Übungsprotokoll – NWT2 – Übung 03

Konfiguration der Endsysteme

In der folgenden Übung haben wir die PCs 4.1 und 4.2 benutzt, somit sind die Netze 4.x verwendet worden. Die IP-Konfiguration wird folgendermaßen vergeben: Klick auf „Network" in der Taskleiste -> „Network & Internet Settings" -> „Change adapter options" -> gewünschtes Netzwerk Interface auswählen, in diesem Fall Ethernet 2 -> „Properties" -> Doppelklick auf „Internet Protocol Version 4" bzw. „Internet Protocol Version 6". In den geöffneten Fenstern können wir nun jeweils die IP-Adresse, Subnetzmakse/Präfix und das Gateway eingeben. Nach der Abschluss der Konfiguration überprüfen wir diese in der "cmd.exe" mittels dem Befehl "ipconfig /all".

PC41 – IP-Konfiguration

```
Ethernet adapter Ethernet 2:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Realtek PCIe GBE Family Controller
   Physical Address. . . . . . . . . : 00-0A-CD-26-D8-EF
   DHCP Enabled. . . . . . . . . . . : No
   Autoconfiguration Enabled . . . . : Yes
   IPv6 Address. . . . . . . . . . . : 2a0c:2343:0:112::2(Preferred)
   IPv6 Address. . . . . . . . . . . : 2a0c:2343:0:112:8589:bfef:6600:d5f3(Preferred)
   Temporary IPv6 Address. . . . . . : 2a0c:2343:0:112:6591:9a02:ff3d:9f8d(Preferred)
   Link-local IPv6 Address . . . . . : fe80::8589:bfef:6600:d5f3%12(Preferred)
   IPv4 Address. . . . . . . . . . . : 185.252.73.114(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.252
   Default Gateway . . . . . . . . . : 2a0c:2343:0:112::1
                                       fe80::2f6:63ff:fe7d:1901%12
                                       185.252.73.113
   DNS Servers . . . . . . . . . . . : fec0:0:0:ffff::1%1
                                       fec0:0:0:ffff::2%1
                                       fec0:0:0:ffff::3%1
   NetBIOS over Tcpip. . . . . . . . : Enabled

C:\Users\admin_SIN>
```

PC42 – IP-Konfiguration

```
Ethernet adapter Ethernet 2:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Realtek PCIe GBE Family Controller
   Physical Address. . . . . . . . . : 00-0A-CD-26-D8-F6
   DHCP Enabled. . . . . . . . . . . : No
   Autoconfiguration Enabled . . . . : Yes
   IPv6 Address. . . . . . . . . . . : 2a0c:2343:0:116::2(Preferred)
   IPv6 Address. . . . . . . . . . . : 2a0c:2343:0:116:a158:e20:a89f:498f(Preferred)
   Temporary IPv6 Address. . . . . . : 2a0c:2343:0:116:14f:2d2c:8083:d75b(Preferred)
   Link-local IPv6 Address . . . . . : fe80::a158:e20:a89f:498f%12(Preferred)
   IPv4 Address. . . . . . . . . . . : 185.252.73.118(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.252
   Default Gateway . . . . . . . . . : 2a0c:2343:0:116::1
                                       fe80::faa7:3aff:fe1f:7921%12
                                       185.252.73.117
   DNS Servers . . . . . . . . . . . : fec0:0:0:ffff::1%1
                                       fec0:0:0:ffff::2%1
                                       fec0:0:0:ffff::3%1
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

Konfiguration der Interfaces der Gruppenrouter

Für die Konfiguration der Gruppenrouter wurden die entsprechenden Teile aus den Runnings Configs der vorigen Übung eingespielt.

Testen der Verbindungen zwischen benachbarten Geräten

Bei den folgenden Ping-Screenshots sind jeweils IPv4-Pings und IPv6-Pings enthalten.
Aufgrund dessen, dass der Ping-Befehl nur bei einer erfolgreichen bidirektionalen Kommunikation erfolgreich ist, werden im Folgenden auch nur „einseitige" Ping-Screenshots angefügt. Also z.B. nur von PC41 -> GR41 und nicht zusätzlich von GR41 -> PC41.

PC41 -> GR41

