

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

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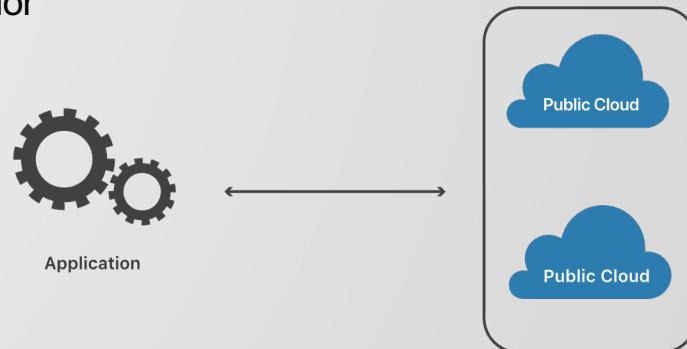
# *There is a new trend... MultiCloud*

## **Benefits →**

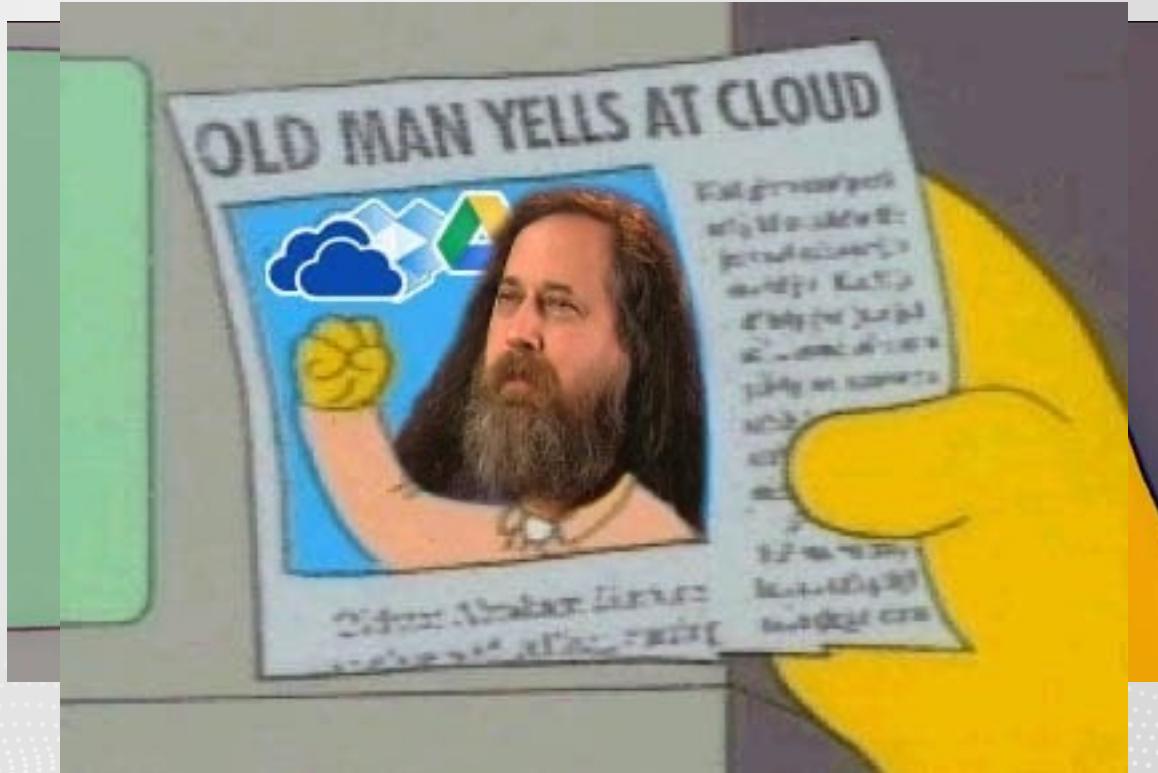
- Get the best out of the Cloud Providers by cherry-picking the services
- Cost savings
- You dictate which technologies to deploy, not your vendor
- We can serve our by client proximity

## **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



*How many of you identify with this picture?*

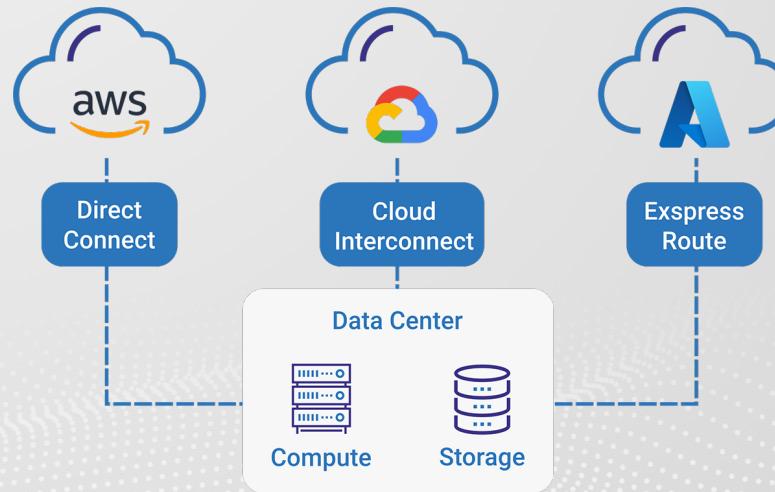


***Today is your lucky day, because we will be in a scenario of a networking architect which will have to implement a hybrid multi-cloud architecture\**...**

