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Intro to BGP

David Lucas – Customer Delivery Architect
CCIE #21272
@dlucas10
DGTL-BRKENT-1101

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Agenda

- BGP Overview
- eBGP vs iBGP
- BGP Path Selection
- Real World Use of BGP
- Conclusion

Session Abstract

Border Gateway Protocol (BGP) is the foundation of the Internet. Many large enterprises are starting to deploy BGP as the main routing protocol. The session covers what BGP is, how it works as a path vector protocol and why you need an Autonomous System. You will learn the differences between External BGP (eBGP) and Internal BGP (iBGP). In this introductory session, you will get a basic understanding of the path selection that it uses to select routes. When you leave this session you will have a basic understanding of how BGP works and how it is used on the Internet and large enterprises.

BGP Overview

Basics of Routing

- Link State
  - OSPF/IS-IS
  - Relies on state of links
  - Complete topology map
- Distance Vector
  - EIGRP/RIP
  - Advertises Vector and Distance
- Path Vector
  - BGP
  - Share information between autonomous systems
  - Path vector protocols rely on analysis of the path to reach the destination and determine if it is loop free

Basics of Routing

- Interior Gateway Protocol (IGP)
  - Used to route within an Autonomous System
  - Should not carry routes from other Autonomous System's
  - All about convergence time

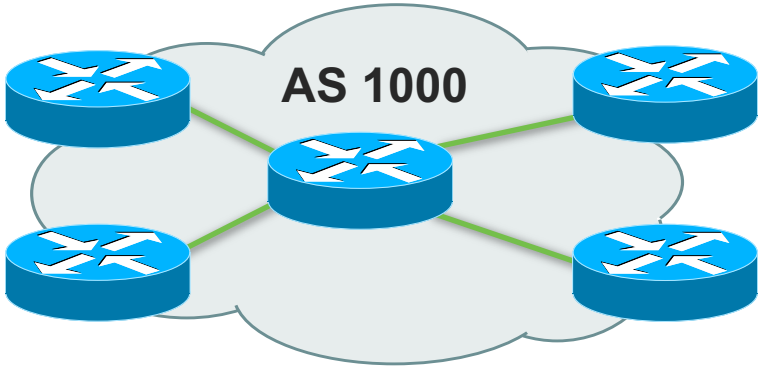
Examples: OSPF, ISIS, EIGRP, RIP

- Exterior Gateway Protocol (EGP)
  - Used to exchange route information between Autonomous System
  - Handling large number of routes
  - Routing Policy

Example: BGP

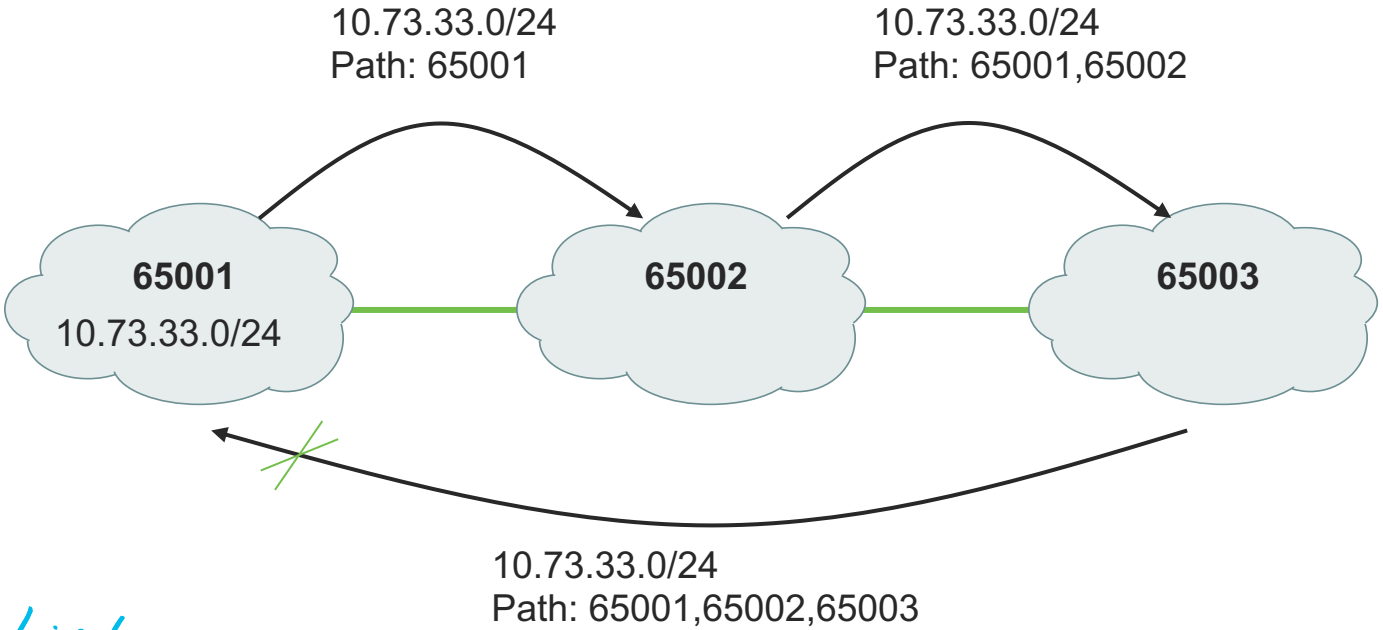
Autonomous Systems

- Set of routers within the same administrative control
- A network(s) sharing the same routing policy
  - Possibly multiple IGPs
  - Usually under single administrative control
- Contiguous internal connectivity
- Identified by a 16-bit number, from 1 to 65535
  - Globally unique “AS Number”
  - Private range: 64512–65535

