

***Interconnection of Public Clouds with the DE-CIX
Cloud ROUTER.***

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DE-CIX | Luis Horvath | Cloud Consultant



There is a new trend... MultiCloud

Benefits →

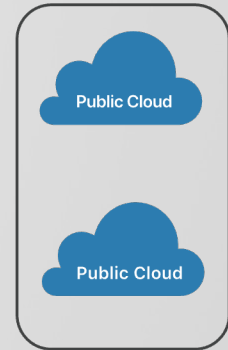
- Get the best out of the Cloud Providers by cherry-picking the services
- Cost savings
- You dictate which technologies to deploy, not your vendor
- We can serve our by client proximity

Challenges →

- Latency
- High Complex Architectures
- No transparency
- High networking & infrastructural costs (DC Locations)
- More attack surface
- You most need to know what you gonna want and have a good design



Application



How many of you identify with this picture?

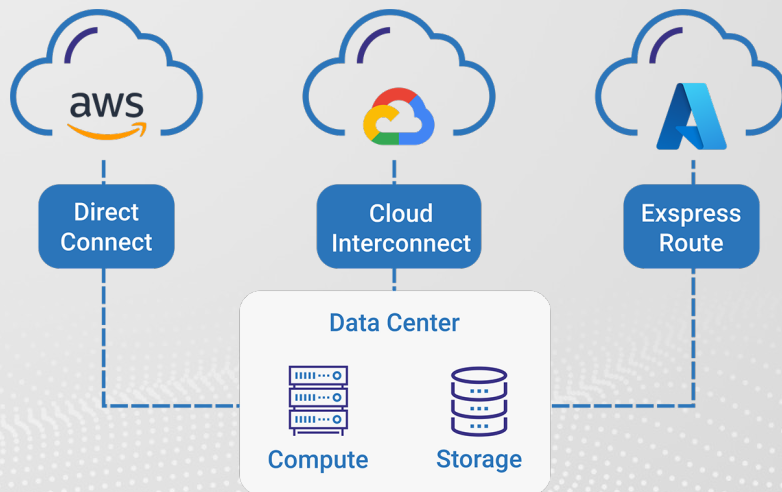


Today is your lucky day, because we will be in a scenario of a networking architect which will have to implement a hybrid multi-cloud architecture*...

**** We already have the hybrid architecture (directly connected)***

Requirements from the CTO – Hybrid Multi-Cloud

- Have the minimum possible latency between clouds
- Reduce the complexity of the architecture
- Transparent & Secure Solution
- The connections must be Redundant, High Available and Resilient
- We need SLA
- It has to be a High-performance network
- Cost-Effective



What should we do now?

A

Gently say NO

B

Go to Lourdes

C

Ask an expert

D

Leave the company

WHO ARE WE?

***WHAT DO
WE DO?***



***DE-CIX at a glance** – the largest carrier & data center neutral interconnection ecosystem in the world*

45

internet & cloud exchanges

600+

cities

50+

cloud partners

1,000+

data centers

3,000+

connected networks

119+

Tbit capacity



North America (x5)

Chicago, Dallas, New York, Phoenix, Richmond

Asia Pacific (x9)

Brunei, Chennai, Delhi, Kuala Lumpur, Kolkata, Johor Bahru, Manila, Mumbai, Singapore

EMEA (x31)

Aqaba, Athens, Baghdad, Barcelona, Berlin, Bucharest, Copenhagen, Dubai, Dusseldorf, Esbjerg, Frankfurt, Hamburg, Helsinki, Istanbul, Kinshasa, Kristiansand, Lagos, Leipzig, Lisbon, Madrid, Marseille, Munich, Oslo, Palermo, Prague, Ruhr region, Sofia, Tripoli, Warsaw

DE-CIX Edge Devices

7750 Service Router (SR)

- Scalable, comprehensive and deterministic routing for 5G and the cloud
- Powered by Nokia 6.0 Tb/s FP5, 3.0 Tb/s FP4 silicon and 400 Gb/s FP3 silicon
- Versatile 10GE, 25GE, 50GE, 100GE, 200GE, 400GE, 800GE and up to 1.6T clear channel interfaces
- Secure IP networks with ubiquitous, line-rate ANYsec encryption, without performance impact
- Precise attack sensor and mitigation element in a network-based DDoS protection solution
- Proven and highly resilient SR OS software delivers a rich set of IP routing capabilities



7750 SR-1s (fixed, modular)

- 4.8 Tb/s (FD), 3.0 Tb/s (FD) or 2.4 Tb/s (FD); 3RU
- 1 slot, up to 4.8 Tb/s (FD), with 12 Tb/s intelligent aggregation
- 24 x QSFP-DD 400GE
- 120 x QSFP28 100GE
- 360 x QSFP28 10GE
- 32 x SFP-DD 10/25/100GE



7750 SR-1se

- 19.2 Tb/s (FD); 3RU
- 1 slot, up to 19.2 Tb/s (FD), all ports are line rate
- 24 x QSFP-DD 800GE
- 48 x QSFP-DD 400GE
- 192 x QSFP28 100GE
- 360 x QSFP28 10GE



7750 SR-2s

- 9.6 Tb/s (FD); 5RU
- 2 slots, 4.8 Tb/s (FD) each, with 12 Tb/s intelligent aggregation
- 48 x QSFP-DD 400GE
- 240 x QSFP28 100GE
- 720 x QSFP28 10GE
- 64 x SFP-DD 10/25/100GE



7750 SR-2se

- 36 Tb/s (FD); 5RU
- 2 slots, 18 Tb/s (FD) each, with 19.2 Tb/s intelligent aggregation
- 48 x QSFP-DD 800GE
- 96 x QSFP-DD 400GE
- 384 x QSFP28 100GE
- 720 x QSFP28 10GE
- 64 x SFP-DD 10/25/100/200GE



7750 SR-7s

- 108 Tb/s (FD); 16RU or 17RU
- 6 slots, 18 Tb/s (FD) each, with 19.2 Tb/s intelligent aggregation
- 144 x QSFP-DD 800GE
- 288 x QSFP-DD 400GE
- 1152 x QSFP28 100GE
- 2160 x QSFP28 10GE
- 192 x SFP-DD 10/25/100/200GE



