

Lokalne sieci komputerowe

Sprawozdanie z laboratorium

Data	Tytuł zajęć	Uczestnicy
07.04.2021 9:15	Dostrojenie i rozwiązywanie problemów OSPF jednoobszarowego	Bartosz Rodziewicz (226105)

Podstawowa konfiguracja protokołu OSPFv2 w sieci z pojedynczym obszarem

Tabela routingu

<pre>R1-226105#show ip route Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is not set 1.0.0.0/32 is subnetted, 1 subnets 1.1.1.1/32 is directly connected, Loopback0 C 192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.1.0/24 is directly connected, GigabitEthernet0/0 L 192.168.1.1/32 is directly connected, GigabitEthernet0/0 O 192.168.2.0/24 [110/782] via 192.168.12.2, 00:00:58, Serial0/0/0 O 192.168.3.0/24 [110/1563] via 192.168.12.2, 00:00:58, Serial0/0/0 192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.12.0/30 is directly connected, Serial0/0/0 L 192.168.12.1/32 is directly connected, Serial0/0/0 O 192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.13.0/30 is directly connected, Serial0/0/1 L 192.168.13.1/32 is directly connected, Serial0/0/1 O 192.168.23.0/24 is directly connected, Serial0/0/1 L 192.168.23.0/30 [110/1562] via 192.168.12.2, 00:00:04, Serial0/0/0 R1-226105# R2-226105#</pre>	<pre>R2-226105# show ip route Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is not set 2.0.0.0/32 is subnetted, 1 subnets 2.2.2.2/32 is directly connected, Loopback0 C 192.168.1.0/24 [110/782] via 192.168.12.1, 00:01:41, Serial0/0/0 O 192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.2.0/24 is directly connected, GigabitEthernet0/0 L 192.168.2.1/32 is directly connected, GigabitEthernet0/0 O 192.168.3.0/24 [110/782] via 192.168.23.2, 00:01:31, Serial0/0/1 192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.12.0/30 is directly connected, Serial0/0/0 L 192.168.12.2/32 is directly connected, Serial0/0/0 O 192.168.13.0/30 is subnetted, 1 subnets C 192.168.13.0/30 [110/2346] via 192.168.12.1, 00:06:37, Serial0/0/0 O 192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.23.0/30 is directly connected, Serial0/0/1 L 192.168.23.1/32 is directly connected, Serial0/0/1 R2-226105# R3-226105#</pre>	<pre>R3-226105# show ip route Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is not set 3.0.0.0/32 is subnetted, 1 subnets 3.3.3.3/32 is directly connected, Loopback0 C 192.168.1.0/24 [110/782] via 192.168.13.1, 00:01:59, Serial0/0/0 O 192.168.2.0/24 [110/782] via 192.168.23.1, 00:01:49, Serial0/0/1 O 192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.3.0/24 is directly connected, GigabitEthernet0/0 L 192.168.3.1/32 is directly connected, GigabitEthernet0/0 O 192.168.12.0/30 is subnetted, 1 subnets C 192.168.12.0/30 [110/1562] via 192.168.23.1, 00:07:56, Serial0/0/1 L 192.168.12.1/32 is directly connected, Serial0/0/0 O 192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.13.0/30 is directly connected, Serial0/0/0 L 192.168.13.2/32 is directly connected, Serial0/0/0 O 192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.23.0/30 is directly connected, Serial0/0/1 L 192.168.23.2/32 is directly connected, Serial0/0/1 R3-226105# R3-226105#</pre>
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Do przemyślenia

- Dlaczego ważna jest kontrola nad przydziałem ID routera przy używaniu protokołu OSPF?
Router ID decyduje o wyborze DR i BDR w sieci. Jeśli router ID jest powiązany z interfejsem może on ulec zmianie, gdy dany interfejs zostanie wyłączony i zmienić aktywny DR/BDR.
- Dlaczego proces elekcji DR/BDR nie był istotny w tym ćwiczeniu?
Proces elekcji DR/BDR ma znaczenie tylko w sieciach wielodostępowych. Wykorzystywane w tym ćwiczeniu połączenia szeregowe są połączeniami point-to-point, stąd DR/BDR nie ma znaczenia.
- Dlaczego ważne jest ustawianie pasywnych interfejsów OSPF?
Zapobiega zbędnemu ruchowi w sieci powodowanemu informacjami OSPF na interfejsach, które ich nie potrzebują.

Konfiguracja OSPFv2 w sieci wielodostępowej

Tabela routingu

<pre>R1-226105#show ip route Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is not set 192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.1.0/24 is directly connected, GigabitEthernet0/1 L 192.168.1.1/32 is directly connected, GigabitEthernet0/1 O 192.168.31.0/32 is subnetted, 1 subnets C 192.168.31.11/32 is directly connected, Loopback0 R1-226105#show ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 192.168.31.33 100 FULL/DROTHER 00:00:38 192.168.1.3 GigabitEthernet0/1 192.168.31.22 100 FULL/BDR 00:00:33 192.168.1.2 GigabitEthernet0/1 R1-226105#</pre>	<pre>R2-226105#show ip route Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is not set 192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.1.0/24 is directly connected, GigabitEthernet0/0 L 192.168.1.2/32 is directly connected, GigabitEthernet0/0 O 192.168.31.0/32 is subnetted, 1 subnets C 192.168.31.32/32 is directly connected, Loopback0 R2-226105#show ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 192.168.31.33 100 FULL/DROTHER 00:00:31 192.168.1.3 GigabitEthernet0/0 192.168.31.11 255 FULL/DR 00:00:37 192.168.1.1 GigabitEthernet0/0 R2-226105#</pre>	<pre>R3-226105#show ip route Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is not set 192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.1.0/24 is directly connected, GigabitEthernet0/1 L 192.168.1.3/32 is directly connected, GigabitEthernet0/1 O 192.168.31.0/32 is subnetted, 1 subnets C 192.168.31.33/32 is directly connected, Loopback0 R3-226105#show ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 192.168.31.22 100 FULL/BDR 00:00:30 192.168.1.2 GigabitEthernet0/1 192.168.31.11 255 FULL/DR 00:00:38 192.168.1.1 GigabitEthernet0/1 R3-226105#</pre>
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Do przemyślenia

