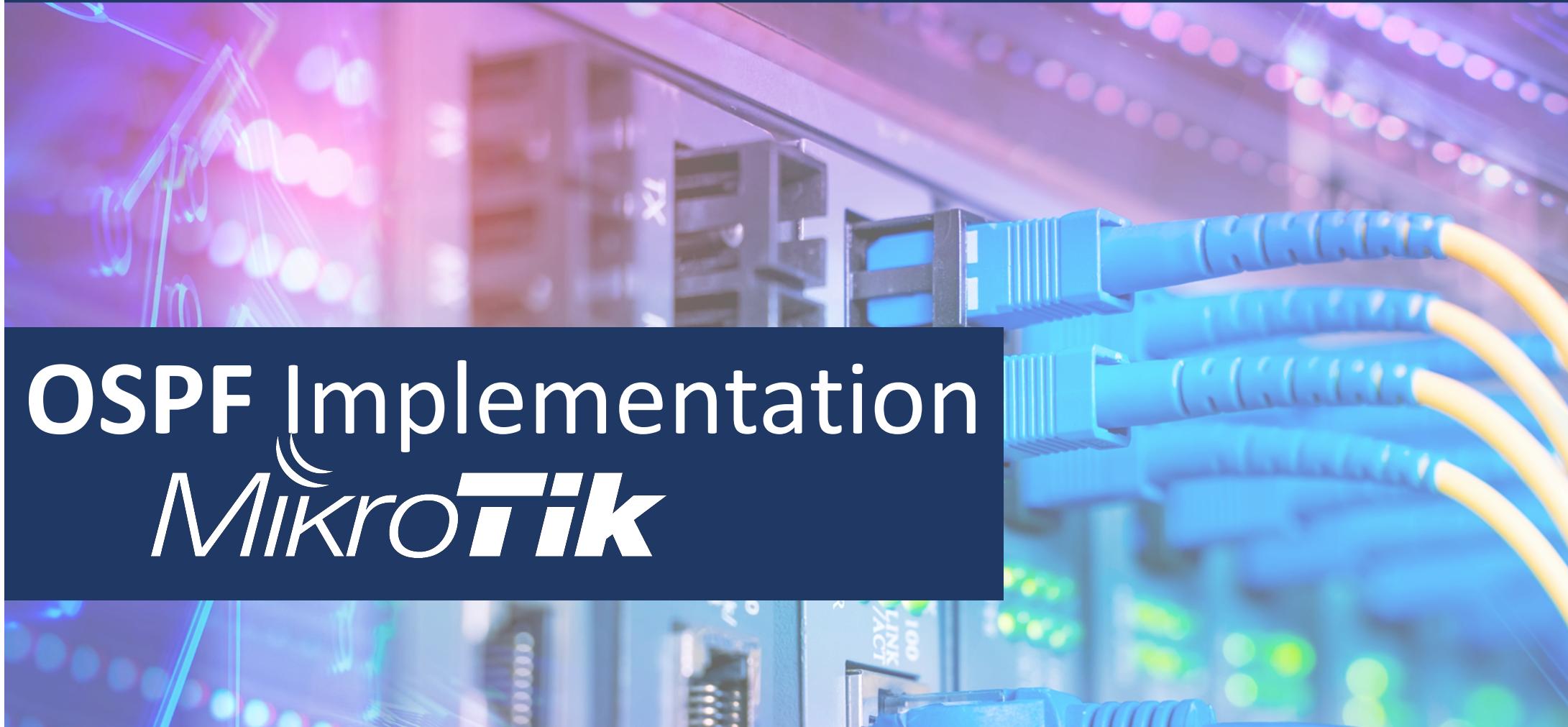


# MikroTik Advanced Routing

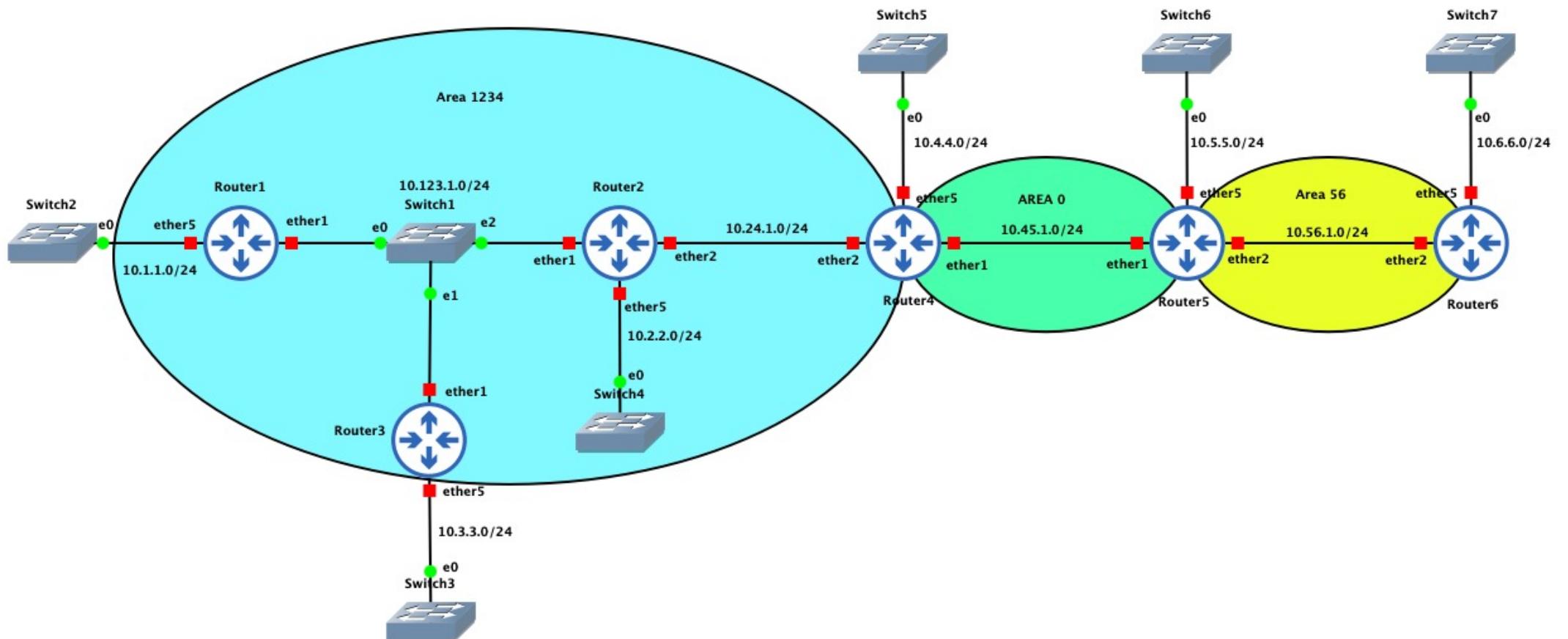
OSPF Implementation  
**MikroTik**



# What are we doing today?

- Configuring OSPF scenario
- LSA types deep-dive
- DR & BDR Election
- OSPF Troubleshooting
- Stub area
- Fine Tuning

# OSPF Implementation



# Checklist

- Create/modify the *default Instance* and enter the Router-ID
- Create/modify the **Area** and tie it to an *instance*
