

# Becoming Multi-Homed

BGP for networks who peer: Part 4

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# ***BGP (new) Webinars Overview***

→01 - Prefixes and AS numbers

→02 - BGP Introduction

→03a - Setting up iBGP

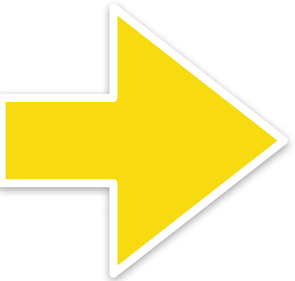
→03b - Setting up eBGP

→04 - Becoming multi-homed

→05 - BGP Best Path Selection

→06 - BGP Communities

→...



# ***What we already know about BGP (1)***

- We already learned about prefixes
  - IPv4 and IPv6
  - BGP is about announcing prefixes
- We also introduced the Autonomous System
  - An Autonomous System groups prefixes together
  - And has a common routing policy
  - And has an Autonomous System Number (ASN, AS-Number)

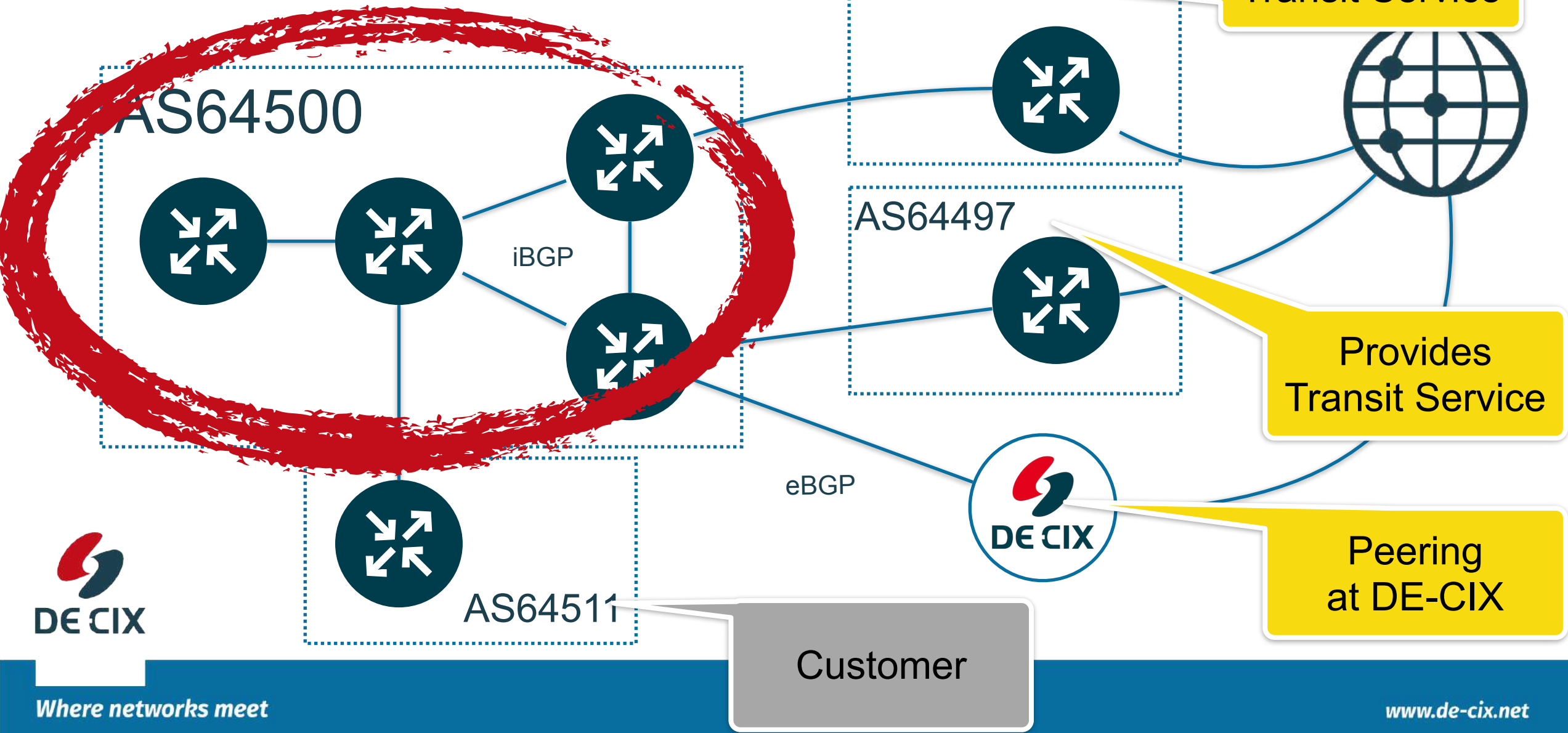
# ***What we already know about BGP (2)***

