

# Internet Peering

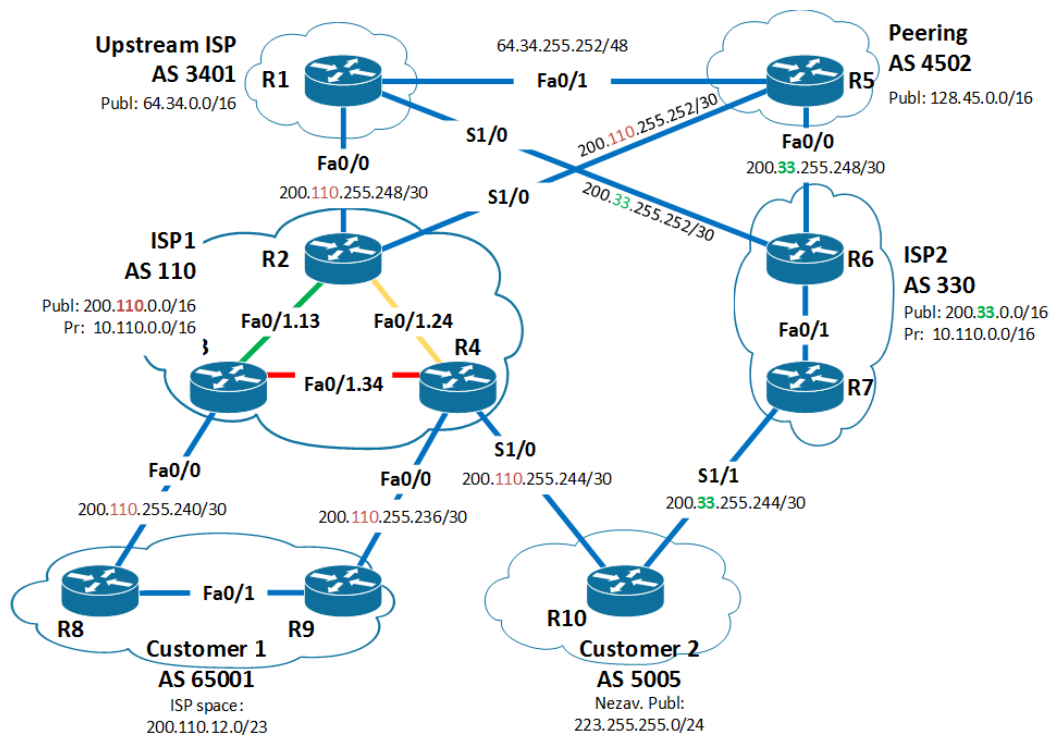
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## 1.1 Topológia

Budeme konfigurovať smerovacie protokoly BGP a IS-IS na topológii, ktorá je znázornená na obrázku 1. V rámci autonómnych systémov sme konfigurovali smerovacie protokoly IS-IS a BGP (iBGP). Medzi autonómnymi systémami sme konfigurovali len BGP (eBGP). IP adresácia je uvedená v tabuľke 1 a dopĺňa grafické znázornenie topológie na obrázku 1. Sieť medzi smerovačmi R1 a R5 nemá mať masku “/48” ale “/30”.