- Create **networks** and tie it to the area that we want to participate in the OSPF

# Verify the OSPF

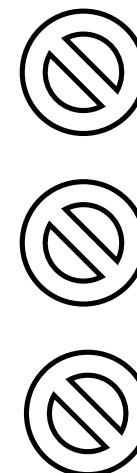
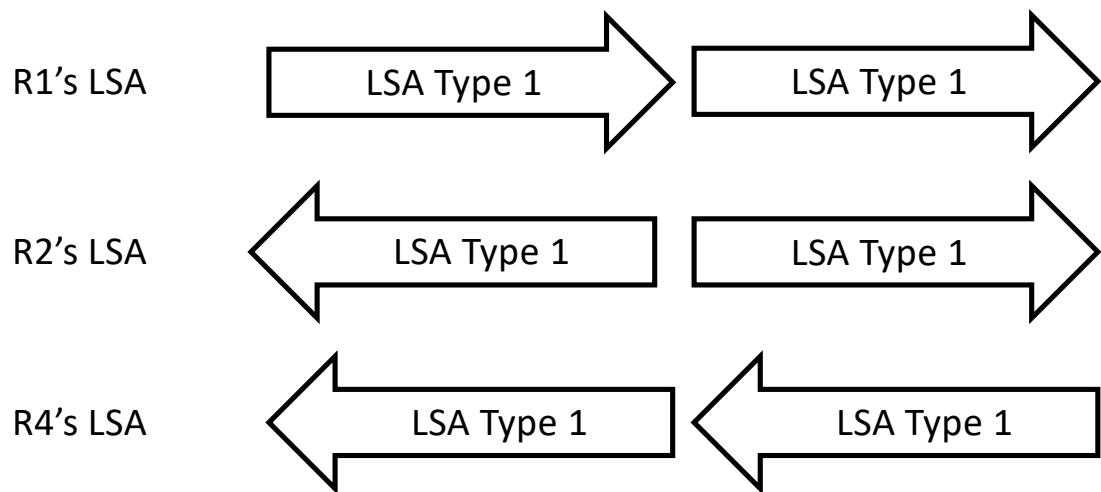
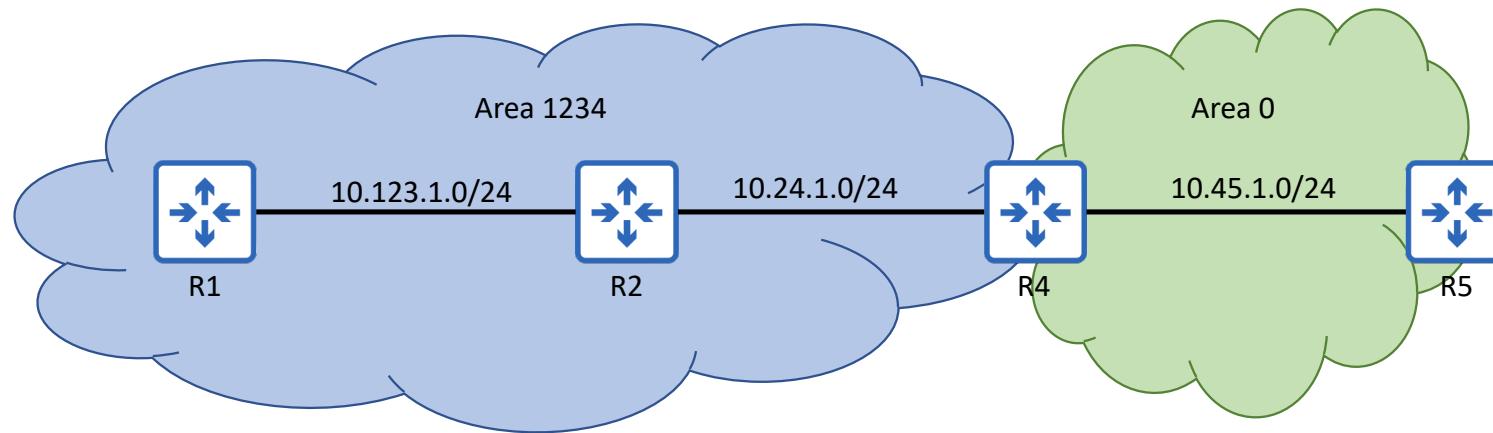
- Check neighborship by *routing ospf neighbor print*
- Check OSPF route database *routing ospf route print*
- Check LSA database *routing ospf lsa print*
- Check local routing table(RIB) *ip route print*
- Check only ospf configuration by entering sub-menu */routing ospf* and execute *export* command