***\* 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



**7750 SR-2s**  
• 9.6 Tb/s (FD); SRU  
• 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



**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

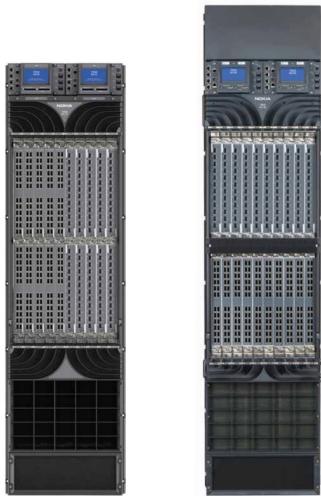


**7750 SR-14s**  
• 216 Tb/s (FD); 27RU or 28RU  
• 12 slots, 18 Tb/s (FD) each, with  
19.2 Tb/s intelligent aggregation  
• 288 x QSFP-DD 800GE  
• 576 x QSFP-DD 400GE  
• 2304 x QSFP28 100GE  
• 4320 x QSFP28 10GE  
• 384 x SFP-DD 10/25/100/200GE

# 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
  - 20 slots, 2.4 Tb/s (FD) each
  - 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-e: 6 x 10/1GE, 20 x 1GE, 4 x FE/GE

### 7250 IXR-R6

- 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-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

## Evolution of the DE-CIX network



# *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)

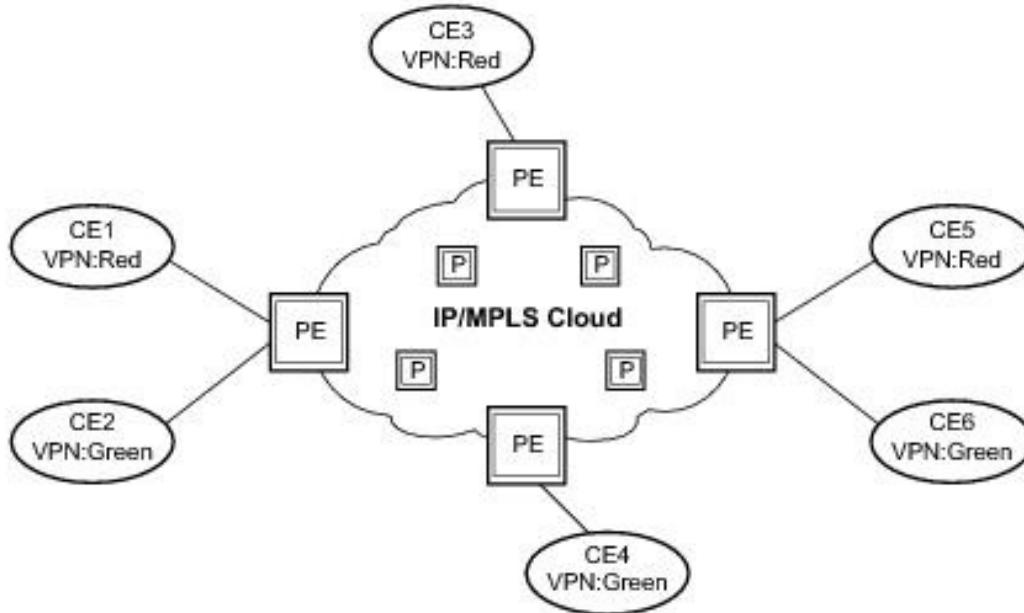
## *And in the Nokia naming?*

Virtual Private Routed Network Service → VPRN

[Documentation](#)

