RIP Version 2

The Classless Brother

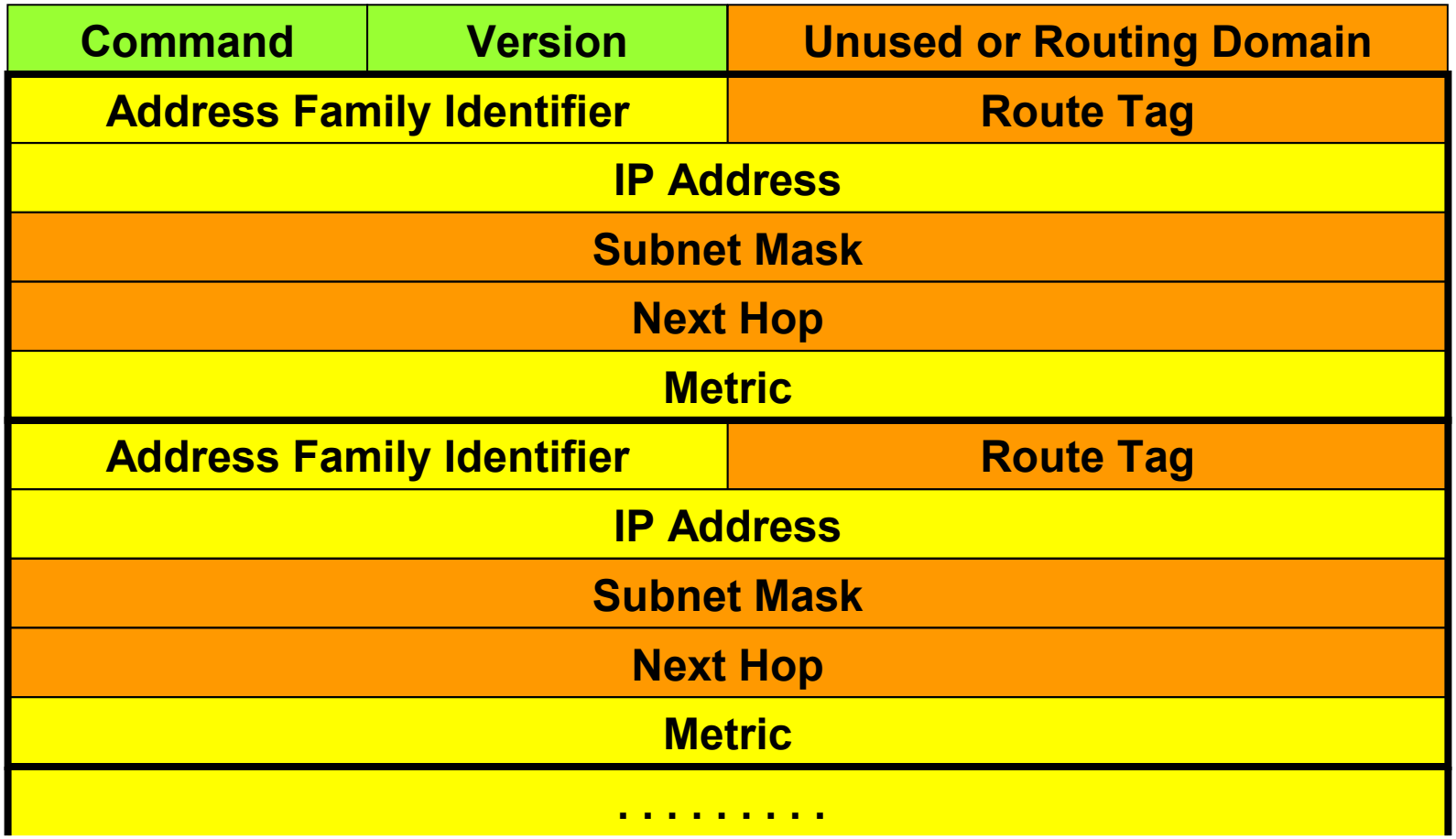
Why RIPv2

- Need for subnet information and VLSM
- Need for Next Hop addresses for each route entry
- Need for external route tags
- Need for multicast route updates
- RFC 2453

Multicast Updates

- RIPv1 used DA=broadcast
  - Seen by each IP host
  - Slows down other IP stations
- RIPv2 uses DA=224.0.0.9
  - Only RIPv2 routers will receive it

Message Format



Up to 25 route entries

Version and Routing Domain

- RIPv1 used version "1"
- RIPv2 uses version "2" (*surprise*)
- According RFC the next two bytes are unused
- However, some implementations carry the routing domain here
  - Simply a process number

Subnet Mask

- RIPv2 is a classless routing protocol
- For each route a subnet mask is carried
- Discontinuous Subnetting and VLSM is supported