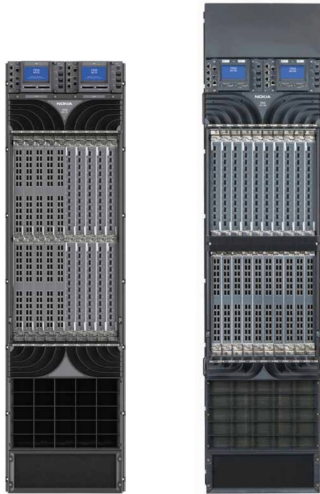
7750 SR-14s

- 216 Tb/s (FD); 27RU or 28RU
- 12 slots, 18 Tb/s (FD) each, with 19.2 Tb/s intelligent aggregation
- 288 x QSFP-DD 800GE
- 576 x QSFP-DD 400GE
- 2304 x QSFP28 100GE
- 4320 x QSFP28 10GE
- 384 x SFP-DD 10/25/100/200GE

DE-CIX Core Devices

7950 Extensible Routing System (XRS)

- Scalable, deterministic and versatile core routing for 5G and the cloud
- Powered by Nokia 3.0 Tb/s FP4 silicon
- Versatile 10GE, 100GE, 400GE, and up to 1T clear channel interfaces
- Optical breakout options include 4 x 100GE, 2 x 100GE, 10 x 10GE, 4 x 10GE
- Proven and highly resilient SR OS software delivers a rich set of IP routing capabilities



7950 XRS-20

- 32 Tb/s (FD); 39RU
- 20 slots, 1.6 Tb/s (FD) each
- 160 x QSFP-DD 400GE
- 320 x QSFP28 100GE
- 120 x CFP2-DCO 100G

7950 XRS-20e

- 48 Tb/s (FD); 44RU
- 240 x QSFP-DD 400GE
- 480 x QSFP28 100GE
- 120 x CFP2-DCO 100G

7250 Interconnect Router (IXR)

- High-port-density, highly scalable interconnect routers
- Terabit-scale routing within data centers and across WANs
- Optical breakout options include 4 x 100GE, 2 x 100GE, 4 x 25GE, 4 x 10GE
- Optimized for next generation of IP mobile transport (anyhaul), fixed-mobile convergence, and mission-critical applications
- Proven and highly resilient SR OS software delivers a rich set of IP routing capabilities
- 7250 IXR-e big, 7250 IXR-Xs, and 7250 IXR-X1 modes: 7x50 Ethernet Satellite port extender or stand-alone router



7250 IXR-e series

- 800, 300, 120, 80 or 64 Gb/s (FD)
- Fixed/1RU ETR
- IXR-e2: 2 x 400GE, 2 x 100/40GE, 24 x 25/10/1GE
- IXR-e big: 2 x 100/40GE, 8 x 25/10GE, 24 x 10/1GE
- IXR-e small: 14 x 10/1GE, 4 x FE/GE
- IXR-e2c: 2 x 100GE, 12 x 25/10/1GE
- IXR-ec: 6 x 10/1GE, 20 x 1GE, 4 x FE/GE



7250 IXR-R4

- 300 Gb/s (FD); 2RU ETR
- 4 slots, 160 Gb/s (FD) each
- 4 x 100/40GE, 16 x 25GE, 42 x 10GE, 80 x GE ports

7250 IXR-R6

- 800 Gb/s (FD); 3RU, ETR
- 6 slots, 160 Gb/s (FD) each
- 6 x 100/40GE, 24 x 25GE, 60 x 10GE, 80 x GE, SONET/SDH, T1/E1 ports



7250 IXR-R6d

- 2.4 Tb/s (FD); 4RU
- 6 half width slots, 500/300 Gb/s (FD)
- 4 x 400GE, 26 x 100GE, 52 x 50GE, 80 x 25GE, 120 x 10GE, 192 x GE

7250 IXR-R6dl

- 2.4 Tb/s (FD); 7RU
- 6 full width slots, 500/300 Gb/s (FD)
- 4 x 400GE, 26 x 100GE, 52 x 50GE, 80 x 25GE, 210 x 10GE, 480 x GE



7250 IXR-X series, IXR-s

- IXR-X3: 14.4 Tb/s (FD); IXR-X1/Xs: 4.8 Tb/s (FD); IXR-s: 800 Gb/s (FD); 1RU
- IXR-X3: 36 x 400GE
- IXR-X1: 4 x 400GE, 32 x 100GE
- IXR-Xs: 6 x 400GE, 48 x 50/25/10GE
- IXR-s: 6 x 100GE, 48 x 10/1GE



7250 IXR-6

- 14.4 Tb/s (FD); 7RU
- 4 slots, 3.6 Tb/s (FD) each
- 144 x 100/40GE, 192 x 10/1GE ports



7250 IXR-10

- 28.8 Tb/s (FD); 13RU
- 8 slots, 3.6 Tb/s (FD) each
- 288 x 100/40GE, 384 x 10/1GE ports



What is a Cloud ROUTER?

It is a virtual router, executed redundantly in our carrier-grade equipment inside of the DCs where we are present, that allows multi-cloud and hybrid-multi-cloud operations for our customers

- It's Metro Based and runs where needed
- Automatically Expands
- Guarantees the lowest possible latency with the maximum performance → (Up to 400Gbps)

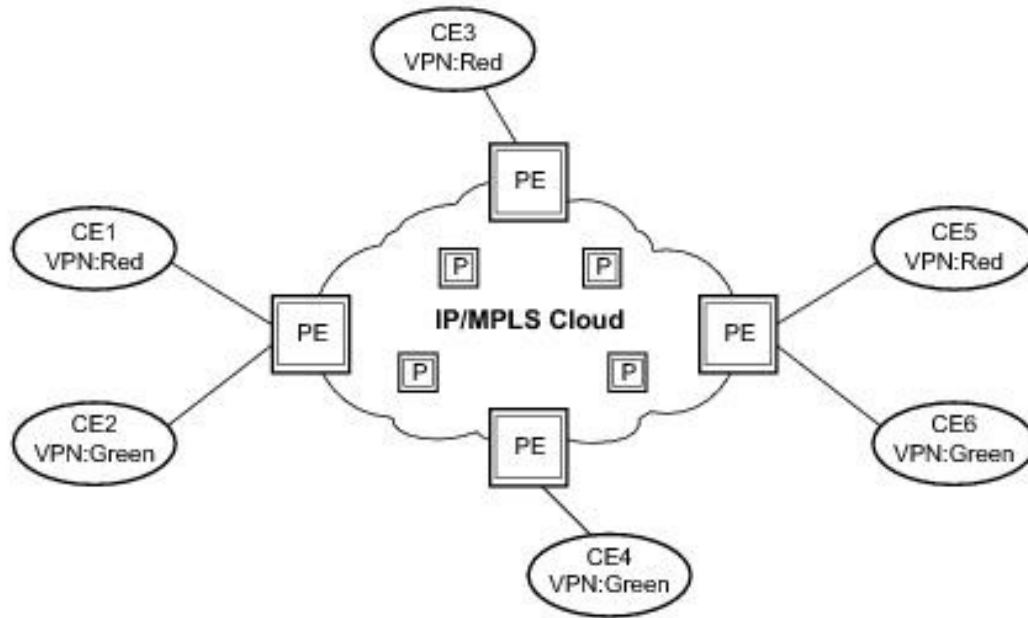
And in the Nokia naming?