- We configured iBGP
  - iBGP is BGP within an AS
- We configured eBGP
  - eBGP is BGP to another AS
  - like an upstream provider
- Today we will do more with eBGP
  - add a second upstream provider
  - and add peering connections to other ASes

# Why do we do this?

	<b>With multiple Upstreams and Peering</b>	<b>Without an AS or with just one upstream</b>
<b>Redundancy</b>	In case of a problem with one upstream you have a second one	If your upstream has a problem, you have a problem
<b>Control</b>	You have full control over your outgoing traffic	Your upstream ISP controls your traffic
<b>Cost</b>	You can optimize your traffic for cost	You just pay your one upstream ISP
<b>Peering</b>	You can setup your own peering policy and have full control	Your upstream ISP makes all decisions

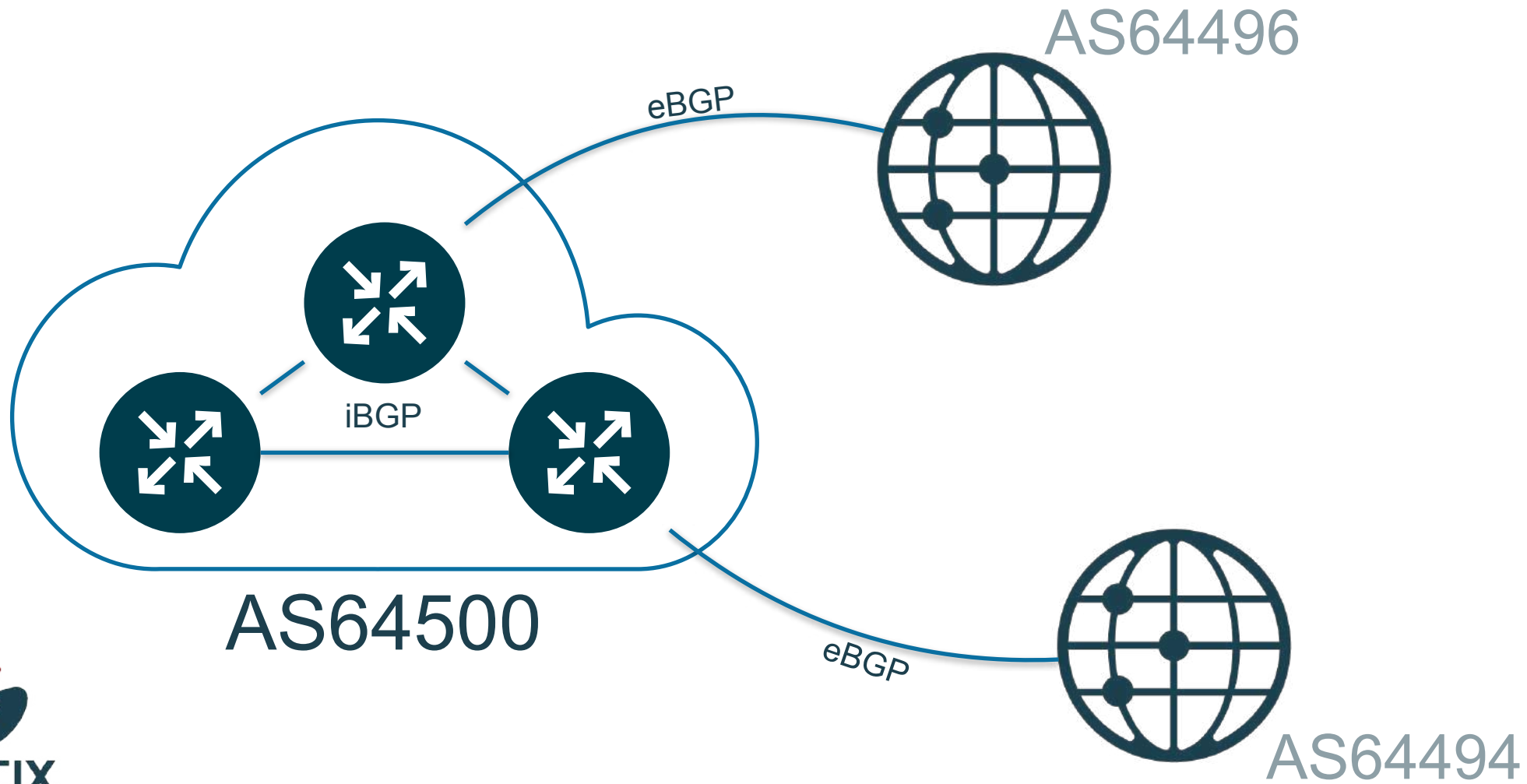
# Example Network



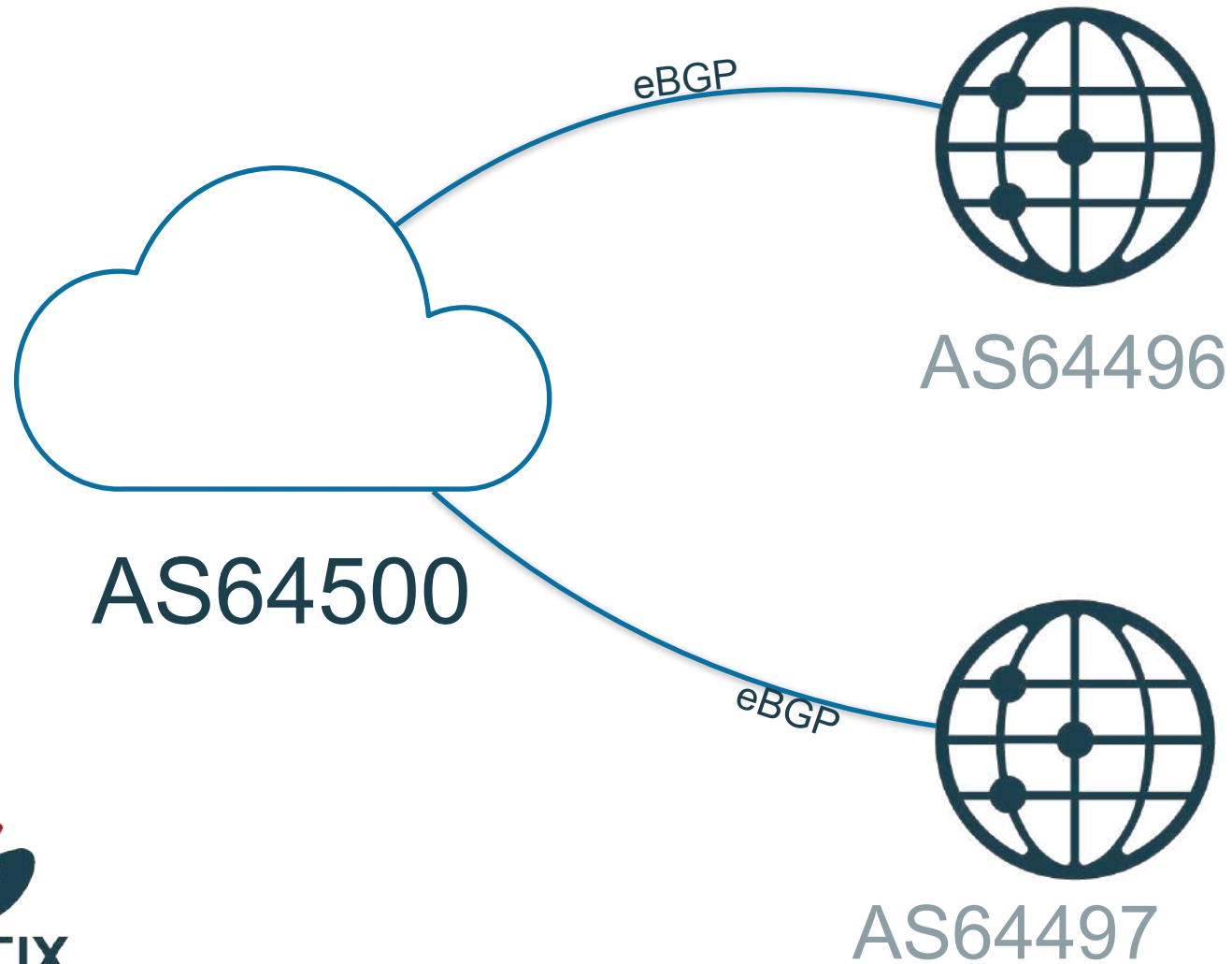
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# Let's simplify that a bit