# LSA Types

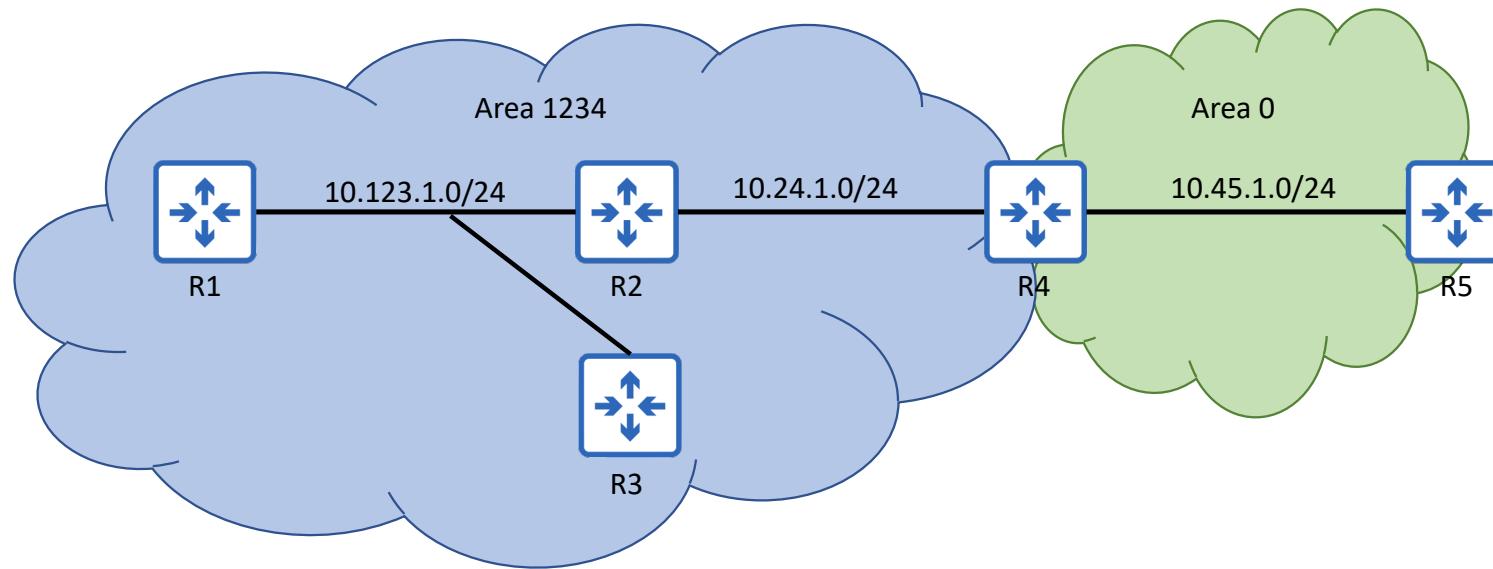
- Type 1, Router – LSA type describes the Router
- Type 2, Network – LSA type describes the network that has a DR
- Type 3, Summary – LSA type describes a subnet in another area
- Type 4, ASBR Summary – LSA type to locate ASBR from a different Area
- Type 5, AS External – Network prefixes that were redistributed in to OSPF
- Type 7, NSSA external – external prefixes that were advertised into local NSSA area

All LSA types have age of 1800 seconds, when this age exceeds the originating router sends an update to confirm that the LSA is still active and the time is reset to 0, in case there is no update for 3600 seconds the LSA expires and is purged from the LSDB

# LSA Type 1 - Router



# LSA Type 2- Network



- Type 2 LSA exist only in Multi-access network segments
- The DR advertises Type-2 LSA and identifies all the routers attached to that network segment
- Like Type 1 LSA, Type 2 LSAs are also not advertised outside the area

# DR & BDR

- Multi Access Networks like Ethernet allow more than 2 routers to exist on a network segment
- To reduce the number of adjacencies that routers create amongst themselves DR & BDR is selected, and the routers create ‘FULL’ neighborship with DR & BDR
- This is done by OSPF process creating a *pseudonode*
- DR is responsible for flooding the updates on all nodes and BDR acts as a backup which takes over in case DR fails
- ALLDRouters – 224.0.0.6
- ALLSPFRouters – 224.0.0.5

