

# Edge computing in 5G networks

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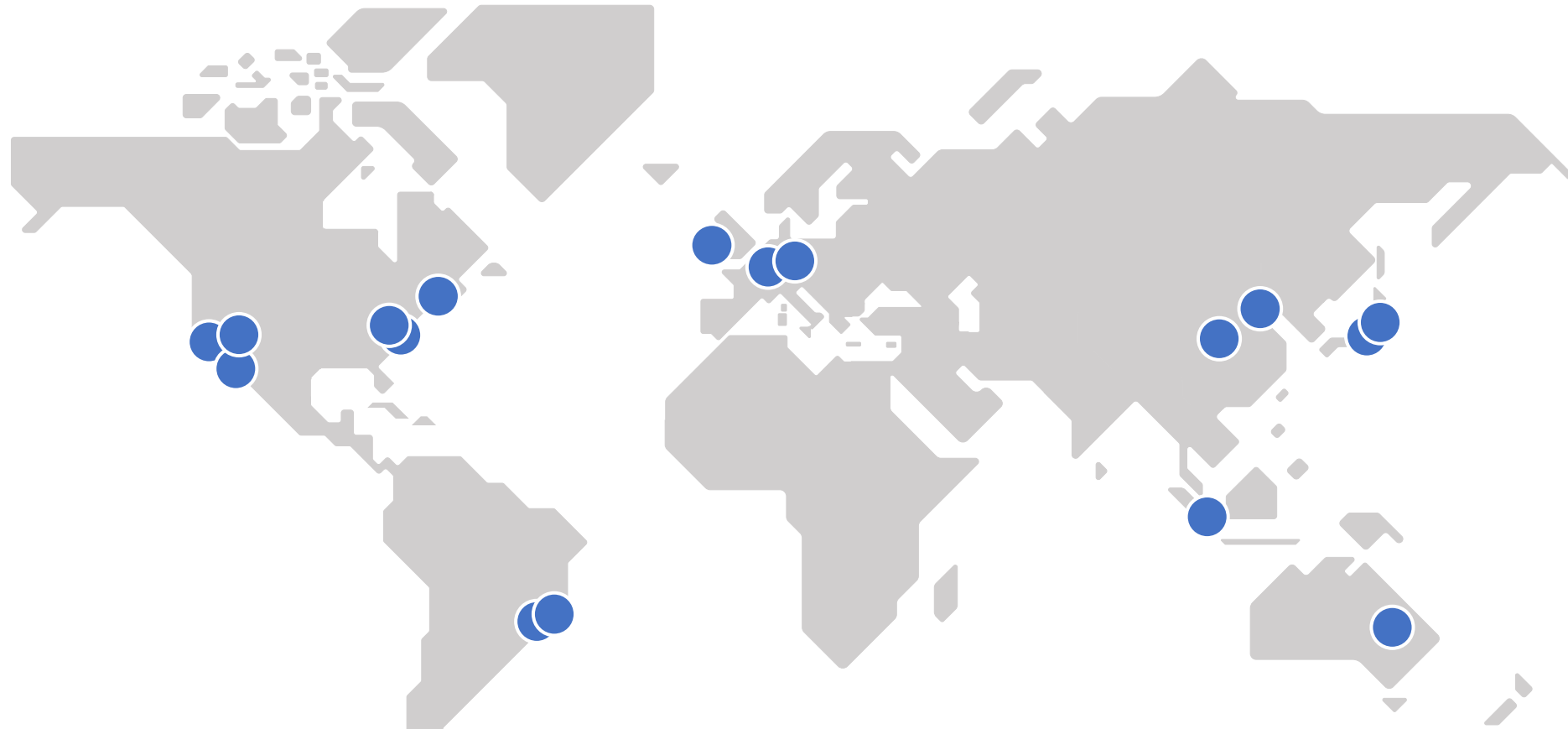
Expert, Edge Computing

Head of Technology and Innovation, Digital Services

Any guess on what is this?



## AWS datacenters globally



— Public AWS cloud datacenters all over the world

## AWS datacenters globally



- Exercise: [gcping.com](https://gcping.com)
- Fastest ping?  
(How fast we can get the fastest ping?)