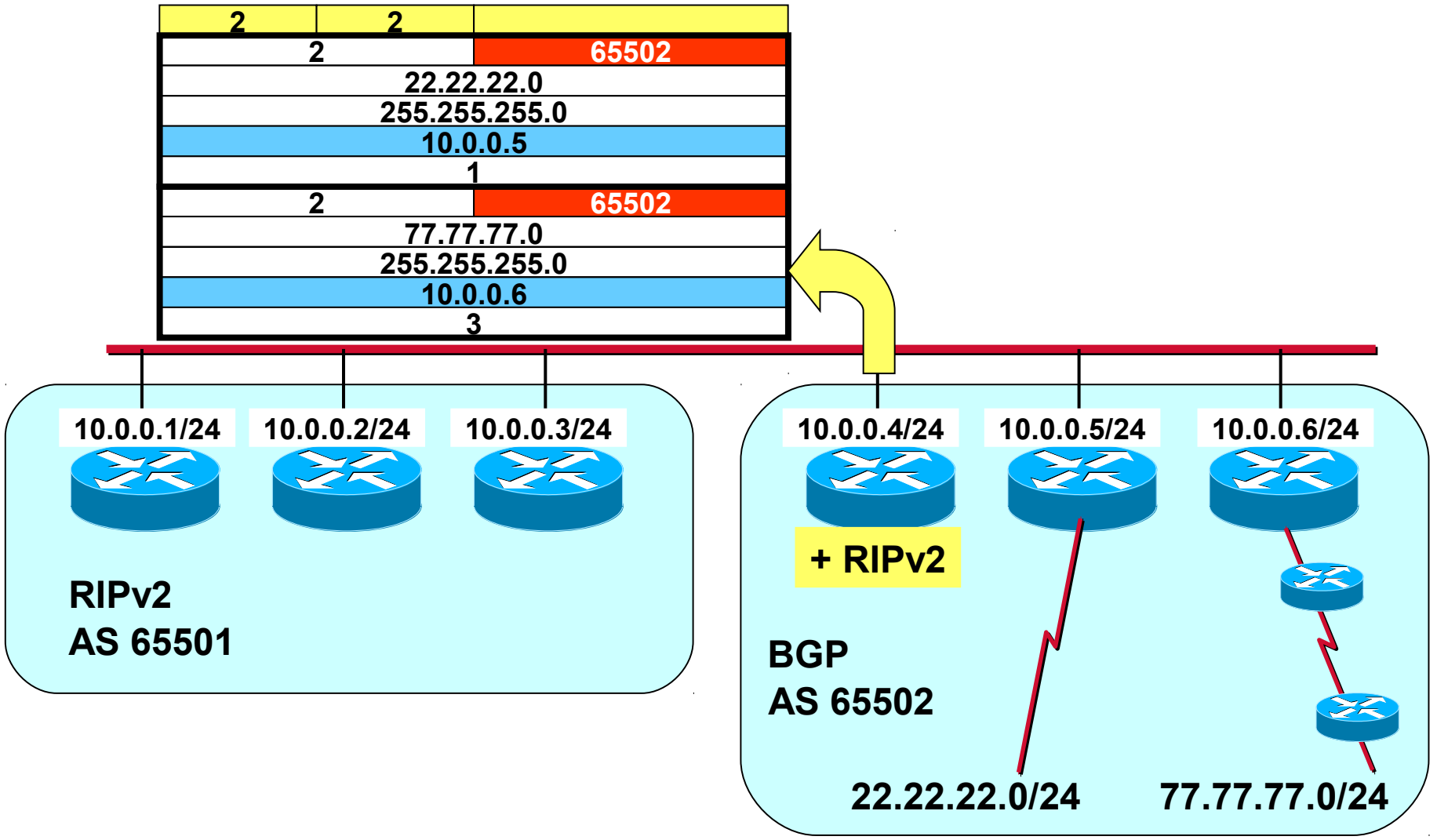
Next Hop

- Identifies a better next hop address than implicitly given (SA)
  - Only if one exists (better metric)
  - 0.0.0.0 if the sender is next hop
- Especially useful on broadcast multi-access network for peering
  - Indirect routing on a broadcast segment would be ...silly.

Route Tag

- To distinguish between internal routes (learned via RIP) and external routes (learned from other protocols)
- Typically AS number is used
  - Not used by RIPv2 process
  - External routing protocols may use the route tag to exchange information across a RIP domain

Next Hop and Route Tag



Authentication

- Hackers might send invalid routing updates
- RIPv2 introduces password protection as authentication
- Initially only Authentication Type 2 defined
  - 16 plaintext characters (!)
- RFC 2082 proposes keyed MD-5 authentication (Type 3)
  - Multiple keys can be defined, updates contain a key-id
  - And a unsigned 32 bit sequence number to prevent replay attacks
- Cisco IOS supports MD5 authentication (Type 3, 128 bit hash)

Authentication

Command	Version	Unused or Routing Domain
0xFFFF		Authentication Type
Password		
Password		
Password		
Password		
Address Family Identifier		Route Tag
IP Address		
Subnet Mask		
Next Hop		
Metric		
. . . . .		

Up to 24 route entries

Key Chain

- Cisco's implementation offers key chains
  - Multiple keys (MD5 or plaintext)
  - Each key is assigned a lifetime (date, time and duration)
- Can be used for migration
  - Key management should rely on Network Time Protocol (NTP)

RIPv1 Inheritance (1)

- All timers are the same
  - UPDATE
  - INVALID
  - HOLDDOWN
  - FLUSH
- Same convergence protections
  - Split Horizon
  - Poison Reverse
  - Hold Down
  - Maximum Hop Count (also 16 !!!)

RIPv1 Inheritance (2)

- Same UDP port 520
- Also maximum 25 routes per update
  - Equally 512 Byte payloads

RIPv1 Compatibility

- RIPv1 Compatibility Mode
  - RIPv2 router uses broadcast addresses
  - RIPv1 routers will ignore header extensions
  - RIPv2 performs route summarization on address class boundaries
    - Disable: `(config-router)# no auto-summary`
- RIPv1 Mode
  - RIPv2 sends RIPv1 messages
- RIPv2 Mode
  - Send genuine RIPv2 messages

Summary

- Most important: RIPv2 is classless
  - Subnet masks are carried for each route
- Multicasts and next hop field increase performance
- But still not powerful enough for large networks

Quiz

- What is a routing domain?
- Why is "infinity" still 16?