Virtual Private Routed Network Service → VPRN

[Documentation](#)



VPRN Service Overview



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VPRN Service Overview

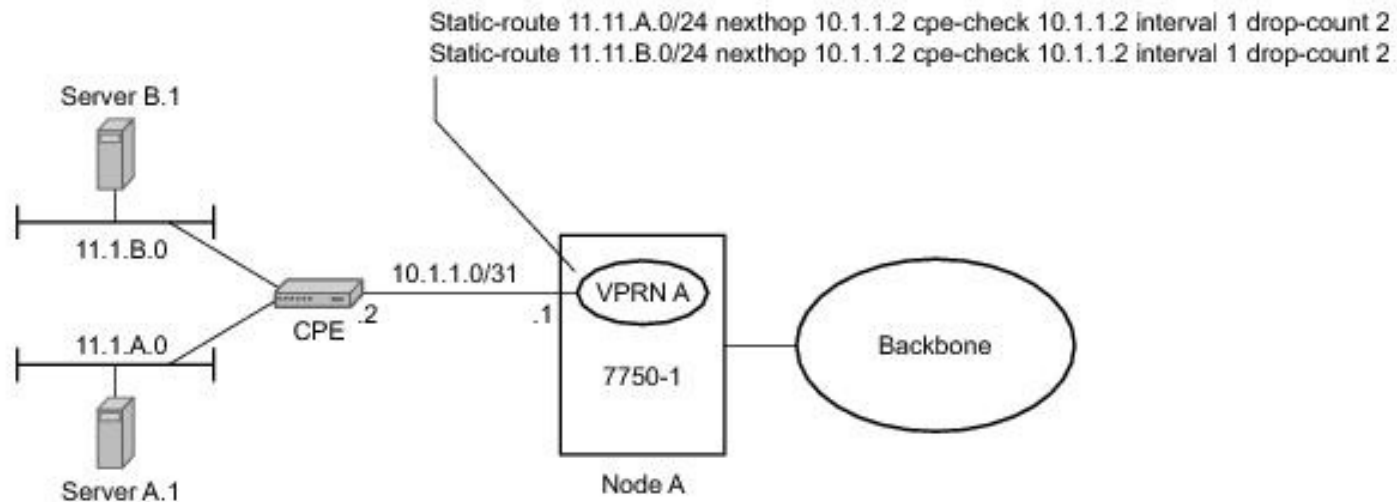


Fig. 18

To the *MULTICLOUD* journey...

Stage 1:

Our CTO wants us to interconnect the DBs in Azure Amsterdam with the computing instances in AWS Frankfurt.

- They need a **Resilient, Redundant & High Available** way to **interconnect** the **clouds**
- With the **minimum latency & Security**
- With **SLA**

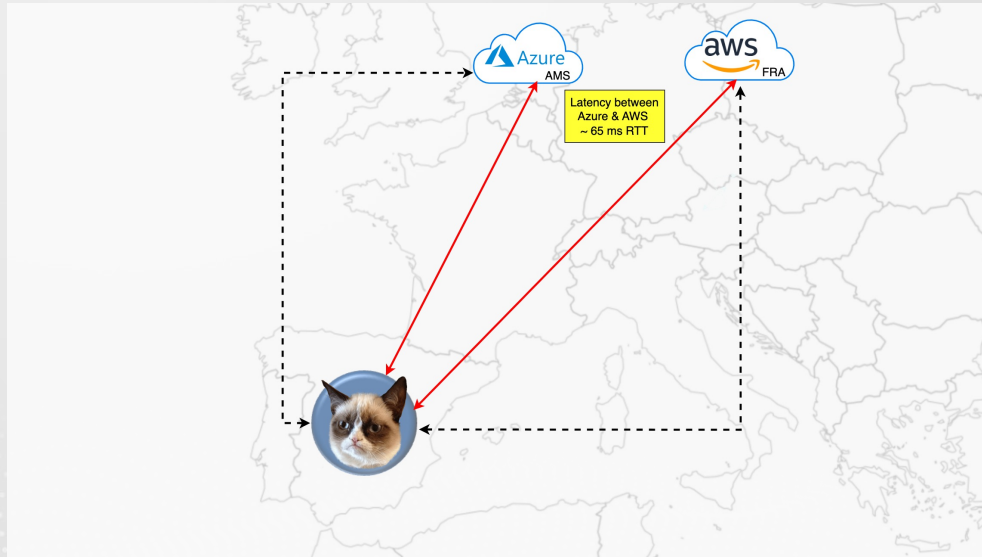
Stage 2:

They want to **add their on-prem in MAD**

To the *MULTICLOUD* journey...

Not so good solution, (I would not recommend it)

- To go via VPN through the public internet and not with a direct connection
- To route back far from the clouds

