



Belnet Cloud Connect MS Azure

January 2019

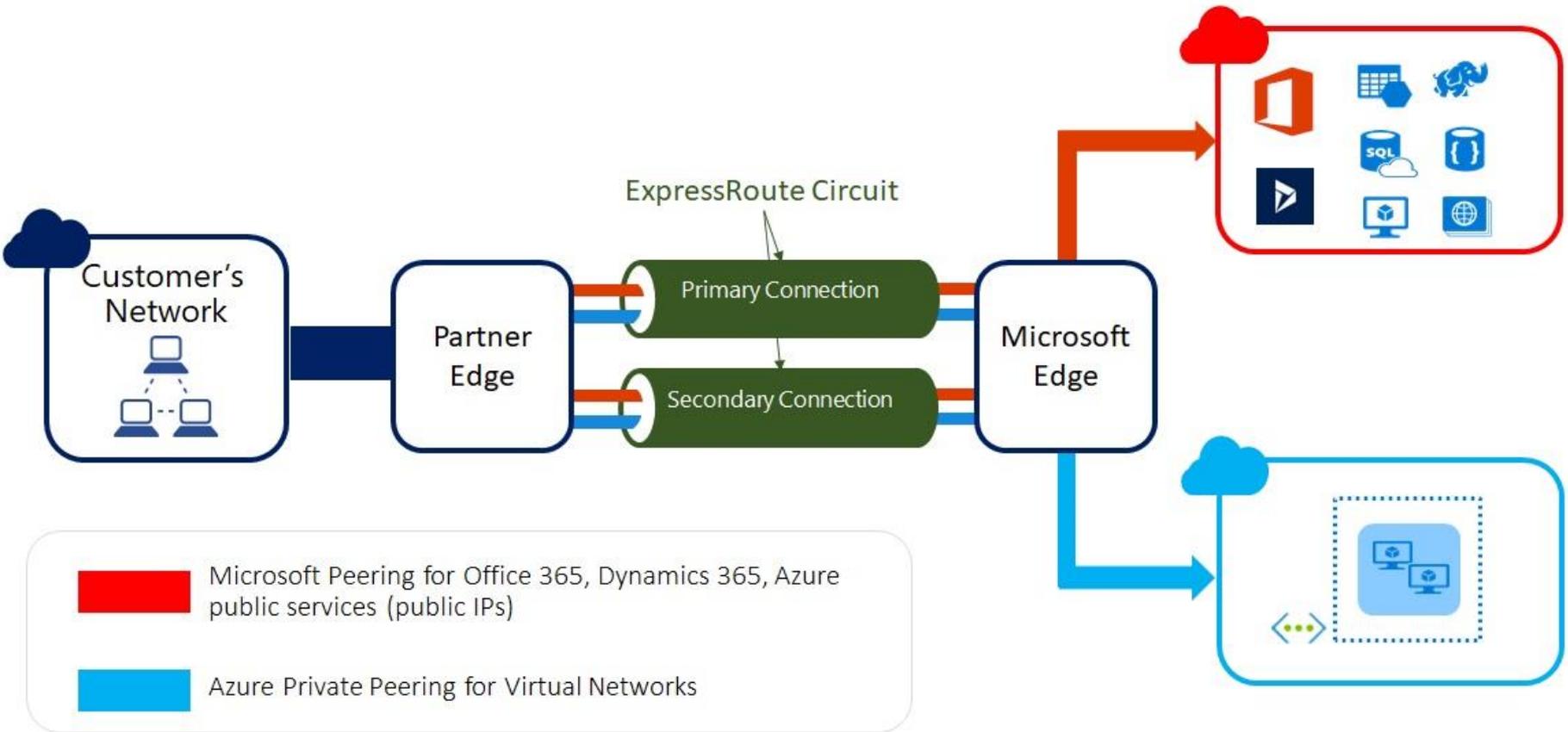
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Agenda



- What is Express Route ?
- What does GÉANT ?
- Pros and Cons
- When/why use it?
- Technical aspects

What is Express Route



(From Microsoft website)

What is Express Route



- A private connection to the Microsoft cloud services
- A redundant layer 2 VPN tunnel to Microsoft
- A routing protocol (BGP) to guarantee connectivity



