

L4-L7 routeconferencing met transportfabric - configuratie van doorvoersnelheid

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Inleiding

In dit document wordt de doorslag van de configuratie van L4-L7 Service Graph met Route Peering beschreven, waarbij zowel de consument als de leverancier extern zijn van de Application Centric Infrastructure (ACI)-stof.

Bijgedragen door Zahid Hassan, Cisco Advanced Services Engineer.

Voorwaarden

Vereisten

Cisco raadt kennis van de volgende onderwerpen aan:

- Statische VLAN-pools die voor de insluiting van VLAN tussen de externe apparaten en de ACI-stof zullen worden gebruikt
- Externe fysieke en Routed Domein die de locatie (bladknooppunt/pad) van de externe apparaten en de VLAN-pool zal verbinden
- Layer 3 Connection naar een buitennetwerk (L3Out)

De vorige stappen van **Fabric Access** en **L3Out** configuraties worden niet in dit document behandeld en er is van uitgegaan dat deze al zijn voltooid.

Gebruikte componenten

De informatie in dit document is gebaseerd op deze softwareversies:

- Cisco Application Policy Infrastructure Controller (Cisco APIC) - 1.2(1)m
- Apparaatpakket voor adaptieve security applicatie (ASA) - 1.2.4.8
- ASA 5585 - 9.5(1)
- Nexus 3064 - 6,0(2)U3(7)

De informatie in dit document is gebaseerd op de apparaten in een specifieke laboratoriumomgeving. Alle apparaten die in dit document worden beschreven, hadden een opgeschoonde (standaard)configuratie. Als uw netwerk live is, moet u de potentiële impact van elke opdracht begrijpen.

Achtergrondinformatie

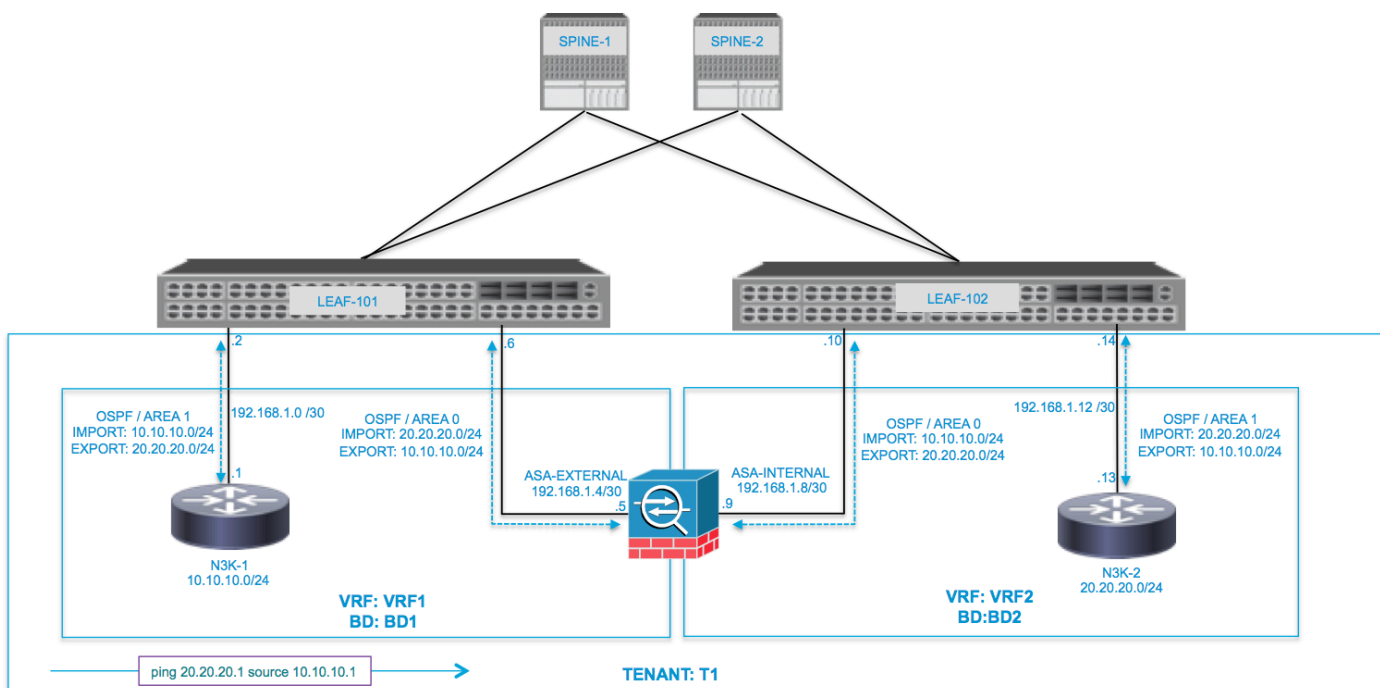
Routeswitch is een functie waarmee een servicetechnicus, zoals een laststabilisator of een firewall, de bereikbaarheid van het apparaat via de ACI-structuur naar een extern netwerk kan adverteren.

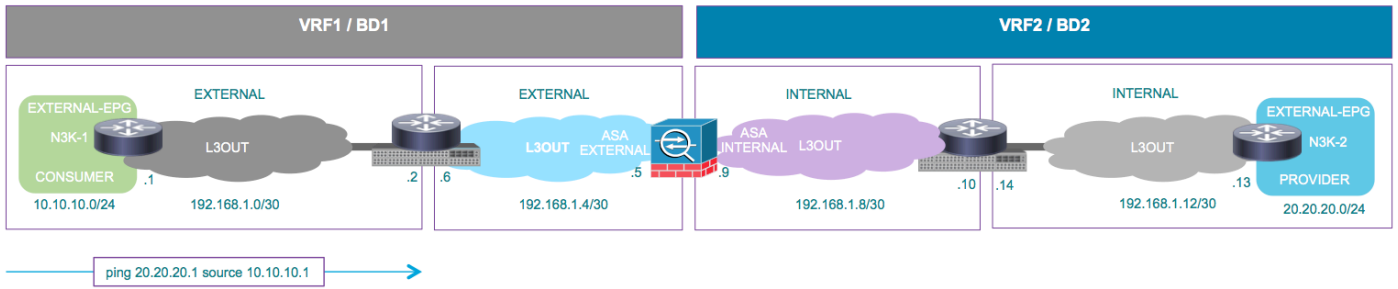
De hier gepresenteerde use case is een fysieke firewall die wordt ingezet als een servicelijnt met twee armen, in twee L3Outs- of externe End Point-groepen (EPG's). De servicesgrafiek is gekoppeld aan een contract tussen de externe EPG op Leaf 101 (N3K-1) en de externe EPG op Leaf 102 (N3K-2). De ACI-stof levert een doorvoerservice voor de routers (N3K-1 en N3K-2) en routeconferencing wordt gebruikt, met Open Shortest Path First (OSPF) als routingprotocol, voor het uitwisselen van routes tussen de firewall en de ACI-structuur.

Configureren

Netwerkdigram

De volgende afbeelding toont hoe het Peering-programma voor de route van begin tot eind werkt:



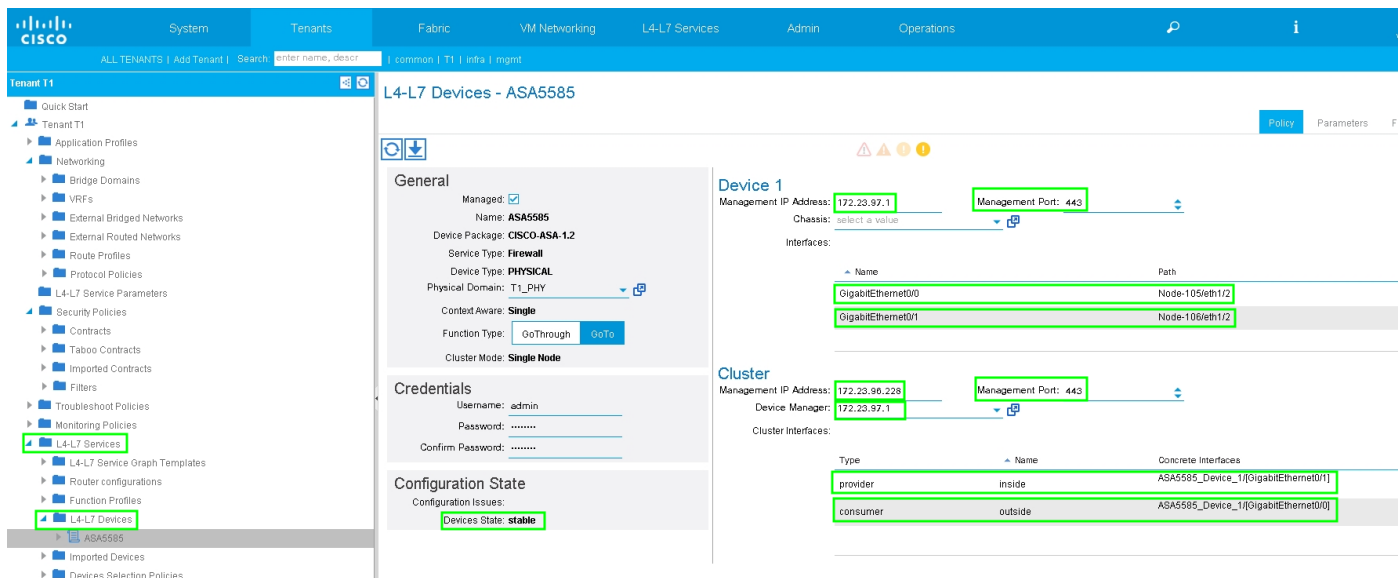


Configureren

Stap 1. Configuratie van de Virtual Routing en Forwarding1 (VRF1), VRF2, Bridge Domain1 (BD1) en BD2. Associeer BD1 aan VRF1 en BD2 aan VRF2, zoals in de afbeelding:

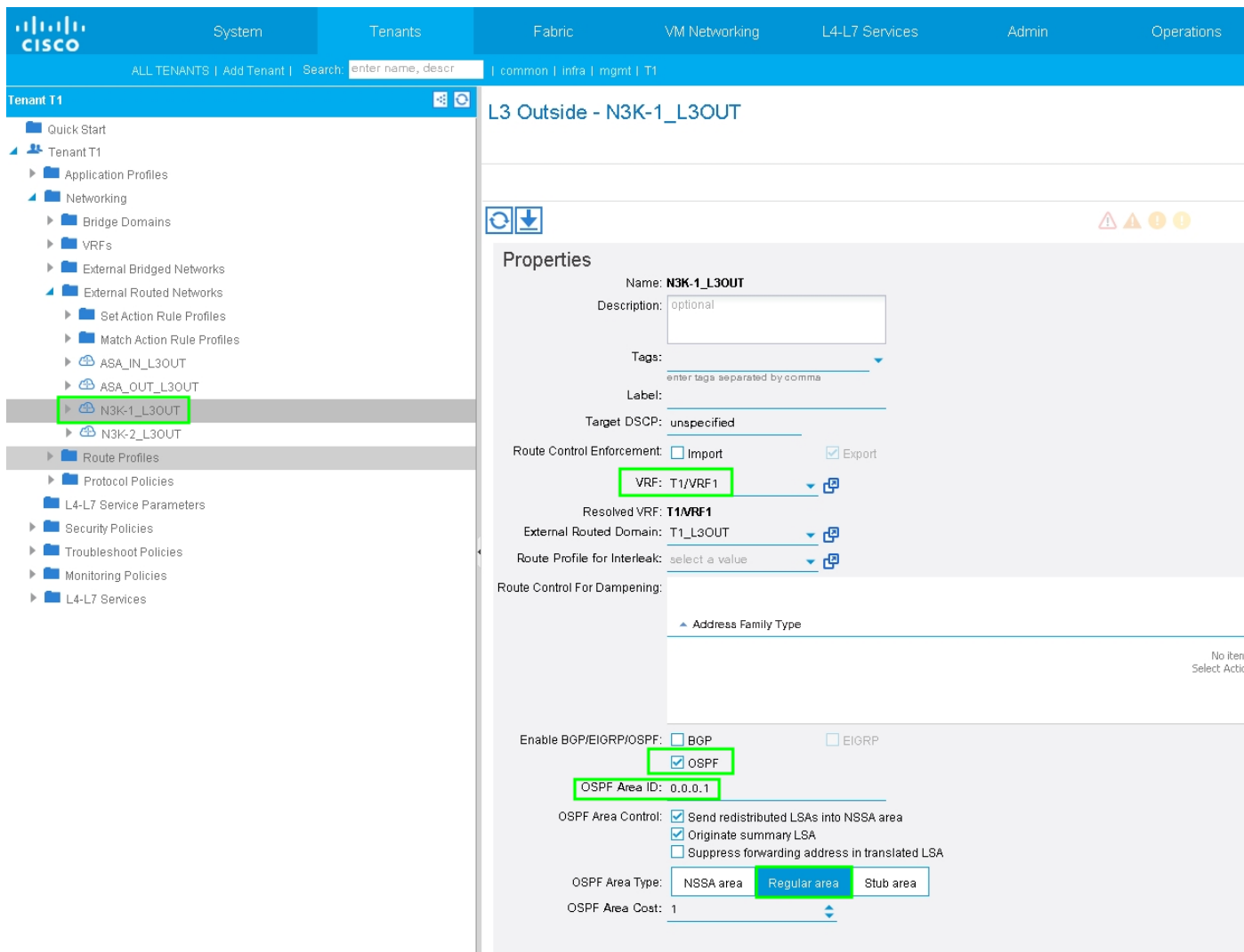
Stap 2. Upload het ASA-apparaatpakket onder L4-L7-apparaat, zoals in de afbeelding, :

Configureer L4-L7 apparaat voor fysieke ASA 5585 (Routed), zoals in de afbeelding:



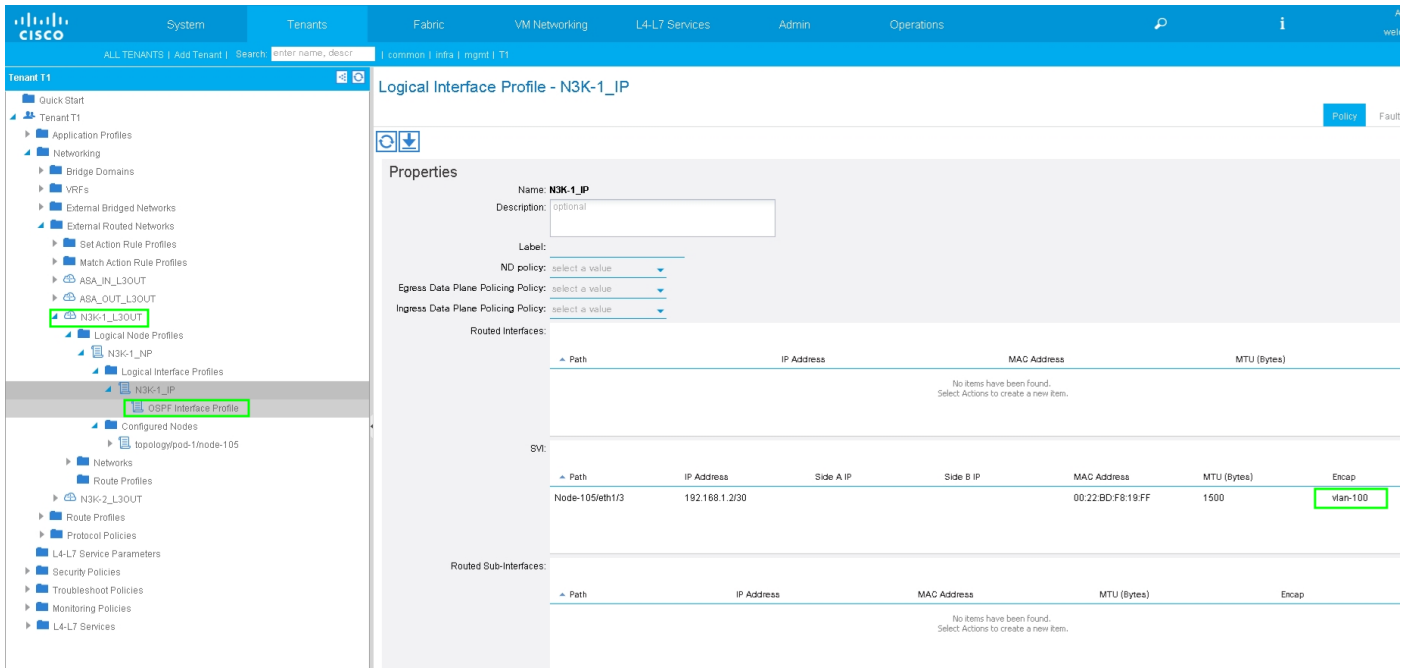
Stap 3. Configureer L3Out voor N3K-1 en associeer met BD1 en VRF1.

Extern routed Network wordt gebruikt om de routeconfiguratie in de ACI-structuur voor routeparing te specificeren, zoals in de afbeelding:

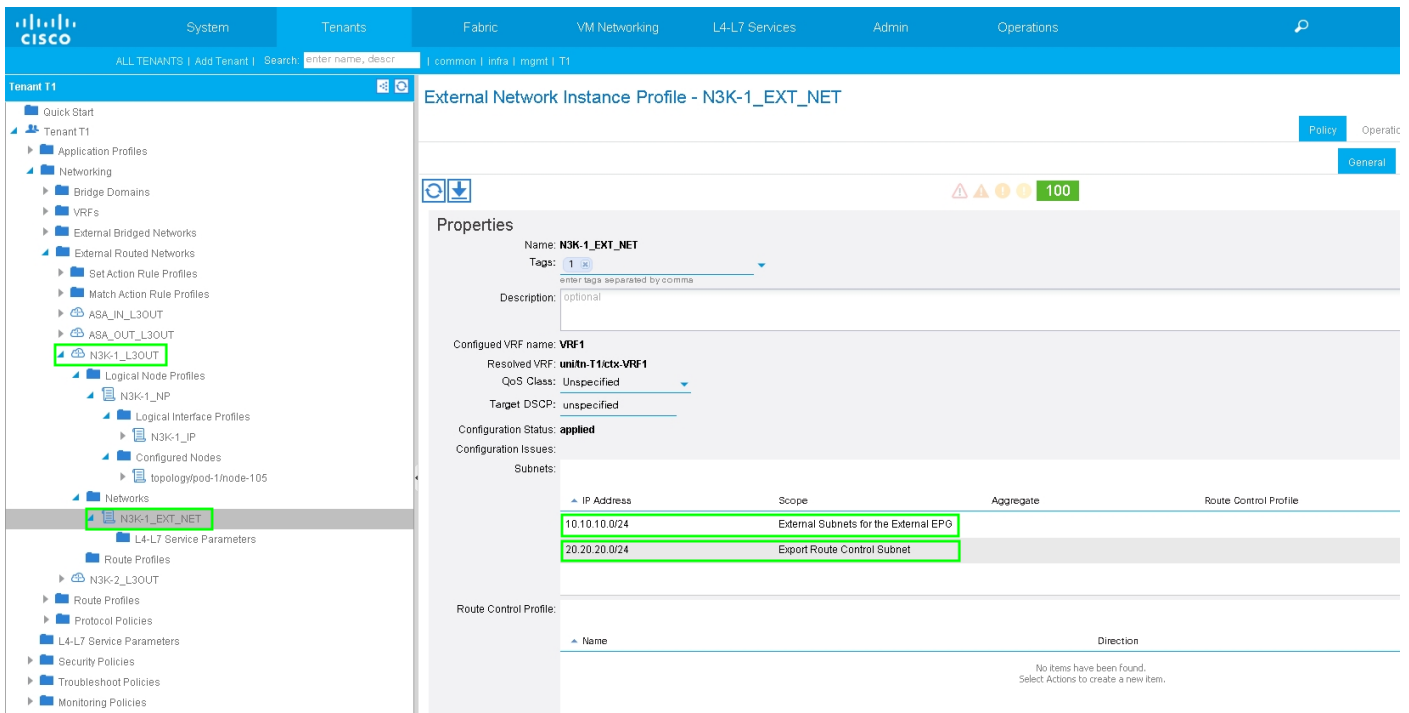


Opmerking: Alle L3Out interfaces die gebruikt worden voor het uitvoeren van route, moeten

dienovereenkomstig worden geconfigureerd als een Switch Virtual Interface (SVI) met VLAN-encap.