# DR & BDR Election

- Election happens in the last stage of 2-way state and just before beginning of ExStart state
- All routers by default have priority of 1 and range is from 0-255, highest priority becomes DR, 0 – Never become DR or BDR
- If the priority is same, then the highest Router-ID becomes DR
- There is no pre-emption, i.e. if a better priority router enters the network segment, then DR&BDR election doesn't happen again, it only happens when the DR fails
- When two routers with same priority broadcast themselves as DR and if a superior hello is received, they withdraw themselves from the DR election in the hello while flooding

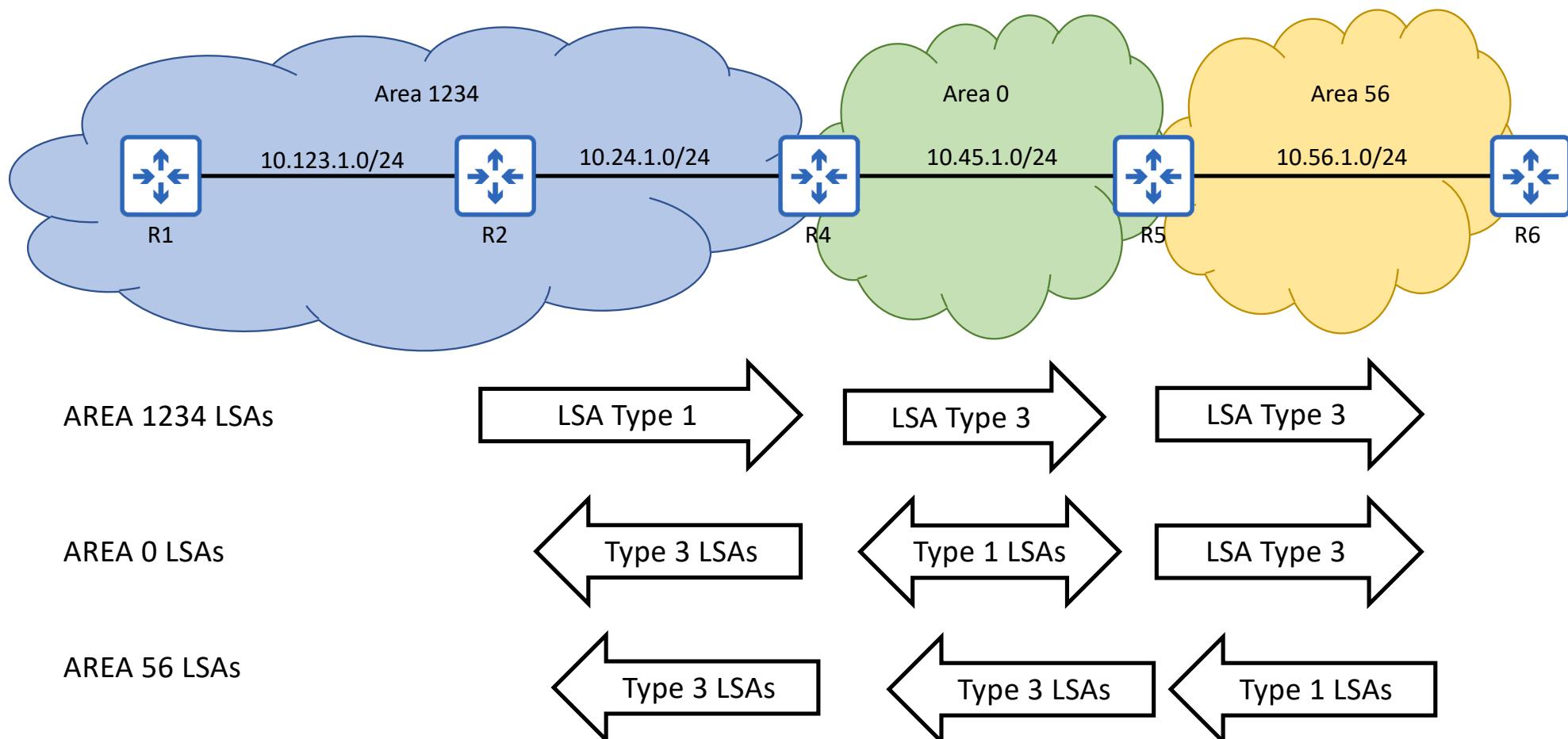
In case no router-id is given then the system will pickup the lowest IP address of the installed active interface as the router-id

NOTE: To set priority, make interface static in routing ospf interface then set priority  
Setting Router-ID for electing DR & BDR is bad network designing