```
C:\Users\admin_SIN>ping 185.252.73.113

Pinging 185.252.73.113 with 32 bytes of data:
Reply from 185.252.73.113: bytes=32 time<1ms TTL=255
Reply from 185.252.73.113: bytes=32 time<1ms TTL=255
Reply from 185.252.73.113: bytes=32 time<1ms TTL=255
Reply from 185.252.73.113: bytes=32 time<1ms TTL=255

Ping statistics for 185.252.73.113:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>ping 2a0c:2343:0:112::1

Pinging 2a0c:2343:0:112::1 with 32 bytes of data:
Reply from 2a0c:2343:0:112::1: time<1ms
Reply from 2a0c:2343:0:112::1: time<1ms
Reply from 2a0c:2343:0:112::1: time<1ms
Reply from 2a0c:2343:0:112::1: time<1ms

Ping statistics for 2a0c:2343:0:112::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>
```

PC42 -> GR42

```
C:\Users\admin_SIN>ping 185.252.73.117

Pinging 185.252.73.117 with 32 bytes of data:
Reply from 185.252.73.117: bytes=32 time<1ms TTL=255
Reply from 185.252.73.117: bytes=32 time<1ms TTL=255
Reply from 185.252.73.117: bytes=32 time<1ms TTL=255
Reply from 185.252.73.117: bytes=32 time<1ms TTL=255

Ping statistics for 185.252.73.117:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>ping 2a0c:2343:0:116::1

Pinging 2a0c:2343:0:116::1 with 32 bytes of data:
Reply from 2a0c:2343:0:116::1: time<1ms
Reply from 2a0c:2343:0:116::1: time<1ms
Reply from 2a0c:2343:0:116::1: time<1ms
Reply from 2a0c:2343:0:116::1: time<1ms

Ping statistics for 2a0c:2343:0:116::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>
```

GR40 -> GR41

```
GR40#ping 185.252.73.122
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 185.252.73.122, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
GR40#ping 2a0c:2343:0:120::2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2A0C:2343:0:120::2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
GR40#
```

GR40 -> GR42

```
GR40#ping 185.252.73.126
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 185.252.73.126, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
GR40#ping 2a0c:2343:0:124::2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2A0C:2343:0:124::2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
GR40#
```

Konfiguration statischer Routen auf den Gruppenroutern

Vorgehensweise zur Konfiguration der statischen Routen:

Um eine statische Route anzulegen, muss mittels „enable" erstmal in den privilegierten EXEC-Modus gewechselt werden. Daraufhin mittels „configure terminal" in den globalen Konfigurationsmodus. Nun kann mittels „ip route …" (für IPv4) und „ipv6 route …" (für IPv6) eine statische Route eingetragen werden. Die Syntax ist dabei folgende: „Zielnetzadresse Subnetzmaske/Präfix Next-Hop". Nun wird für jedes Netzwerk eine Route eingetragen. Für zusammengehörende Netze (also x.1, x.2, x.3 und x.4) werden bei IPv4 Summary Routen verwendet. Für IPv6 wird für jedes Netz eine statische Route eingetragen.

Frage 1: Welche Routen sind schon vor der Routing Konfiguration vorhanden?
Antwort 1: Die "direkten Routen" sind bereits in der Routing Konfiguration vorhanden. Also eine Route in ein direkt angeschlossenes Netzwerk, d.h. das Netzwerk ist über ein Netzwerk Interface am System direkt angeschlossen.

Frage 2: Warum bzw. in welchen Fällen kann es problematisch sein, wenn nur das Interface bekannt gegeben wird?
Antwort 2: Es gibt folgende drei Probleme:
1. Wenn ein Router in seinem "ARP-Cache" noch keinen Eintrag für den nächsten "IP-Hop" hat, so muss ein "ARP-Request" durchgeführt werden. Dies kann zu Verzögerungen führen.
2. Wenn die IP oder MAC Adresse des nächsten Routers sich verändert, so entstehen veraltete und inkorrekte Einträge im "ARP-Cache". Dies kann zu verworfenen oder falsch weitergeleiteten Packeten führen.
3. Wird routing über einen ARP-Cache vollzogen, so kann es zu "ARP-Spoofing"-Attacken kommen, welche Netzwerkkommunikation an andere Ziele umleiten kann.

Frage 3: Warum reichen hier die Default Routen aus?
Antwort 3: Weil GR41 & GR42 nur mit **einem** weiterführenden **Router** verbunden sind. Also müssen diese beiden Router im klassischen Sinne keine komplexen Routing-Entscheidungen treffen, sondern lediglich die IP-Pakete an GR40 forwarden. Aus diesem Grund ist hier eine Default-Route ausreichend.

Frage 4: Warum ist bei dem gegebenen Adressschema die Verwendung von Summary Routen bei IPv6 nicht sinnvoll?
Antwort 4: Die Routenzusammenfassung kann für IPv6-Netzwerke nachteilig sein, da sie zu suboptimalen Pfaden, zum Verlust von Routeninformationen und zur Bildung von Routing-Schleifen führen kann. Suboptimale Pfade können länger oder teurer sein als optimale Pfade, während verlorene Routeninformationen granularere Routing-Richtlinien oder Filterung auf der Grundlage bestimmter Präfixe oder Attribute verhindern können. Routing-Schleifen können dazu führen, dass Pakete im Kreis weitergeleitet werden und ihr Ziel nie erreichen.
(Quelle: https://www.linkedin.com/advice/0/how-do-you-optimize-route-summarization-ipv6)

Frage 5: Warum können Unterschiede zwischen den konfigurierten Routen (in der Running Config) und den Einträgen in den Routing Tabellen entstehen?
Antwort 5: In der Running-Config sind nur die statisch konfigurierten Routen enthalten. In der Routing-Tabelle sind auch die direkten Routen (directly connected) enthalten.

Dokumentation des Routings

PC41 -> PC42