What does GÉANT



- GÉANT has signed a partnership agreement with Microsoft to act as network connectivity provider
- The agreement connects Microsoft's cloud services directly to Europe's research and education community
- The partnership agreement is part of the GÉANT Project's cloud activity
- <https://cloud.geant.org>

Pros and Cons



- Dedicated layer 2 connection
- Scalable bandwidth (in theory up to 10Gbps)
- Private IP addressing with BGP for better resilience
- Independent from IP connectivity (commercial Internet connection)

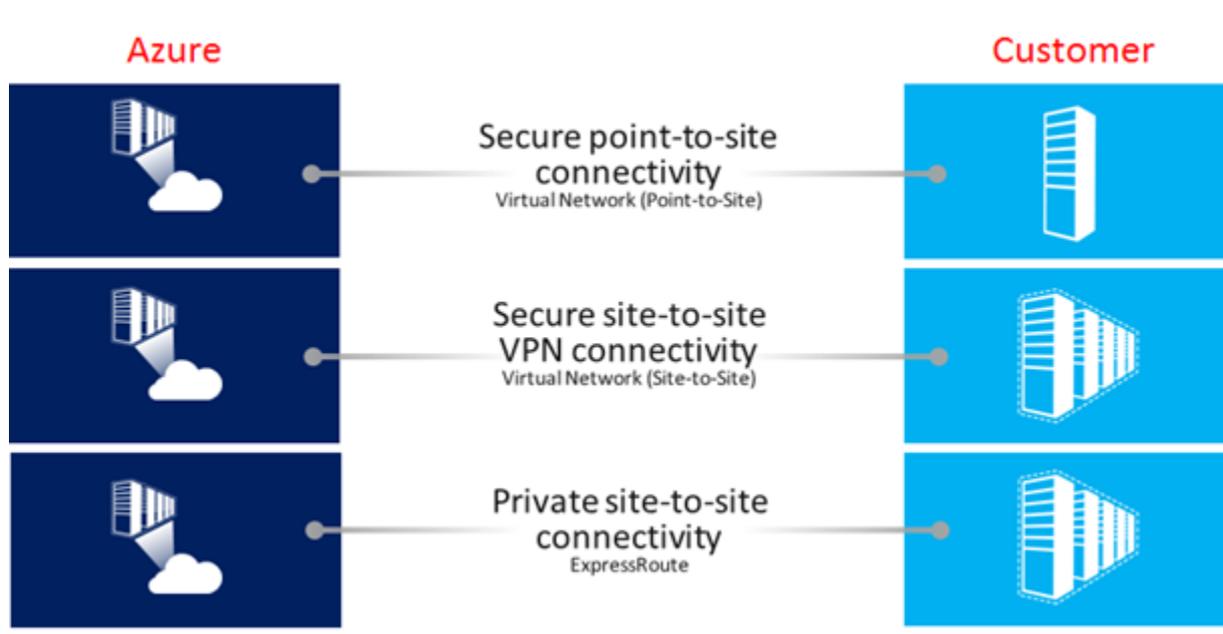
- Azure cloud data unavailable on public internet

When/why use it?



- You need virtualization logically within your own network
- You don't want the possibility to access the data from public internet
- Examples: MySQL Database, LDAP server, SharePoint, Intranet,...

When/why use it?