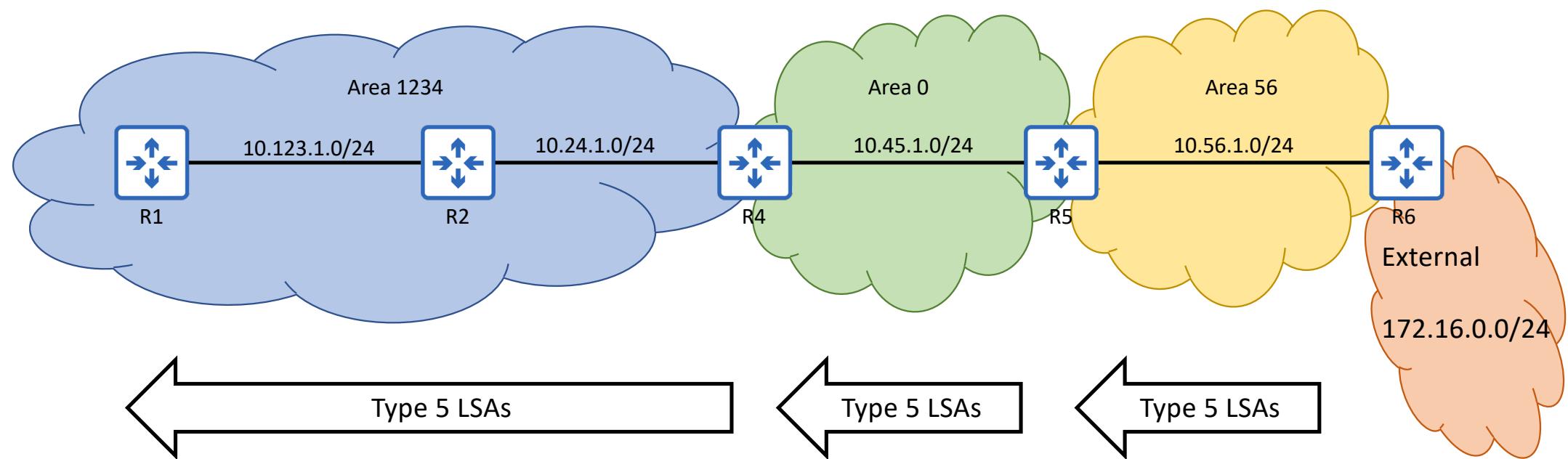
# OSPF Network Type

Type	Description	DR/BDR Field in OSPF Hellos	Timers
Broadcast(default)	Default Setting on OSPF Enabled Interface	Yes	Hello: 10 secs Wait: 40 secs Dead: 40 secs
Nbma (Non-Broadcast Multi-Access)	Non-Broadcast Multiple Access. Protocol packets are sent to each neighbors unicast address. Requires manual configuration of neighbors	Yes	Hello: 30 secs Wait: 120 secs Dead: 120 secs
Point-to-point	Suitable for network with two nodes	No	Hello: 10 secs Wait: 40 secs Dead: 40 secs
Point-to-multipoint	Easier to install as compared to nbma, suitable for wireless network	No	Hello: 30 secs Wait: 120 secs Dead: 120 secs