```
C:\Users\admin_SIN>ping 185.252.73.118

Pinging 185.252.73.118 with 32 bytes of data:
Reply from 185.252.73.118: bytes=32 time<1ms TTL=125
Reply from 185.252.73.118: bytes=32 time<1ms TTL=125
Reply from 185.252.73.118: bytes=32 time<1ms TTL=125
Reply from 185.252.73.118: bytes=32 time<1ms TTL=125

Ping statistics for 185.252.73.118:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>ping 2a0c:2343:0:116::2

Pinging 2a0c:2343:0:116::2 with 32 bytes of data:
Reply from 2a0c:2343:0:116::2: time<1ms
Reply from 2a0c:2343:0:116::2: time<1ms
Reply from 2a0c:2343:0:116::2: time<1ms
Reply from 2a0c:2343:0:116::2: time<1ms

Ping statistics for 2a0c:2343:0:116::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>
```

PC42 -> PC41

```
C:\Users\admin_SIN>ping 185.252.73.114

Pinging 185.252.73.114 with 32 bytes of data:
Reply from 185.252.73.114: bytes=32 time<1ms TTL=125
Reply from 185.252.73.114: bytes=32 time<1ms TTL=125
Reply from 185.252.73.114: bytes=32 time<1ms TTL=125
Reply from 185.252.73.114: bytes=32 time<1ms TTL=125

Ping statistics for 185.252.73.114:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>ping 2a0c:2343:0:112::2

Pinging 2a0c:2343:0:112::2 with 32 bytes of data:
Reply from 2a0c:2343:0:112::2: time<1ms
Reply from 2a0c:2343:0:112::2: time<1ms
Reply from 2a0c:2343:0:112::2: time<1ms
Reply from 2a0c:2343:0:112::2: time<1ms

Ping statistics for 2a0c:2343:0:112::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>
```

PC41 -> PC0

```
C:\Users\admin_SIN>ping 185.252.73.17

Pinging 185.252.73.17 with 32 bytes of data:
Reply from 185.252.73.17: bytes=32 time<1ms TTL=125
Reply from 185.252.73.17: bytes=32 time<1ms TTL=125
Reply from 185.252.73.17: bytes=32 time<1ms TTL=125
Reply from 185.252.73.17: bytes=32 time<1ms TTL=125

Ping statistics for 185.252.73.17:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>ping 2a0c:2343:0:16::1

Pinging 2a0c:2343:0:16::1 with 32 bytes of data:
Reply from 2a0c:2343:0:16::1: time<1ms
Reply from 2a0c:2343:0:16::1: time<1ms
Reply from 2a0c:2343:0:16::1: time<1ms
Reply from 2a0c:2343:0:16::1: time<1ms

Ping statistics for 2a0c:2343:0:16::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>
```

PC42 -> PC0