- Wypisz kryteria, od najważniejszego do najmniej ważnego, używane przy wyborze routera DR w sieci OSPF.
 - najwyższy priorytet interfejsu,
 - najwyższy sprecyzowany router ID,
 - najwyższy adres IP interfejsów (gdy router ID nie jest sprecyzowany, jest on ustawiany na podstawie adresów IP przypisanych do interfejsów routera).
- Jakie jest znaczenie priorytetu interfejsu równego 255?
Najwyższa możliwa wartość priorytetu.

Konfiguracja zaawansowanych właściwości protokołu OSPFv2

Tabela routingu

<pre>R1-226108#show ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 2.2.2.2 0 FULL/- 00:00:39 192.168.12.2 Serial0/0/0 3.3.3.3 0 FULL/- 00:00:38 192.168.13.2 Serial0/0/1 R1-226108#show ip route Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - BGP I - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is 192.168.12.2 to network 0.0.0.0 O 192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.1.0/24 is directly connected, GigabitEthernet0/0 L 192.168.1.1/32 is directly connected, GigabitEthernet0/0 O 192.168.3.0/24 [110/1304] via 192.168.12.2, 00:02:09, Serial0/0/0 O 192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.12.0/30 is directly connected, Serial0/0/0 C 192.168.12.1/32 is directly connected, Serial0/0/0 L 192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.13.0/30 is directly connected, Serial0/0/1 L 192.168.13.1/32 is directly connected, Serial0/0/1 O 192.168.23.0/30 is subnetted, 1 subnets O 192.168.23.0/30 [110/1294] via 192.168.12.2, 00:06:48, Serial0/0/0 O*EZ 0.0.0.0/0 [110/1] via 192.168.12.2, 00:06:48, Serial0/0/0 R1-226108#</pre>	<pre>R2-226108#show ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 1.1.1.1 0 FULL/- 00:00:30 192.168.12.1 Serial0/0/0 3.3.3.3 0 FULL/- 00:00:36 192.168.13.2 Serial0/0/1 R2-226108#show ip route Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - BGP I - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is 0.0.0.0 to network 0.0.0.0 O 192.168.1.0/24 [110/687] via 192.168.12.1, 00:06:44, Serial0/0/0 O 192.168.3.0/24 [110/687] via 192.168.13.2, 00:02:06, Serial0/0/1 O 192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.12.0/30 is directly connected, Serial0/0/0 C 192.168.12.1/32 is directly connected, Serial0/0/0 O 192.168.13.0/30 is subnetted, 1 subnets O 192.168.13.0/30 [110/1647] via 192.168.12.1, 00:06:44, Serial0/0/0 C 192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.23.0/30 is directly connected, Serial0/0/1 L 192.168.23.1/32 is directly connected, Serial0/0/1 O 209.168.200.0/24 is variably subnetted, 2 subnets, 2 masks C 209.168.200.224/30 is directly connected, Loopback0 L 209.168.200.228/32 is directly connected, Loopback0 S* 0.0.0.0/0 is directly connected, Loopback0 R2-226108#</pre>	<pre>R3-226108#show ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 2.2.2.2 0 FULL/- 00:00:37 192.168.13.1 Serial0/0/1 1.1.1.1 0 FULL/- 00:00:37 192.168.13.1 Serial0/0/0 R3-226108#show ip route Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - BGP I - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is 192.168.23.1 to network 0.0.0.0 O 192.168.1.0/24 [110/687] via 192.168.13.1, 00:02:53, Serial0/0/0 O 192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.3.0/24 is directly connected, GigabitEthernet0/0 L 192.168.3.1/32 is directly connected, GigabitEthernet0/0 O 192.168.12.0/30 is subnetted, 1 subnets O 192.168.12.0/30 [110/1294] via 192.168.13.1, 00:01:50, Serial0/0/0 C 192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.13.0/30 is directly connected, Serial0/0/0 L 192.168.13.2/32 is directly connected, Serial0/0/0 O 192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.23.0/30 is directly connected, Serial0/0/1 L 192.168.23.1/32 is directly connected, Serial0/0/1 O*EZ 0.0.0.0/0 [110/1] via 192.168.23.1, 00:01:50, Serial0/0/1 R3-226108#</pre>
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Do przemyślenia

- Jaka jest najprostsza i preferowana metoda manipulowania kosztem trasy OSPF.
Komenda `ip ospf cost`, która pozwala całkowicie manualnie podać kosztą danej trasy.
- Co spowoduje użycie polecenia `default-information originate` w sieci, w której uruchomiony został protokół OSPF?
Powoduje, że OSPF staje się świadom domyślnej trasy i propaguje ją do innych routerów.
- Dlaczego dobrym pomysłem jest używanie uwierzytelnienia OSPF?
Aby zapobiec wprowadzeniu do sieci niepoprawnych lub celowo fałszywych danych routingu, które mogłyby zmienić działanie routingu sieci np przekierowując ruch do podstawionego przez atakującego routera.