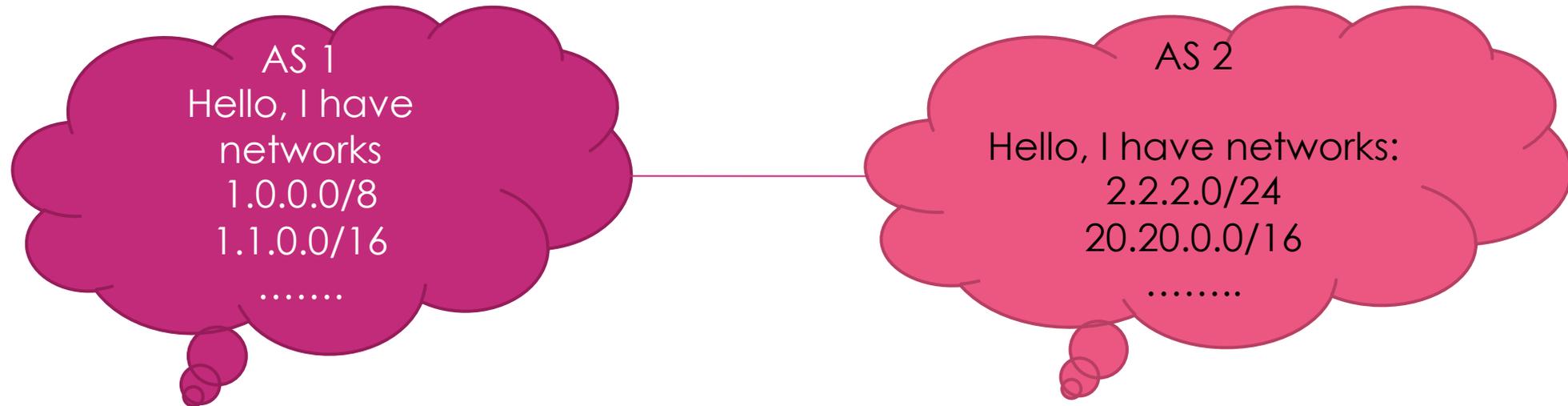


Non optimal routing  
caused by incompatibility  
of 32-bit ASN with the old  
router software.