```
C:\Users\admin_SIN>ping 185.252.73.17

Pinging 185.252.73.17 with 32 bytes of data:
Reply from 185.252.73.17: bytes=32 time<1ms TTL=125
Reply from 185.252.73.17: bytes=32 time<1ms TTL=125
Reply from 185.252.73.17: bytes=32 time<1ms TTL=125
Reply from 185.252.73.17: bytes=32 time<1ms TTL=125

Ping statistics for 185.252.73.17:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\admin_SIN>ping 2a0c:2343:0:16::1

Pinging 2a0c:2343:0:16::1 with 32 bytes of data:
Reply from 2a0c:2343:0:16::1: time<1ms
Reply from 2a0c:2343:0:16::1: time<1ms
Reply from 2a0c:2343:0:16::1: time<1ms
Reply from 2a0c:2343:0:16::1: time<1ms

Ping statistics for 2a0c:2343:0:16::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Users\admin_SIN>
```

PC41 -> PC81

```
C:\Users\admin_SIN>ping 185.252.73.178

Pinging 185.252.73.178 with 32 bytes of data:
Reply from 185.252.73.178: bytes=32 time=1ms TTL=124
Reply from 185.252.73.178: bytes=32 time=1ms TTL=124
Reply from 185.252.73.178: bytes=32 time=1ms TTL=124
Reply from 185.252.73.178: bytes=32 time=1ms TTL=124

Ping statistics for 185.252.73.178:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\Users\admin_SIN>ping 2a0c:2343:0:176::2

Pinging 2a0c:2343:0:176::2 with 32 bytes of data:
Reply from 2a0c:2343:0:176::2: time=1ms
Reply from 2a0c:2343:0:176::2: time=1ms
Reply from 2a0c:2343:0:176::2: time=1ms
Reply from 2a0c:2343:0:176::2: time=1ms

Ping statistics for 2a0c:2343:0:176::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\Users\admin_SIN>
```

PC41 -> PC82

```
C:\Users\admin_SIN>ping 185.252.73.182

Pinging 185.252.73.182 with 32 bytes of data:
Reply from 185.252.73.182: bytes=32 time=1ms TTL=124
Reply from 185.252.73.182: bytes=32 time=1ms TTL=124
Reply from 185.252.73.182: bytes=32 time=2ms TTL=124
Reply from 185.252.73.182: bytes=32 time=2ms TTL=124

Ping statistics for 185.252.73.182:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\Users\admin_SIN>ping 2a0c:2343:0:180::2

Pinging 2a0c:2343:0:180::2 with 32 bytes of data:
Reply from 2a0c:2343:0:180::2: time=1ms
Reply from 2a0c:2343:0:180::2: time=2ms
Reply from 2a0c:2343:0:180::2: time=2ms
Reply from 2a0c:2343:0:180::2: time=2ms

Ping statistics for 2a0c:2343:0:180::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\Users\admin_SIN>
```

PC42 -> PC81

```
C:\Users\admin_SIN>ping 185.252.73.178

Pinging 185.252.73.178 with 32 bytes of data:
Reply from 185.252.73.178: bytes=32 time=1ms TTL=124
Reply from 185.252.73.178: bytes=32 time<1ms TTL=124
Reply from 185.252.73.178: bytes=32 time=1ms TTL=124
Reply from 185.252.73.178: bytes=32 time=1ms TTL=124

Ping statistics for 185.252.73.178:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Users\admin_SIN>ping 2a0c:2343:0:176::2

Pinging 2a0c:2343:0:176::2 with 32 bytes of data:
Reply from 2a0c:2343:0:176::2: time=1ms
Reply from 2a0c:2343:0:176::2: time=1ms
Reply from 2a0c:2343:0:176::2: time=1ms
Reply from 2a0c:2343:0:176::2: time=1ms

Ping statistics for 2a0c:2343:0:176::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\Users\admin_SIN>
```

PC42 -> PC82

```
C:\Users\admin_SIN>ping 185.252.73.182

Pinging 185.252.73.182 with 32 bytes of data:
Reply from 185.252.73.182: bytes=32 time=2ms TTL=124
Reply from 185.252.73.182: bytes=32 time=1ms TTL=124
Reply from 185.252.73.182: bytes=32 time=1ms TTL=124
Reply from 185.252.73.182: bytes=32 time=1ms TTL=124