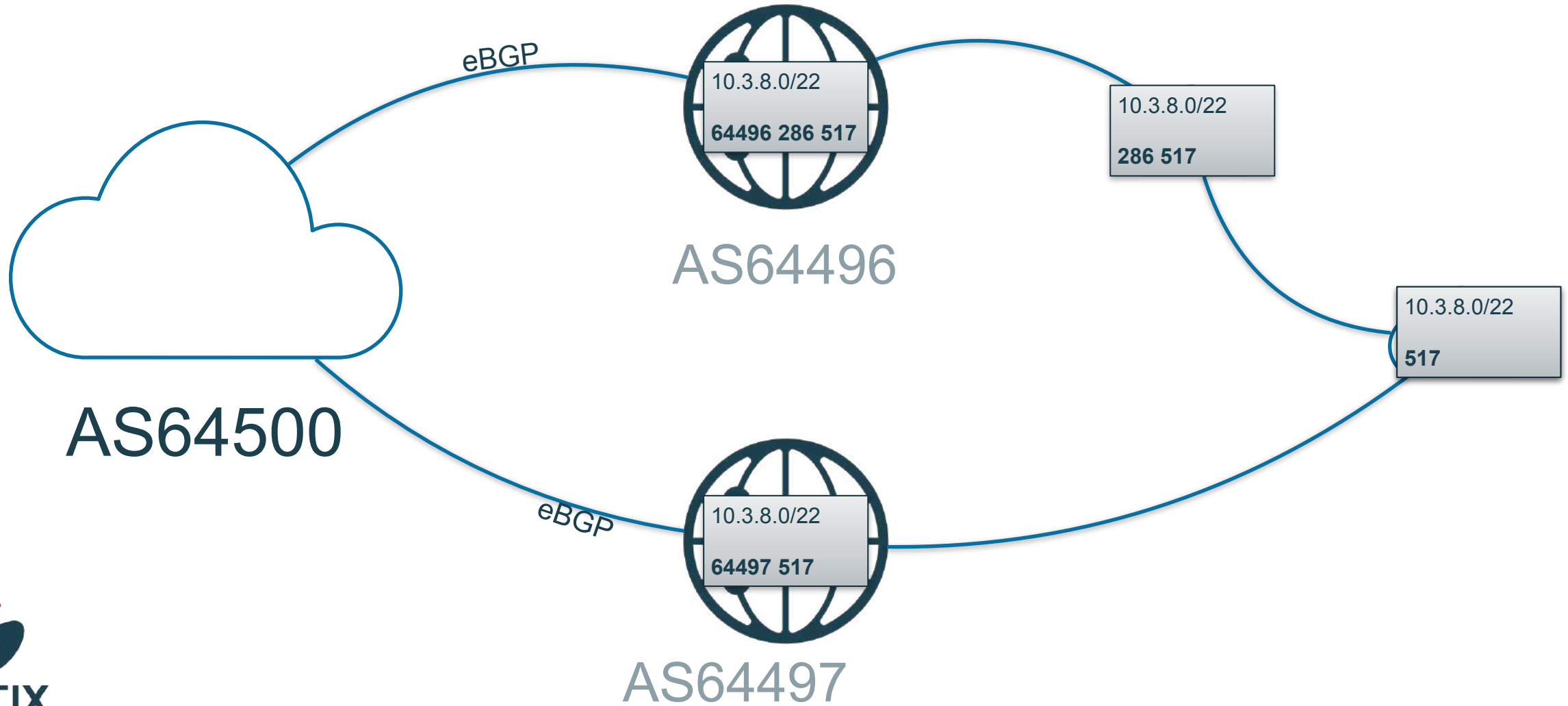


# Let's get started.... with two upstreams

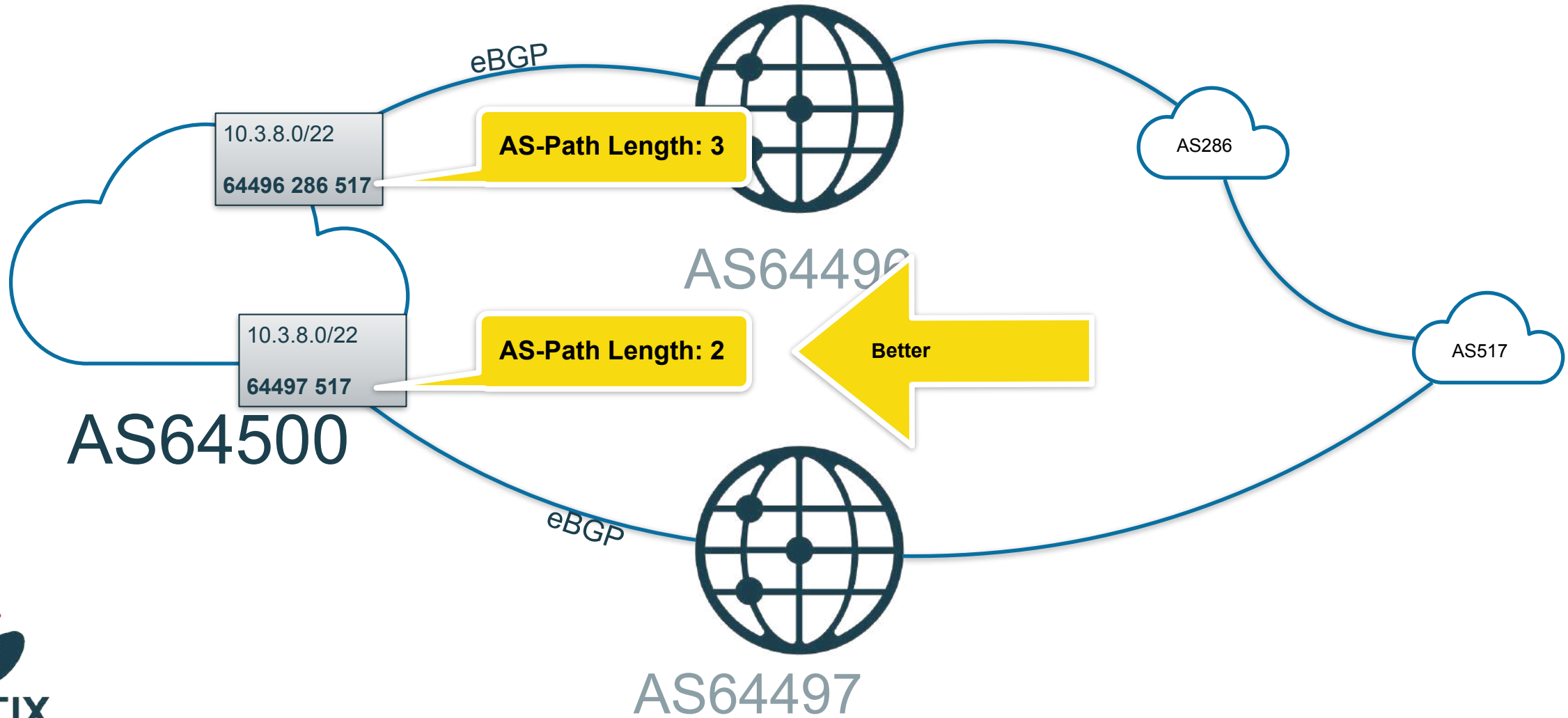




# Let's get started.... with two upstreams



# Let's get started.... with