Configureer de controle van de invoer/uitvoer van subnetten voor N3K-1 L3Out Extern EPG zoals in de afbeelding:



Configureer L3Out voor ASA-externe interface en associeer met BD1 en VRF1, zoals in de afbeelding wordt weergegeven:

L3 Outside - ASA_OUT_L3OUT

Properties

Name: **ASA_OUT_L3OUT**

Description: optional

Tags:

Label:

Target DSCP: unspecified

Route Control Enforcement: Import Export

VRF: **T1/VRF1**

Resolved VRF: **T1/VRF1**

External Routed Domain: T1_L3OUT

Route Profile for Interleaf: select a value

Route Control For Dampening:

Address Family Type:

Route Dampening Policy:

No items have been found. Select Actions to create a new item.

Enable BGP/EIGRP/OSPF: BGP OSPF EIGRP

OSPF Area ID: **0**

OSPF Area Control: Send redistributed LSAs into NSSA area Originate summary LSA Suppress forwarding address in translated LSA

OSPF Area Type: NSSA area **Regular area** Stub area

OSPF Area Cost: **0**

Logical Interface Profile - ASA_OUT_IP

Properties

Name: **ASA_OUT_IP**

Description: optional

Label:

ND policy: select a value

Egress Data Plane Policing Policy: select a value

Ingress Data Plane Policing Policy: select a value

Routed interfaces:

Path	IP Address	MAC Address	MTU (Bytes)
No items have been found. Select Actions to create a new item.			

SVI:

Path	IP Address	Side A IP	Side B IP	MAC Address	MTU (Bytes)	Encap
Node-105eth1/2	192.168.1.8/30			00:22:BD:F8:19:FF	1500	Vlan-101

Routed Sub-Interfaces:

Path	IP Address	MAC Address	MTU (Bytes)	Encap
No items have been found. Select Actions to create a new item.				

Configureer routecontrole van invoer/export op subnetten voor ASA-Extern L3Out Extern EPG, zoals in de afbeelding:

External Network Instance Profile - ASA_OUT_EXT_NET

Properties

Name: **ASA_OUT_EXT_NET**

Tags:

Description: optional

Configured VRF name: **VRF1**

Resolved VRF: **unitn-T1/ctx-VRF1**

QoS Class: Unspecified

Target DSCP: unspecified

Configuration Status: **applied**

Configuration Issues:

IP Address	Scope	Aggregate	Route Control Profile	Route Summa
10.10.10.0/24	Export Route Control Subnet			
20.20.20.0/24	External Subnets for the External EPoS Shared Route Control Subnet			

Route Control Profile:

Name	Direction
No items have been found. Select Actions to create a new item.	

Configureer L3out voor ASA-intern en associeer met BD2 en VRF2, zoals in de afbeelding wordt weergegeven:

L3 Outside - ASA_IN_L3OUT

Properties

Name: **ASA_IN_L3OUT**

Description: optional

Tags: 1

Label:

Target DSCP: unspecified

Route Control Enforcement: Import Export

VRF: **T1/VRF2**

Resolved VRF: **T1/VRF2**

External Routed Domain: **T1_L3OUT**

Route Profile for Interleak: select a value

Route Control For Dampening:

Address Family Type	Route Dampening Policy
No items have been found. Select Actions to create a new item.	

Enable BGP/EIGRP/OSPF: BGP OSPF EIGRP

OSPF Area ID: **0**

OSPF Area Control: Send redistributed LSAs into NSSA area Originate summary LSA Suppress forwarding address in translated LSA

OSPF Area Type: **Regular area** (NSSA area, Stub area)

OSPF Area Cost: 0

The screenshot displays the configuration page for the Logical Interface Profile named **ASA_IN_IP**. The left-hand navigation pane shows the hierarchy: Tenant T1 > Networking > External Routed Networks > Logical Node Profiles > ASA_IN_IP > Logical Interface Profiles > ASA_IN_IP. The main configuration area includes:

- Properties:** Name: ASA_IN_IP, Description: optional, Label: (empty), ND policy: select a value, Egress Data Plane Policing Policy: select a value, Ingress Data Plane Policing Policy: select a value.
- Routed Interfaces:** A table with columns Path, IP Address, MAC Address, and MTU (Bytes). A message states: "No items have been found. Select Actions to create a new item."
- SVI:** A table with columns Path, IP Address, Side A IP, Side B IP, MAC Address, MTU (Bytes), and Encap. One entry is shown: Node-106/eth1/2, IP Address: 192.168.1.10/30, MAC Address: 00:22:BD:F8:19:FF, MTU: 1500, Encap: **vlan-102**.
- Routed Sub-Interfaces:** A table with columns Path, IP Address, MAC Address, MTU (Bytes), and Encap. A message states: "No items have been found. Select Actions to create a new item."

Configuratie van de Controle van de Toevoer/van de Uitvoer op Subnetten voor ASA-Interne L3Out Extern EPG, zoals in de afbeelding getoond:

The screenshot displays the configuration page for the External Network Instance Profile named **ASA_IN_EXT_NET**. The left-hand navigation pane shows the hierarchy: Tenant T1 > Networking > External Routed Networks > Logical Node Profiles > Networks > ASA_IN_EXT_NET. The main configuration area includes:

- Properties:** Name: ASA_IN_EXT_NET, Tags: (empty), Description: optional.
- Configured VRF name:** VRF2
- Resolved VRF:** uni/tn-T1/ctx-VRF2
- QoS Class:** Unspecified
- Target DSCP:** unspecified
- Configuration Status:** applied
- Configuration Issues:** (empty)
- Subnets:** A table with columns IP Address, Scope, Aggregate, and Route Control Profile. Two entries are shown:

IP Address	Scope	Aggregate	Route Control Profile
10.10.10.0/24	External Subnets for the External EPG	Shared Route Control Subnet	
20.20.20.0/24	Export Route Control Subnet	Shared Route Control Subnet	
- Route Control Profile:** A table with columns Name and Direction. A message states: "No items have been found. Select Actions to create a new item."

Configureer L3Out voor N3K-2 en associeer met BD2 en VRF2, zoals in de afbeelding wordt weergegeven:

System | Tenants | Fabric | VM Networking | L4-L7 Services | Admin | Operations

ALL TENANTS | Add Tenant | Search: enter name, descr | common | T1 | infra | mgmt

Tenant T1

Quick Start

- Tenant T1
 - Application Profiles
 - Networking
 - Bridge Domains
 - VRFs
 - External Bridged Networks
 - External Routed Networks
 - Set Action Rule Profiles
 - Match Action Rule Profiles
 - ASA_IN_L3OUT
 - ASA_OUT_L3OUT
 - N3K-1_L3OUT
 - N3K-2_L3OUT**
 - Logical Node Profiles
 - Networks
 - Route Profiles
 - Route Profiles
 - Protocol Policies
 - L4-L7 Service Parameters
 - Security Policies
 - Troubleshoot Policies
 - Monitoring Policies
 - L4-L7 Services

L3 Outside - N3K-2_L3OUT

Properties

Name: **N3K-2_L3OUT**

Description: optional

Tags:

Label:

Target DSCP: unspecified

Route Control Enforcement: Import Export

VRF: **T1/VRF2**

Resolved VRF: **T1/VRF2**

External Routed Domain: T1_L3OUT

Route Profile for Interleaf: select a value

Route Control For Dampening:

Address Family Type:

Route Dampening Policy:

No items have been found. Select Actions to create a new item.

Enable BGP/EIGRP/OSPF: BGP OSPF EIGRP

OSPF Area ID: **0.0.0.1**

OSPF Area Control: Send redistributed LSAs into NSSA area Originate summary LSA Suppress forwarding address in translated LSA

OSPF Area Type: NSSA area **Regular area** Stub area

OSPF Area Cost: 0

System | Tenants | Fabric | VM Networking | L4-L7 Services | Admin | Operations

ALL TENANTS | Add Tenant | Search: enter name, descr | common | T1 | infra | mgmt

Tenant T1

Quick Start

- Tenant T1
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 - External Bridged Networks
 - External Routed Networks
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 - Match Action Rule Profiles
 - ASA_IN_L3OUT
 - ASA_OUT_L3OUT
 - N3K-1_L3OUT
 - N3K-2_L3OUT**
 - Logical Node Profiles
 - N3K-2_NP
 - Logical Interface Profiles**
 - N3K-2_IP**
 - OSPF Interface Profile
 - Configured Nodes
 - Networks
 - Route Profiles
 - Route Profiles
 - Protocol Policies
 - L4-L7 Service Parameters
 - Security Policies
 - Troubleshoot Policies
 - Monitoring Policies
 - L4-L7 Services

Logical Interface Profile - N3K-2_IP

Properties

Name: **N3K-2_IP**

Description: optional

Label:

ND policy: select a value

Egress Data Plane Policing Policy: select a value

Ingress Data Plane Policing Policy: select a value

Routed Interfaces:

Path	IP Address	MAC Address	MTU (Bytes)
No items have been found. Select Actions to create a new item.			