Ping statistics for 185.252.73.182:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\Users\admin_SIN>ping 2a0c:2343:0:180::2

Pinging 2a0c:2343:0:180::2 with 32 bytes of data:
Reply from 2a0c:2343:0:180::2: time=2ms
Reply from 2a0c:2343:0:180::2: time=1ms
Reply from 2a0c:2343:0:180::2: time=1ms
Reply from 2a0c:2343:0:180::2: time=1ms

Ping statistics for 2a0c:2343:0:180::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\Users\admin_SIN>
```

Die Tests sind alle erfolgreich verlaufen. Somit sind die getesteten Geräte alle untereinander erreichbar.

Routing Tabellen der Gruppenrouter

GR40 – IPv4-Routingtabelle

```
GR40#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
       i - IS-IS, su - IS-IS summary, 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, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

      185.252.0.0/16 is variably subnetted, 18 subnets, 3 masks
C        185.252.73.0/28 is directly connected, GigabitEthernet0/0
L        185.252.73.4/32 is directly connected, GigabitEthernet0/0
S        185.252.73.16/28 [1/0] via 185.252.73.12
S        185.252.73.64/28 [1/0] via 185.252.73.1
S        185.252.73.80/28 [1/0] via 185.252.73.2
S        185.252.73.96/28 [1/0] via 185.252.73.3
S        185.252.73.112/30 [1/0] via 185.252.73.122
S        185.252.73.116/30 [1/0] via 185.252.73.126
C        185.252.73.120/30 is directly connected, GigabitEthernet0/1
L        185.252.73.121/32 is directly connected, GigabitEthernet0/1
C        185.252.73.124/30 is directly connected, GigabitEthernet0/2
L        185.252.73.125/32 is directly connected, GigabitEthernet0/2
S        185.252.73.128/28 [1/0] via 185.252.73.5
S        185.252.73.144/28 [1/0] via 185.252.73.6
S        185.252.73.160/28 [1/0] via 185.252.73.7
S        185.252.73.176/28 [1/0] via 185.252.73.8
S        185.252.73.192/28 [1/0] via 185.252.73.9
S        185.252.73.208/28 [1/0] via 185.252.73.10
GR40#
```

GR40 – IPv6-Routingtabelle (Sorry für die Formatierung)

```
GR40#show ipv6 route
IPv6 Routing Table - default - 55 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2
       IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       RL - RPL, O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1
       OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       a - Application
C   2A0C:2343::/64 [0/0]
     via GigabitEthernet0/0, directly connected
L   2A0C:2343::4/128 [0/0]
     via GigabitEthernet0/0, receive
S   2A0C:2343:0:16::/64 [1/0]
     via 2A0C:2343::12
S   2A0C:2343:0:64::/62 [1/0]
     via 2A0C:2343::1
S   2A0C:2343:0:64::/64 [1/0]
     via 2A0C:2343::1
S   2A0C:2343:0:68::/64 [1/0]
     via 2A0C:2343::1
S   2A0C:2343:0:72::/64 [1/0]
     via 2A0C:2343::1
S   2A0C:2343:0:76::/64 [1/0]
     via 2A0C:2343::1
S   2A0C:2343:0:80::/62 [1/0]
     via 2A0C:2343::2
S   2A0C:2343:0:80::/64 [1/0]
     via 2A0C:2343::2
S   2A0C:2343:0:84::/64 [1/0]
     via 2A0C:2343::2
S   2A0C:2343:0:88::/64 [1/0]
     via 2A0C:2343::2
S   2A0C:2343:0:92::/64 [1/0]
     via 2A0C:2343::2
S   2A0C:2343:0:94::/62 [1/0]
     via 2A0C:2343::3
S   2A0C:2343:0:96::/64 [1/0]
     via 2A0C:2343::3
S   2A0C:2343:0:100::/64 [1/0]
     via 2A0C:2343::3
S   2A0C:2343:0:104::/64 [1/0]
     via 2A0C:2343::3
S   2A0C:2343:0:108::/64 [1/0]
     via 2A0C:2343::3
S   2A0C:2343:0:112::/64 [1/0]
     via 2A0C:2343:0:120::2
S   2A0C:2343:0:116::/64 [1/0]
     via 2A0C:2343:0:124::2
C   2A0C:2343:0:120::/64 [0/0]
     via GigabitEthernet0/1, directly connected
L   2A0C:2343:0:120::1/128 [0/0]
     via GigabitEthernet0/1, receive
C   2A0C:2343:0:124::/64 [0/0]
     via GigabitEthernet0/2, directly connected
L   2A0C:2343:0:124::1/128 [0/0]
     via GigabitEthernet0/2, receive
S   2A0C:2343:0:128::/62 [1/0]
     via 2A0C:2343::5
S   2A0C:2343:0:128::/64 [1/0]
     via 2A0C:2343::5
S   2A0C:2343:0:132::/64 [1/0]
     via 2A0C:2343::5
S   2A0C:2343:0:136::/64 [1/0]
     via 2A0C:2343::5
S   2A0C:2343:0:140::/64 [1/0]
     via 2A0C:2343::5
S   2A0C:2343:0:144::/62 [1/0]
     via 2A0C:2343::6
S   2A0C:2343:0:144::/64 [1/0]
     via 2A0C:2343::6
     via 2A0C:2343::5
S   2A0C:2343:0:148::/64 [1/0]
     via 2A0C:2343::6
S   2A0C:2343:0:152::/64 [1/0]
```