two upstreams

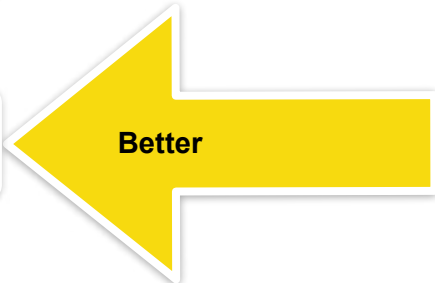


# BGP Best Path Selection

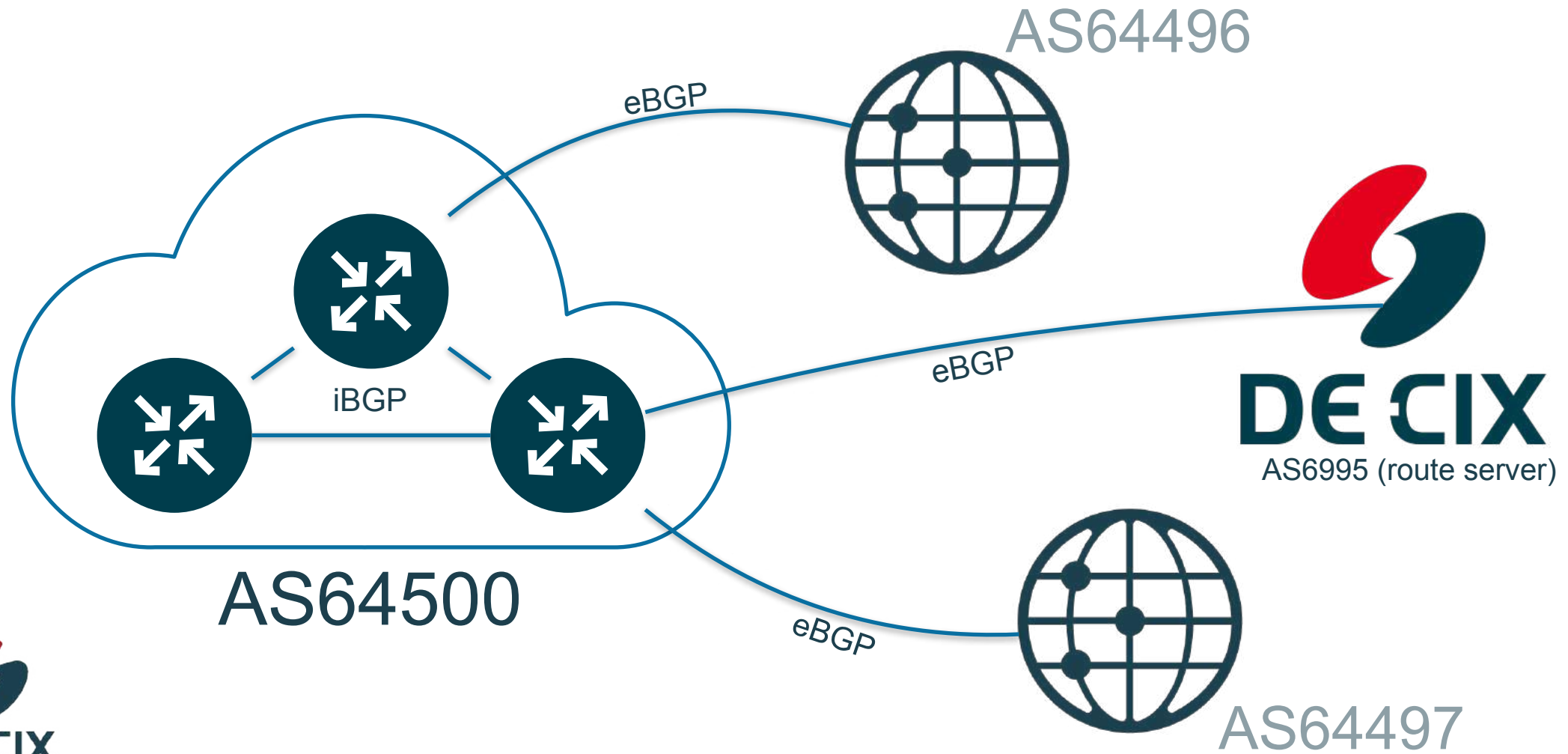
1	NextHop reachable?	Continue if "yes"
2		
3		
4		
5		
6		
7		
8		
9		
10		

