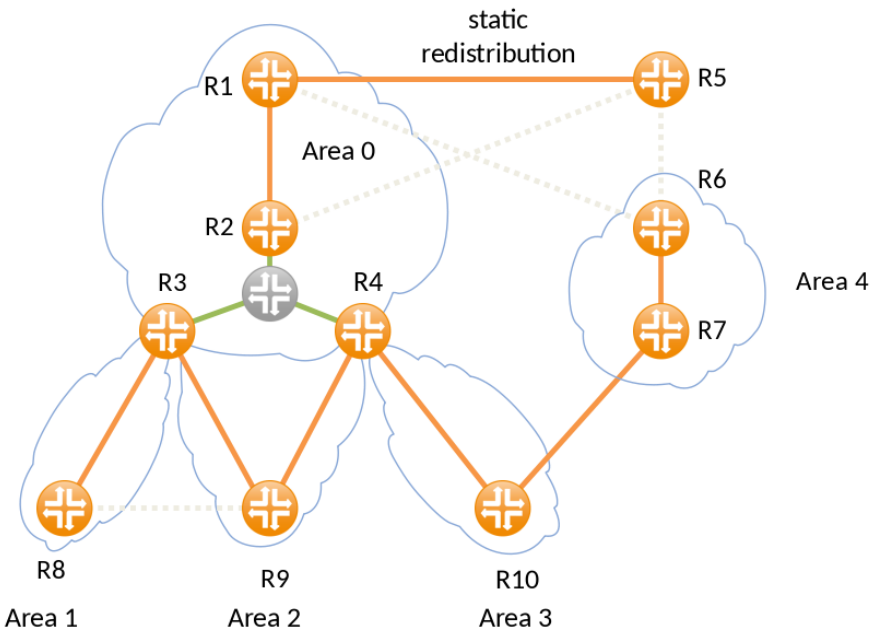
Multi-area OSPF

Topológia

Budeme konfigurovať Multi-area OSPF, ktorá je znázornená na obrázku 1.



Obr. 1: Topológia Multi-area OSPF

Úlohy a ich konfigurácia

Základná konfigurácia

Popis

Ako za základnú konfiguráciu považujeme nastavenie adresácie, vzdialeného prístupu a vypisovania konzoly.