KAZRENA CASE STUDY

# BGP - Exterior Routing Protocol



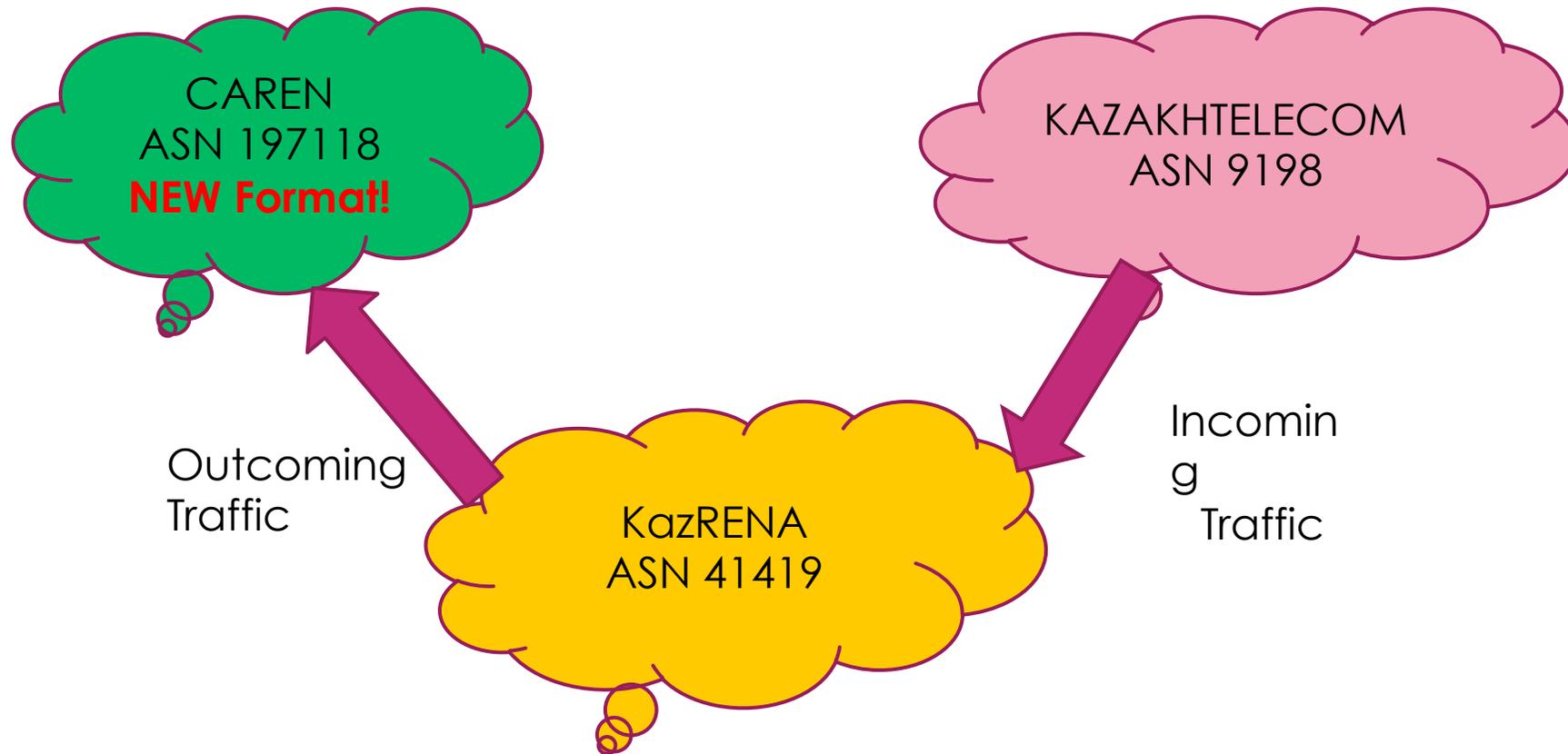
# Autonomous System

- ▶ What is an Autonomous System (AS)?
  - ▶ A set of routers under a single technical administration, using an *interior gateway protocol (IGP)* and common metrics to route packets within the AS and using an *exterior gateway protocol (EGP)* to route packets to other AS's
  - ▶ Sometimes AS's use multiple IGPs and metrics, but appear as single AS's to other AS's
- ▶ Each AS assigned unique ID
- ▶ AS's peer at network exchanges

# AS Numbers (ASN)

- ▶ ASN is unique identifier of autonomous systems
- ▶ Initially, ASN was 16-bit binary number
- ▶ Maximum number of ASN – 65535
- ▶ Now we are running out of 16-bit ASN
- ▶ In 2007 IETF adopted new 32-bit format of ASN (RFC4893)

# BGP asymmetric routing in KazRENA

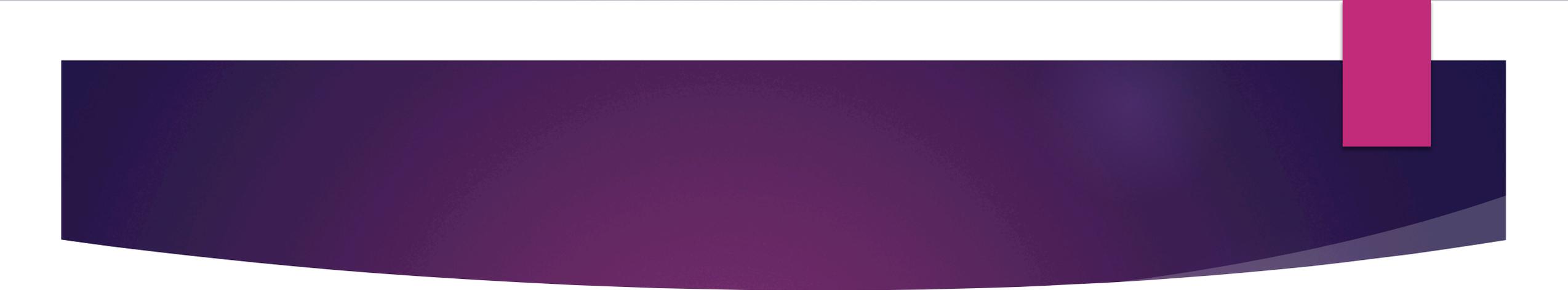


# Routing software supporting of 32-bit Asn

- ▶ Cisco IOS 12.4(24)T, 12.0(32)S12 and above  
Cisco IOS XR 3.4(1) and above  
Juniper JUNOS 9.1R1 and above  
Juniper JUNOSe 4.1.0 and above  
Quagga 0.99.10 and above  
Redback SEOS 2.0 and above

# BGP as\_path issue with new format ASN

- ▶ Router with outdated software without support of new format ASN replaces 32-bit ASN with special 16-bit placeholder ASN – 23456.
- ▶ That causes problems with BGP AS\_PATH attribute:
- ▶ If there are several 32-bit ASes in AS\_PATH all of them replaced by the same placeholder 16-bit ASN.
- ▶ As analysis shows some ISPs use routing policies which gives very low priority for AS\_PATH with ASN 23456.



▶ Thank for  
attention!