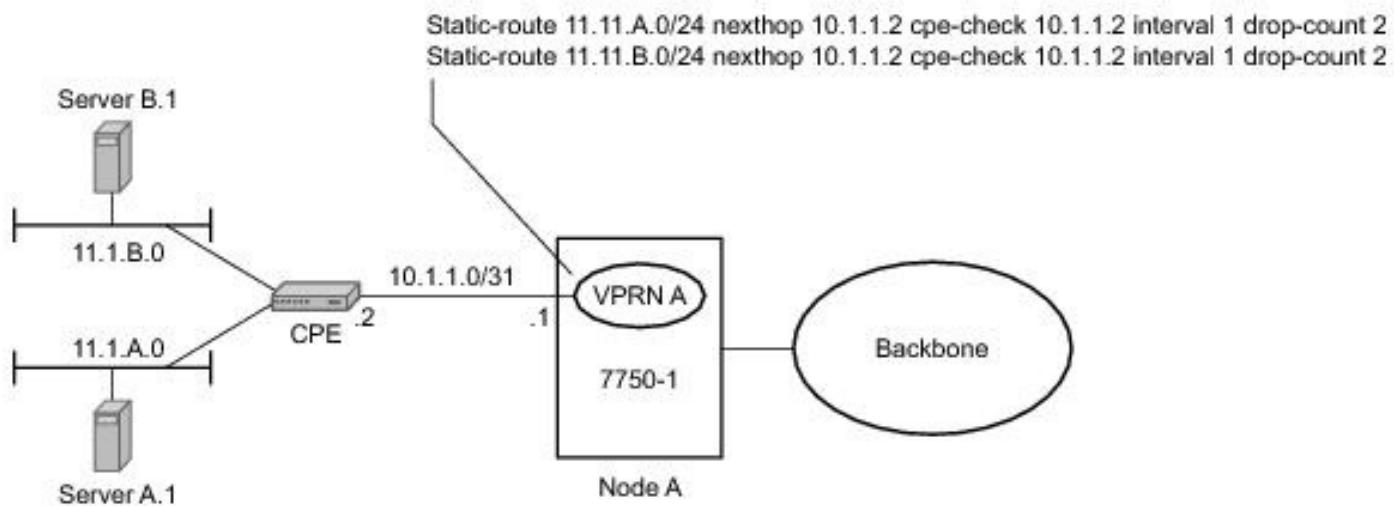


# VPRN Service Overview



03/02/24

# 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**

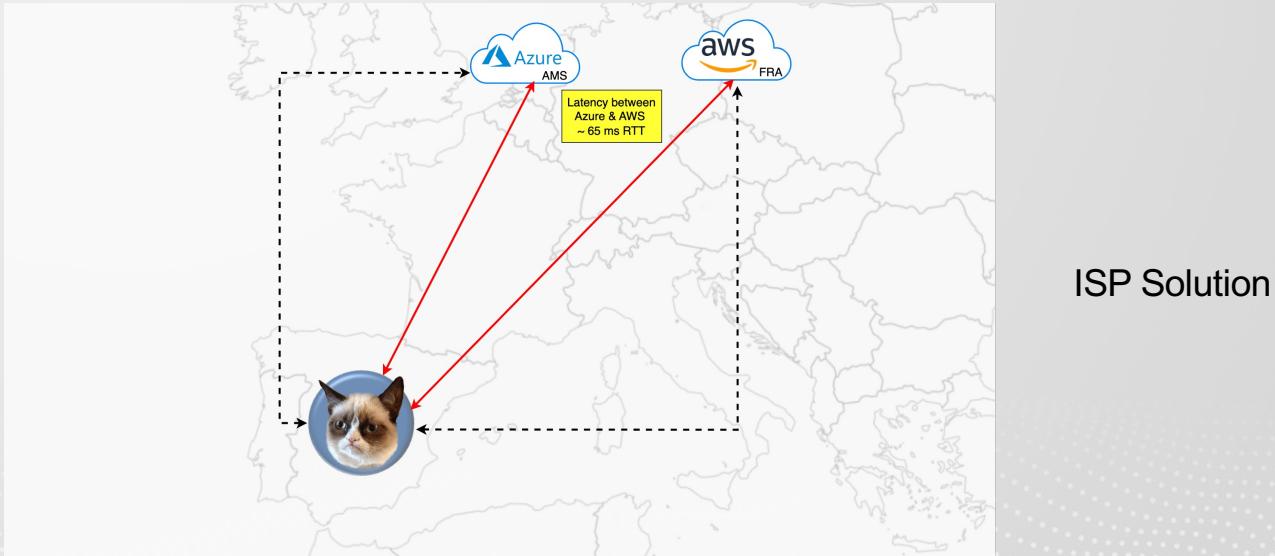
## **Stage 2:**

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

# To the *MULTICLOUD* journey...

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

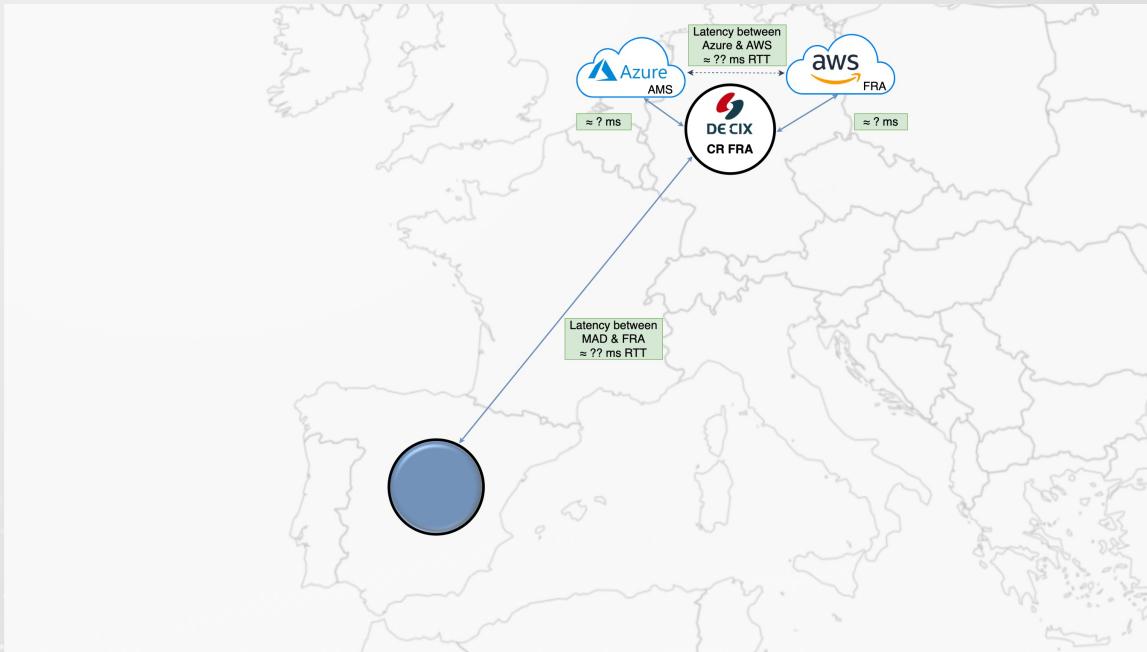
- To go via VPN through the public internet and not with a direct connection
- To route back far from the clouds