# AWS datacenters globally



## Measure your latency to Google Cloud regions

REGION	MEDIAN LATENCY
Warsaw europa-central2	28 ms
Frankfurt europa-west3	30 ms
Zurich europa-west6	31 ms
Global HTTP Load Balancer → europa-central2	32 ms



# AWS datacenters globally



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28 ms

A screenshot of the GCPing.com website. The browser address bar shows 'GCPing.com' and 'gcping.com'. The page title is 'Measure your latency to Google Cloud regions'. The table below shows median latency measurements for various Google Cloud regions. A blue callout box highlights the 'Frankfurt europa-west3' row with a value of '50 ms'. A mouse cursor is visible over the table.

REGION	MEDIAN LATENCY
Frankfurt europa-west3	50 ms
Zurich europa-west6	57 ms
Belgium europa-west1	60 ms
London europa-west2	61 ms
Global HTTP Load Balancer →europa-central2	61 ms

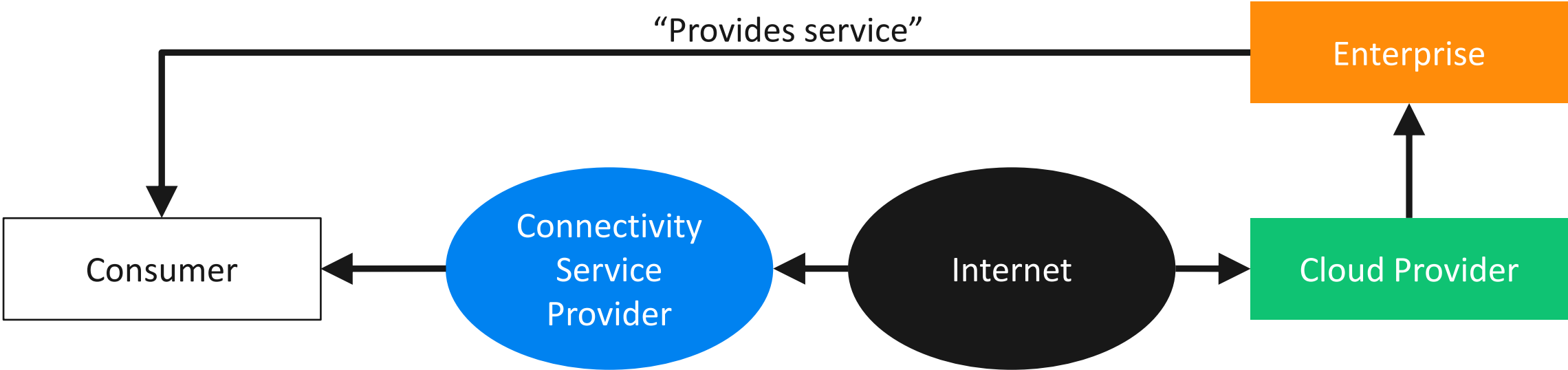
50 ms

- On local WiFi
- On VPN

- On mobile network



# Value chain (high level) for Hyperscale Cloud Providers



# Example: META



- Zuckerberg describes the metaverse, which he sees as the next generation of the internet, as a virtual environment that will allow people to be present with each other in digital spaces.