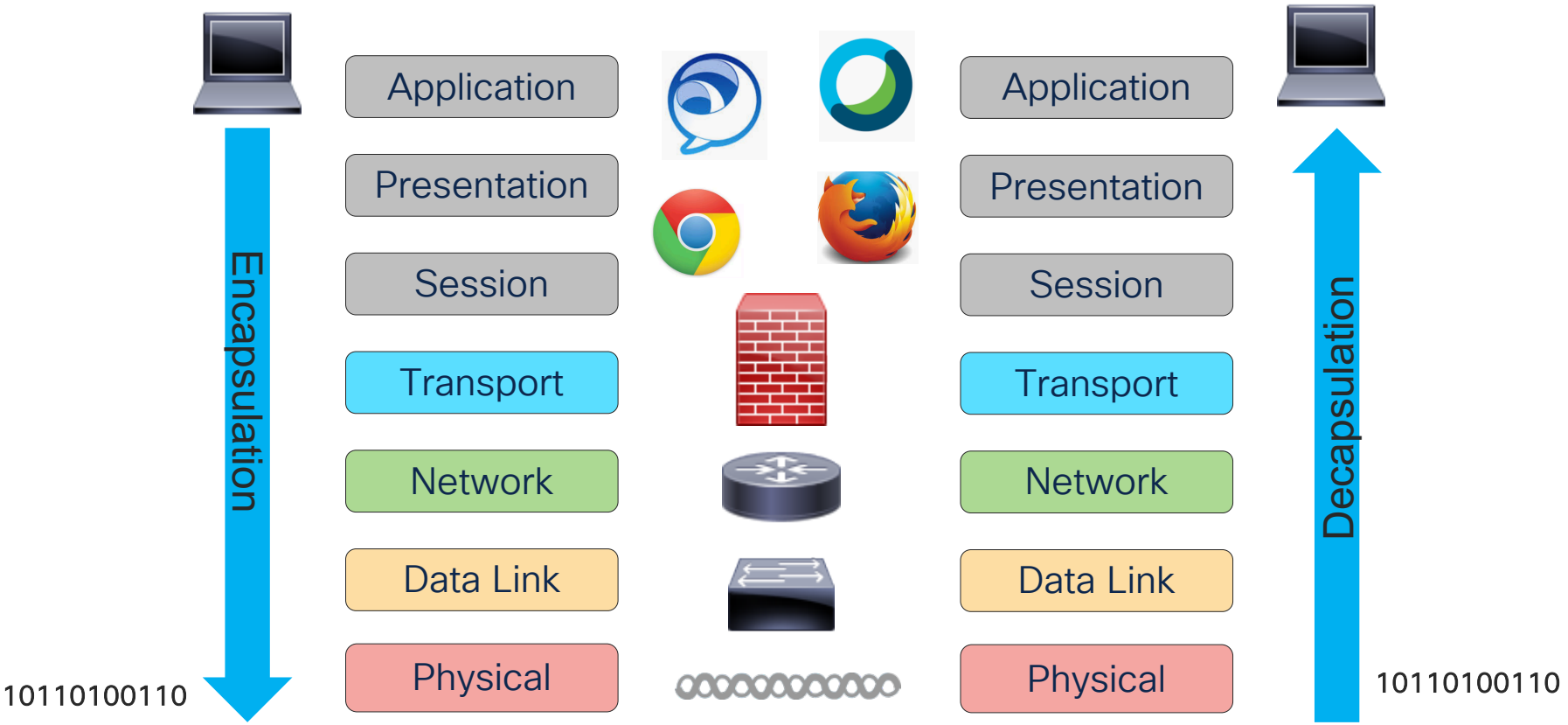


BGP and Path Vector

- Autonomous Systems (AS) is added to the path as it traverses another AS
- Loop detection is determined by AS in path



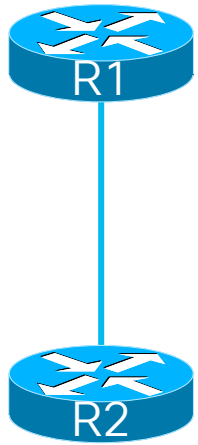
OSI Model



BGP Sessions

- TCP Connection Established on Port 179
- Both Peers attempt to connect defined by neighbor statement
- Exchange messages to open and confirm the connection parameters
- Initial exchange of entire table
- Incremental updates after initial exchange