# 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

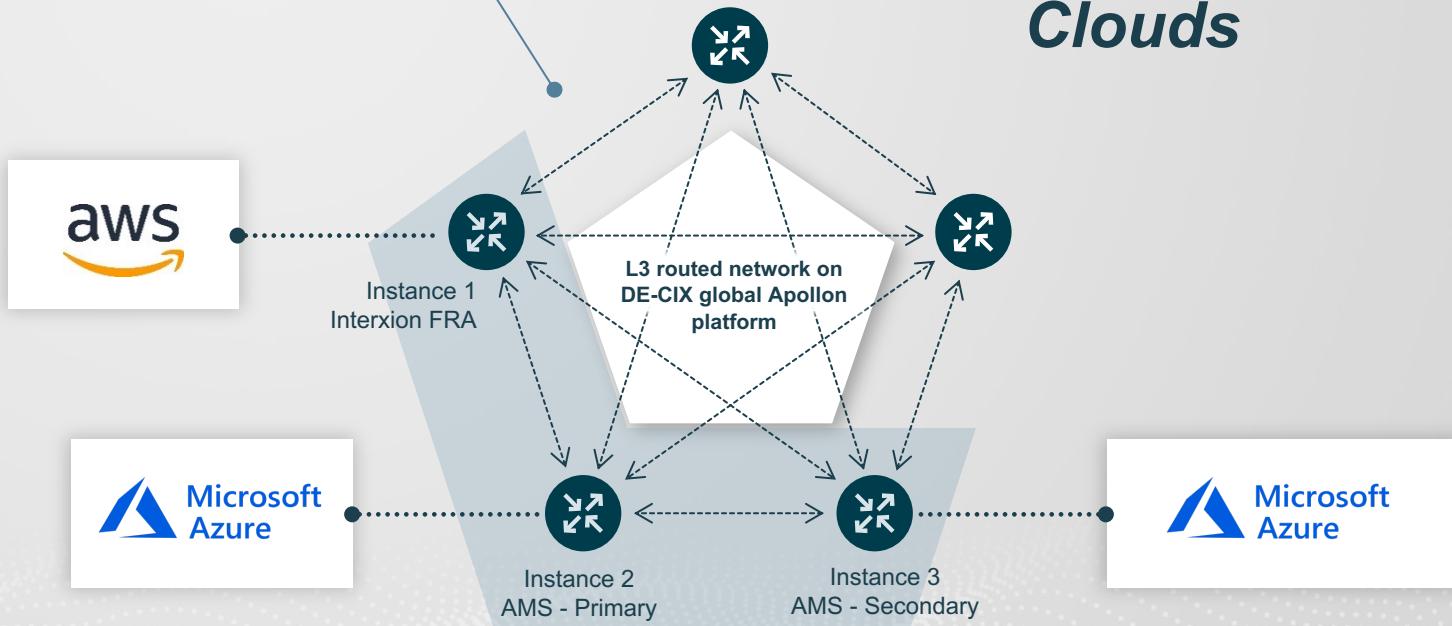


**DE-CIX Solution**



# Stage 1

Cloud Router in Frankfurt  
3 instances → 1 Cloud Router

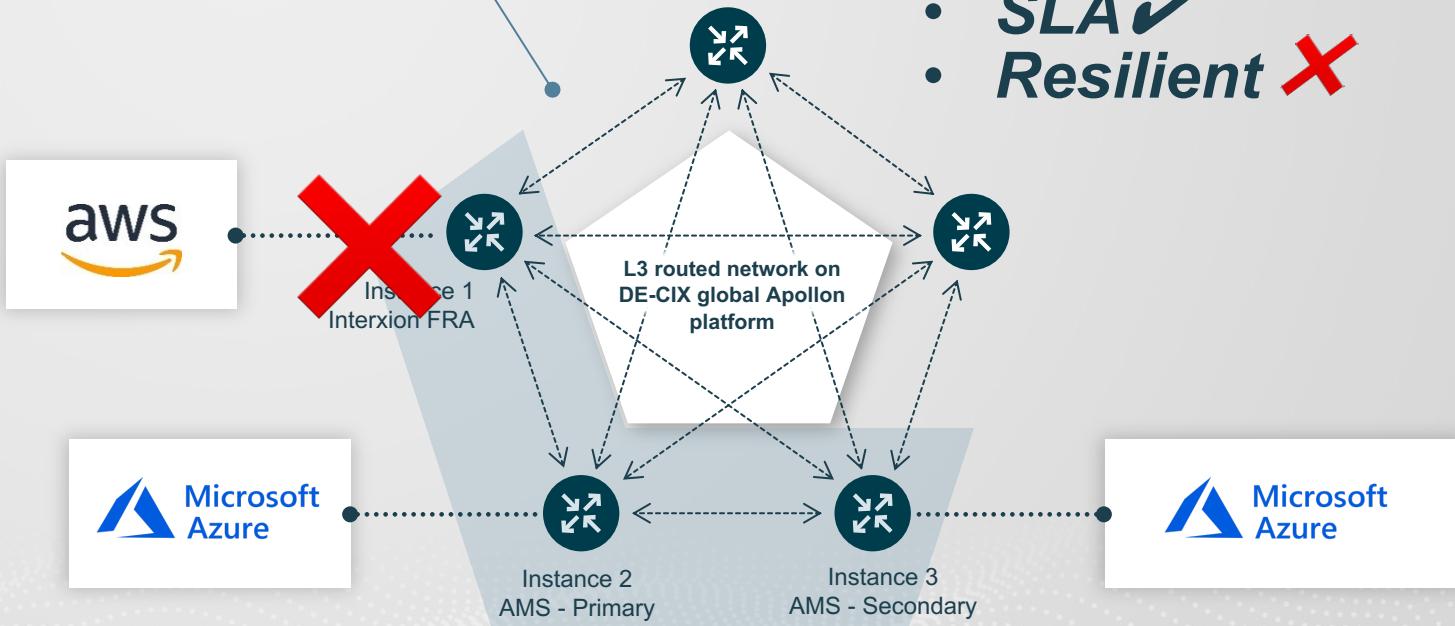


*We create a CR in FRA, and we interconnect the Clouds*