Obr. 1: Topológia BGP

Tabuľka 1: IP adresácia

Smerovač	Rozhranie	IP adresa	Maska
R1	Fa0/0	200.110.255.249	
	Fa0/1	64.34.255.253	
	S1/0	200.33.255.253	
	Lo0	10.255.255.1	255.255.255.255
	Lo1	64.34.1.1	
R2	Fa0/0	200.110.255.250	
	Fa0/1.23	10.110.23.2	
	Fa0/1.24	10.110.24.2	
	S1/0	200.110.255.253	
	Lo0	10.255.255.2	255.255.255.255
R3	Fa0/0	200.110.255.241	
	Fa0/1.23	10.110.23.3	
	Fa0/1.34	10.110.34.3	
	Lo0	10.255.255.3	255.255.255.255
R4	Fa0/0	200.110.255.237	
	Fa0/1.24	10.110.24.4	
	Fa0/1.34	10.110.34.4	
	S1/0	200.110.255.245	
	Lo0	10.255.255.4	255.255.255.255
R5	Fa0/0	200.33.255.249	
	Fa0/1	10.100.15.2	
	S1/0	200.110.255.254	
	Lo0	10.255.255.5	255.255.255.255
	Lo1	128.45.5.1	
R6	Fa0/0	200.33.255.250	
	Fa0/1	10.110.67.6	
	S1/0	200.33.255.254	
	Lo0	10.255.255.6	255.255.255.255
	Lo1	200.33.6.1	
R7	Fa0/1	10.110.67.7	
	S1/1	200.33.255.245	
	Lo0	10.255.255.7	255.255.255.255
	Lo1	200.33.7.1	
R8	Fa0/0	200.110.255.242	
	Fa0/1	10.110.89.8	
	Lo0	10.255.255.8	255.255.255.255
	Lo1	200.110.12.1	
R9	Fa0/0	200.110.255.238	
	Fa0/1	10.110.89.9	
	Lo0	10.255.255.9	255.255.255.255
	Lo1	200.110.13.1	
R10	S1/0	200.110.255.246	
	S1/1	200.33.255.246	
	Lo0	10.255.255.10	255.255.255.255
	Lo1	223.255.255.1	

## 1.2 Úlohy

- 1.2.1 Použiť IGP IS–IS (L2 only) single area dizajn, priame p2p prepojenia
- 1.2.2 Zabezpečiť plnú konektivitu prostredníctvom iBGP alebo eBGP protokolov pre zákaznícké a internetové smerovacie záznamy
- 1.2.3 Distribúcia internetových statických smerovacích záznamov z AS3401, AS4502 a zákazníckych smerovacích záznamov z AS65001, AS5005, AS330
- 1.2.4 Prepísať privátne AS65001 – DOROBÍŤ!!!
- 1.2.5 Sumarizácia

### Popis

Dohodli sme sa, že vnútri autonómneho systému budeme používať iba smerovací protokol IS-IS. Medzi autonómnymi systémami používame smerovací protokol BGP. Subrozhranie “.13” a VLAN 13 sme premenovali na “.23” a VLAN 23, lebo sieť je medzi smerovačmi R2 a R3 (23), a nie medzi R1 a R3 (13).

predtým boli linky medzi providermi siredne aj cez ISIS -č toto bolo odstranene; interfejsy boli odstranene z ISIS

```
int <nazov_interfaceu>
  no ip router isis
router isis
  no passive-interface <nazov_interfaceu>
  no redistribute-connected
```

Privatne siete operatorov ohlasujeme prikazom “network”.

### Konfigurácia

```
R1
ena
conf t
hostname R1
no ip domain-lookup
username admin privil 15 secret admin
line con 0
  login local
  logging syn
  exec-time 120
line vty 0 15
  privilege level 15
```

```

    no login
int f0/0
    ip addr 200.110.255.249 255.255.255.252
    no shut
int f0/1
    ip addr 64.34.255.253 255.255.255.252
    no shut
int s1/0
    ip addr 200.33.255.253 255.255.255.252
    no shut
int lo0
    ip addr 10.255.255.1 255.255.255.255
    no shut
int lo1
    ip addr 64.34.1.1 255.255.255.0
    no shut
router bgp 3401
    neighbor 64.34.255.254 remote-as 4502
    neighbor 200.33.255.254 remote-as 330
    neighbor 200.110.255.250 remote-as 110
    network 10.255.255.1 mask 255.255.255.255
    network 64.34.1.0 mask 255.255.255.0
    aggregate-address 64.34.0.0 255.255.0.0 summary-only
    no auto-summary
    no sync
    bgp log-neighbor-changes

```

```

R2
ena
conf t
hostname R2
no ip domain-lookup
username admin privil 15 secret admin
line con 0
    login local
    logging syn
    exec-time 120
line vty 0 15
    privilege level 15
    no login
int f0/0
    ip addr 200.110.255.250 255.255.255.252
    no shut
int f0/1
    no ip add
    isis network point-to-point
    no sh
int f0/1.23
    encap dot1q 23