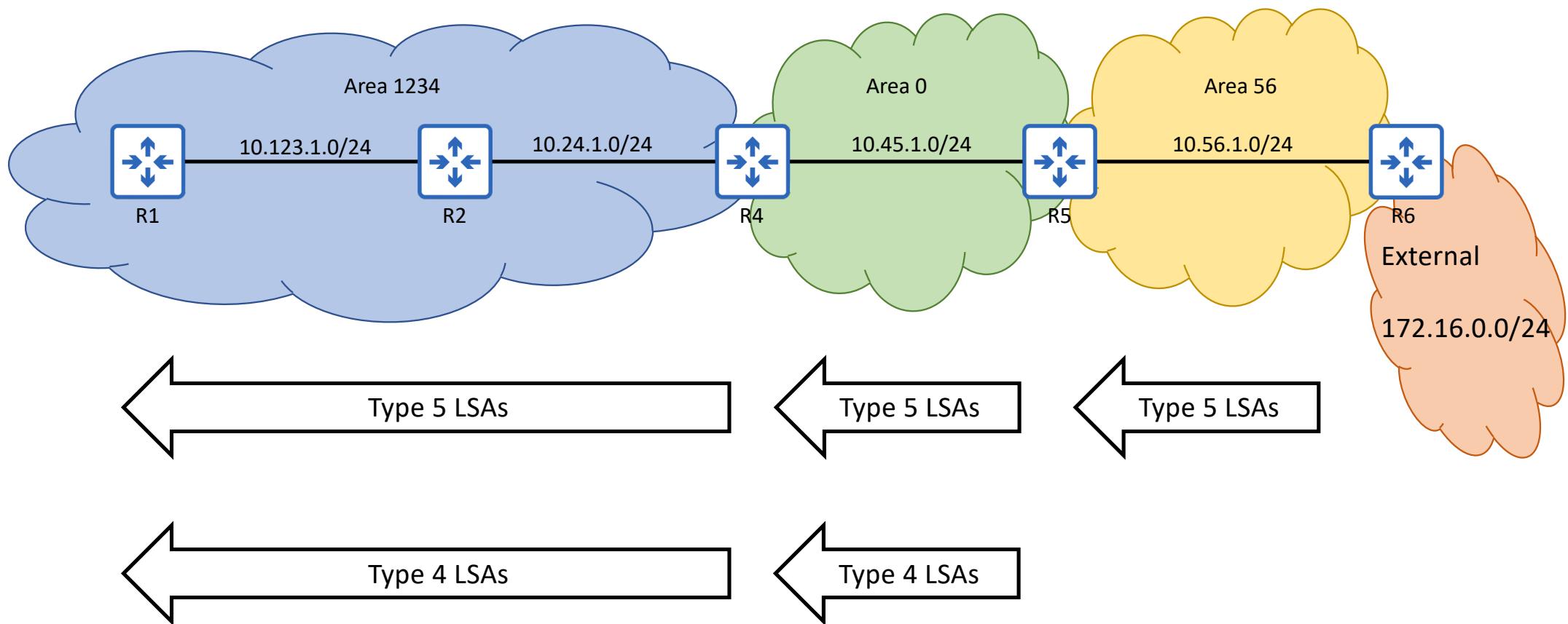
# LSA Type 3 - Summary



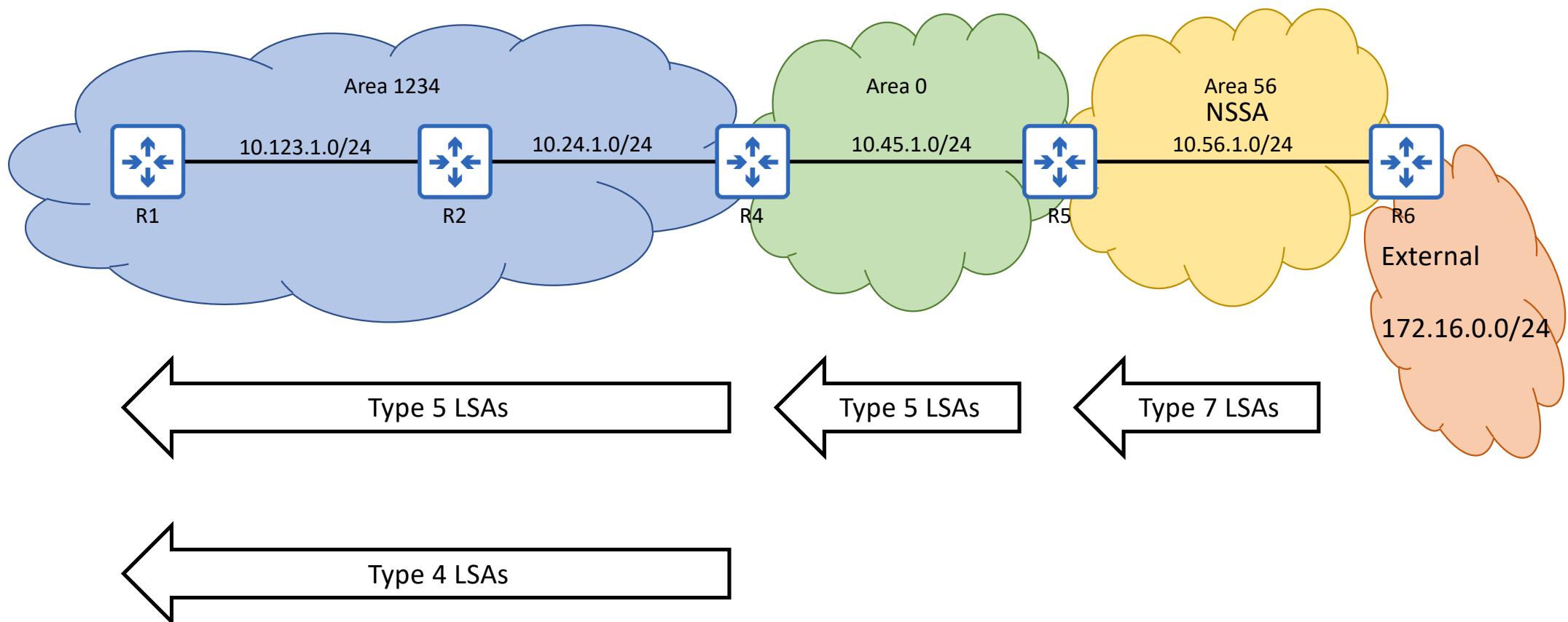
# LSA Type 5 – External Route



# LSA Type 4 – ASBR Summary



# LSA Type 7 – NSSA External Summary



# OSPF Failure Detection & Timers

- hello packet is sent at set intervals, a secondary dead interval-time is used in case there is no response from the neighbor then the neighborship is changed to state down
- dead interval-timer is set to 4x the hello timer
- Timers are set on interface