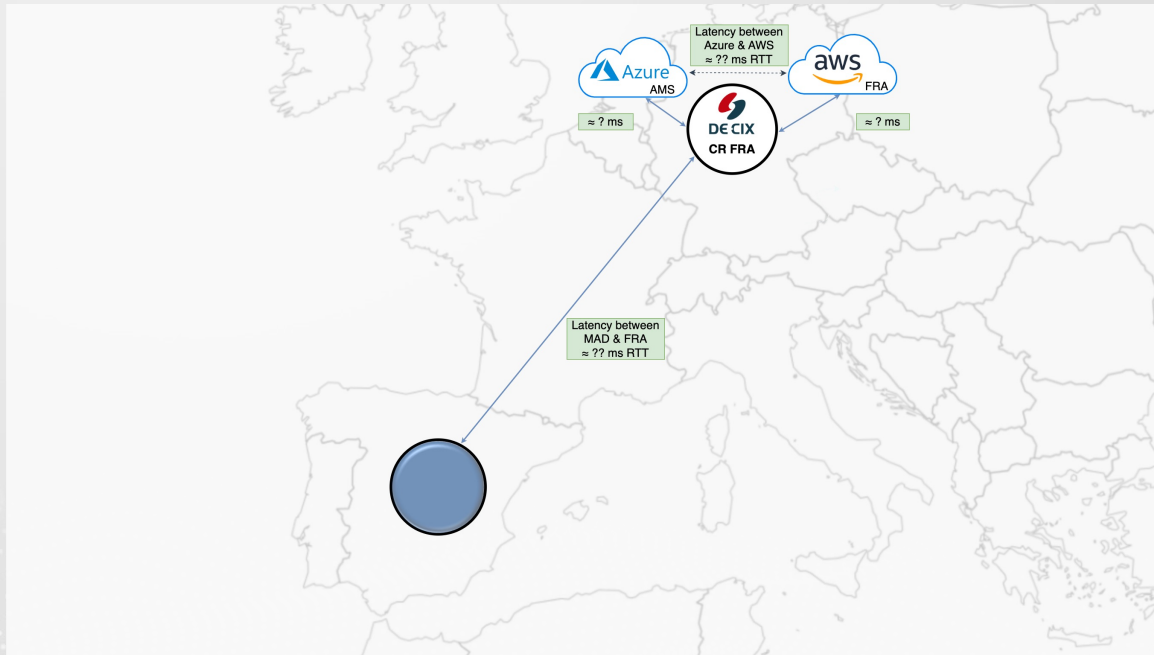


ISP Solution

To the *MULTICLOUD* journey...

A good approach

- To use a Cloud Router to interconnect the Clouds & On-prem in the closest metro area from the CSPs