# Stage 1



Cloud Router in **Frankfurt**  
3 instances → 1 Cloud Router

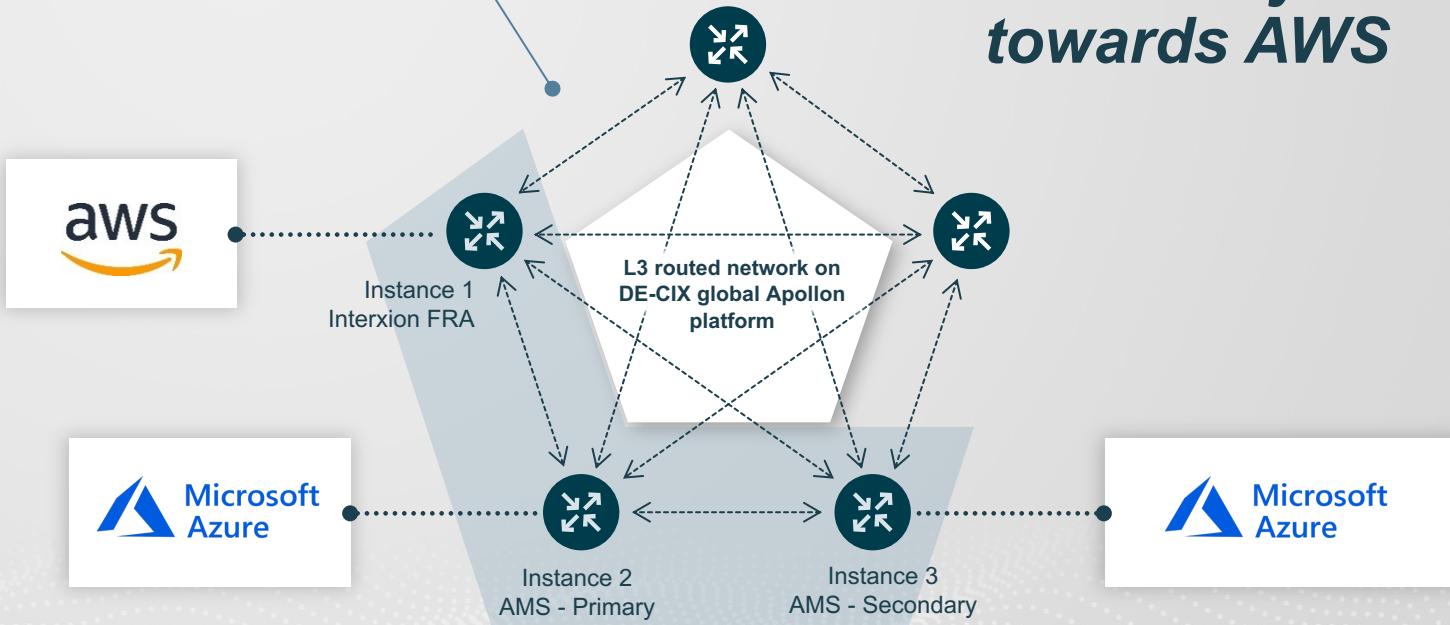


# Stage 1



Cloud Router in Frankfurt  
3 instances → 1 Cloud Router

- Let's create secondary VLAN towards AWS

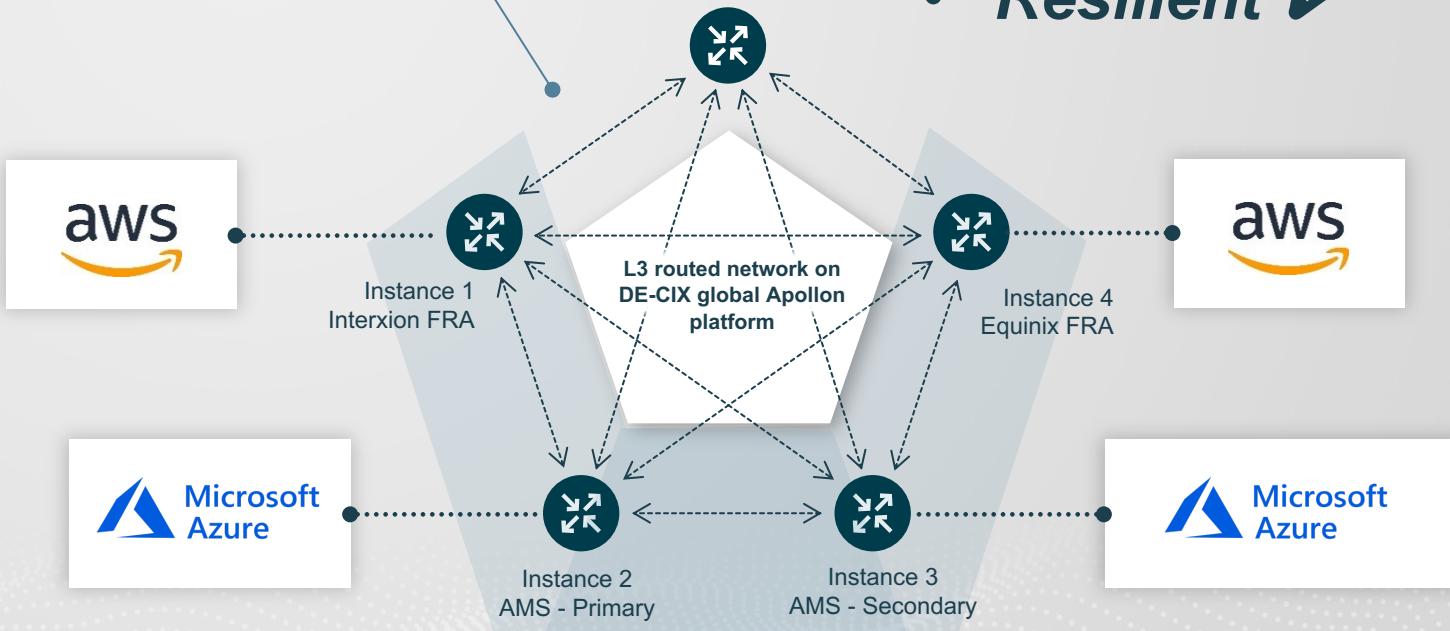