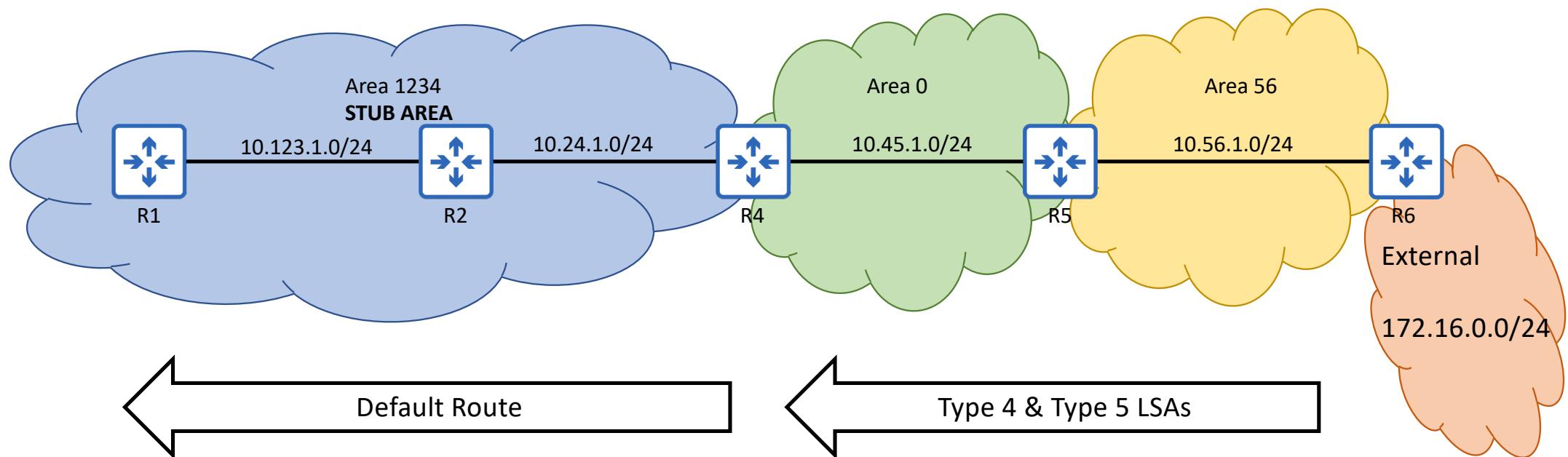
# Authentication

- Attacker can connect to an un-authenticated interface and cause havoc on OSPF network, by manipulating routes and even perform DDoS
- OSPF supports two(2) authentications, simple and MD5 hash
- Authentication is set on interface
- To enable authentication set the *type* and *key*

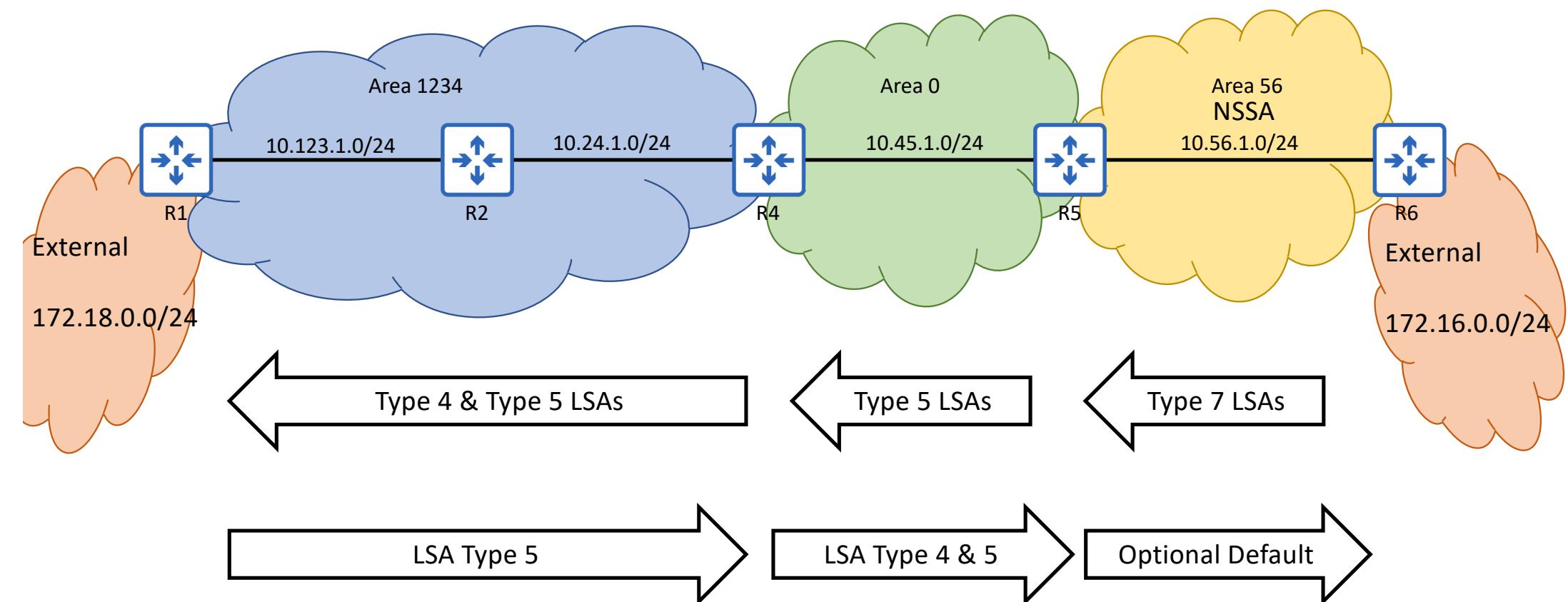
# OSPF Stubby Area

- Stubby area provide a method to filter out external routes and an option to block interarea routes
- Stub area is identified by OSPF hello packet's area flag
- All routers in a stub area need to be configured as stub so that adjacencies can be made
- Types of Stub Area in OSPF:
  - Stub Area
  - NSSA – Not So Stubby Area