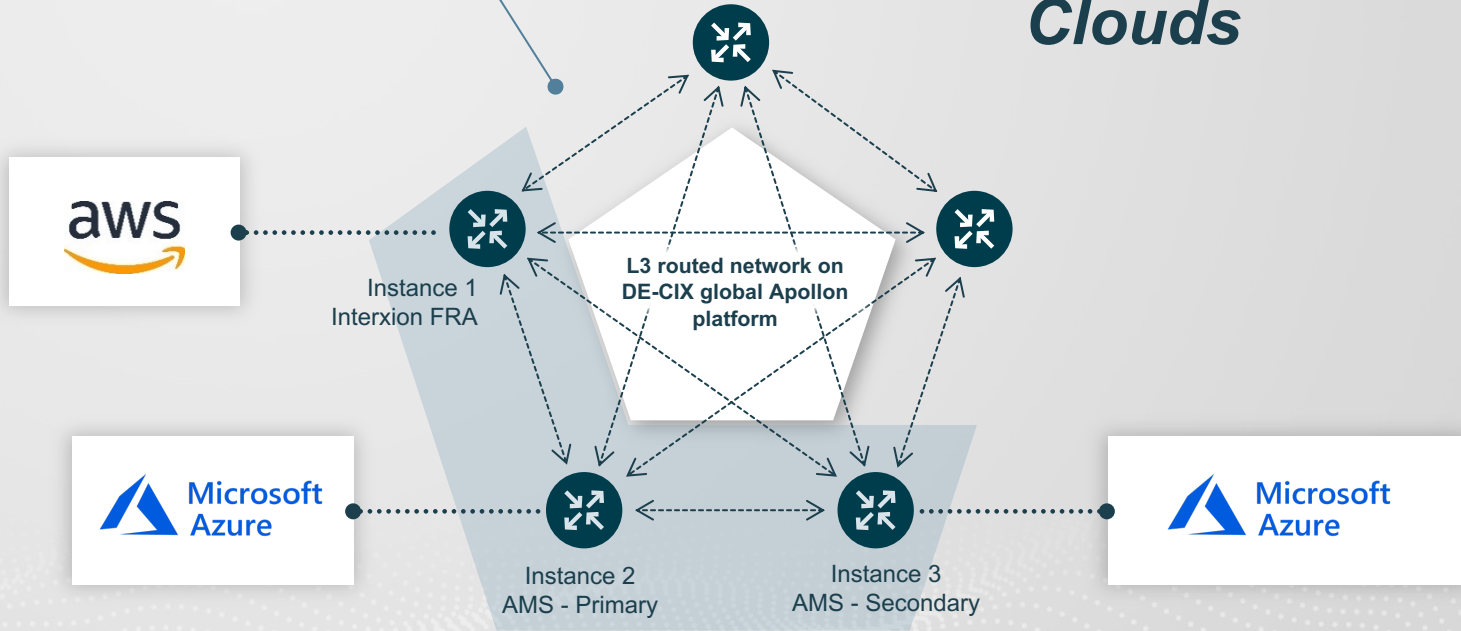
DE-CIX Solution

Stage 1



Cloud Router in Frankfurt
3 instances → 1 Cloud Router

We create a CR in FRA, and we interconnect the Clouds

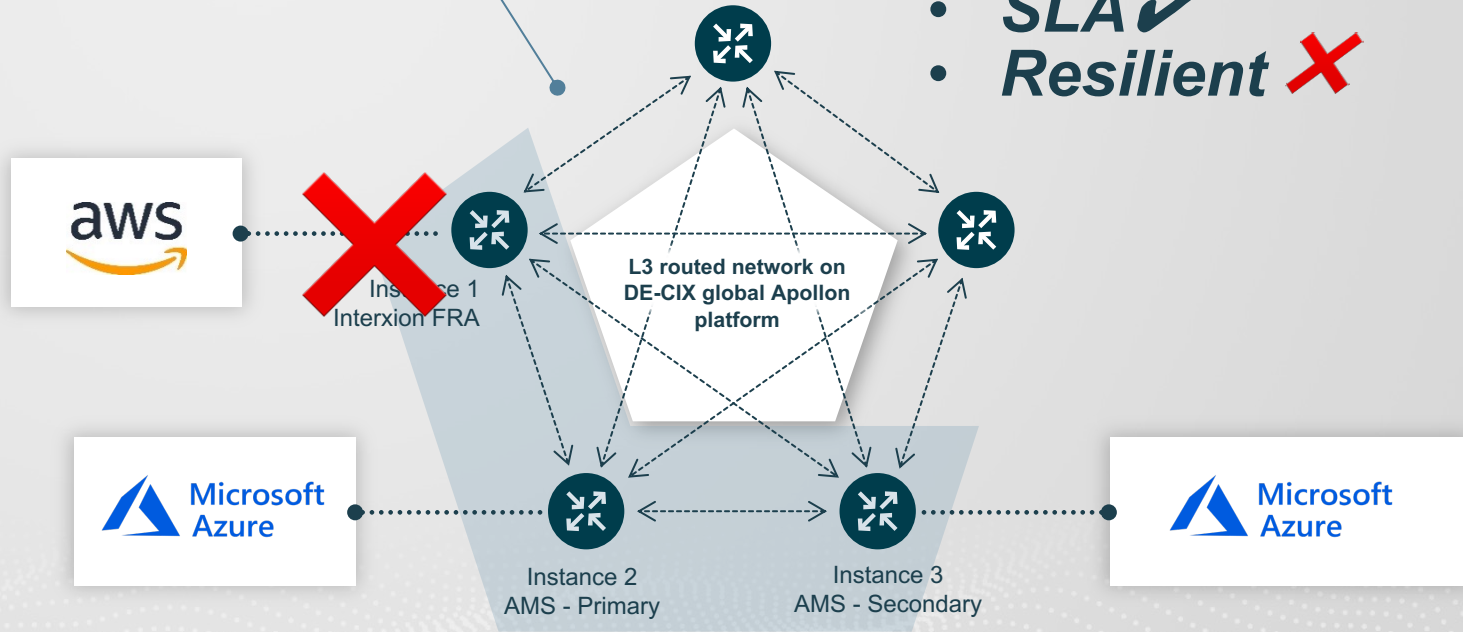


Stage 1



Cloud Router in Frankfurt