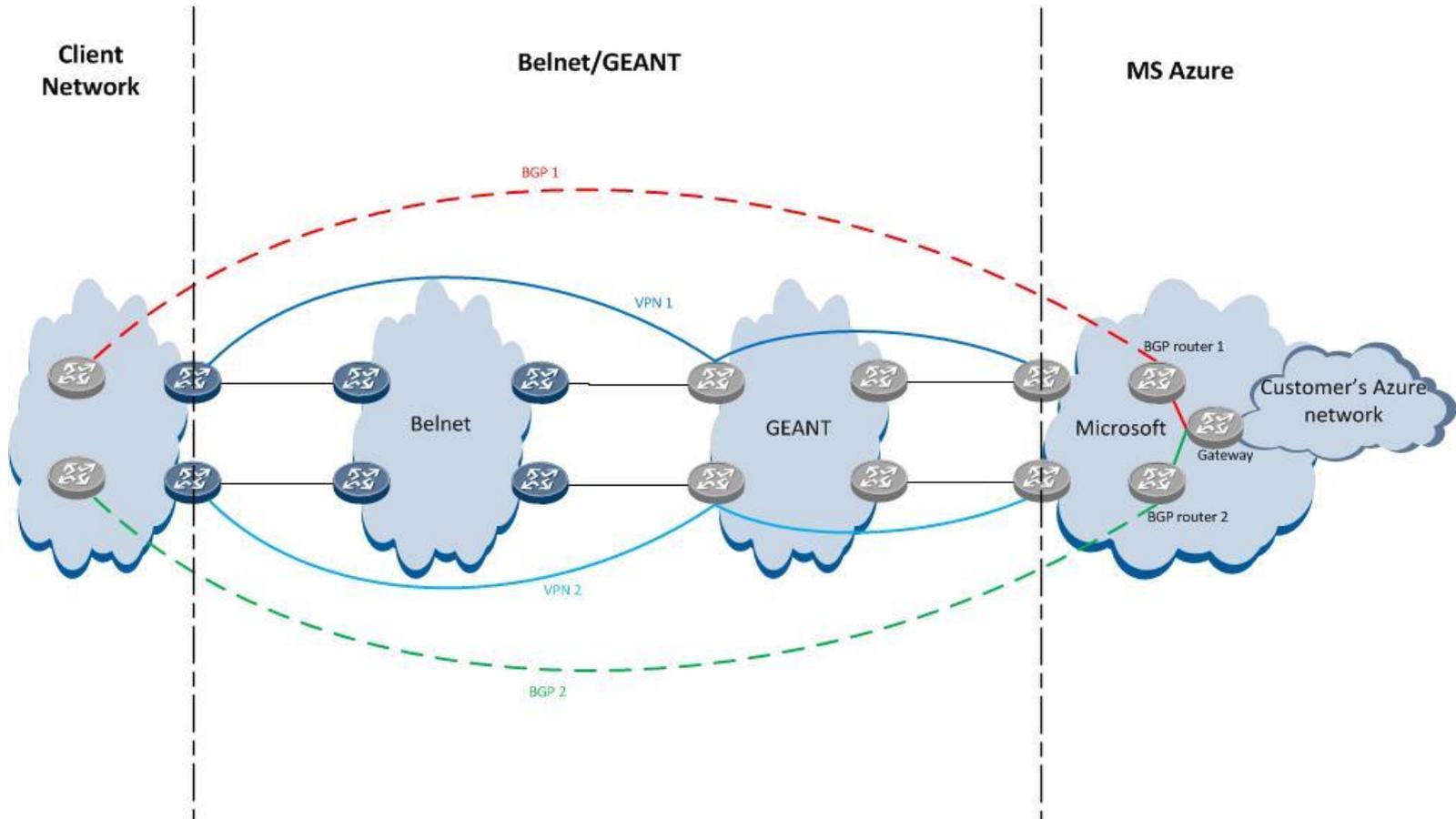
(From Microsoft website)

Cloud Connect MS Azure vs. VPN through Internet



- Belnet and Microsoft are connected on the BNIX, no advantages for Cloud Connect concerning response time
- Geant connection to Belnet in only 1 datacenter (this should change in the future)
- Microsoft connection on BNIX in only 1 datacenter
- VPN uses commercial Internet, Cloud Connect is not taken into account for the Internet available bandwidth

Technical aspects



Important remark



- The user pays Microsoft as soon as he activate his service key.
- We (Belnet) need some time to configure the connection.
- To avoid paying a service without receiving it for too long, it is better to let us know you want Express Route, before activating it by Microsoft.
- We (Geant) needs the service key to activate the service by Microsoft, so once you receive the service key it will take a couple of days for Geant to configure the final touch to the connection.

Commercial info / pricing



- Installation fee: 750 euro (one time fee)
- Annual fee: 1.700 euro for 100Mbps and 1Gbps for a redundant connection to Microsoft



And now, the real technical part...

Expressroute How to...