```
     via 2A0C:2343::2
S   2A0C:2343:0:84::/64 [1/0]
     via 2A0C:2343::2
S   2A0C:2343:0:88::/64 [1/0]
     via 2A0C:2343::2
S   2A0C:2343:0:92::/64 [1/0]
     via 2A0C:2343::2
S   2A0C:2343:0:94::/62 [1/0]
     via 2A0C:2343::3
S   2A0C:2343:0:96::/64 [1/0]
     via 2A0C:2343::3
S   2A0C:2343:0:100::/64 [1/0]
     via 2A0C:2343::3
S   2A0C:2343:0:104::/64 [1/0]
     via 2A0C:2343::3
S   2A0C:2343:0:108::/64 [1/0]
     via 2A0C:2343::3
S   2A0C:2343:0:112::/64 [1/0]
     via 2A0C:2343:0:120::2
S   2A0C:2343:0:116::/64 [1/0]
     via 2A0C:2343:0:124::2
C   2A0C:2343:0:120::/64 [0/0]
     via GigabitEthernet0/1, directly connected
L   2A0C:2343:0:120::1/128 [0/0]
     via GigabitEthernet0/1, receive
C   2A0C:2343:0:124::/64 [0/0]
     via GigabitEthernet0/2, directly connected
L   2A0C:2343:0:124::1/128 [0/0]
     via GigabitEthernet0/2, receive
S   2A0C:2343:0:128::/62 [1/0]
     via 2A0C:2343::5
S   2A0C:2343:0:128::/64 [1/0]
     via 2A0C:2343::5
S   2A0C:2343:0:132::/64 [1/0]
     via 2A0C:2343::5
S   2A0C:2343:0:136::/64 [1/0]
     via 2A0C:2343::5
S   2A0C:2343:0:140::/64 [1/0]
     via 2A0C:2343::5
S   2A0C:2343:0:144::/62 [1/0]
     via 2A0C:2343::6
S   2A0C:2343:0:144::/64 [1/0]
     via 2A0C:2343::6
     via 2A0C:2343::5
S   2A0C:2343:0:148::/64 [1/0]
     via 2A0C:2343::6
S   2A0C:2343:0:152::/64 [1/0]
     via 2A0C:2343::6
S   2A0C:2343:0:156::/64 [1/0]
     via 2A0C:2343::6
S   2A0C:2343:0:160::/62 [1/0]
     via 2A0C:2343::7
S   2A0C:2343:0:160::/64 [1/0]
     via 2A0C:2343::7
S   2A0C:2343:0:164::/64 [1/0]
     via 2A0C:2343::7
S   2A0C:2343:0:168::/64 [1/0]
     via 2A0C:2343::7
S   2A0C:2343:0:172::/64 [1/0]
     via 2A0C:2343::7
S   2A0C:2343:0:174::/62 [1/0]
     via 2A0C:2343::8
S   2A0C:2343:0:176::/64 [1/0]
     via 2A0C:2343::8
S   2A0C:2343:0:180::/64 [1/0]
     via 2A0C:2343::8
S   2A0C:2343:0:184::/64 [1/0]
     via 2A0C:2343::8
S   2A0C:2343:0:188::/64 [1/0]
     via 2A0C:2343::8
S   2A0C:2343:0:190::/62 [1/0]
     via 2A0C:2343::9
S   2A0C:2343:0:192::/64 [1/0]
     via 2A0C:2343::9
S   2A0C:2343:0:196::/64 [1/0]
     via 2A0C:2343::9
S   2A0C:2343:0:200::/64 [1/0]
     via 2A0C:2343::9
S   2A0C:2343:0:204::/64 [1/0]
     via 2A0C:2343::9
S   2A0C:2343:0:208::/62 [1/0]
     via 2A0C:2343::10
S   2A0C:2343:0:208::/64 [1/0]
     via 2A0C:2343::10
S   2A0C:2343:0:212::/64 [1/0]
     via 2A0C:2343::10
S   2A0C:2343:0:216::/64 [1/0]
     via 2A0C:2343::10
S   2A0C:2343:0:220::/64 [1/0]
     via 2A0C:2343::10
L   FF00::/8 [0/0]
     via Null0, receive
GR40#
```

GR41 – IPv4-Routingtabelle