# Stage 1



Cloud Router in Frankfurt  
4 instances → 1 Cloud Router

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

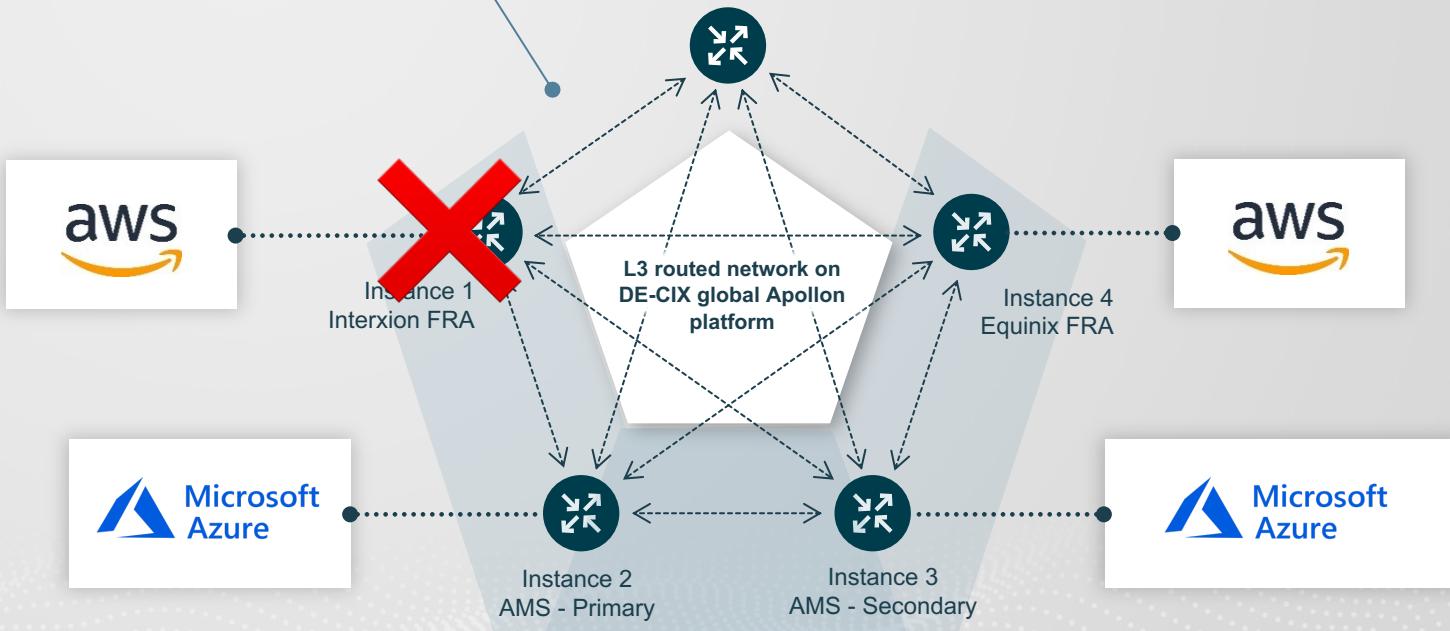


***DEMO TIME!***

# Stage 1



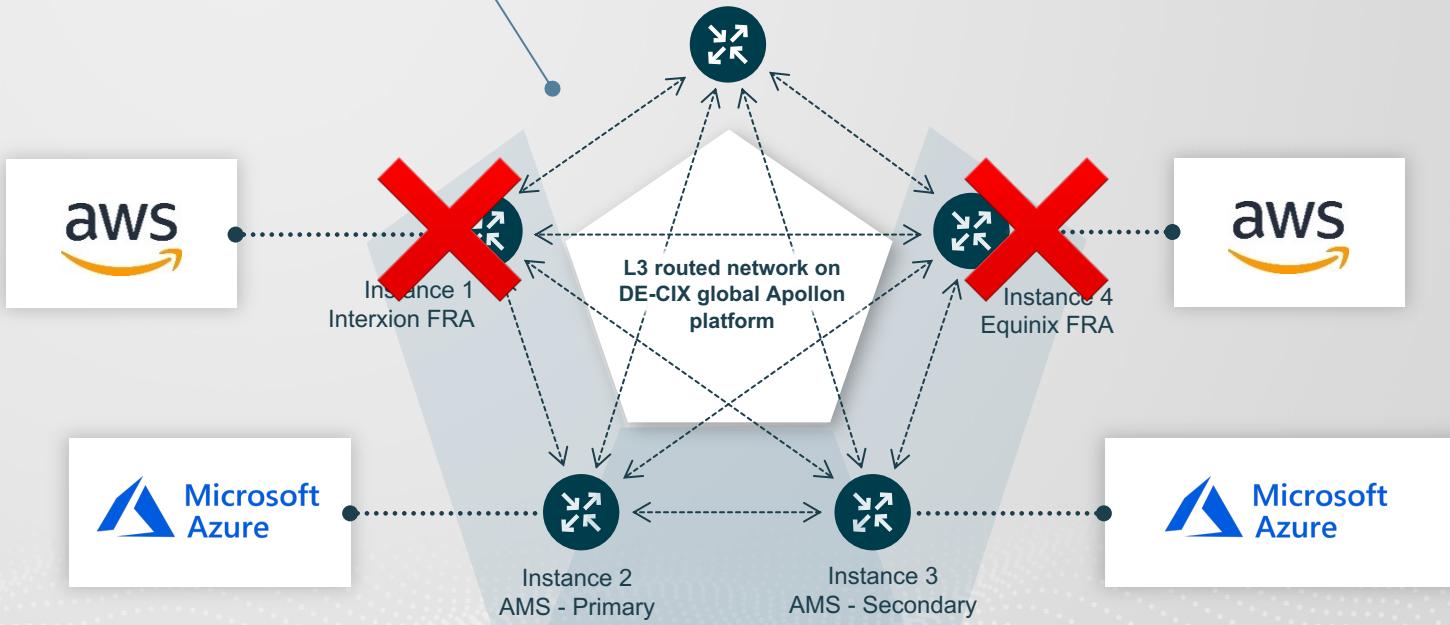
Cloud Router in **Frankfurt**  
4 instances → 1 Cloud Router