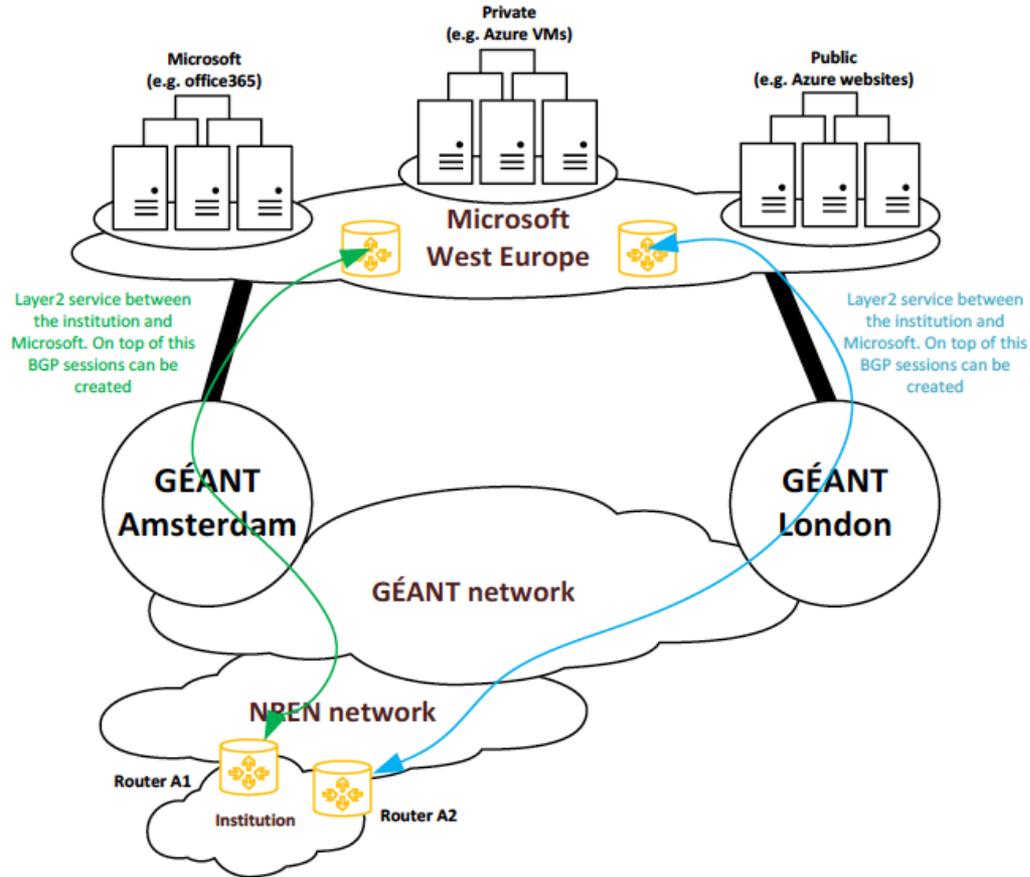


Preconditions

To be able to request and setup an ExpressRoute connection via GÉANT institutions should consider the following conditions and requirements:

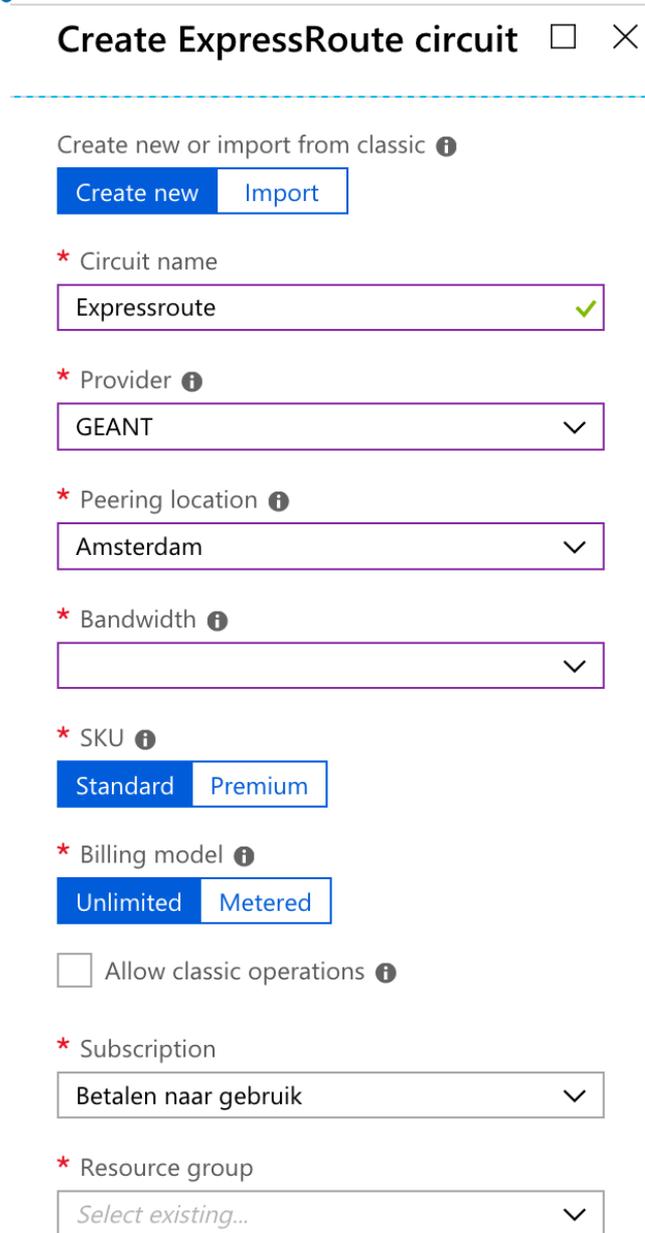
- You must have a valid Microsoft account with an active Azure subscription
- You must have connectivity to an NREN that is connected to GÉANT
- You need a device that is capable of handling double tagged VLANs (IEEE 802.1ad)1
- You must have a router that runs BGP

Expressroute How to...



Expressroute How to...

- First step → Request Expressroute via Azure Portal
 - Provider: Géant
 - Determine bandwidth, subscription, billing model (depending needs)



The screenshot shows the 'Create ExpressRoute circuit' form in the Azure portal. The form is titled 'Create ExpressRoute circuit' and has a close button (X) in the top right corner. Below the title, there is a section 'Create new or import from classic' with two buttons: 'Create new' (highlighted in blue) and 'Import'. The form contains several required fields, each marked with a red asterisk and an information icon (i):

- * Circuit name:** A text input field containing 'Expressroute' with a green checkmark on the right.
- * Provider:** A dropdown menu showing 'GEANT' with a downward arrow.
- * Peering location:** A dropdown menu showing 'Amsterdam' with a downward arrow.
- * Bandwidth:** A dropdown menu that is currently empty.
- * SKU:** Two buttons: 'Standard' (highlighted in blue) and 'Premium'.
- * Billing model:** Two buttons: 'Unlimited' (highlighted in blue) and 'Metered'.
- Allow classic operations
- * Subscription:** A dropdown menu showing 'Betalen naar gebruik' with a downward arrow.
- * Resource group:** A dropdown menu showing 'Select existing...' with a downward arrow.

Expressroute How to...



- Expressroute created in state 'not provisioned'

ExpressRoute-circ... bestellingensurfn... (Default Directory)

GEANT_test_circuit ExpressRoute circuit

Initiate the provisioning process with your service provider.

Essentials

Resource group	Provider
GEANT-TEST	GEANT
Circuit status	Provider status
Enabled	Not provisioned
Location	Peering location
West Europe	Amsterdam
Subscription name	Bandwidth
Azure ExpressRoute pilot	50 Mbps
Subscription ID	Service key
488a471a-8625-4815-aa55-bf1ebac0551e	39bd834f-e6fb-479b-ba57-feac5245ceae

All settings →

- Send us the service key

Expressroute How to...



- Belnet asks Géant to provision the Expressroute
- Two VLANs are communicated for redundant setup:
 - Primary VLAN directly to Amsterdam
 - Secondary VLAN via London to Amsterdam
- Belnet sets up a layer2 circuit from customer to the edge with Géant.
 - Customer port(s) becomes a trunk with IP + VLAN determined by Géant
 - Géant picks up the VLAN and transports it to Microsoft.