SVI:

Path	IP Address	Side A IP	Side B IP	MAC Address	MTU (Bytes)	Encap
Node-1066eth1/4	192.168.1.14/30			00:22:BD:F8:19:FF	1500	vlan-103

Routed Sub-Interfaces:

Path	IP Address	MAC Address	MTU (Bytes)	Encap
No items have been found. Select Actions to create a new item.				

Configureer de controle van de import/export-route op subnetten voor N3K-2 L3Out voor externe EPG, zoals in de afbeelding:

External Network Instance Profile - N3K-2_EXT_NET

Properties

Name: **N3K-2_EXT_NET**

Tags:

Description: optional

Configured VRF name: **VRF2**

Resolved VRF: **uni1tn-11ctx-VRF2**

QoS Class: **Unspecified**

Target DSCP: **unspecified**

Configuration Status: **applied**

Configuration Issues:

Subnets:

IP Address	Scope	Aggregate	Route Control Profile
10.10.10.0/24	Export Route Control Subnet		
20.20.20.0/24	External Subnets for the External EPG		

Route Control Profile:

Name	Direction
No items have been found. Select Actions to create a new item.	

Stap 4. Maak de functiegroep van Functie en configuratie Functieprofiel van bestaande sjabloon, zoals in de afbeelding:

L4-L7 Services Function Profile - ASA585_FP

Properties

Name: **ASA585_FP**

Description:

Associated Function: **CISCO-ASA-1.2Firewall**

FEATURES AND PARAMETERS

Basic Parameters | All Parameters

Meta Folder/Param Key	Name	Value	Mandatory	Locked	Shared
Device Config	Device				
Access List	access-list-inbound			false	false
Interface Related Configuration	externalif			false	false
Interface Related Configuration	internalif			false	false
Function Config	Function				
External Interface Configuration	ExtConfig			false	false
Internal Interface Configuration	IntConfig			false	false



Properties

Name: **ASA5585_FP**
 Description:
 Associated Function: **CISCO-ASA-1.2Firewall**

FEATURES AND PARAMETERS

Features:

- [Interfaces](#)
- [AccessLists](#)
- [NAT](#)
- [TrafficSelectionObjects](#)
- All**

Basic Parameters

All Parameters

Meta Folder/Param Key	Name	Value	Mandatory	Locked	Shared
Device Config	Device				
Access List	access-list-inbound			false	false
Interface Related Configuration	externalif			false	false
Access Group	ExtAccessGroup			false	
Inbound Access List	name	access-list-inbound	false	false	
Interface Specific Configuration	externalIfCfg			false	
IPv4 Address Configuration	IPv4Address			false	
IPv4 Address	ipv4_address	192.168.1.5/30	true	false	
Security Level	external_security_level	50	false	false	
Interface Related Configuration	internalif			false	false
Interface Specific Configuration	internalIfCfg			false	
IPv4 Address Configuration	IPv4Address			false	
IPv4 Address	ipv4_address	192.168.1.9/30	true	false	
Security Level	internal_security_level	100	false	false	
Function Config	Function				
External Interface Configuration	ExtConfig			false	false
Interface Configuration	ExtConfigrel	externalif	false	false	
Internal Interface Configuration	IntConfig			false	false
Interface Configuration	IntConfigrel	internalif	false	false	

Step 5. Maak een contract en wijzig het veld Toepassingsgebied in huurder, zoals in de afbeelding:

The screenshot shows the Cisco ISE configuration interface for a contract named 'PERMIT_ALL'. The left sidebar shows the navigation tree with 'Contracts' highlighted. The main area displays the configuration for 'Contract - PERMIT_ALL'. The 'Properties' section includes:

- Name: PERMIT_ALL
- Label:
- Scope: **Tenant** (highlighted with a green box)
- QoS Class: unspecified
- Target DSCP: unspecified
- Description: optional
- Subjects: A table with columns 'Name' and 'Filters' showing 'PERMIT_ALL' and 'T1/PERMIT_ALL'.

Step 6. Zoals in de afbeelding wordt getoond, kunt u L4-L7 Service Graph sjabloon maken waar de associatie Service Graph is gekoppeld aan een extern routed Network Policy en routerconfiguratie met een beleid voor apparaatselectie.

:

ALL TENANTS | Add Tenant | Search: enter name, descr | common | T1 | info | mgmt

Tenant T1

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 - L4-L7 Service Graph Templates
 - ASA5585_SGT
 - Function Node - N1
 - Router configurations
 - Function Profiles
 - L4-L7 Devices
 - Imported Devices
 - Devices Selection Policies
 - Deployed Graph Instances
 - Deployed Devices
 - Inband Management Configuration for L4-L7 devices
 - Device Managers
 - Chassis

L4-L7 Service Graph Template - ASA5585_SGT

Topology Policy

ASA5585 Information

Firewall: Routed

Profile: ASA5585_FP

Create L4-L7 Service Graph Template

Drag device clusters to create graph nodes.

Device Clusters

- T1 /ASA5585 (Managed Firewall)

Graph Name: ASA5585_SGT

Graph Type:
 Create A New One
 Clone An Existing One

Please drag a device from devices table and drop it here to create a service node.

ASA5585 Information

Firewall: Routed Transparent

Profile: T1/ASA5585_FP/ASA5585_FP

SUBMIT CANCEL

Routerconfiguratie om de router-ID te specificeren die op de Service-applicatie (ASA 5585) gebruikt zal worden, zoals in de afbeelding:

The screenshot shows the Cisco tenant configuration interface. The left sidebar is expanded to 'Tenant T1' > 'L4-L7 Services' > 'Router configurations', with 'ASA5585' selected. The main panel displays 'Router configuration - ASA5585' with the following properties:

- Name: ASA5585
- Router ID: 3.3.3.3
- Description: optional

Verandert het type nabijheid van L2 tot L3, zoals in het beeld wordt getoond:

The screenshot shows the Cisco tenant configuration interface for an L4-L7 Service Graph Template. The left sidebar is expanded to 'Tenant T1' > 'L4-L7 Services' > 'L4-L7 Service Graph Templates', with 'ASA5585_SGT' selected. The main panel displays 'L4-L7 Service Graph Template - ASA5585_SGT' with the following properties:

- Name: ASA5585_SGT
- Template Name: UNSPECIFIED
- Description: optional

The 'Function Nodes' table is as follows:

Name	Function Name	Function Type	Description
N1	CISCO-ASA-1.2/Firewall	GoTo	

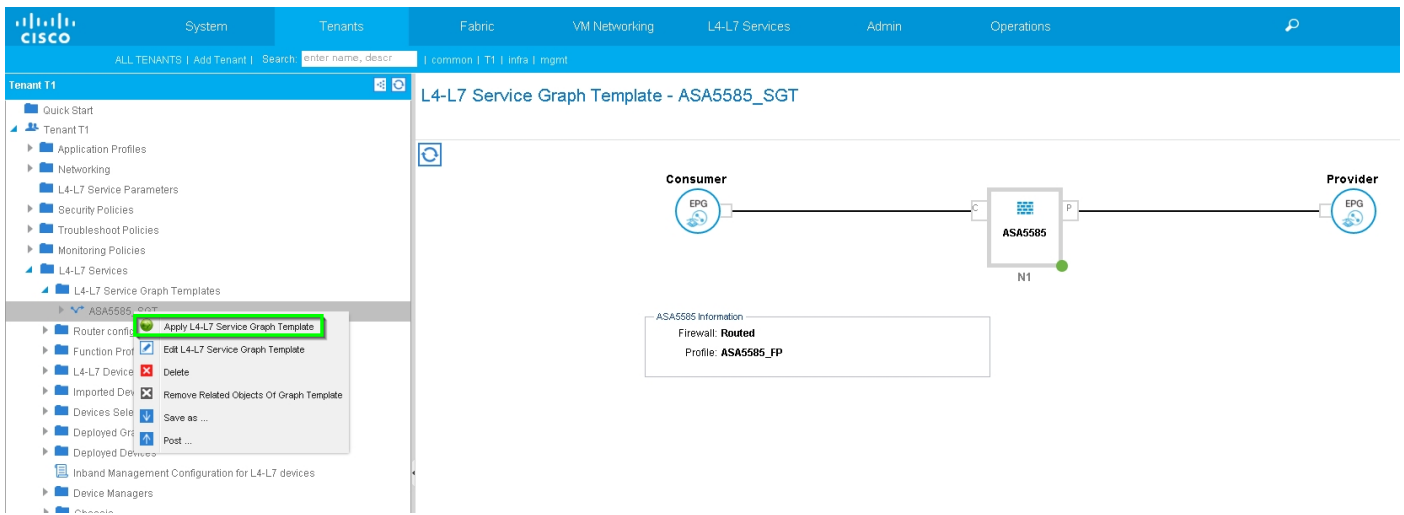
The 'Terminal Nodes' table is as follows:

Name	Provider/Consumer	Description
T1	Consumer	
T2	Provider	

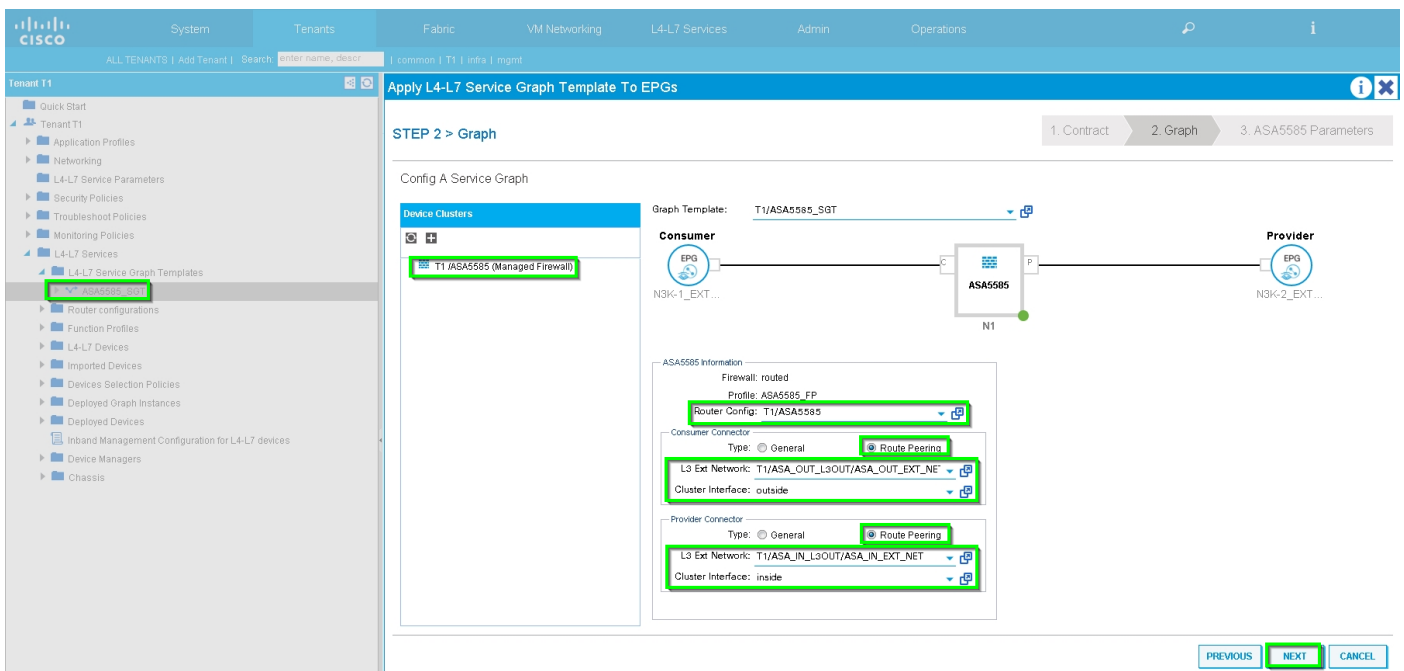
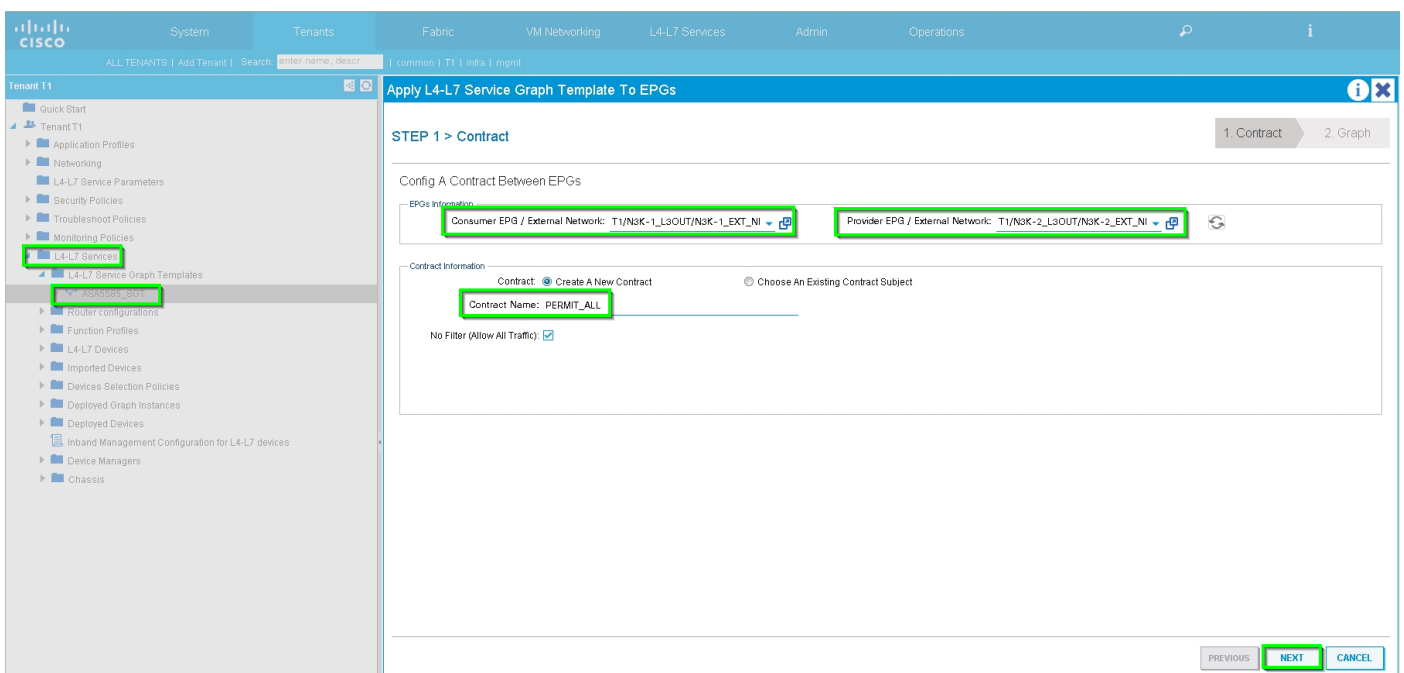
The 'Connections' table is as follows:

Name	Connected Nodes	Unicast Route	Adjacency Type	Description
C1	N1, T1	True	L3	
C2	N1, T2	True	L3	

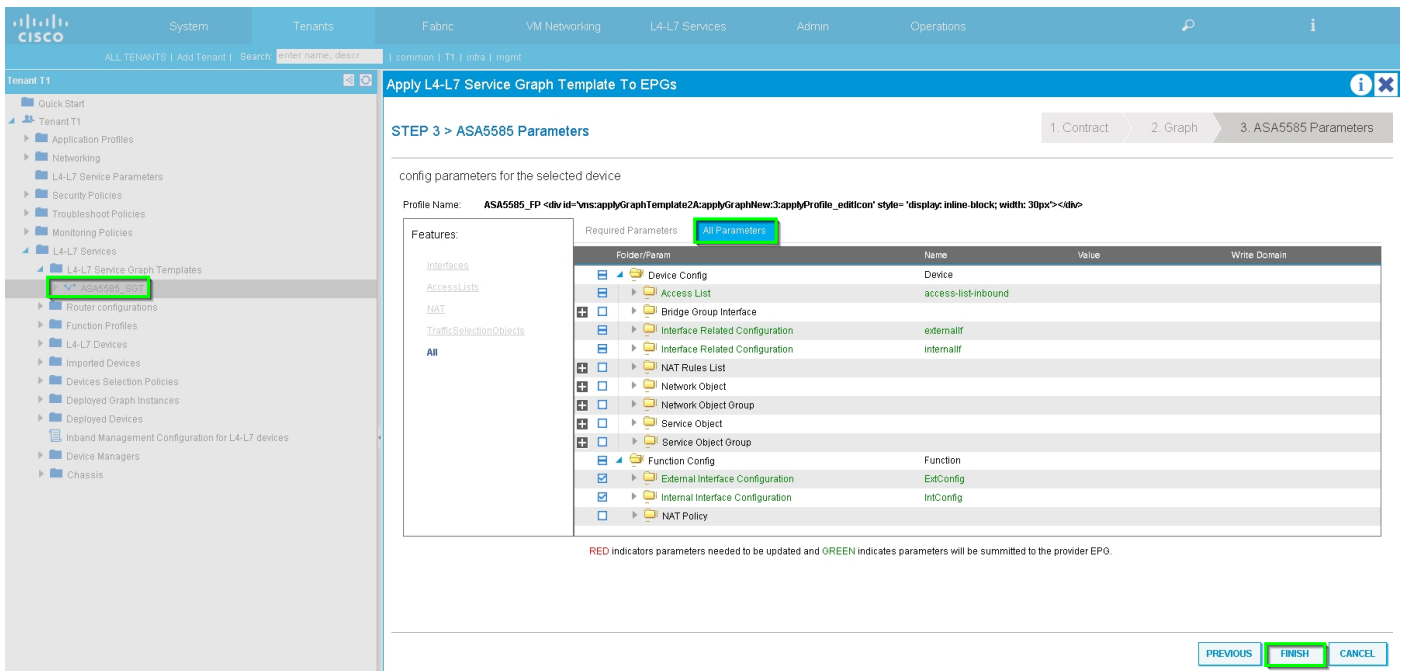
Sjabloon voor servicesdiagram toepassen, zoals in de afbeelding wordt getoond:



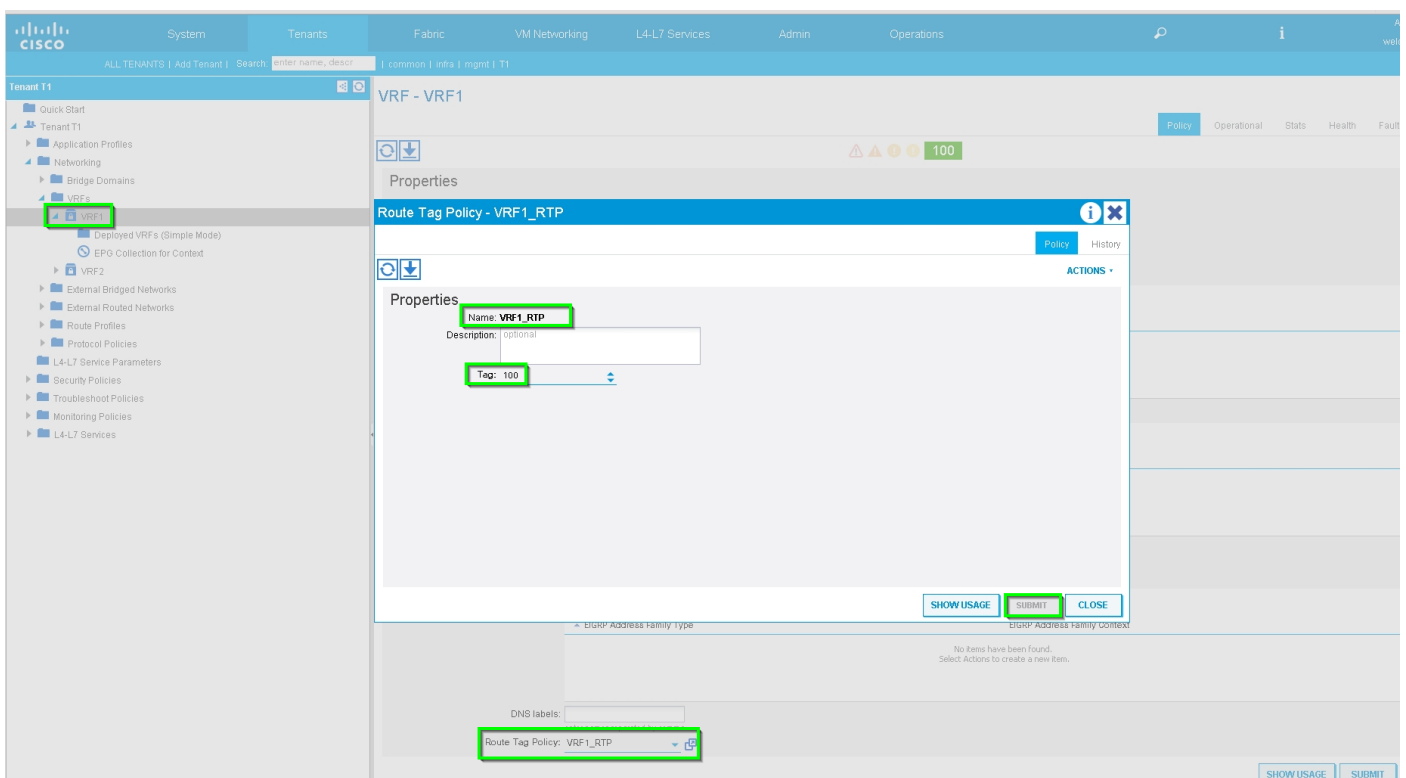
Hang de servicediagram aan contract, zoals in de afbeelding:



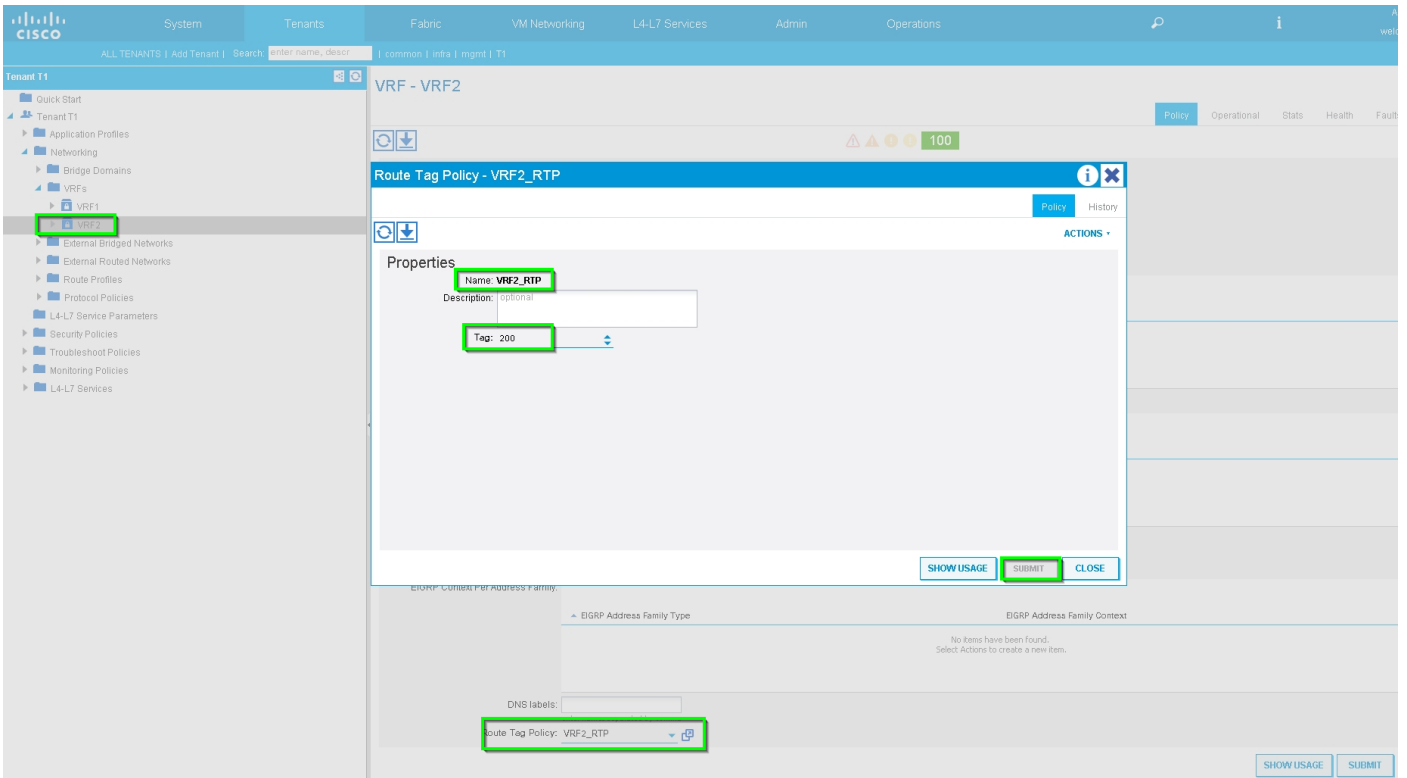
Voeg, indien nodig, L4-L7 parameter toe, zoals in het beeld wordt getoond:



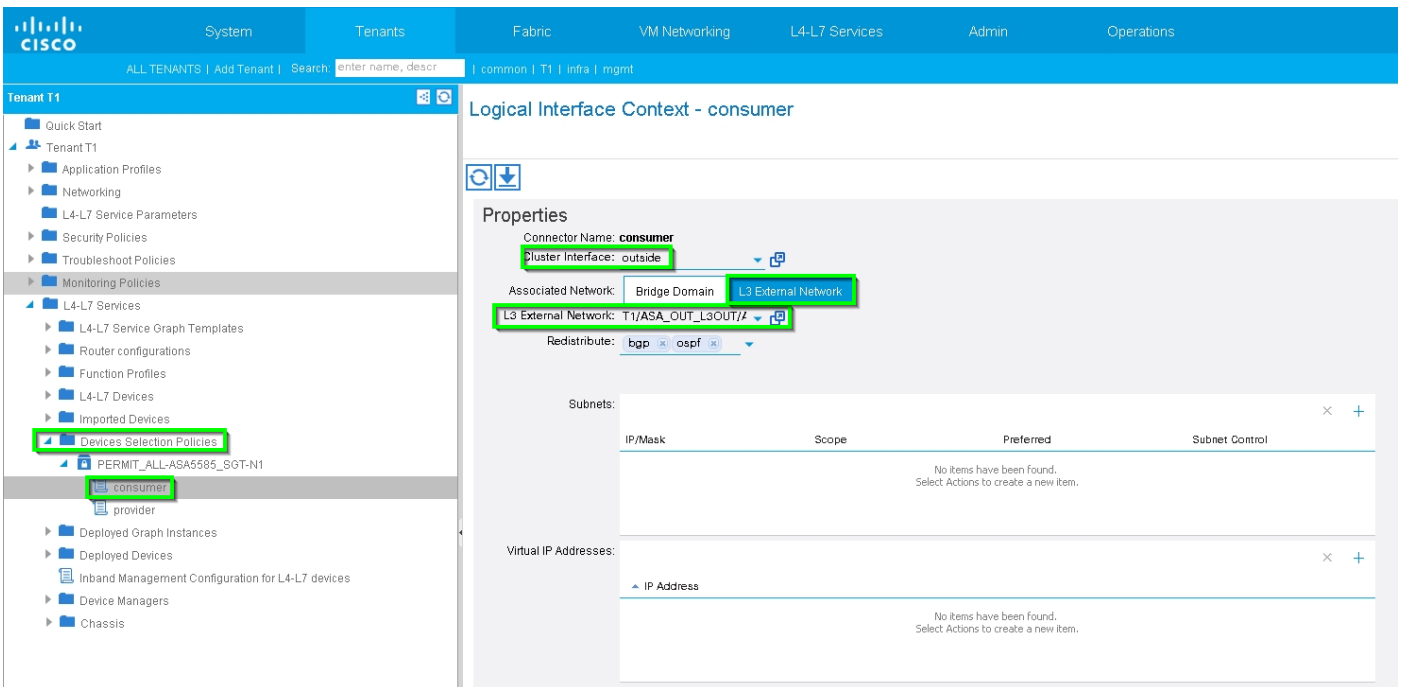
Step 7: Route-tag Policy, configureer routeswitchbeleid voor VRF1 (Tag:100), zoals in de afbeelding:



Configureer routeswitchbeleid voor VRF2 (tag:200), zoals in de afbeelding:



Step 8: Controleer de status en controleer het beleid voor apparaatselectie zoals in de afbeelding:



System Tenants Fabric VM Networking L4-L7 Services Admin Operations

ALL TENANTS | Add Tenant | Search: enter name, descr | common | T1 | infra | mgmt

Tenant T1

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 - Troubleshoot Policies
 - Monitoring Policies
 - L4-L7 Services
 - L4-L7 Service Graph Templates
 - Router configurations
 - Function Profiles
 - L4-L7 Devices
 - Imported Devices
 - Devices Selection Policies
 - PERMIT_ALL-ASA5585_SOT-N1
 - consumer
 - provider
 - Deployed Graph Instances
 - Deployed Devices
 - Inband Management Configuration for L4-L7 devices
 - Device Managers
 - Chassis

Logical Interface Context - provider

Properties

Connector Name: provider
 Cluster Interface: inside
 Associated Network: Bridge Domain L3 External Network
 L3 External Network: T1/ASA_IN_L3OUT/AS
 Redistribute: bgp ospf

Subnets:

IP/Mask	Scope	Preferred	Subnet Control
No items have been found. Select Actions to create a new item.			