3 instances → 1 Cloud Router

- **Minimum Latency** ✓
- **SLA** ✓
- **Resilient** ✗

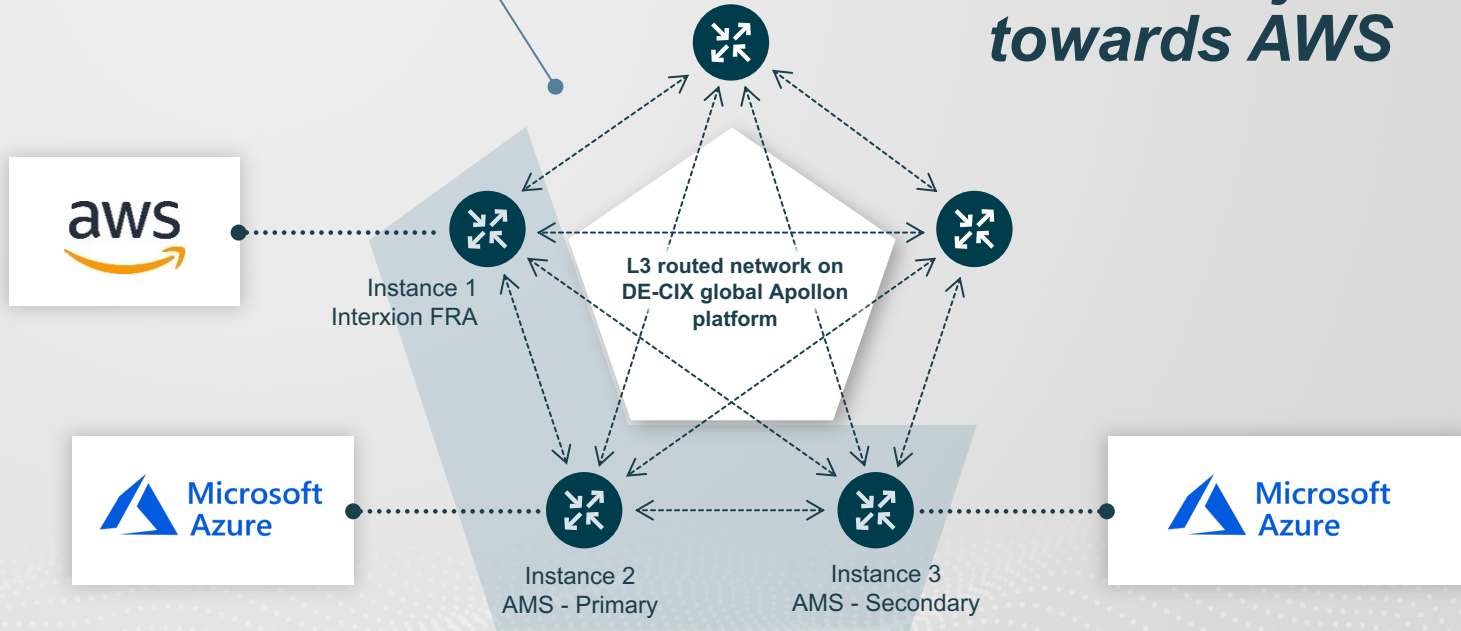


Stage 1



Cloud Router in Frankfurt
3 instances → 1 Cloud Router

- *Let's create secondary VLAN towards AWS*

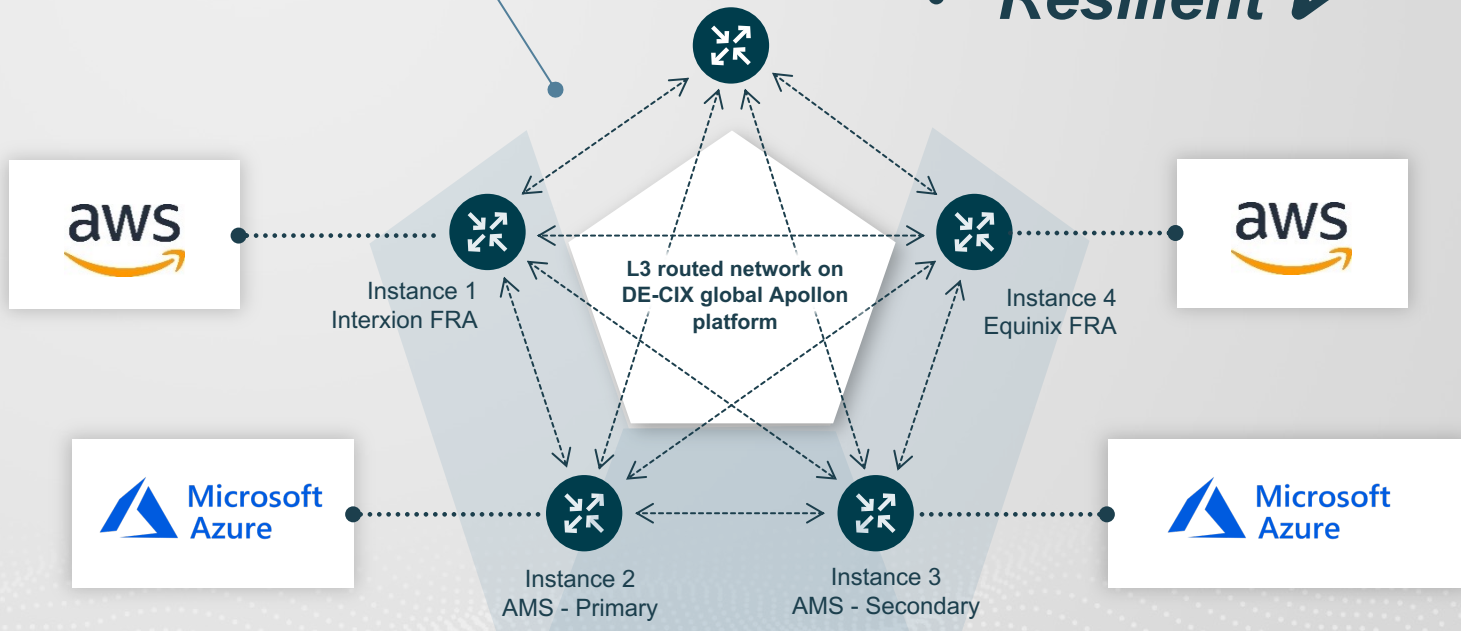


Stage 1



