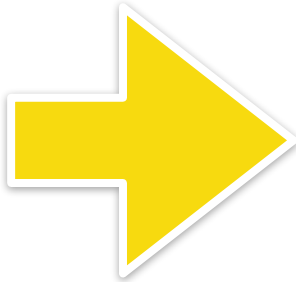
# BGP Advanced Concepts

Announcing IPv4 prefixes via IPv6-only networks

Wolfgang Tremmel
wolfgang.tremmel@de-cix.net

# *BGP Topics Overview*

- →01 - Prefixes and AS numbers
- →02 - BGP Introduction
- →03a - Setting up iBGP
- →03b - Setting up eBGP
- →04 - Becoming multi-homed
- →05 - BGP Best Path Selection
- →06 - BGP Communities
- →07 - BGP Traffic Engineering
- →08 - BGP Security



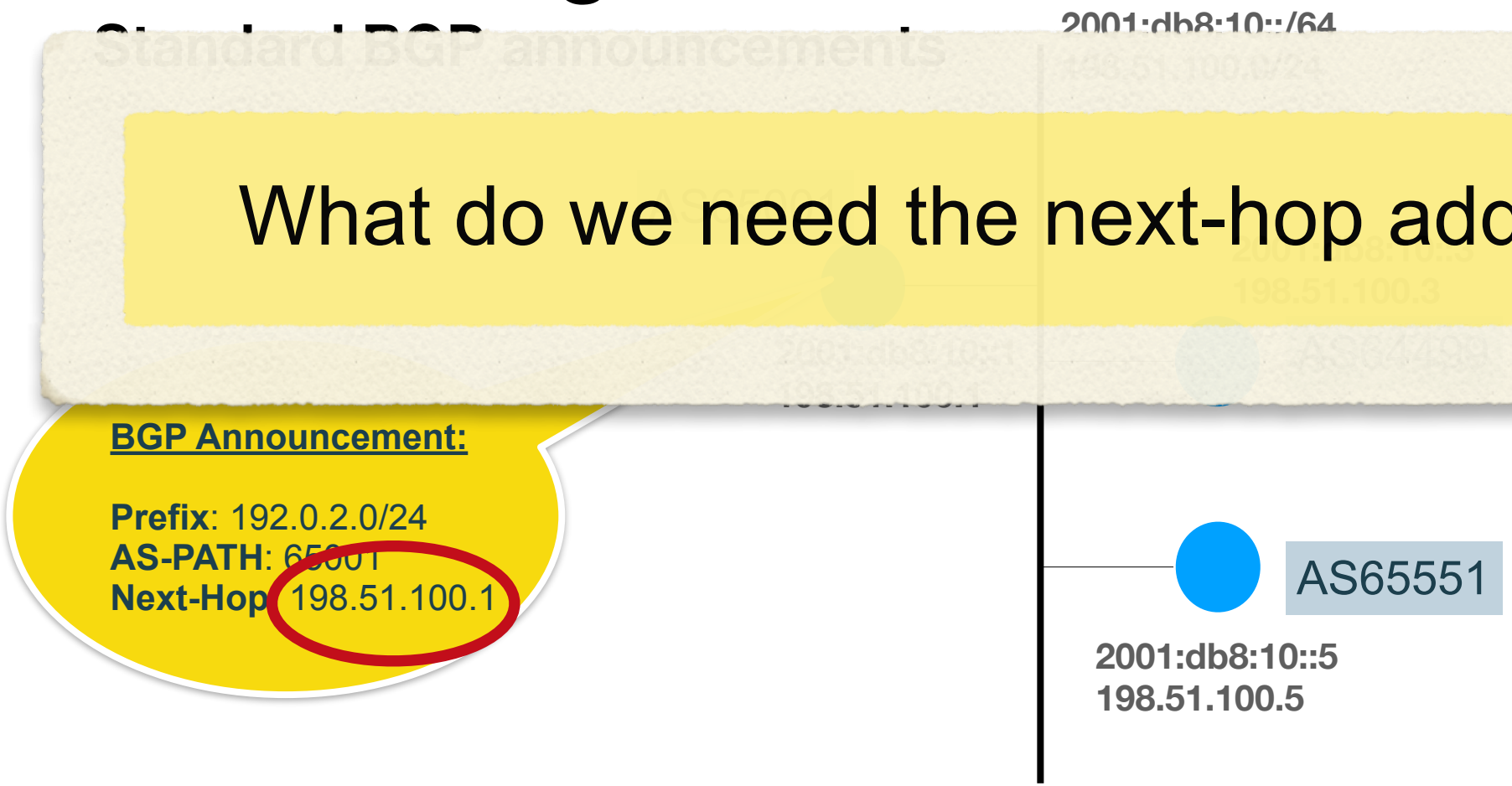
**Advanced Concepts**

Announcing IPv4 prefixes via IPv6-only networks

# Motivation

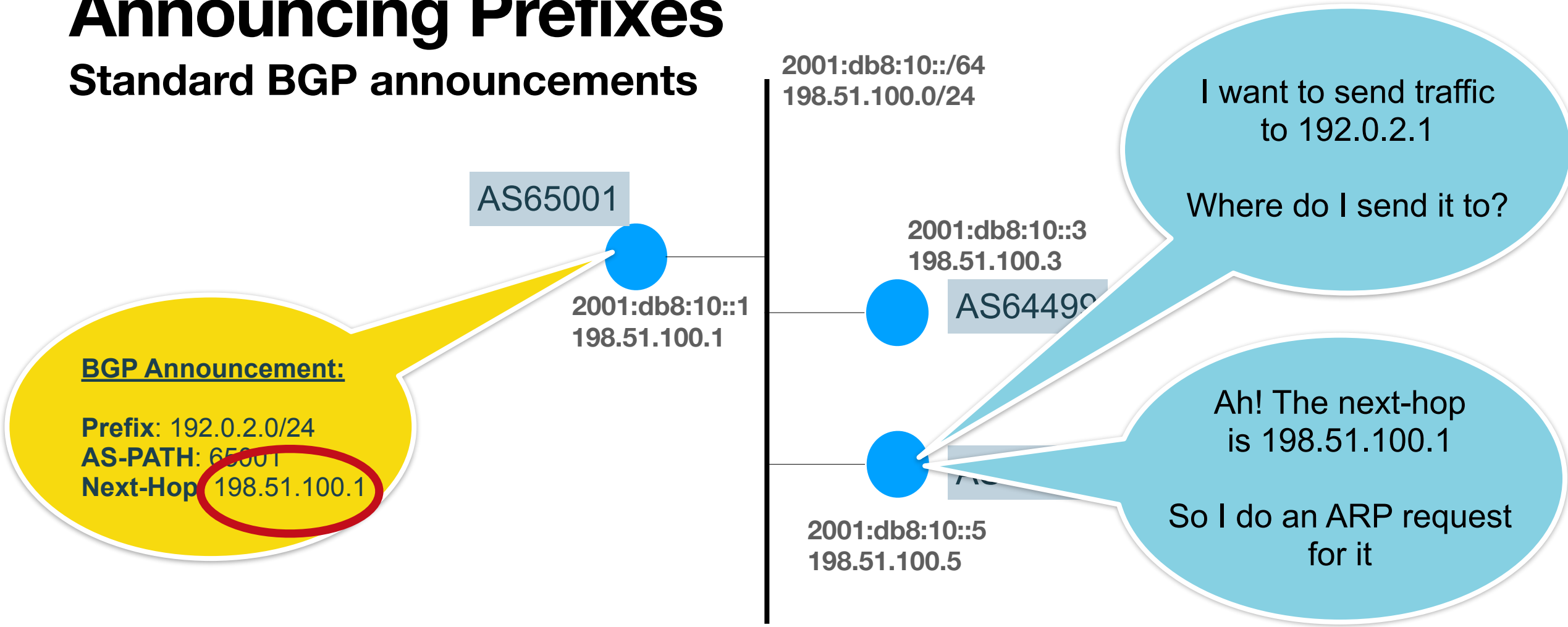
# Announcing Prefixes

What do we need the next-hop address for?