Virtual IP Addresses:

IP Address
No items have been found. Select Actions to create a new item.

Controleer de implementaties van Grafiek, zoals in de afbeelding weergegeven:

System Tenants Fabric VM Networking L4-L7 Services Admin Operations

ALL TENANTS | Add Tenant | Search: enter name, descr | common | T1 | infra | mgmt

Tenant T1

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 - L4-L7 Service Graph Templates
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 - Function Profiles
 - L4-L7 Devices
 - Imported Devices
 - Devices Selection Policies
 - PERMIT_ALL-ASA5585_SOT-N1
 - consumer
 - provider
 - Deployed Graph Instances
 - PERMIT_ALL-ASA5585_SOT-T1
 - Function Node-N1
 - Deployed Devices
 - Inband Management Configuration for L4-L7 devices
 - Device Managers
 - Chassis

Function Node - N1

Properties

Name: N1
 Function Type: GoTo
 Devices: ASA5585

Cluster Interfaces	Name	Concrete Interfaces	Encap
inside		ASA5585_Device_1(0)igabitEthernet0/1	unknown
outside		ASA5585_Device_1(0)igabitEthernet0/0	unknown

Function Connectors	Name	Encap	Class ID
consumer		vlan-101	32773
provider		vlan-102	49156

Folders And Parameters

Basic Parameters All Parameters

Meta Folder/Param Key	Name	Value	Override Name/Value To
Features:			

System | Tenants | Fabric | VM Networking | L4-L7 Services | Admin | Operations

ALL TENANTS | Add Tenant | Search: enter name, descr | common | T1 | infra | mgmt

Tenant T1

Deployed Devices

Device Name	VRF
ASA5585	none

System | Tenants | Fabric | VM Networking | L4-L7 Services | Admin | Operations

ALL TENANTS | Add Tenant | Search: enter name, descr | common | T1 | infra | mgmt

Tenant T1

Device OSPF Configurations

Name	Enable	Context Name	Address Family	Area	Area Control	Area Type	Networks
ASA_IN_L3OUT_area_0	True	VRF2	IPv4	Backbone area	Send redistributed LSAs into NSSA area Originate consumer LSA	Regular area	ASA_IN_EXT_NET (10.10.10.0/24)
ASA_OUT_L3OUT_area_0	True	VRF1	IPv4	Backbone area	Send redistributed LSAs into NSSA area Originate summary LSA	Regular area	ASA_OUT_EXT_NET (20.20.20.0/24)

Probleemoplossing controleren

APIC-configuratie voor Tenant:

```
apic1# sh running-config tenant T1
# Command: show running-config tenant T1
# Time: Thu Feb 25 16:05:14 2016
tenant T1
```

```
access-list PERMIT_ALL
  match ip
  exit
contract PERMIT_ALL
  scope tenant
  subject PERMIT_ALL
    access-group PERMIT_ALL both
    1417 graph ASA5585_SGT
  exit
exit
vrf context VRF1
  exit
vrf context VRF2
  exit
l3out ASA_IN_L3OUT
  vrf member VRF2
  exit
l3out ASA_OUT_L3OUT
  vrf member VRF1
  exit
l3out N3K-1_L3OUT
  vrf member VRF1
  exit
l3out N3K-2_L3OUT
  vrf member VRF2
  exit
bridge-domain BD1
  vrf member VRF1
  exit
bridge-domain BD2
  vrf member VRF2
  exit
application AP1
  epg EPG1
    bridge-domain member BD1
  exit
  epg EPG2
    bridge-domain member BD2
  exit
exit
external-l3 epg ASA_IN_EXT_NET l3out ASA_IN_L3OUT
  vrf member VRF2
  match ip 10.10.10.0/24
  exit
external-l3 epg ASA_OUT_EXT_NET l3out ASA_OUT_L3OUT
  vrf member VRF1
  match ip 20.20.20.0/24
  exit
external-l3 epg N3K-1_EXT_NET l3out N3K-1_L3OUT
  vrf member VRF1
  match ip 10.10.10.0/24
  contract consumer PERMIT_ALL
  exit
external-l3 epg N3K-2_EXT_NET l3out N3K-2_L3OUT
  vrf member VRF2
  match ip 20.20.20.0/24
  contract provider PERMIT_ALL
  exit
interface bridge-domain BD1
  exit
interface bridge-domain BD2
  exit
1417 cluster name ASA5585 type physical vlan-domain T1_PHY service FW function go-to
  cluster-device ASA5585_Device_1
```

```

cluster-interface inside
  member device ASA5585_Device_1 device-interface GigabitEthernet0/1
  interface ethernet 1/2 leaf 106
  exit
exit
cluster-interface outside
  member device ASA5585_Device_1 device-interface GigabitEthernet0/0
  interface ethernet 1/2 leaf 105
  exit
exit
exit
1417 graph ASA5585_SGT contract PERMIT_ALL
  service N1 device-cluster-tenant T1 device-cluster ASA5585 mode FW_ROUTED
  connector consumer cluster-interface outside
    1417-peer tenant T1 out ASA_OUT_L3OUT epg ASA_OUT_EXT_NET redistribute bgp,ospf
  exit
  connector provider cluster-interface inside
    1417-peer tenant T1 out ASA_IN_L3OUT epg ASA_IN_EXT_NET redistribute bgp,ospf
  exit
  rtr-cfg ASA5585
  exit
  connection C1 terminal consumer service N1 connector consumer
  connection C2 terminal provider service N1 connector provider
  exit
rtr-cfg ASA5585
  router-id 3.3.3.3
  exit
exit
apic1#

```

Controleer OSPF-buurrelatie en routingtabel op blad 101:

```

leaf101# show ip ospf neighbors vrf T1:VRF1
OSPF Process ID default VRF T1:VRF1
Total number of neighbors: 2
Neighbor ID      Pri State                Up Time  Address      Interface
1.1.1.1          1 FULL/BDR              02:07:19 192.168.1.1  Vlan8
3.3.3.3          1 FULL/BDR              00:38:35 192.168.1.5  Vlan9

leaf101# show ip route vrf T1:VRF1
IP Route Table for VRF "T1:VRF1"
'*' denotes best ucast next-hop
'***' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>

10.10.10.0/24, ubest/mbest: 1/0
  *via 192.168.1.1, vlan8, [110/8], 01:59:50, ospf-default, intra
20.20.20.0/24, ubest/mbest: 1/0
  *via 192.168.1.5, vlan9, [110/22], 00:30:20, ospf-default, inter
100.100.100.100/32, ubest/mbest: 2/0, attached, direct
  *via 100.100.100.100, lo1, [1/0], 02:21:22, local, local
  *via 100.100.100.100, lo1, [1/0], 02:21:22, direct
192.168.1.0/30, ubest/mbest: 1/0, attached, direct
  *via 192.168.1.2, vlan8, [1/0], 02:35:53, direct
192.168.1.2/32, ubest/mbest: 1/0, attached
  *via 192.168.1.2, vlan8, [1/0], 02:35:53, local, local
192.168.1.4/30, ubest/mbest: 1/0, attached, direct
  *via 192.168.1.6, vlan9, [1/0], 02:20:53, direct
192.168.1.6/32, ubest/mbest: 1/0, attached
  *via 192.168.1.6, vlan9, [1/0], 02:20:53, local, local

```

```
192.168.1.8/30, ubest/mbest: 1/0
  *via 192.168.1.5, vlan9, [110/14], 00:30:20, ospf-default, intra
200.200.200.200/32, ubest/mbest: 1/0
  *via 192.168.1.5, vlan9, [110/15], 00:30:20, ospf-default, intra
```

Controleer OSPF-buurrelatie en routingtabel op blad 102:

```
leaf102# show ip ospf neighbors vrf T1:VRF2
OSPF Process ID default VRF T1:VRF2
Total number of neighbors: 2
Neighbor ID      Pri State                Up Time  Address      Interface
3.3.3.3          1 FULL/BDR              00:37:07 192.168.1.9  Vlan14
2.2.2.2          1 FULL/BDR              02:09:59 192.168.1.13 Vlan15
```

```
leaf102# show ip route vrf T1:VRF2
IP Route Table for VRF "T1:VRF2"
'*' denotes best ucast next-hop
'***' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>
```

```
10.10.10.0/24, ubest/mbest: 1/0
  *via 192.168.1.9, vlan14, [110/22], 00:35:22, ospf-default, inter
20.20.20.0/24, ubest/mbest: 1/0
  *via 192.168.1.13, vlan15, [110/8], 02:08:13, ospf-default, intra
192.168.1.4/30, ubest/mbest: 1/0
  *via 192.168.1.9, vlan14, [110/14], 00:35:22, ospf-default, intra
192.168.1.8/30, ubest/mbest: 1/0, attached, direct
  *via 192.168.1.10, vlan14, [1/0], 02:14:29, direct
192.168.1.10/32, ubest/mbest: 1/0, attached
  *via 192.168.1.10, vlan14, [1/0], 02:14:29, local, local
192.168.1.12/30, ubest/mbest: 1/0, attached, direct
  *via 192.168.1.14, vlan15, [1/0], 02:09:04, direct
192.168.1.14/32, ubest/mbest: 1/0, attached
  *via 192.168.1.14, vlan15, [1/0], 02:09:04, local, local
200.200.200.200/32, ubest/mbest: 2/0, attached, direct
  *via 200.200.200.200, lo4, [1/0], 02:10:02, local, local
  *via 200.200.200.200, lo4, [1/0], 02:10:02, direct
```