# Stage 1



Cloud Router in **Frankfurt**  
4 instances → 1 Cloud Router

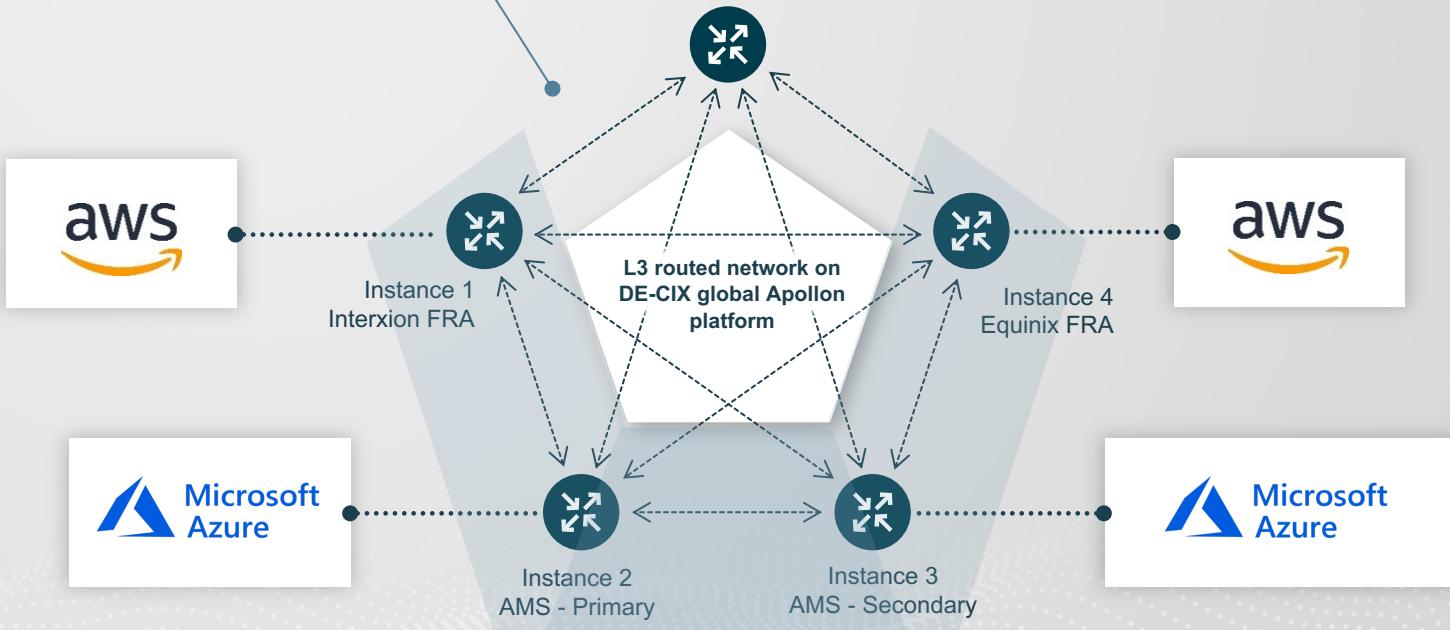


## Stage 2



Cloud Router in Frankfurt  
5 instances → 1 Cloud Router

*We have to add the customer DC*

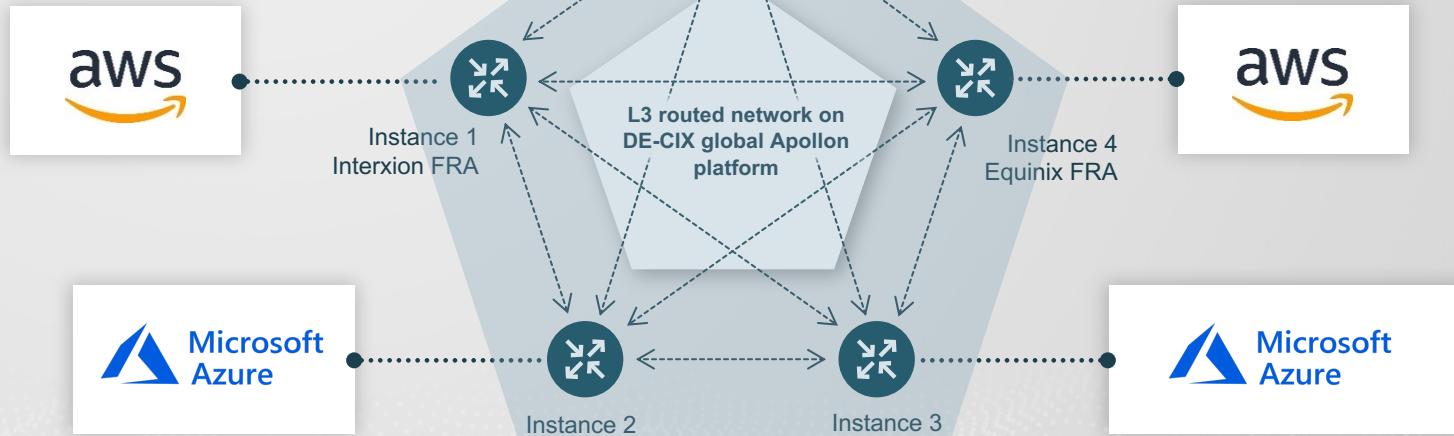