```
GR41#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
       i - IS-IS, su - IS-IS summary, 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, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is 185.252.73.121 to network 0.0.0.0

S*    0.0.0.0/0 [1/0] via 185.252.73.121
      185.252.0.0/16 is variably subnetted, 4 subnets, 2 masks
C        185.252.73.112/30 is directly connected, GigabitEthernet0/1
L        185.252.73.113/32 is directly connected, GigabitEthernet0/1
C        185.252.73.120/30 is directly connected, GigabitEthernet0/0
L        185.252.73.122/32 is directly connected, GigabitEthernet0/0
GR41#
```

GR41 – IPv6-Routingtabelle

```
GR41#show ipv6 route
IPv6 Routing Table - default - 6 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, RL - RPL, O - OSPF Intra, OI - OSPF Inter
       OE1 - OSPF ext 1, OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1
       ON2 - OSPF NSSA ext 2, a - Application
S    ::/0 [1/0]
     via 2A0C:2343:0:120::1
C    2A0C:2343:0:112::/64 [0/0]
     via GigabitEthernet0/1, directly connected
L    2A0C:2343:0:112::1/128 [0/0]
     via GigabitEthernet0/1, receive
C    2A0C:2343:0:120::/64 [0/0]
     via GigabitEthernet0/0, directly connected
L    2A0C:2343:0:120::2/128 [0/0]
     via GigabitEthernet0/0, receive
L    FF00::/8 [0/0]
     via Null0, receive
GR41#
```

GR42 – IPv4-Routingtabelle

```
GR42#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, m - OMP
       n - NAT, Ni - NAT inside, No - NAT outside, Nd - NAT DIA
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       H - NHRP, G - NHRP registered, g - NHRP registration summary
       o - ODR, P - periodic downloaded static route, l - LISP
       a - application route
       + - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is 185.252.73.125 to network 0.0.0.0

S*     0.0.0.0/0 [1/0] via 185.252.73.125
       185.252.0.0/16 is variably subnetted, 4 subnets, 2 masks
C         185.252.73.116/30 is directly connected, GigabitEthernet0/0/1
L         185.252.73.117/32 is directly connected, GigabitEthernet0/0/1
C         185.252.73.124/30 is directly connected, GigabitEthernet0/0/0
L         185.252.73.126/32 is directly connected, GigabitEthernet0/0/0
GR42#
```

GR42 – IPv6-Routingtabelle

```
GR42#show ipv6 route
IPv6 Routing Table - default - 6 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, RL - RPL, O - OSPF Intra, OI - OSPF Inter
       OE1 - OSPF ext 1, OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1
       ON2 - OSPF NSSA ext 2, a - Application, m - OMP
S    ::/0 [1/0]
      via 2A0C:2343:0:124::1
C    2A0C:2343:0:116::/64 [0/0]
      via GigabitEthernet0/0/1, directly connected
L    2A0C:2343:0:116::1/128 [0/0]
      via GigabitEthernet0/0/1, receive
C    2A0C:2343:0:124::/64 [0/0]
      via GigabitEthernet0/0/0, directly connected
L    2A0C:2343:0:124::2/128 [0/0]
      via GigabitEthernet0/0/0, receive
L    FF00::/8 [0/0]
      via Null0, receive
GR42#
```