Controleer configuratie, OSPF-relatie en routingtabel op ASA 5585:

```
ASA5585# sh run interface
!
interface GigabitEthernet0/0
  no nameif
  security-level 0
  no ip address
!
interface GigabitEthernet0/0.101
  nameif externalIf
  security-level 50
  ip address 192.168.1.5 255.255.255.252
!
interface GigabitEthernet0/1
  no nameif
  security-level 100
  no ip address
!
interface GigabitEthernet0/1.102
  nameif internalIf
```

```
security-level 100
ip address 192.168.1.9 255.255.255.252
!
interface Management0/0
management-only
nameif management
security-level 0
ip address 172.23.97.1 255.255.254.0
```

```
ASA5585# sh run router
router ospf 1
router-id 3.3.3.3
network 192.168.1.4 255.255.255.252 area 0
network 192.168.1.8 255.255.255.252 area 0
area 0
log-adj-changes
!
```

```
ASA5585# sh ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
100.100.100.100	1	FULL/DR	0:00:38	192.168.1.6	externalIf
200.200.200.200	1	FULL/DR	0:00:33	192.168.1.10	internalIf

```
ASA5585# sh route ospf
```

```
Routing Table: T1
```

```
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, + - replicated route
Gateway of last resort is not set
```

```
O IA    10.10.10.0 255.255.255.0
         [110/18] via 192.168.1.6, 00:22:57, externalIf
O IA    20.20.20.0 255.255.255.0
         [110/18] via 192.168.1.10, 00:22:47, internalIf
O       200.200.200.200 255.255.255.255
         [110/11] via 192.168.1.10, 00:22:47, internalIf
```

```
ASA5585# sh access-list
```

```
access-list cached ACL log flows: total 0, denied 0 (deny-flow-max 4096)
alert-interval 300
access-list access-list-inbound; 3 elements; name hash: 0xcb5bd6c7
access-list access-list-inbound line 1 extended permit tcp any any eq www (hitcnt=0) 0xc873a747
access-list access-list-inbound line 2 extended permit tcp any any eq https (hitcnt=0)
0x48bedbdd
```

```
access-list access-list-inbound line 3 extended permit icmp any any (hitcnt=6) 0xe4b5a75d
```

Controleer configuratie, OSPF buurrelatie en routingtabel op N3K-1:

```
N3K-1# sh run ospf
```

```
!Command: show running-config ospf  
!Time: Thu Feb 25 15:40:55 2016
```

```
version 6.0(2)U3(7)  
feature ospf
```

```
router ospf 1  
router-id 1.1.1.1
```

```
interface Ethernet1/21  
ip router ospf 1 area 0.0.0.1
```

```
interface Ethernet1/47  
ip router ospf 1 area 0.0.0.1
```

```
N3K-1# sh ip ospf neighbors
```

```
OSPF Process ID 1 VRF default  
Total number of neighbors: 1
```

Neighbor ID	Pri	State	Up Time	Address	Interface
100.100.100.100	1	FULL/DR	01:36:24	192.168.1.2	Eth1/47

```
N3K-1# sh ip ospf route
```

```
OSPF Process ID 1 VRF default, Routing Table
```

```
(D) denotes route is directly attached (R) denotes route is in RIB
```

```
10.10.10.0/24 (intra)(D) area 0.0.0.1  
via 10.10.10.0/Eth1/21* , cost 4  
20.20.20.0/24 (inter)(R) area 0.0.0.1  
via 192.168.1.2/Eth1/47 , cost 62  
100.100.100.100/32 (intra)(R) area 0.0.0.1  
via 192.168.1.2/Eth1/47 , cost 41  
192.168.1.0/30 (intra)(D) area 0.0.0.1  
via 192.168.1.1/Eth1/47* , cost 40
```

Controleer configuratie, OSPF buurrelatie en routingtabel op N3K-2:

```
N3K-2# sh run ospf
```

```
!Command: show running-config ospf  
!Time: Thu Feb 25 15:44:47 2016
```

```
version 6.0(2)U3(7)  
feature ospf
```

```
router ospf 1  
router-id 2.2.2.2
```

```
interface loopback0  
ip ospf network point-to-point  
ip router ospf 1 area 0.0.0.0
```

```
interface Ethernet1/21  
ip router ospf 1 area 0.0.0.1
```

```
interface Ethernet1/47  
ip router ospf 1 area 0.0.0.1
```

```
N3K-2# sh ip ospf neighbors
OSPF Process ID 1 VRF default
Total number of neighbors: 1
Neighbor ID      Pri State                Up Time  Address      Interface
200.200.200.200  1 FULL/DR              01:43:50 192.168.1.14 Eth1/47
```

```
N3K-2# sh ip ospf route
OSPF Process ID 1 VRF default, Routing Table
(D) denotes route is directly attached      (R) denotes route is in RIB
2.2.2.0/30 (intra)(D) area 0.0.0.0
  via 2.2.2.0/Lo0* , cost 1
10.10.10.0/24 (inter)(R) area 0.0.0.1
  via 192.168.1.14/Eth1/47 , cost 62
20.20.20.0/24 (intra)(D) area 0.0.0.1
  via 20.20.20.0/Eth1/21* , cost 4
192.168.1.12/30 (intra)(D) area 0.0.0.1
  via 192.168.1.13/Eth1/47* , cost 40
```

Controleer de regels van het contractfilter op blad en het pakkethit telt.

```
leaf101# show system internal policy-mgr stats
Requested Rule Statistics
[CUT]
Rule (4107) DN (sys/actrl/scope-3112964/rule-3112964-s-32773-d-49158-f-33)      Ingress: 1316,
Egress: 0, Pkts: 0 RevPkts: 0
Rule (4108) DN (sys/actrl/scope-3112964/rule-3112964-s-49158-d-32773-f-33)      Ingress: 1317,
Egress: 0, Pkts: 0 RevPkts: 0
```

```
leaf101# show system internal policy-mgr stats
Requested Rule Statistics
[CUT]
Rule (4107) DN (sys/actrl/scope-3112964/rule-3112964-s-32773-d-49158-f-33)      Ingress: 2317,
Egress: 0, Pkts: 0 RevPkts: 0
Rule (4108) DN (sys/actrl/scope-3112964/rule-3112964-s-49158-d-32773-f-33)      Ingress: 2317,
Egress: 0, Pkts: 0 RevPkts: 0
```

```
leaf102# show system internal policy-mgr stats Requested Rule Statistics [CUT] Rule (4103) DN
(sys/actrl/scope-2752520/rule-2752520-s-49156-d-6019-f-default) Ingress: 3394, Egress: 0, Pkts:
0 RevPkts: 0 Rule (4104) DN (sys/actrl/scope-2752520/rule-2752520-s-6019-d-49156-f-default)
Ingress: 3394, Egress: 0, Pkts: 0 RevPkts: 0 [CUT] leaf102# show system internal policy-mgr
stats Requested Rule Statistics [CUT] Rule (4103) DN (sys/actrl/scope-2752520/rule-2752520-s-
49156-d-6019-f-default) Ingress: 4392, Egress: 0, Pkts: 0 RevPkts: 0 Rule (4104) DN
(sys/actrl/scope-2752520/rule-2752520-s-6019-d-49156-f-default) Ingress: 4392, Egress: 0, Pkts:
0 RevPkts: 0 [CUT]
```

Betaalbaarheidsproef tussen N3K-1 en N3K-2:

```
N3K-1# ping 20.20.20.1 source 10.10.10.1
PING 20.20.20.1 (20.20.20.1) from 10.10.10.1: 56 data bytes
64 bytes from 20.20.20.1: icmp_seq=0 ttl=250 time=2.098 ms
64 bytes from 20.20.20.1: icmp_seq=1 ttl=250 time=0.922 ms
64 bytes from 20.20.20.1: icmp_seq=2 ttl=250 time=0.926 ms
64 bytes from 20.20.20.1: icmp_seq=3 ttl=250 time=0.893 ms
64 bytes from 20.20.20.1: icmp_seq=4 ttl=250 time=0.941 ms
```

```
--- 20.20.20.1 ping statistics ---
```



```
5 packets transmitted, 5 packets received, 0.00% packet loss  
round-trip min/avg/max = 0.893/1.156/2.098 ms
```

```
N3K-2# ping 10.10.10.1 source 20.20.20.1
```

```
PING 10.10.10.1 (10.10.10.1) from 20.20.20.1: 56 data bytes
```

```
64 bytes from 10.10.10.1: icmp_seq=0 ttl=250 time=2.075 ms
```

```
64 bytes from 10.10.10.1: icmp_seq=1 ttl=250 time=0.915 ms
```

```
64 bytes from 10.10.10.1: icmp_seq=2 ttl=250 time=0.888 ms
```

```
64 bytes from 10.10.10.1: icmp_seq=3 ttl=250 time=1.747 ms
```

```
64 bytes from 10.10.10.1: icmp_seq=4 ttl=250 time=0.828 ms
```

```
--- 10.10.10.1 ping statistics ---
```

```
5 packets transmitted, 5 packets received, 0.00% packet loss
```

```
round-trip min/avg/max = 0.828/1.29/2.075 ms
```

Bijgevoegd is het XML configuratiebestand voor de huurder en het ASA-functieprofiel, gebruikt voor deze demonstratie.