AS-Path Length: 3

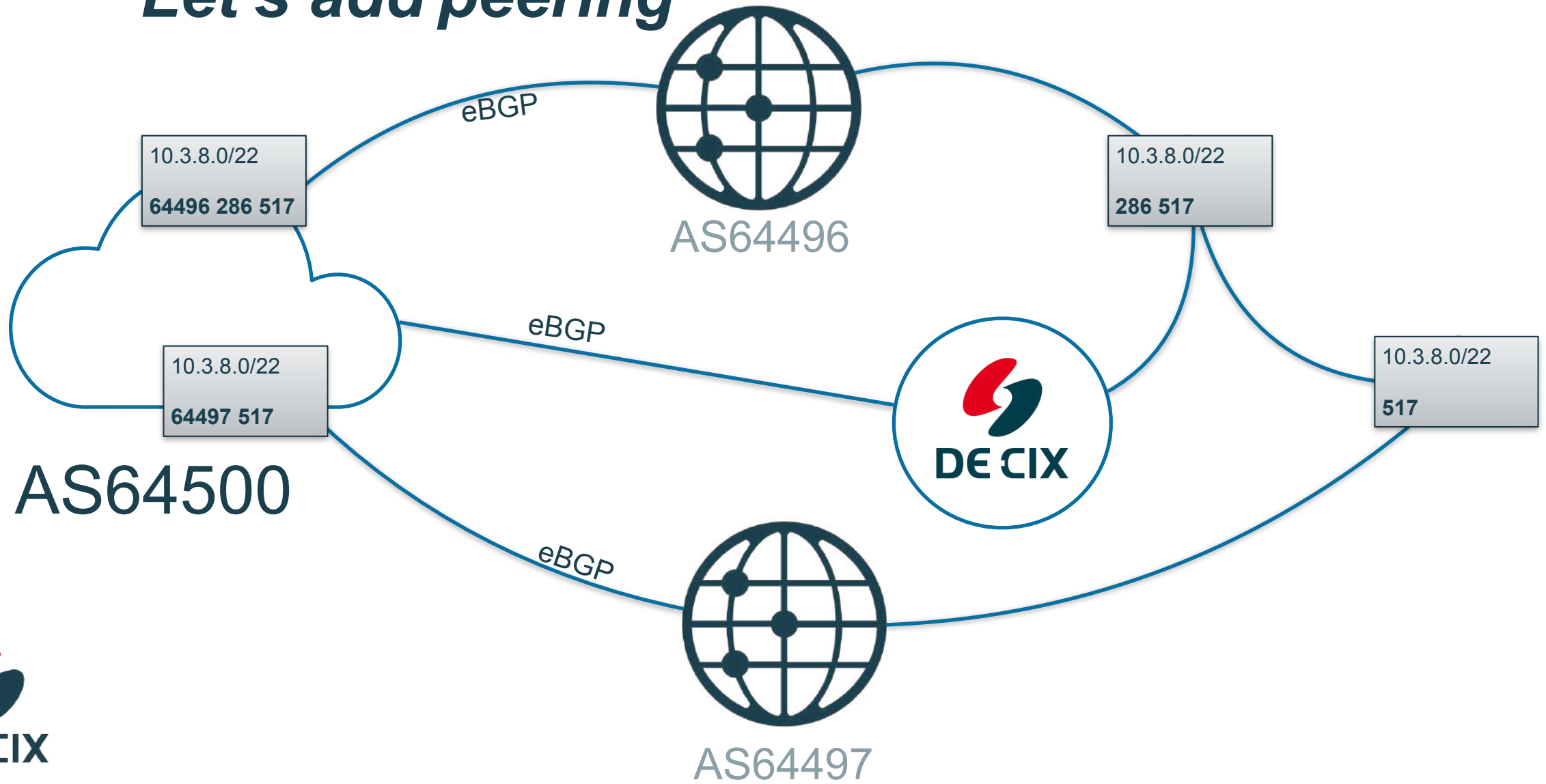
AS-Path Length: 2