Enterprise  
=  
Meta

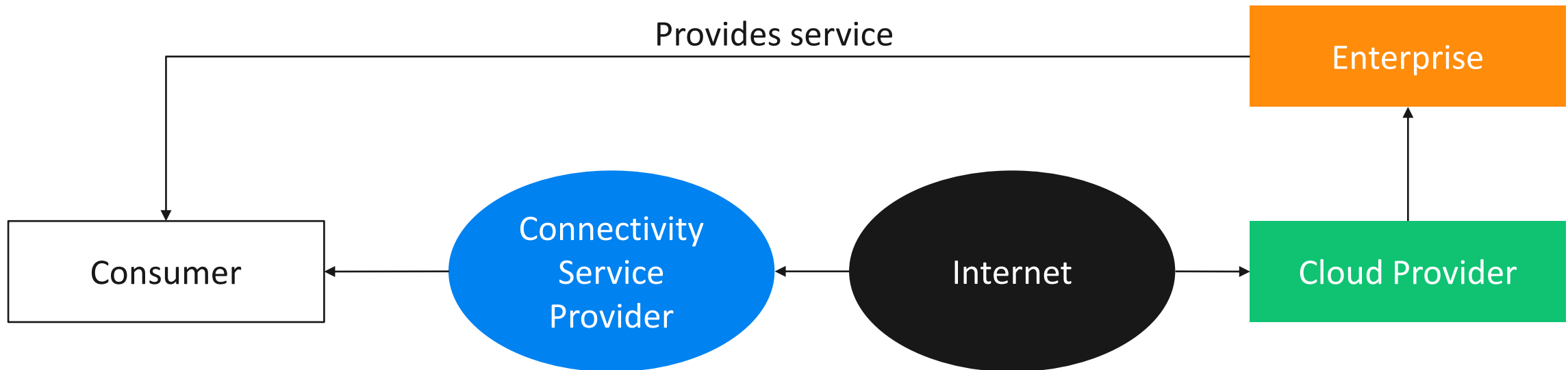


Requires  
low latency  
connectivity



- Meta joined telekom standardization bodies to standardize the 6G ultra-low latency infrastructure






# Delay and latency is a problem



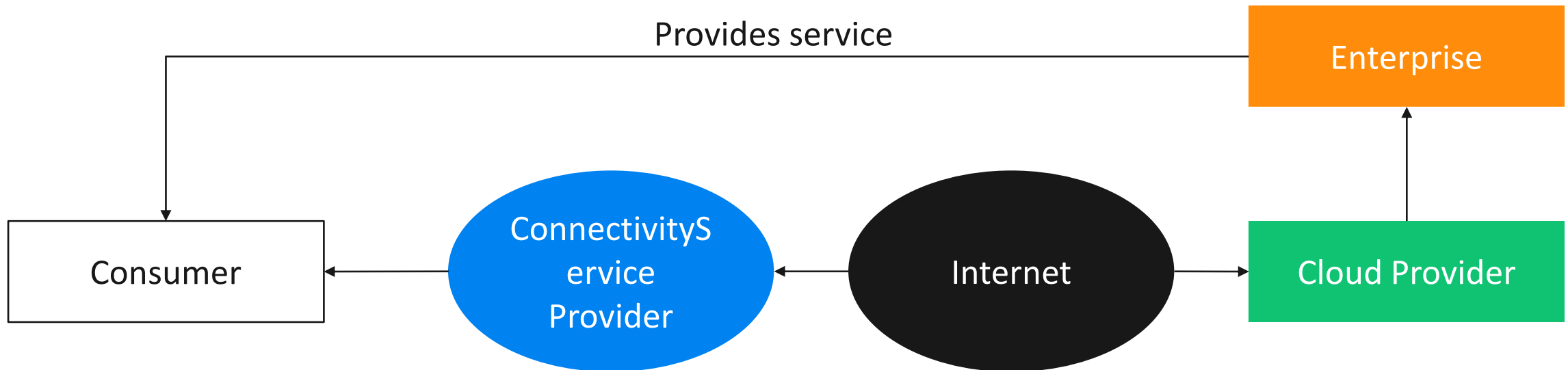
←----- Delay between client-server application ----->

  
  
User  
Mobility, Locality

  
Mobile operator  
Country, Subscribers

  
  
Global  
Economy of scale

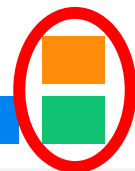
# HCPs entering the local “sites”



Delay between client-server application



User  
Mobility, Locality



Mobile operator  
Country, Subscribers

Disruption is to move from a global, optimized setup to an expensive, local.



Global  
Economy of scale

# Hyperscale Companies

## AWS, Google, MS Azure, Meta



### AWS Outposts

Run AWS infrastructure and services on premises for a truly consistent hybrid experience

Get started with AWS Outposts

Contact Sales



— Managed, local HW with full\* support of AWS services

### Anthos

Anthos unifies the management of infrastructure and applications across on-premises, edge, and in multiple public clouds with a Google Cloud-backed control plane for consistent operation at scale.