# Announcing Prefixes

## Standard BGP announcements

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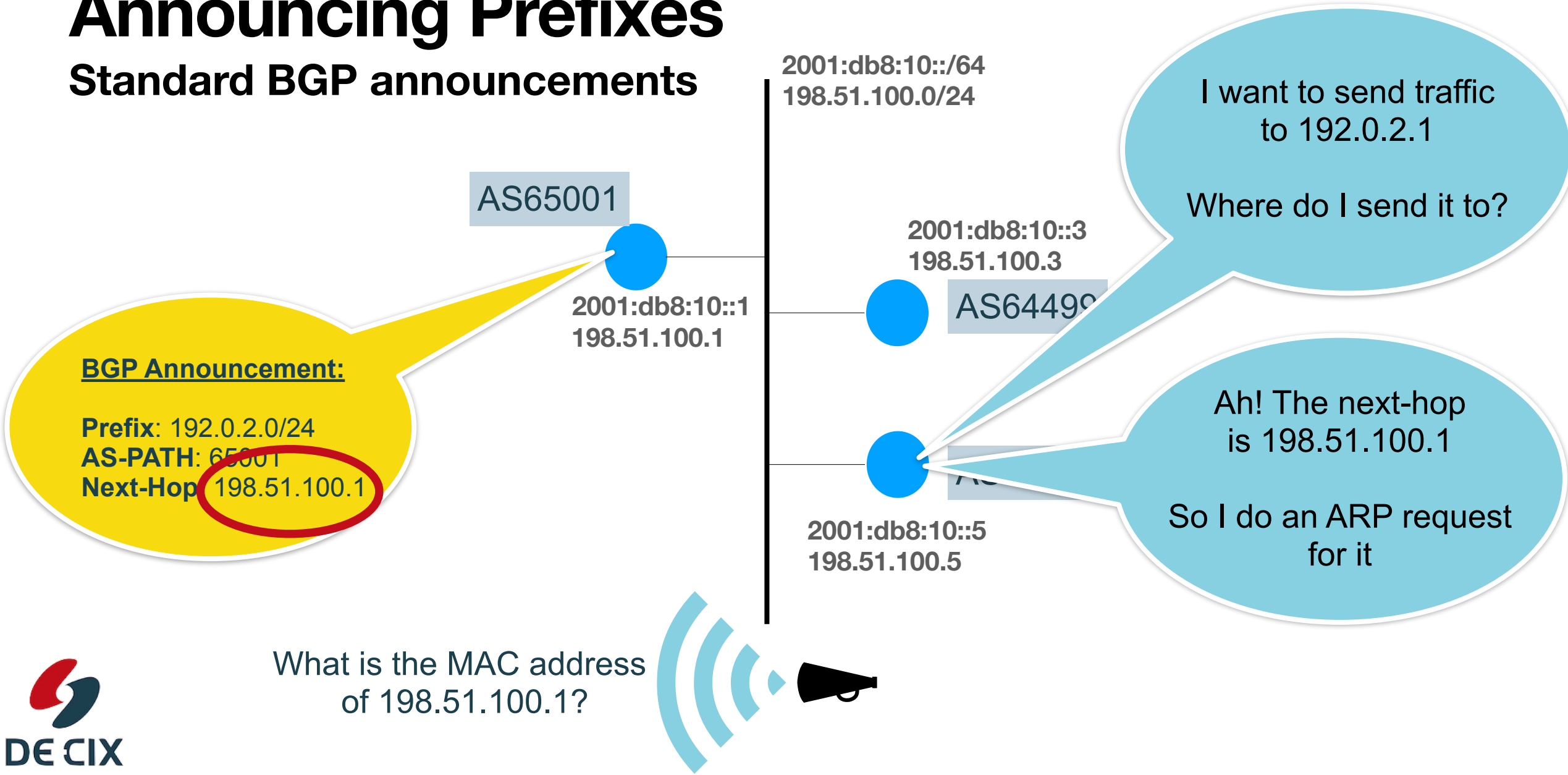
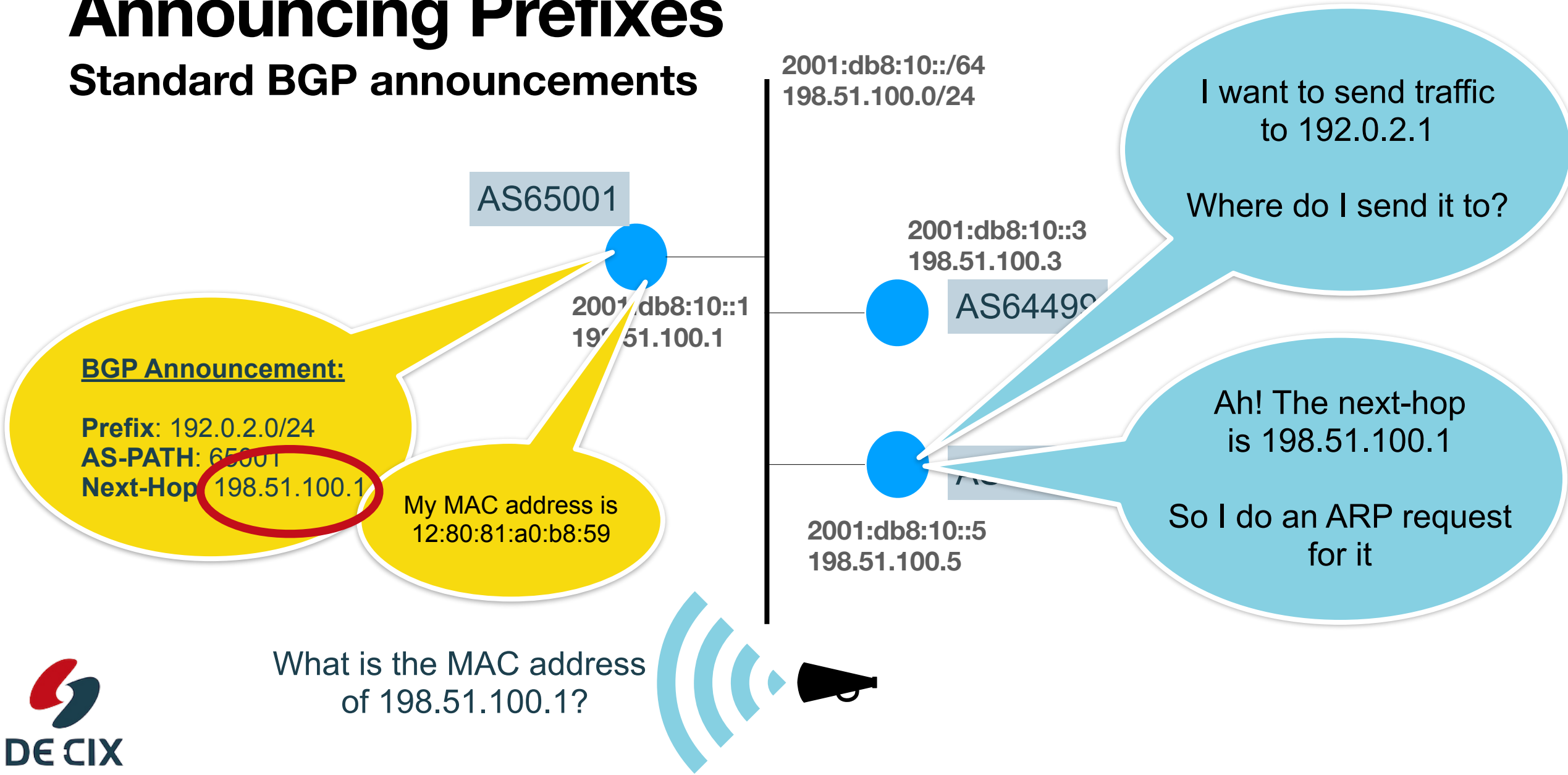
# Announcing Prefixes