# Stub Area

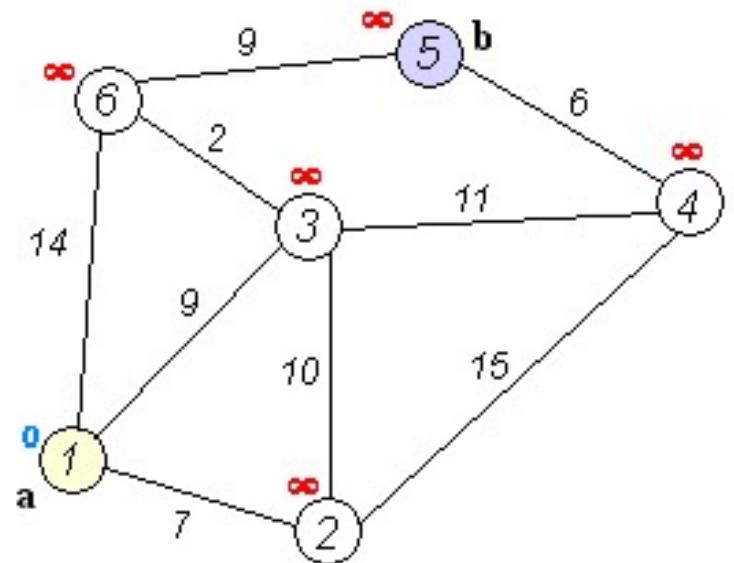


# Not-So-Stubby-Area

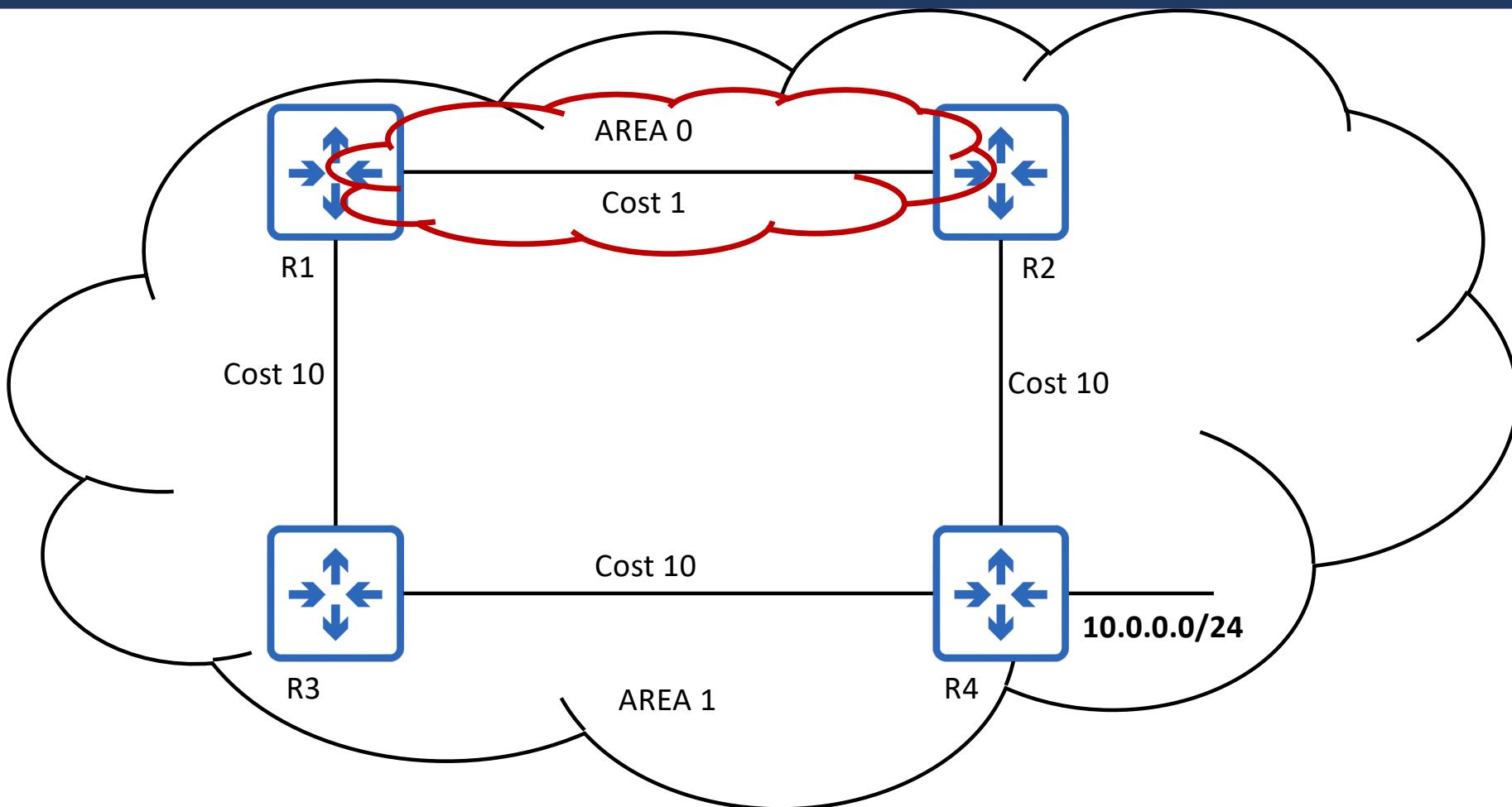


# OSPF Path Selection

- OSPF path selection priority by using the following logic:
  - Intra-Area routes
  - Interarea routes
  - External Type 1
  - External Type 2
- Cost – Dijkstra Algorithm to calculate SPF tree



# Inter Area vs Intra Area



# Equal Cost Multipathing

- OSPF identifies multiple paths to the destination and installs using ECMP

## Summarization

- Summarization helps SPF runs faster
- ABR is responsible for Inter-Area summarization
- Works with only Type-1 LSA and lowest metric is adopted by summarized route

# Q & A

# Thank you for watching

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