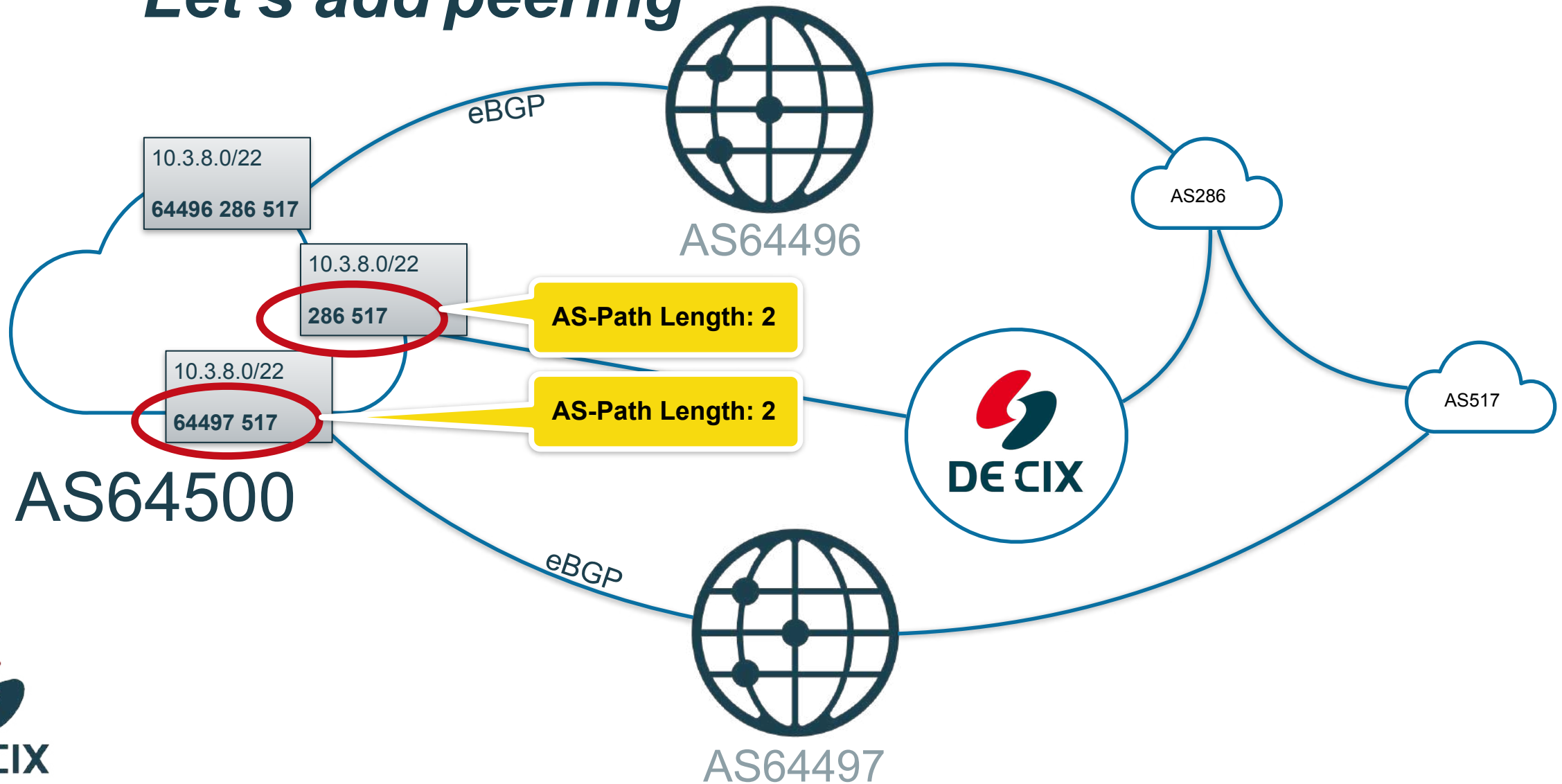
# Let's continue...