```

```

    ip addr 10.110.23.2 255.255.255.0
    ip router isis
int f0/1.24
    encap dot1q 24
    ip addr 10.110.24.2 255.255.255.0
    ip router isis
int s1/0
    ip addr 200.110.255.253 255.255.255.252
    no shut
int lo0
    ip addr 10.255.255.2 255.255.255.255
    ip router isis
    no shut
int lo1
    ip addr 200.110.2.1 255.255.255.0
    ip router isis
    no shut
router isis
    net 49.0001.0102.5525.5002.00
    passive-interface lo0
    passive-interface lo1
    redistribute static
    is-type level-2
    metric-style wide
    exit
router bgp 110
    neighbor 10.255.255.3 remote-as 110
    neighbor 10.255.255.3 update-source lo0
    neighbor 10.255.255.3 next-hop-self
    neighbor 10.255.255.4 remote-as 110
    neighbor 10.255.255.4 update-source lo0
    neighbor 10.255.255.4 next-hop-self
    neighbor 200.110.255.249 remote-as 3401
    neighbor 200.110.255.254 remote-as 4502
    network 10.255.255.2 mask 255.255.255.255
    network 200.110.2.0 mask 255.255.255.0
    aggregate-address 200.110.0.0 255.255.0.0 summary-only
    no auto-summary
    no sync
    bgp log-neighbor-changes

```

```

R3
ena
conf t
hostname R3
no ip domain-lookup
username admin privil 15 secret admin
line con 0
    login local

```

```

logging syn
exec-time 120
line vty 0 15
  privilege level 15
  no login
int f0/0
  ip addr 200.110.255.241 255.255.255.252
  no shut
int f0/1
  no ip addr
  isis network point-to-point
  no shut
int f0/1.23
  encaps dot1q 23
  ip addr 10.110.23.3 255.255.255.0
  ip router isis
int f0/1.34
  encaps dot1q 34
  ip addr 10.110.34.3 255.255.255.0
  ip router isis
int lo0
  ip addr 10.255.255.3 255.255.255.255
  ip router isis
  no shut
int lo1
  ip addr 200.110.3.1 255.255.255.0
  ip router isis
  no shut
router isis
  net 49.0001.0102.5525.5003.00
  passive-interface lo0
  passive-interface lo1
  redistribute static
  is-type level-2
  metric-style wide
  exit
router bgp 110
  neighbor 10.255.255.2 remote-as 110
  neighbor 10.255.255.2 update-source lo0
  neighbor 10.255.255.2 next-hop-self
  neighbor 10.255.255.4 remote-as 110
  neighbor 10.255.255.4 update-source lo0
  neighbor 10.255.255.4 next-hop-self
  neighbor 200.110.255.242 remote-as 65001
  network 10.255.255.3 mask 255.255.255.255
  network 200.110.3.0 mask 255.255.255.0
  no auto-summary
  no sync
  bgp log-neighbor-changes

```



```

R4
ena
conf t
hostname R4
no ip domain-lookup
username admin privil 15 secret admin
line con 0
    login local
    logging syn
    exec-time 120
line vty 0 15
    privilege level 15
    no login
int f0/0
    ip addr 200.110.255.237 255.255.255.252
    no shut
int f0/1
    no ip addr
    isis network point-to-point
    no sh
int f0/1.24
    encap dot1q 24
    ip addr 10.110.24.4 255.255.255.0
    ip router isis
int f0/1.34
    encap dot1q 34
    ip addr 10.110.34.4 255.255.255.0
    ip router isis
int s1/0
    ip addr 200.110.255.245 255.255.255.252
    no shut
int lo0
    ip addr 10.255.255.4 255.255.255.255
    ip router isis
    no shut
int lo1
    ip addr 200.110.4.1 255.255.255.0
    ip router isis
    no shut
router isis
    net 49.0001.0102.5525.5004.00
    passive-interface lo0
    passive-interface lo1
    redistribute static
    is-type level-2
    metric-style wide
    exit
router bgp 110
    neighbor 10.255.255.2 remote-as 110

```

```

neighbor 10.255.255.2 update-source lo0
neighbor 10.255.255.2 next-hop-self
neighbor 10.255.255.3 remote-as 110
neighbor 10.255.255.3 update-source lo0
neighbor 10.255.255.3 next-hop-self
neighbor 200.110.255.238 remote-as 65001
neighbor 200.110.255.246 remote-as 5005
network 10.255.255.4 mask 255.255.255.255
network 200.110.4.0 mask 255.255.255.0
no auto-summary
no sync
bgp log-neighbor-changes