## Standard BGP announcements



# Announcing Prefixes

## Standard BGP announcements

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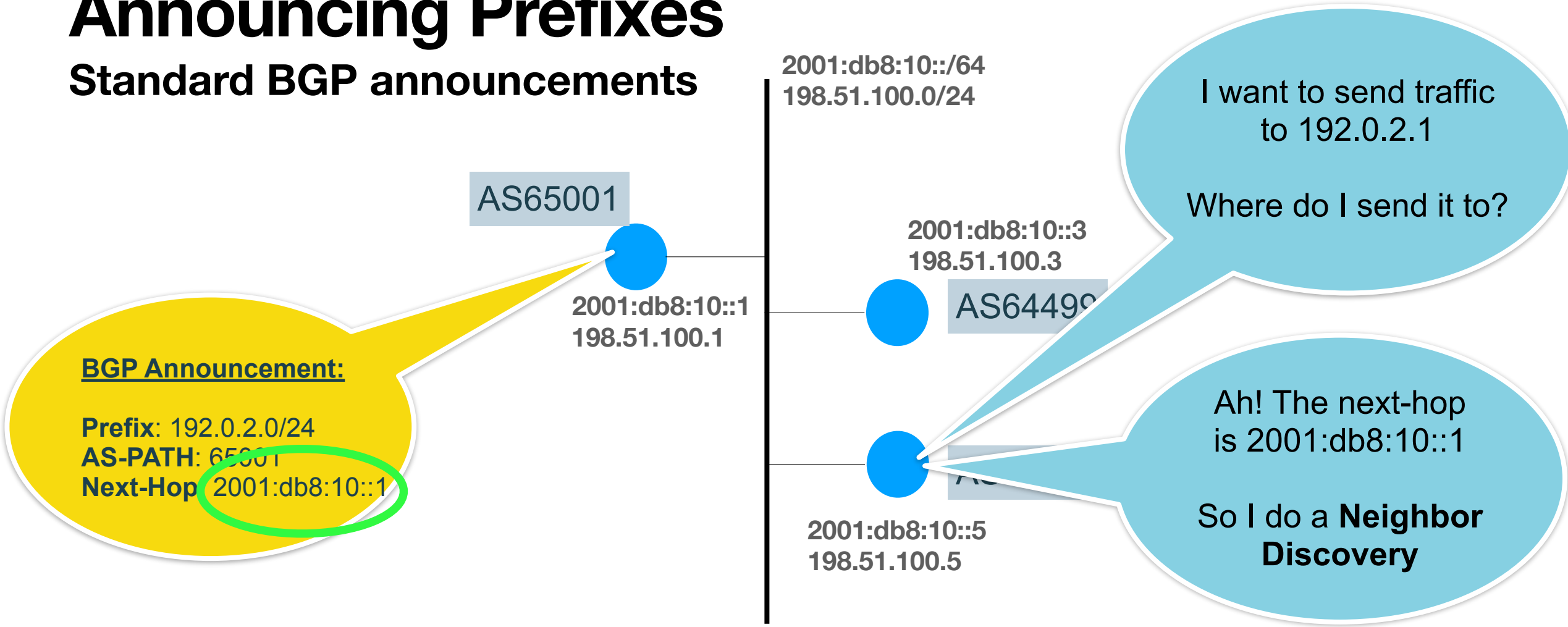
# *Do we really need IPv4 for that?*

# *NO*

# Announcing Prefixes

## Standard BGP announcements

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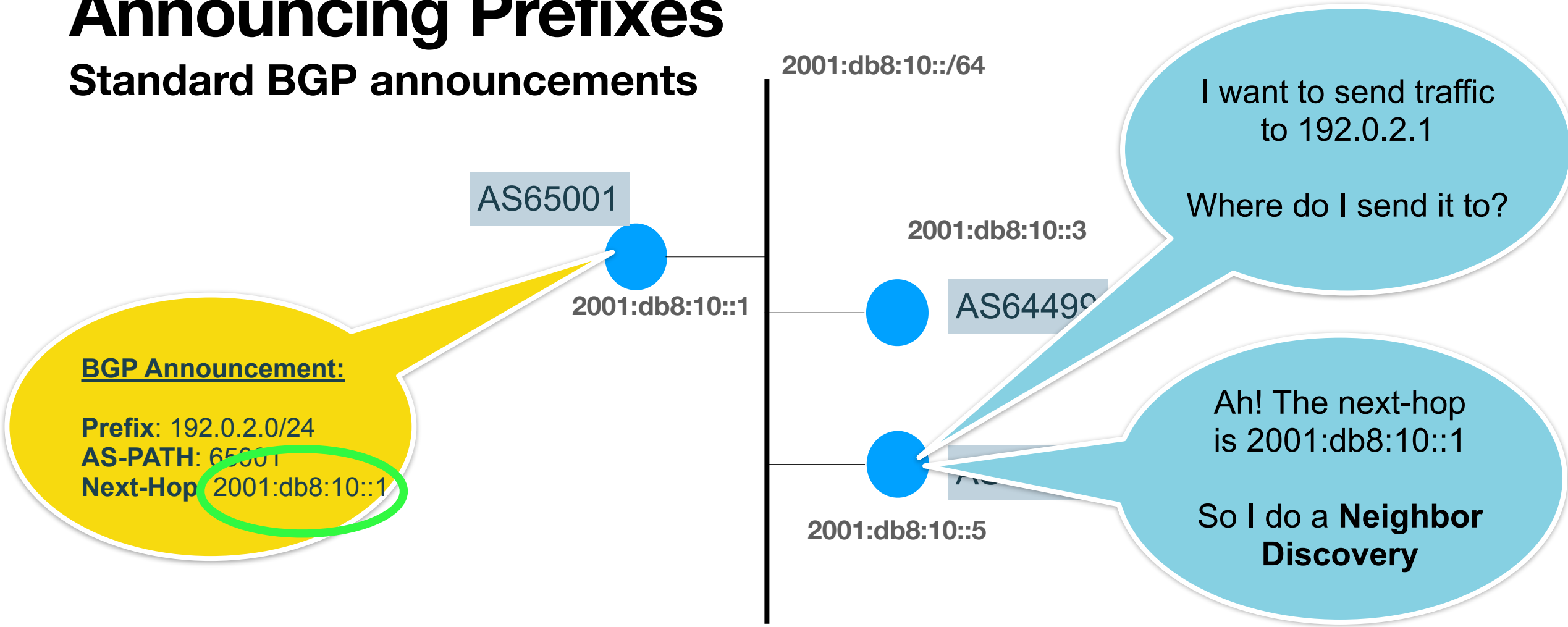
# Announcing Prefixes