Konfigurácia

```
!!!!!!!!!!   R1   !!!!!!!!!!
hostname R1
no ip domain-lookup
username admin privilege 15 secret admin
line con 0
login local
logging synchronous
line vty 0 15
privilege level 15
no login
int lo1
```

```
ip address 10.255.255.1 255.255.255.255
no shutdown
int f0/1
ip address 10.100.15.1 255.255.255.0
no shutdown
int f0/0
ip address 10.0.12.1 255.255.255.0
no shutdown

do show ip interface brief


!!!!!!!!!!   R2   !!!!!!!!!!
hostname R2
no ip domain-lookup
username admin privilege 15 secret admin
line con 0
login local
logging synchronous
line vty 0 15
privilege level 15
no login
int lo1
ip address 10.255.255.2 255.255.255.255
no shutdown
int f0/1
ip address 10.0.234.2 255.255.255.0
no shutdown
int f0/0
ip address 10.0.12.2 255.255.255.0
no shutdown

do show ip interface brief


!!!!!!!!!!   R3   !!!!!!!!!!
hostname R3
no ip domain-lookup
username admin privilege 15 secret admin
line con 0
login local
logging synchronous
line vty 0 15
privilege level 15
no login
int lo1
ip address 10.255.255.3 255.255.255.255
no shutdown
int f0/1
ip address 10.0.234.3 255.255.255.0
no shutdown
```

```
int f0/0
ip address 10.1.38.1 255.255.255.0
no shutdown
int s1/0
ip address 10.2.39.1 255.255.255.252
no shutdown

do show ip interface brief


!!!!!!!!!!   R4   !!!!!!!!!!
hostname R4
no ip domain-lookup
username admin privilege 15 secret admin
line con 0
login local
logging synchronous
line vty 0 15
privilege level 15
no login
int lo1
ip address 10.255.255.4 255.255.255.255
no shutdown
int f0/1
ip address 10.0.234.4 255.255.255.0
no shutdown
int f0/0
ip address 10.2.49.1 255.255.255.0
no shutdown
int s1/0
ip address 10.3.104.1 255.255.255.252
no shutdown

do show ip interface brief


!!!!!!!!!!   R5   !!!!!!!!!!
hostname R5
no ip domain-lookup
username admin privilege 15 secret admin
line con 0
login local
logging synchronous
line vty 0 15
privilege level 15
no login
int lo1
ip address 10.255.255.5 255.255.255.255
no shutdown
int f0/1
ip address 10.100.15.2 255.255.255.0
```

```
no shutdown

do show ip interface brief

!!!!!!!!!!   R6   !!!!!!!!!!
hostname R6
no ip domain lookup
username admin privil 15 secret admin
line con 0
login local
logging synchro
line vty 0 15
privilege level 15
no login
int lo1
ip add 10.255.255.6 255.255.255.255
no sh
int fa0/1
ip add 10.4.67.1 255.255.255.0
no sh

!!!!!!!!!!   R7   !!!!!!!!!!
hostname R7
no ip domain lookup
username admin privil 15 secret admin
line con 0
login local
logging synchro
line vty 0 15
privilege level 15
no login
int lo1
ip add 10.255.255.7 255.255.255.255
no sh
int fa0/1
ip add 10.4.67.2 255.255.255.0
no sh
int s1/1
ip add 10.4.107.1 255.255.255.0
no sh

!!!!!!!!!!   R8   !!!!!!!!!!
hostname R8
no ip domain lookup
username admin privil 15 secret admin
line con 0
login local
logging synchro
line vty 0 15
privilege level 15
no login
```

```
int lo1
ip add 10.255.255.8 255.255.255.255
no sh
int fa0/0
ip add 10.1.38.2 255.255.255.0
no sh

!!!!!!!!!!   R9   !!!!!!!!!!
hostname R9
no ip domain lookup
username admin privil 15 secret admin
line con 0
login local
logging synchro
line vty 0 15
privilege level 15
no login
int lo1
ip add 10.255.255.9 255.255.255.255
no sh
int fa0/0
ip add 10.2.49.2 255.255.255.0
no sh
int s1/0
ip add 10.2.39.2 255.255.255.0
no sh

!!!!!!!!!!   R10   !!!!!!!!!!
hostname R10
no ip domain lookup
username admin privil 15 secret admin
line con 0
login local
logging synchro
line vty 0 15
privilege level 15
no login
int lo1
ip add 10.255.255.10 255.255.255.255
no sh
int s1/1
ip add 10.4.107.2 255.255.255.0
no sh
int s1/0
ip add 10.3.104.2 255.255.255.0
no sh
```

Overenie

Základnú konfiguráciu sme overili príkazmi:

show ip interface brief

```
výpis
```

show cdp neighbors

```
výpis
```

Nakonfigurovať OSPF s viacerými oblasťami

Popis

Jednotlivé smerovače sme priradili do oblastí podľa obrázku 1.

Konfigurácia

```
!KONFIGURACIA R1
router ospf 1
    network 10.255.255.1 0.0.0.0 area 0
    exit
int f0/0
    ip ospf 1 area 0
    !treba zapnut interface, ked nam padne router/server
    no shutdown

!KONFIGURACIA R2
router ospf 1
    network 10.255.255.2 0.0.0.0 area 0
    exit
int f0/0
    ip ospf 1 area 0
    no shutdown
int f0/1
    ip ospf 1 area 0
    no shutdown

!KONFIGURACIA R3
router ospf 1
    network 10.255.255.3 0.0.0.0 area 1
    exit
int f0/1
    ip ospf 1 area 0
    no shutdown
int f0/0
    ip ospf 1 area 1
    no shutdown
int s1/0
    ip ospf 1 area 2
```

```
    no shutdown

!KONFIGURACIA R4
router ospf 1
    network 10.255.255.4 0.0.0.0 area 3
    exit
int f0/1
    ip ospf 1 area 0
    no shutdown
int f0/0
    ip ospf 1 area 2
    no shutdown
int s1/0
    ip ospf 1 area 3
    no shutdown


!KONFIGURACIA R5
ip route 0.0.0.0 0.0.0.0 f0/1 10.100.15.1

!KONFIGURACIA R6
router ospf 1
    network 10.255.255.6 0.0.0.0 area 4
    exit
int f0/1
    ip ospf 1 area 4
    no sh

!KONFIGURACIA R7
router ospf 1
    network 10.255.255.7 0.0.0.0 area 4
    exit
int f0/1
    ip ospf 1 area 4
    no sh
int s1/1
    ip ospf 1 area 4
    no sh

!KONFIGURACIA R8
router ospf 1
    network 10.255.255.8 0.0.0.0 area 1
    exit
int f0/0
    ip ospf 1 area 1
    no sh

!KONFIGURACIA R9
router ospf 1
    network 10.255.255.9 0.0.0.0 area 2
    exit
```

```
int f0/0
    ip ospf 1 area 2
    no sh
int s1/0
    ip ospf 1 area 2
    no sh

!KONFIGURACIA R10
router ospf 1
    network 10.255.255.10 0.0.0.0 area 3
    exit
int s1/0
    ip ospf 1 area 3
    no sh
int s1/1
    ip ospf 1 area 4
    no sh
```