```

```

R5
ena
conf t
hostname R5
no ip domain-lookup
username admin privil 15 secret admin
line con 0
    login local
    logging syn
    exec-time 120
line vty 0 15
    privilege level 15
    no login
int f0/0
    ip addr 200.33.255.249 255.255.255.252
    no shut
int f0/1
    ip addr 64.34.255.254 255.255.255.252
    no shut
int s1/0
    ip addr 200.110.255.254 255.255.255.252
    no shut
int lo0
    ip addr 10.255.255.5 255.255.255.255
    no shut
int lo1
    ip addr 128.45.5.1 255.255.255.128
    no shut
router bgp 4502
    neighbor 200.33.255.250 remote-as 330
    neighbor 200.110.255.253 remote-as 110
    neighbor 64.34.255.253 remote-as 3401
    network 10.255.255.5 mask 255.255.255.255
    network 128.45.5.0 mask 255.255.255.128
    aggregate-address 128.45.0.0 255.255.0.0 summary-only
    no auto-summary
    no sync

```

bgp log-neighbor-changes

```
R6
ena
conf t
hostname R6
no ip domain-lookup
username admin privil 15 secret admin
line con 0
    login local
    logging syn
    exec-time 120
line vty 0 15
    privilege level 15
    no login
int f0/0
    ip addr 200.33.255.250 255.255.255.252
    no shut
int f0/1
    ip addr 10.110.67.6 255.255.255.0
    ip router isis
    isis network point-to-point
    no shut
int s1/0
    ip addr 200.33.255.254 255.255.255.252
    no shut
int lo0
    ip addr 10.255.255.6 255.255.255.255
    ip router isis
    no shut
int lo1
    ip add 200.33.6.1 255.255.255.128
    ip router isis
router isis
    net 49.0001.0102.5525.5006.00
    passive-interface lo0
    passive-interface lo1
    redistribute static
    is-type level-2
    metric-style wide
    exit
router bgp 330
    neighbor 10.255.255.7 remote-as 330
    neighbor 10.255.255.7 update-source lo0
    neighbor 10.255.255.7 next-hop-self
    neighbor 200.33.255.253 remote-as 3401
    neighbor 200.33.255.249 remote-as 4502
    network 10.255.255.6 mask 255.255.255.255
```

```
network 200.33.6.0 mask 255.255.255.128
aggregate-address 200.33.0.0 255.255.0.0 summary-only
no auto-summary
no sync
bgp log-neighbor-changes
```

```
R7
ena
conf t
hostname R7
no ip domain-lookup
username admin privil 15 secret admin
line con 0
    login local
    logging syn
    exec-time 120
line vty 0 15
    privilege level 15
    no login
int f0/1
    ip addr 10.110.67.7 255.255.255.0
    ip router isis
    isis network point-to-point
    no shut
int s1/1
    ip addr 200.33.255.245 255.255.255.252
    no shut
int lo0
    ip addr 10.255.255.7 255.255.255.255
    ip router isis
    no shut
int lo1
    ip addr 200.33.7.1 255.255.255.128
    ip router isis
    no shut
router isis
    net 49.0001.0102.5525.5007.00
    passive-interface lo0
    passive-interface lo1
    redistribute static
    is-type level-2
    metric-style wide
    exit
router bgp 330
    neighbor 10.255.255.6 remote-as 330
    neighbor 10.255.255.6 update-source lo0
    neighbor 10.255.255.6 next-hop-self
    neighbor 200.33.255.246 remote-as 5005
    network 10.255.255.7 mask 255.255.255.255
```

```
network 200.33.7.0 255.255.255.128
aggregate-address 200.33.0.0 255.255.0.0 summary-only
no auto-summary
no sync
bgp log-neighbor-changes
```

```
R8
ena
conf t
hostname R8
no ip domain-lookup
username admin privil 15 secret admin
line con 0
    login local
    logging syn
    exec-time 120
line vty 0 15
    privilege level 15
    no login
int f0/0
    ip addr 200.110.255.242 255.255.255.252
    no shut
int f0/1
    ip addr 10.110.89.8 255.255.255.0
    ip router isis
    isis network point-to-point
    no shut
int lo0
    ip addr 10.255.255.8 255.255.255.255
    ip router isis
    no shut
int lo1
    ip add 200.110.12.1 255.255.255.128
    ip router isis
router isis
    net 49.0001.0102.5525.5008.00
    passive-interface lo0
    passive-interface lo1
    redistribute static
    is-type level-2
    metric-style wide
    exit
router bgp 65001
    neighbor 10.255.255.9 remote-as 65001
    neighbor 10.255.255.9 update-source lo0
    neighbor 200.110.255.241 remote-as 110
    network 10.255.255.8 mask 255.255.255.255
    network 200.110.12.0 mask 255.255.255.128
```

```
aggregate-address 200.110.12.0 255.255.254.0 summary-only
no auto-summary
no sync
bgp log-neighbor-changes
```

```
R9
ena
conf t
hostname R9
no ip domain-lookup
username admin privil 15 secret admin
line con 0
    login local
    logging syn
    exec-time 120
line vty 0 15
    privilege level 15
    no login
int f0/0
    ip addr 200.110.255.238 255.255.255.252
    no sh
int f0/1
    ip addr 10.110.89.9 255.255.255.0
    ip router isis
    isis network point-to-point
    no shut
int lo0
    ip addr 10.255.255.9 255.255.255.255
    ip router isis
    no shut
int lo1
    ip addr 200.110.13.1 255.255.255.128
    ip router isis
    no shut
router isis
    net 49.0001.0102.5525.5009.00
    passive-interface lo0
    passive-interface lo1
    redistribute static
    is-type level-2
    metric-style wide
    exit
router bgp 65001
    neighbor 10.255.255.8 remote-as 65001
    neighbor 10.255.255.8 update-source lo0
    neighbor 200.110.255.237 remote-as 110
    network 10.255.255.9 mask 255.255.255.255
```

```
network 200.110.13.0 mask 255.255.255.128
aggregate-address 200.110.12.0 255.255.254.0 summary-only
no auto-summary
no sync
bgp log-neighbor-changes
```

```
R10
ena
conf t
hostname R10
no ip domain-lookup
username admin privil 15 secret admin
line con 0
    login local
    logging syn
    exec-time 120
line vty 0 15
    privilege level 15
    no login
int s1/0
    ip addr 200.110.255.246 255.255.255.252
    no shut
int s1/1
    ip addr 200.33.255.246 255.255.255.252
    no shut
int lo0
    ip addr 10.255.255.10 255.255.255.255
    no shut
int lo1
    ip addr 223.255.255.1 255.255.255.128
    no shut
router bgp 5005
    neighbor 200.110.255.245 remote-as 110
    neighbor 200.33.255.245 remote-as 330
    network 10.255.255.10 mask 255.255.255.255
    network 223.255.255.0 mask 255.255.255.128
    aggregate-address 223.255.255.0 255.255.255.0 summary-only
    no auto-summary
    no sync
    bgp log-neighbor-changes
```