## Standard BGP announcements

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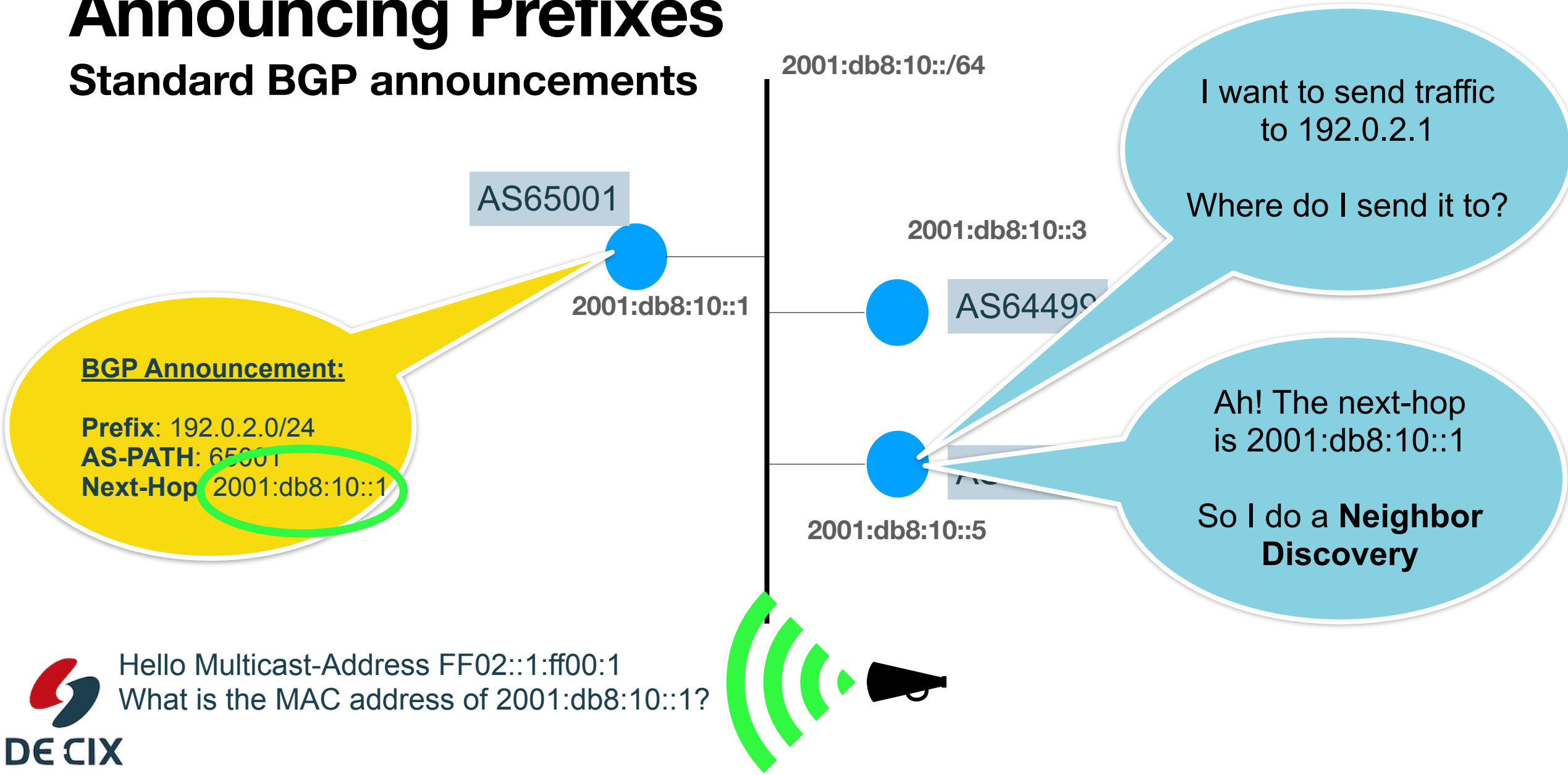
# Announcing Prefixes