Try it free

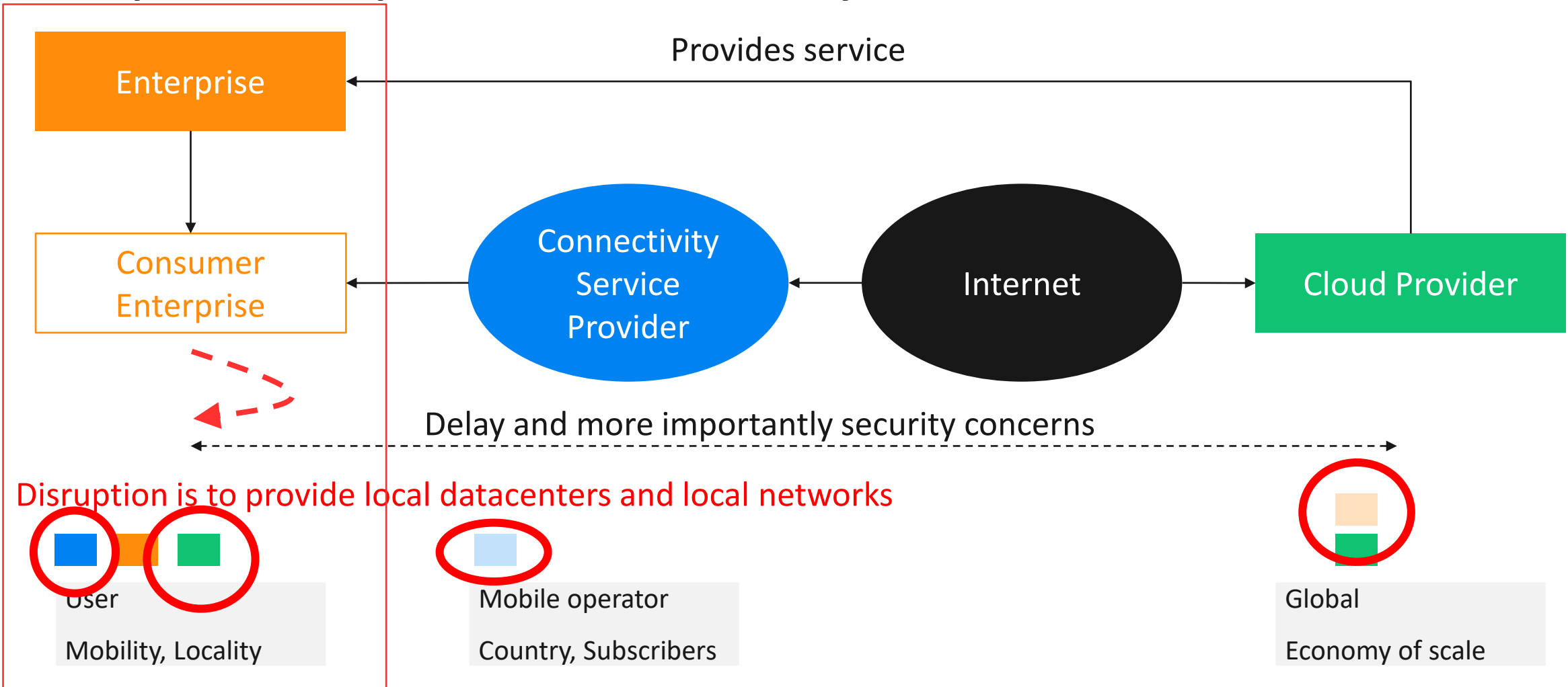
Contact sales



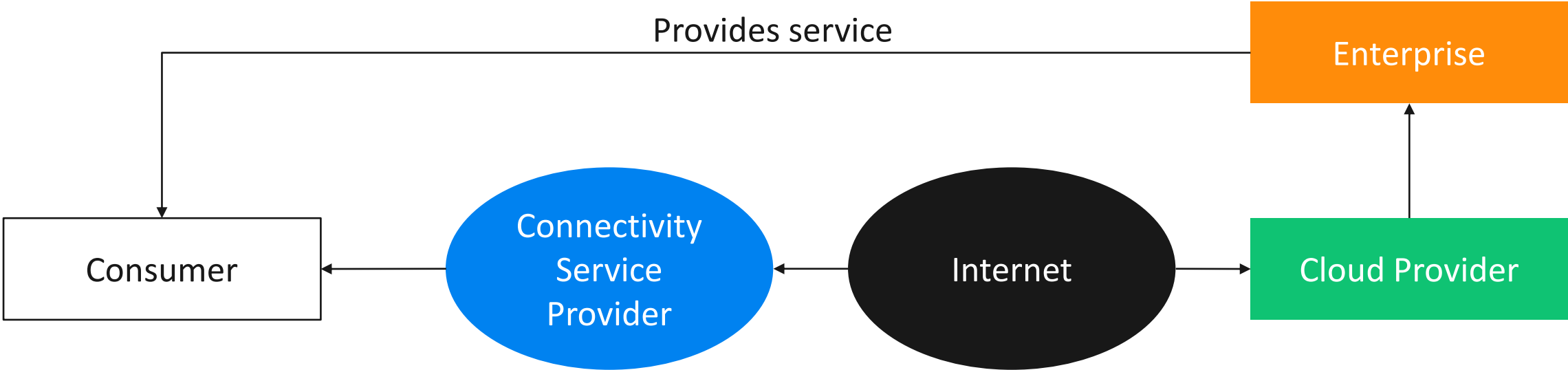
— Managed cloud environment for **private** infrastructures

ENTERPRISE BUSINESS

# The complete network and cloud should be on premise, private at a factory site...



# Telecom moving into the cloud?



Is this also a cost saving?

Would be a cost saving, however, not suitable for performance