## Overenie

Kontrola, či interné ISP adresy nie sú propagované

Kontrola konektivity medzi zákazníckymi a internetovými smerovacími záznamami

## **1.2.6 ISP politika**

### **Popis**

Definovať vlastnú politiku – použiť community, community alter LP, AS–PATH filtering, prepending, atď

### **Konfigurácia**

### **Overenie**

## **1.2.7 Primárne linky R3–R8, R4–R10**

### **Popis**

### **Konfigurácia**

### **Overenie**

## **1.2.8 Distribúovať iba default, AS5005 a peering prefixy do AS65001**

### **Popis**

### **Konfigurácia**

### **Overenie**

## **1.2.9 AS5005 nesme byť nikdy transit**

### **Popis**

### **Konfigurácia**



**Overenie**

#### **1.2.10 Peering iba pre ISP1 a ISP2, nie pre prefixy naučené z Upstream ISP**

**Popis**

**Konfigurácia**

**Overenie**

#### **1.2.11 Overiť funkčnosť nastavenia politiky vhodnými výpadkami liniek a smerovačov**

**Popis**

**Konfigurácia**

**Overenie**

#### **1.2.12 Overiť, či je možné odkloniť celú prevádzku (upstream, downstream) na linke R4–R10 v prípade plánovanej údržby (linka musí byť plne funkčná a BGP spojenie propaguje všetky prefixy)**

**Popis**

**Konfigurácia**

**Overenie**