## Standard BGP announcements

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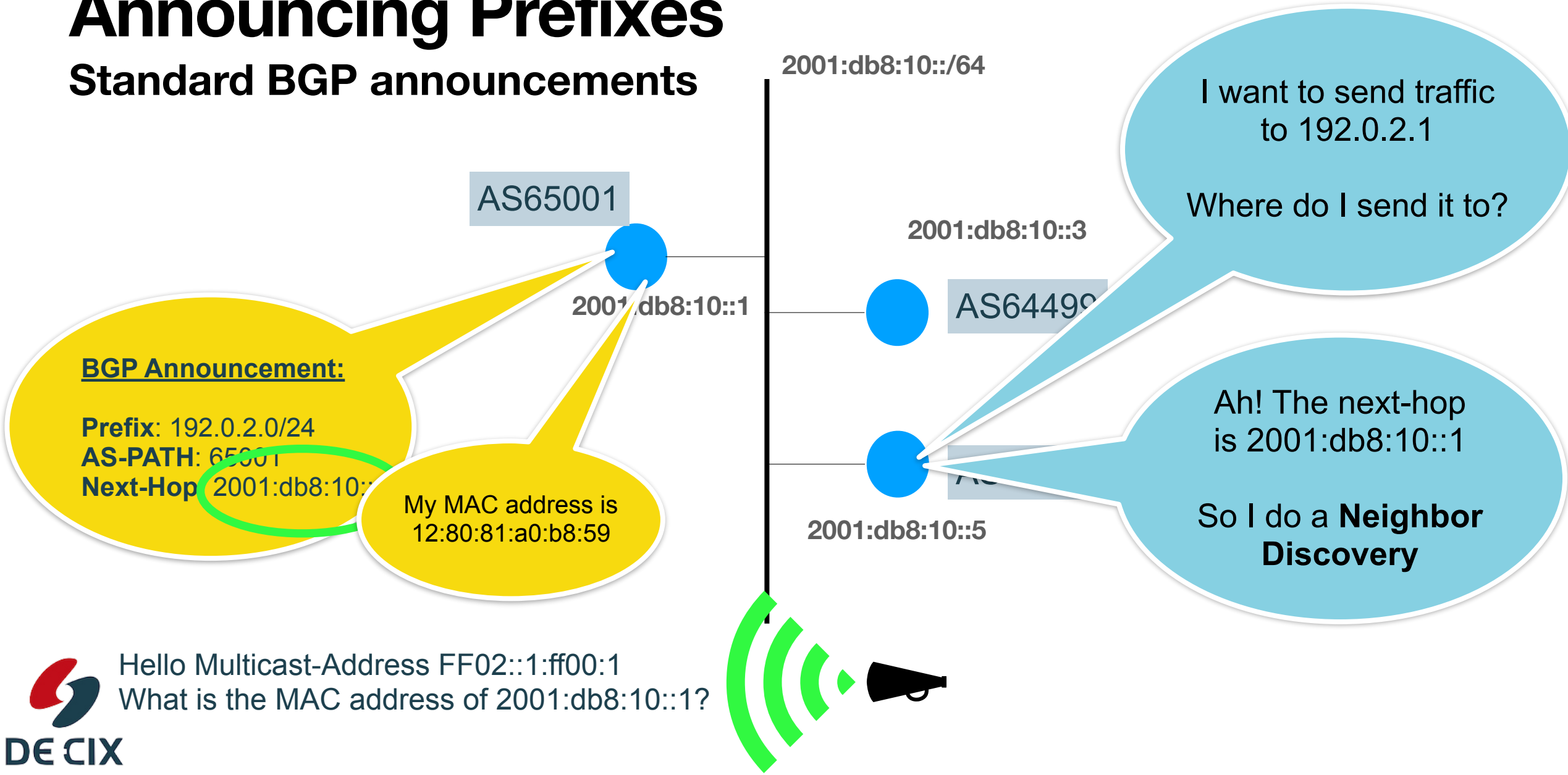
# Announcing Prefixes