Cloud Router in Frankfurt
4 instances → 1 Cloud Router

- *Minimum Latency* ✓
- *SLA* ✓
- *Resilient* ✓

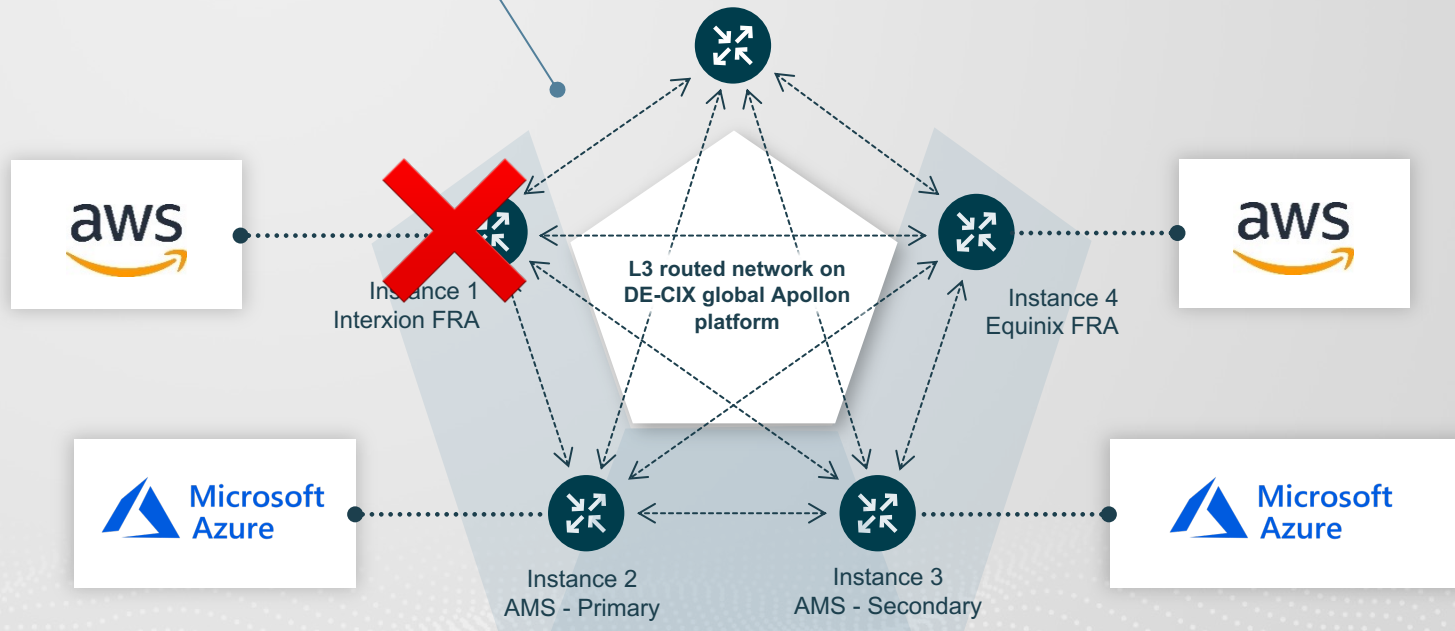


DEMO TIME!

Stage 1



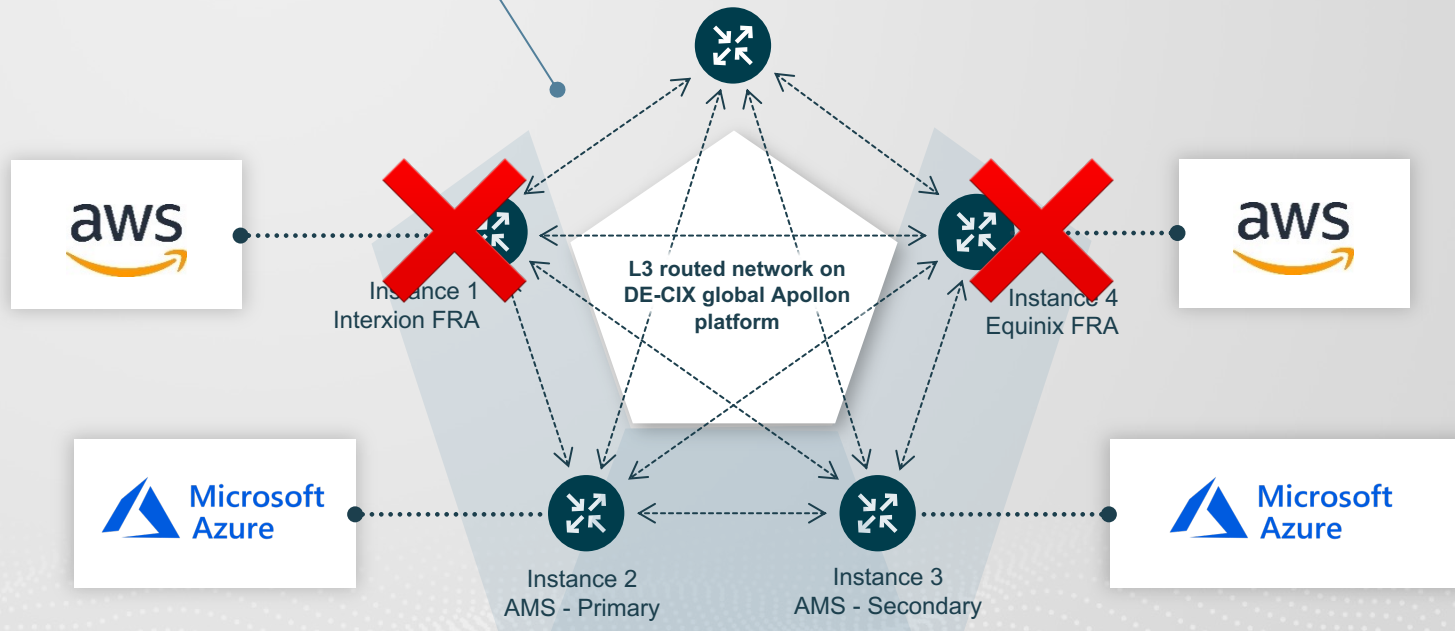
Cloud Router in Frankfurt
4 instances → 1 Cloud Router