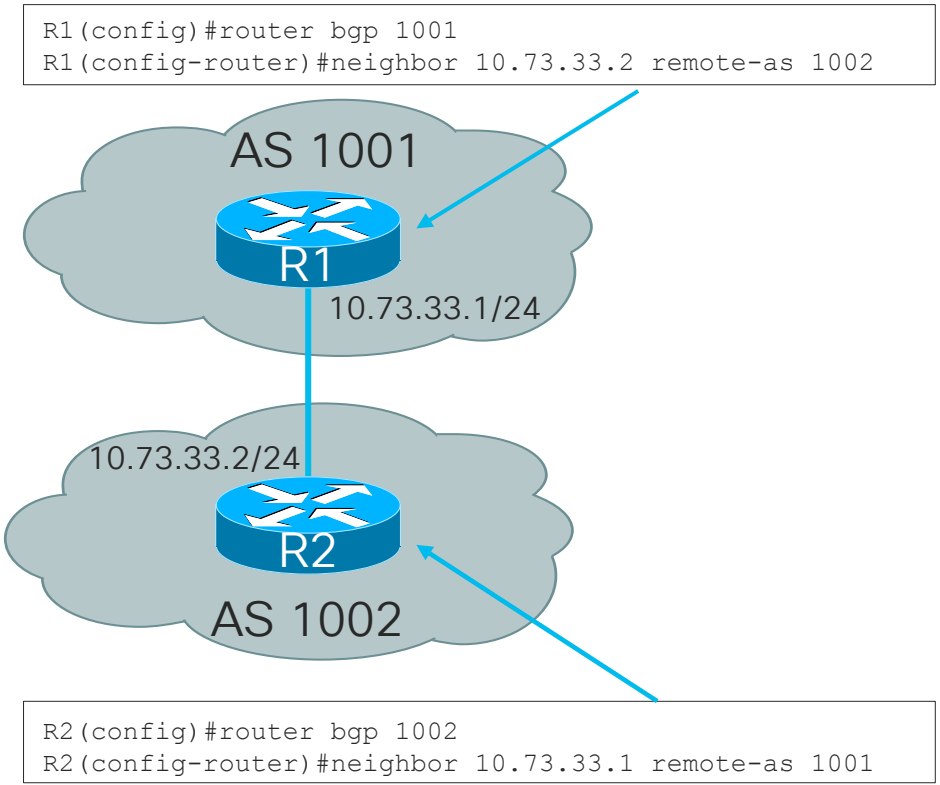
```
R1(config)#router bgp 1001
R1(config-router)#neighbor 10.73.33.2 remote-as 1002
R1(config-router)#network 172.31.1.0 mask 255.255.255.0
```




```
R2(config)#router bgp 1002
R2(config-router)#neighbor 10.73.33.1 remote-as 1001
```

External BGP (eBGP)

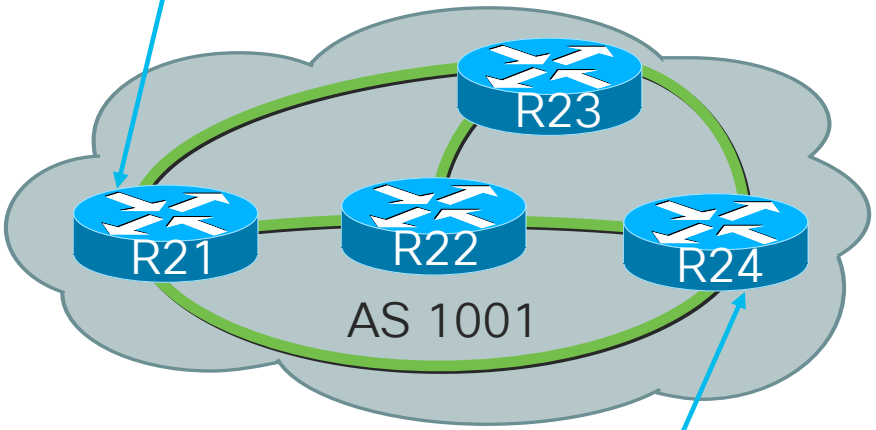
- Between BGP peers in different AS
- Usually directly connected
  - Time to Live (TTL) set 1
- Next-hop will be modified
- Administrative Distance is 20
- BGP Path is prepended



Internal BGP (iBGP)

- Neighbor in same AS
- Next-hop unchanged
- May be several hops away
  - Does not need to directly connected!
  - Can IGP be used?
- Don't forward iBGP learned routes to other iBGP peers
  - n*(n-1)/2 peering mesh – scaling problem!

```
R21(config)#router bgp 1001
R21(config-router)#neighbor 172.31.255.22 remote-as 1001
R21(config-router)#neighbor 172.31.255.23 remote-as 1001
R21(config-router)#neighbor 172.31.255.24 remote-as 1001
```




```
R24(config)#router bgp 1001
R24(config-router)#neighbor 172.31.255.21 remote-as 1001
R24(config-router)#neighbor 172.31.255.22 remote-as 1001
R24(config-router)#neighbor 172.31.255.23 remote-as 1001
```

Thank you

Possibilities

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