Expressroute How to...



Resource group ([change](#))
test-expressroute-services

Circuit status
Failed

Location
West Europe

Subscription ([change](#))
Betalen naar gebruik

Subscription ID
834ccbe6-e2c9-4f9d-80ee-9f988c3d82e0 

Tags ([change](#))
[Click here to add tags](#)

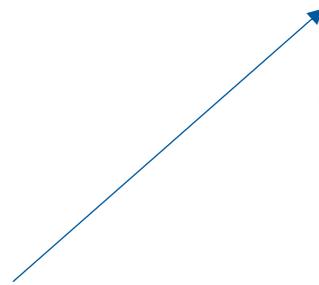
Provider
GEANT

Provider status
Provisioned

Peering location
Amsterdam

Bandwidth
100 Mbps

Service key
a5b763de-adc1-4392-9a98-4c900d7516ca



Expressroute in state provisioned

Expressroute How to...



- Here comes the tricky part
 - Setup your BGP session towards Azure
 - Encapsulating you traffic in the correct VLAN to be transported over Belnet and Géant

Expressroute How to...



- Setting up you BGP session
 - Click on your Expressroute and select Private peering

The screenshot shows the Azure portal interface for configuring a Private peering session on an ExpressRoute circuit named 'GEANT_test_circuit'.

Essentials:

- Resource group: GEANT-TEST
- Circuit status: Enabled
- Location: West Europe
- Subscription name: Azure ExpressRoute pilot
- Subscription ID: 488a471a-8625-4815-aa55-bf1ebac0551e
- Provider: GEANT
- Provider status: Provisioned
- Peering location: Amsterdam
- Bandwidth: 50 Mbps
- Service key: 39bd834f-e6fb-479b-ba57-feac5245ceae

Private peering configuration:

- Peer ASN: 65000 ✓
- Primary subnet: 192.168.168.0/30 ✓
- Secondary subnet: 192.168.168.4/30 ✓
- VLAN ID: 500 ✓
- Shared key: yourkeyhere ✓

Peerings table:

TYPE	STATUS	PRIMARY SUBNET	SECONDARY SUBNET	
Azure private	Disabled	-	-	...
Azure public	Disabled	-	-	...
Microsoft	Disabled	-	-	...

Expressroute How to...



- Encapsulate your BGP session in the correct VLAN
 - Primary BGP session in the VLAN communicated by us that goes to Amsterdam
 - Secondary BGP session goes into the VLAN that is transported via London
- Use of QinQ is necessary
 - Azure demands the BGP session to be setup with a tag...
- Once this is configured, check if you can ping the other side and see if BGP comes up
- Don't worry, we're here to help!

Expressroute How to...



- Now you have setup a BGP session
- Next step is determine a Virtual Network and exchange the subnets via BGP
- You need to create a Virtual Network Gateway in Azure to act as Gateway between your network and the Azure Virtual Network.

Expressroute How to...



- Create a virtual network
- Click on the search box and type 'Virtual Network'
- Select and click on create

Create virtual net..

* Name
GEANTTEST ✓

* Address space ⓘ
10.15.20.0/24 ✓
10.15.20.0 - 10.15.20.255 (256 addresses)

* Subnet name
GEANT ✓

* Subnet address range ⓘ
10.15.20.0/24 ✓
10.15.20.0 - 10.15.20.255 (256 addresses)

* Subscription
Azure ExpressRoute pilot ▼

* Resource group ⓘ
 Create new Use existing
GEANT-TEST ▼

* Location
West Europe ▼

Expressroute How to...



- Create a Virtual Network Gateway
- Click in the search box and type 'Virtual Network Gateway', Select and click on create
- Virtual Gateway has to be a subnet taken from the Virtual Network you defined before.
- Takes a long time to create, so be patient...