# Let's add peering



# Let's add peering



# The BGP Routing Algorithm

1	NextHop reachable?	Continue if "yes"
2		
3	AS Path Length	shorter wins
4		
5		
6		
7		
8		
9		
10		

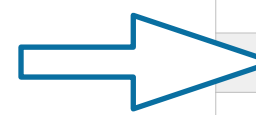
AS-Path Length: 2

AS-Path Length: 2



# Local Preference

- Higher wins
- Integer value (32bit, 0-4294967295)
- Propagated via iBGP inside an Autonomous System
- Usually set using rules when receiving prefixes
- Typical values:
  - Customer prefixes: 10000
  - Peering prefixes: 1000
  - Upstream prefixes: 100



1	NextHop reachable?	Continue if "yes"
2	Local Preference	higher wins
3	AS Path Length	shorter wins
4		
5		
6		
7		
8		
9		
10		



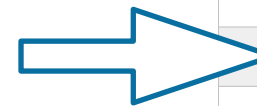
# Local Preference - how to set

→ High level:

```
if (prefix received from customer)
  then set local-preference of prefix = 10000
else if (prefix received from peer)
  then set local-preference of prefix = 1000
else
  set local-preference of prefix = 100
```

→ Cisco IOS or FRRouting:

```
route-map peering-in permit 10
  set local-preference 1000
router bgp 64500
  neighbor peering route-map peering-in in
```



1	NextHop reachable?	Continue if "yes"
2	Local Preference	higher wins
3	AS Path Length	shorter wins
4		
5		
6		
7		
8		
9		
10		

# Before we go to our experiment part....



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## The Interconnection Database

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The database is a non-profit, community-driven initiative run and promoted by volunteers. It is a public tool for the growth and good of the Internet. Join the community and support the continued development of the Internet.

<https://docs.peeringdb.com/>



# *Experiment: Setup eBGP*



experiment 02b + ./2a-solution-ipv4 + ./2a-solution-ipv6

# Thank you!

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# *Links and further reading*



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# Links visited during the webinar

## → RFCs

RFCs are Internet standards issued by the [Internet Engineering Task Force \(IETF\)](#)

### → [RFC4271](#) - A Border Gateway Protocol 4 (BGP-4)

→ see [5.1.5](#) for a definition of *Local Preference*

→ see [9.1](#) for the BGP best path selection algorithm

## → BGP Best Path Selection by vendor

→ [Cisco](#)

→ [Juniper](#)

→ [Mikrotik](#)

→ [Nokia](#)

→ [BIRD](#)

→ [FRRouting](#)

→ If you peering at any Internet Exchange - please use [PeeringDB](#)



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