Overenie

Príslušnosť smerovačov do oblastí sme testovali týmito príkazmi:

show ip ospf interface brief

```
výpis
```

show ip ospf neighbors

```
výpis
```

R2, R3, R4 broadcast spojenia prostredníctvom L2 prepínača, zvyšok spojení P2P

Popis

Konfigurácia

```
!KONFIGURACIA R1
int f0/0
    ip ospf network point-to-point

!KONFIGURACIA R2
int f0/0
    ip ospf network point-to-point
```

```
!KONFIGURACIA R3
int f0/0
    ip ospf network point-to-point
int s1/0
    ip ospf network point-to-point

!KONFIGURACIA R4
int f0/0
    ip ospf network point-to-point
int s1/0
    ip ospf network point-to-point

!KONFIGURACIA R6
int f0/1
    ip ospf network point-to-point

!KONFIGURACIA R7
int f0/1
    ip ospf network point-to-point
int s1/1
    ip ospf network point-to-point

!KONFIGURACIA R8
int f0/0
    ip ospf network point-to-point

!KONFIGURACIA R9
int f0/0
    ip ospf network point-to-point
    ip ospf 1 area 2
int s1/0
    ip ospf network point-to-point

!KONFIGURACIA R10
int s1/0
    ip ospf network point-to-point
int s1/1
    ip ospf network point-to-point
```

Overenie

Router-id - loopback0, passive-interface

Popis

Konfigurácia Na každom routri sme vykonali tieti príkazy:

```
router ospf 1
    router-id 10.255.255.X
    passive-interface lo1
```

'X' symbolizuje číslo smerovača (napr. pre R1: 10.255.255.1)

Overenie

Area 1 – Totally Stubby

Popis

Konfigurácia

Overenie

Area 3 – Stub

Popis

Konfigurácia

Overenie

Area 4 – pripojenie pomocou virtuálnej linky

Popis

Konfigurácia

Overenie

Statická redistribúcia smerovacích záznamov z R5

Popis

Na smerovači R5 sme nastavili predvolenú cestu.

Konfigurácia

```
ip route 0.0.0.0 0.0.0.0 f0/1 10.100.15.1
```

Potom sme na smerovači R1 namapovali cestu k ”lo1”na R5, ktorú sme ohlásili v rámci OSPF topológie príkazmi ”redistribute”:

```
ip route 10.255.255.5 255.255.255.255 f0/1 10.100.15.2
router ospf 1
    redistribute static subnets
    redistribute connected subnets
```

Overenie

show ip route

Kontrola DR prostredníctvom “ip ospf priority”

Popis

Smerovač R4 sme manuálne nastavili ako DR.

Konfigurácia

```
int f0/1
    ip ospf priority 100
```

Overenie

Kontrola OSPF databáz a smerovacích tabuliek

Popis

Konfigurácia

Overenie

Kontrola konektivity

Popis

Konektivitu sme testovali pomocou tclsh skriptu.

Konfigurácia

Overenie

Area 2 – R3 primárny smerovač, R4 sekundárny smerovač so sumarizovanými internými smerovacími záznamami do jedného sumarizačného

Popis

Smerovač R3 sme nastavili ako primárneho a R4 ako sekundárny smerovač.

Konfigurácia

```
int f0/0
    bandwidth 1
```

Tým, že znížime bandwidth na tomto rozhraní, zvýšime jeho ”Cost”. Zmena sa potom ohlási všetkým smerovačom v sieti. Následkom toho bude rozhranie f0/1 na R3 preferované pre ďalšie smerovanie.

Overenie

show ip ospf interface f0/1

Skrátenie hello a dead-interval časovačov, zistenie funkčnosti vytrhnutím jednej z liniek smerom ku L2 prepínaču

Popis

Smerovačom R2, R3 a R4 sme znížili “hello” a “dead” intervaly na rozhraniach pripojených k prepínaču.

Konfigurácia

Overenie

show ip ospf interface f0/1