## Standard BGP announcements

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# How to configure this?

# BGP

➔In BGP, transport (how to connect to my neighbor) and announced prefixes are two different things

➔Command (here: Cisco) "neighbor xx:xx::xx" is how to connect to my neighbor

```
router bgp 196610
 neighbor 2a02:c50:db8:7:1:0:aaaa:0
  remote-as 64501
  address-family ipv4 unicast
   next-hop-self
   soft-reconfiguration inbound always
  !
  address-family ipv6 unicast
   soft-reconfiguration inbound always
  !
 !
!
```

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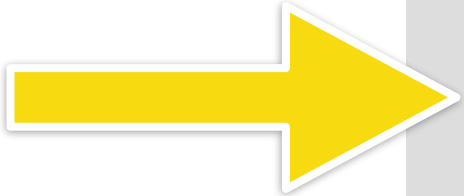
# BGP

➔Prefixes announced are configured in the "address-family" context



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# BGP

➔So, "address-family ipv6 unicast" controls the announcement of IPv6 prefixes

```
router bgp 196610
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   next-hop-self
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  !
 !
!
```

# BGP

- ➔So, "address-family ipv6 unicast" controls the announcement of IPv6 prefixes
- ➔And "address-family ipv4 unicast" the announcement of IPv4 prefixes

```
router bgp 196610
 neighbor 2a02:c50:db8:7:1:0:aaaa:0
  remote-as 64501
  address-family ipv4 unicast
   next-hop-self
   soft-reconfiguration inbound always
  !
  address-family ipv6 unicast
   soft-reconfiguration inbound always
  !
 !
!
```

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# BGP

- ➔So, "address-family ipv6 unicast" controls the announcement of IPv6 prefixes
- ➔And "address-family ipv4 unicast" the announcement of IPv4 prefixes
- ➔here the "next-hop-self" is important so an IPv6 next-hop is set

```
router bgp 196610
 neighbor 2a02:c50:db8:7:1:0:aaaa:0
  remote-as 64501
  address-family ipv4 unicast
   next-hop-self
   soft-reconfiguration inbound always
  !
  address-family ipv6 unicast
   soft-reconfiguration inbound always
  !
 !
!
```

# Conclusion

# *Conclusion*

- The next-hop address in BGP is needed for routers to find out the Layer 2 MAC address to send traffic to
- Usually for IPv4 an IPv4 next-hop address is used,
  and for IPv6 and IPv6 next-hop address is used
- RFC5549 first defined that the independence of prefix-type (IPv4 or IPv6) and type of next-hop address
- So IPv4 traffic can be transported across a LAN with no IPv4 configured, using an IPv6 next-hop address.

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# Thank you!

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# Links and further reading

# Links and further reading

- RFC5549: Advertising IPv4 Network Layer Reachability Information with an IPv6 Next Hop (obsolete)
- RFC8950: Advertising IPv4 Network Layer Reachability Information (NLRI) with an IPv6 Next Hop

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DE-CIX Management GmbH | Lindleystr. 12 | 60314 Frankfurt | Germany
Phone + 49 69 1730 902 0 | sales@de-cix.net | www.de-cix.net