Stage 1



Cloud Router in Frankfurt
4 instances → 1 Cloud Router

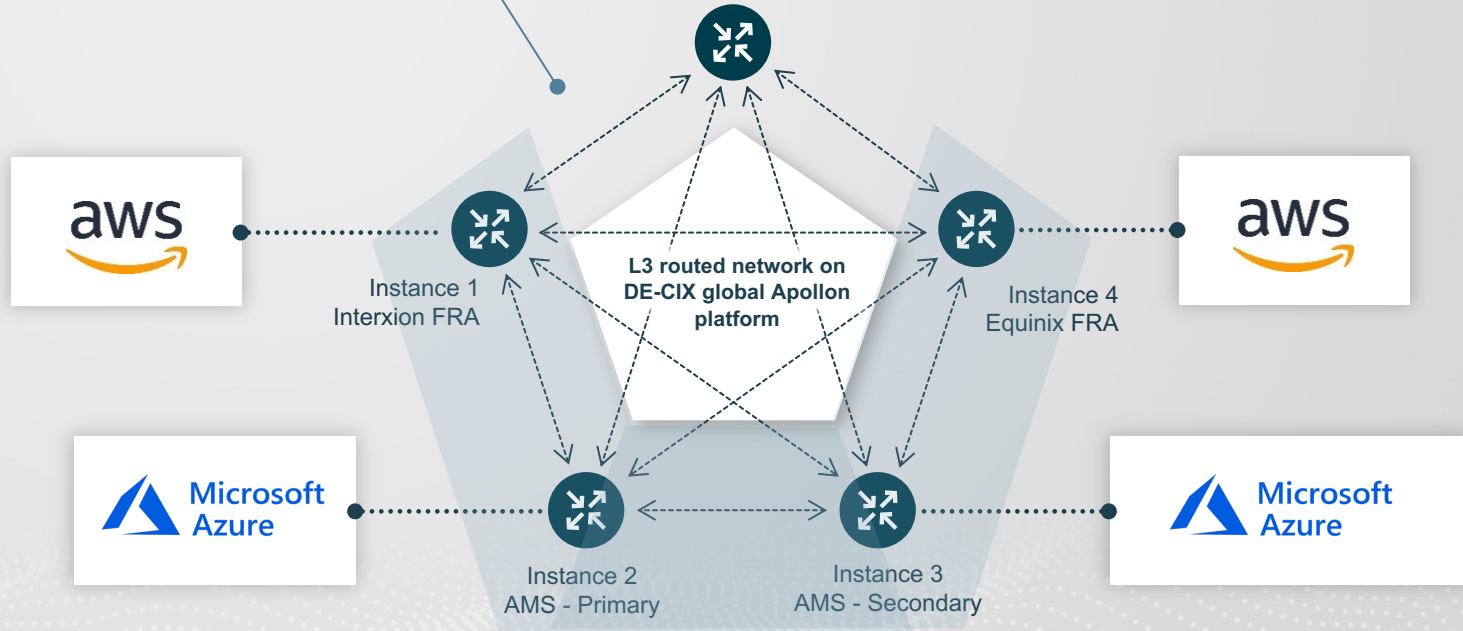


Stage 2



Cloud Router in Frankfurt
5 instances → 1 Cloud Router

We have to add the customer DC

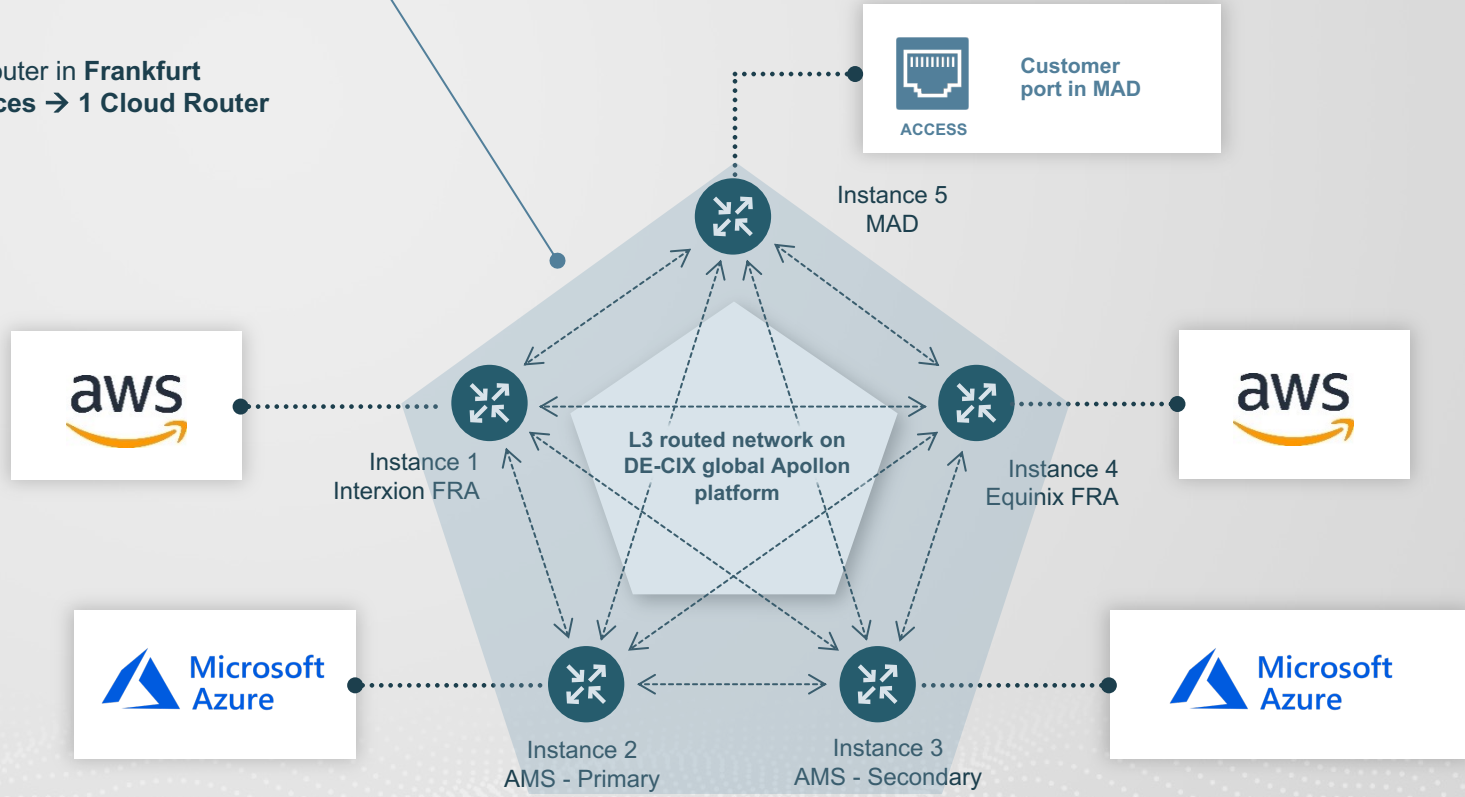


Stage 2

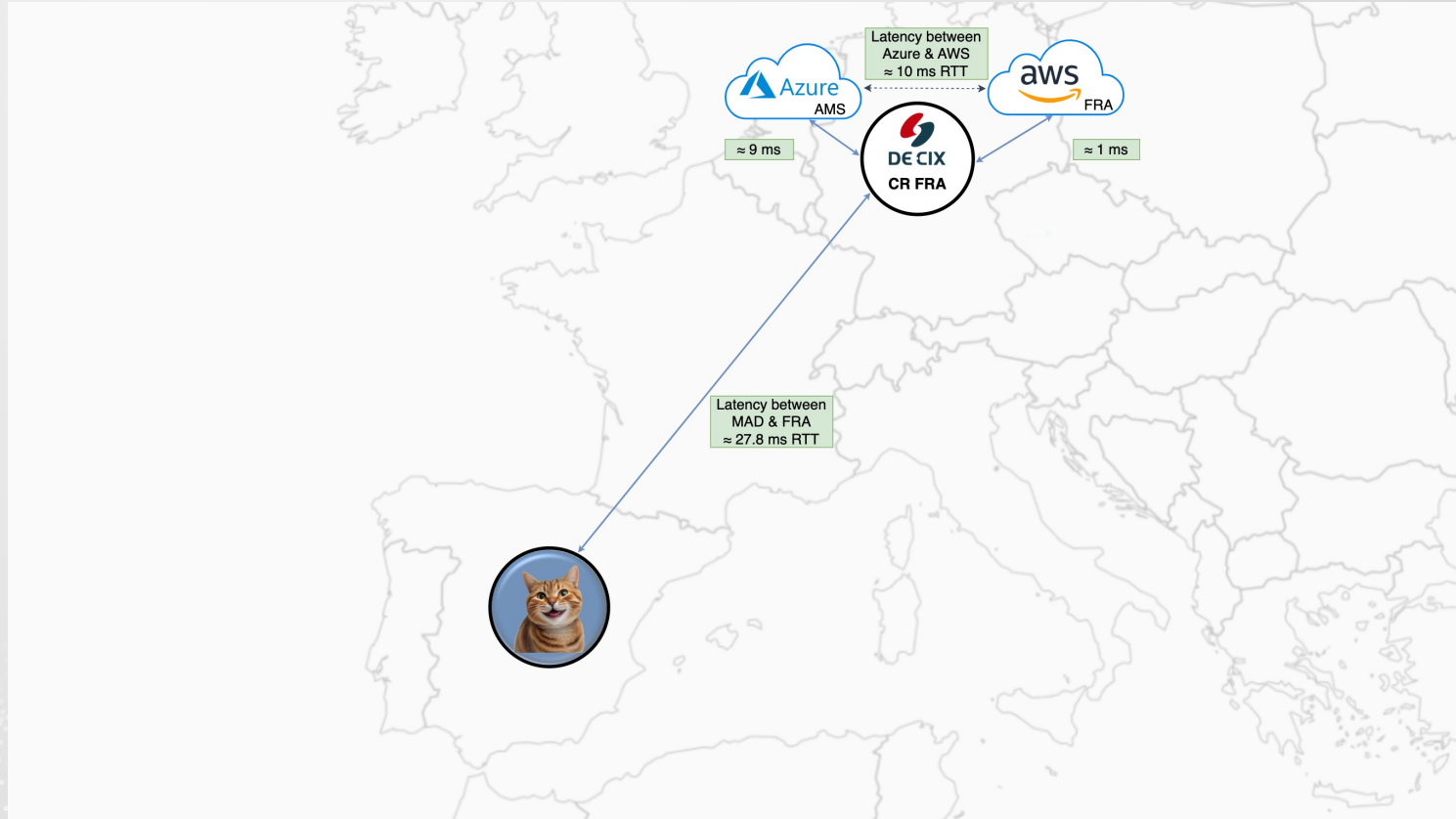
The customer is connected



Cloud Router in Frankfurt
5 instances → 1 Cloud Router



Optimal Solution



IX API – Automating the networks

- Initiative by AMS-IX, DE-CIX and LINX
- Open Source API for provisioning & automating the network services at multiple IXs
 - **Standard:** You don't have to handle numerous different APIs in different IXs
 - **Implementation costs** for customers **can be lowered drastically**
 - **Will overcome the manual provisioning** of interconnections, it can be error-prone and time-consuming
 - Available **24/7/365**

IX  API

<https://ix-api.net/>

Q&A

THANK YOU



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