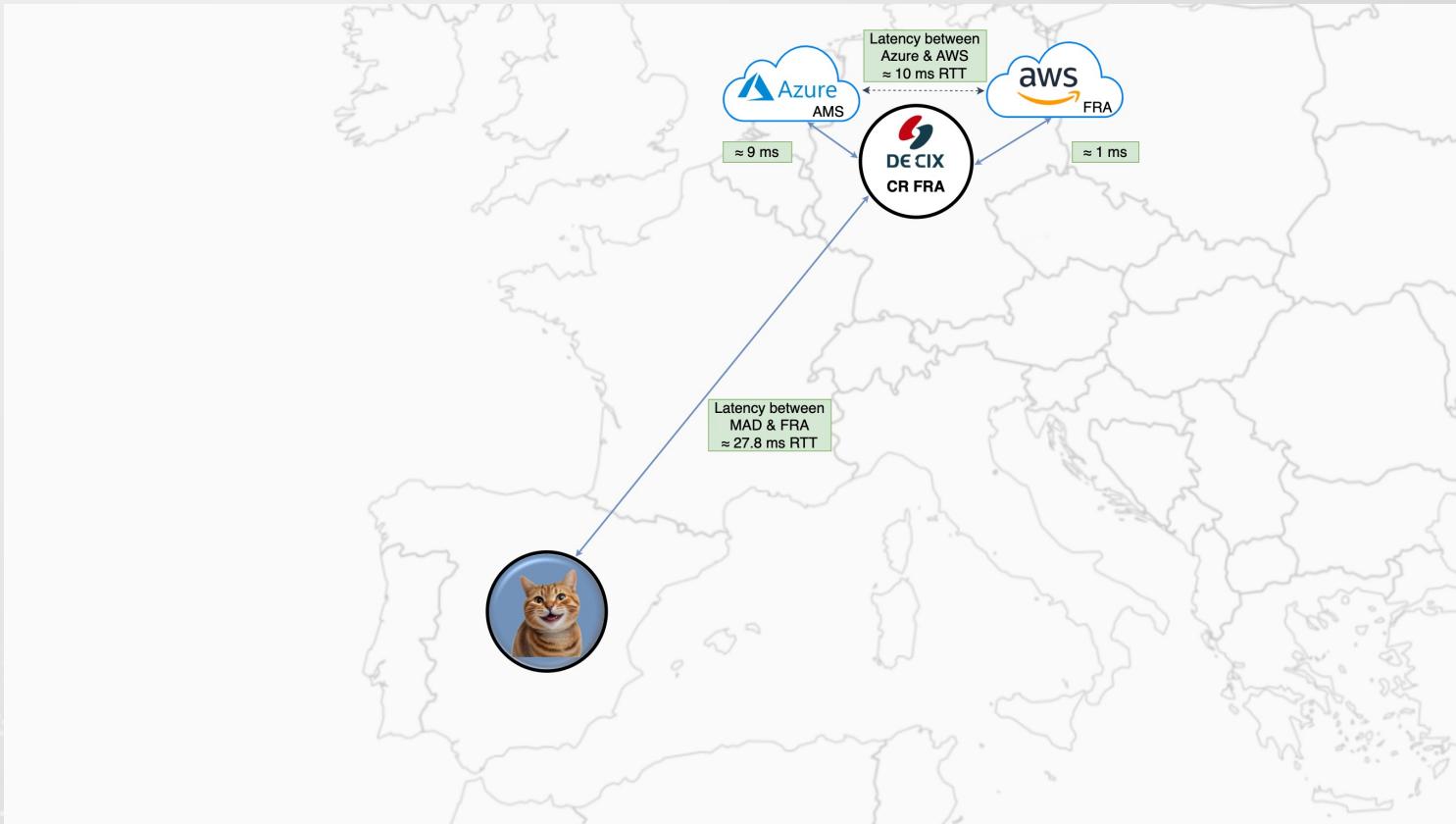
## Stage 2

# *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**



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

# Q&A

# THANK YOU



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