* Name
GEANT_Gateway ✓

* Virtual network ⓘ
GEANT_TEST >

* Gateway subnet address range ⓘ
10.15.20.16/28 ✓
10.15.20.16 - 10.15.20.31 (16 addresses)

* Public IP address ⓘ
(new) GEANT_Gateway >

Gateway type ⓘ
VPN ExpressRoute

* Subscription
Azure ExpressRoute pilot ▼

Resource group ⓘ
GEANT-TEST

* Location ⓘ
West Europe ▼

Expressroute How to...



- Attach the Virtual Network gateway to you Expressroute
- Go to your Expreesroute and click on connections
- Click add and attach your Virtual Network Gateway to your Expressroute.

The screenshot displays three overlapping windows from the Azure portal:

- Settings (GEANT_test_circuit):** Shows the left-hand navigation menu with 'Connections' highlighted under the 'GENERAL' section.
- Connections (GEANT_test_circuit):** Shows a table with columns for NAME, STATUS, CONNECTION TYPE, and PEER. The table is currently empty, displaying 'No results'.
- Add connect... (GEANT_test_circuit):** Shows the configuration form for a new connection. The fields are:
 - Name: GEANT (with a checkmark)
 - Connection type: ExpressRoute (dropdown)
 - Virtual network gateway: GEANT_Gateway (dropdown)
 - ExpressRoute circuit: GEANT_test_circuit (dropdown)
 - Subscription: Azure ExpressRoute pilot (dropdown)
 - Resource group: GEANT-TEST (dropdown)
 - Location: West Europe (dropdown)

Expressroute How to...

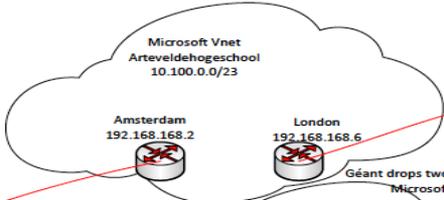


- Check if you are receiving the virtual network via BGP into your network
- You can check routing table in Azure to see if all is well received. You can check the detail of your peering session
- Test failover
- Be aware that the secondary VLAN goes via London, which means double latency
- Create a Virtual Machine in your Virtual network and perform tests.

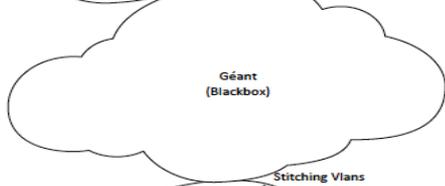
Expressroute User case Arteveldehogeschool



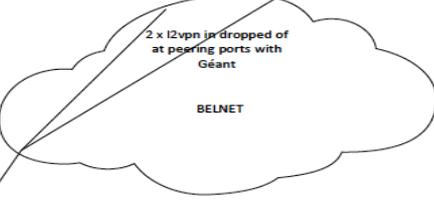
- First to sign in the POC
- I was working there...
- Two juniper loans from Belnet to test



Géant drops two Vlan at Microsoft



Stitching Vlans



2 x I2vpn is dropped of at peering ports with Géant

VLAN 4082 Expressroute1
VLAN 4083 Expressroute2



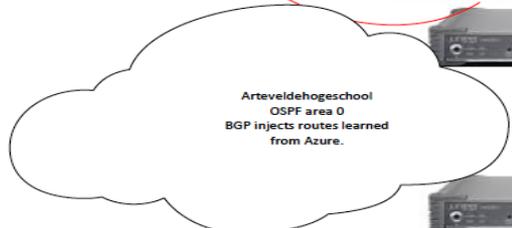
BGP session
Latency between ptp addresses is 16ms

BGP session (Primary)
Latency between ptp addresses is 6ms
Learns subnet Azure and injects it via OSPF in the Network of Artevelde.
Exports subnets on from Artevelde.

Trunk Vlan 4082 and 4083



QinQ for transport to Belnet



Expressroute1 Juniper SRX 300
10.2.2.249
Ge0/0/0/1 BGP Sessie PRIMAIR in VLAN 500
IP 192.168.168.1, neighbour 192.168.168.2

BGP



Expressroute2 Juniper SRX 300
10.2.2.249
Ge0/0/0/1 BGP Sessie Secundair in VLAN 500
IP 192.168.168.5, neighbour 192.168.168.6



Thank you
for your attention

Beinet
dedicated connectivity



Belnet
dedicated connectivity



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