Can I provide the right platform?

User  
Mobility, Locality

Mobile operator  
Country, Subscribers

Global  
Economy of scale

# Proof of Concept, Ericsson with AWS

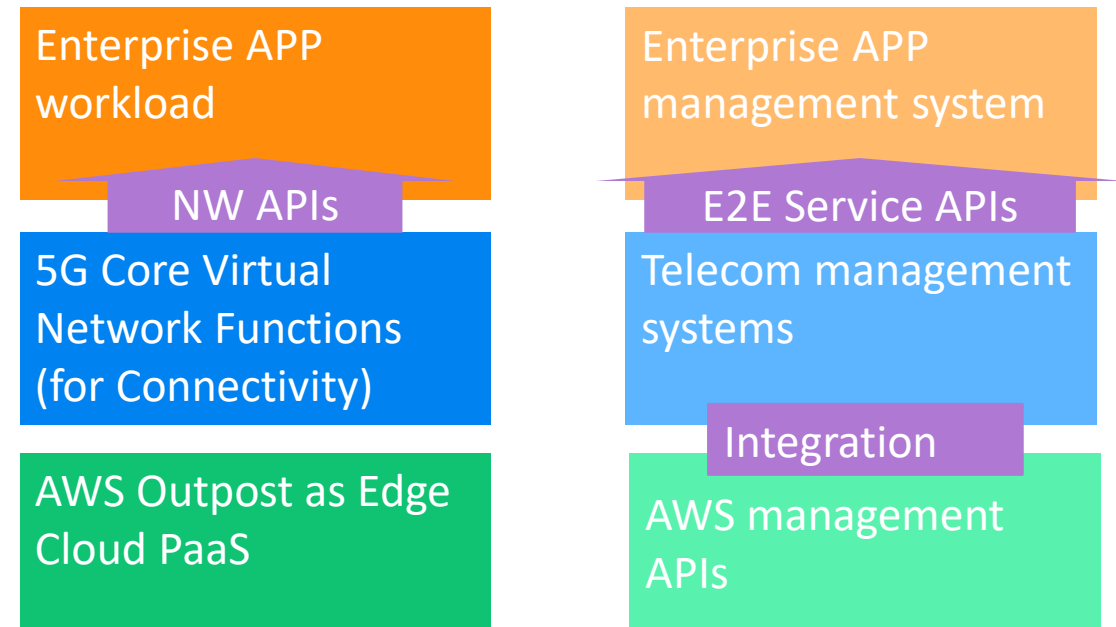
<https://www.youtube.com/watch?v=wsxLbUN2p-c>



## The main activities in the POC include:

- Deployment of the **Ericsson 5G SA Core** as part of a private network and **Enterprise App(s)** on AWS Outpost
- Integration of **AWS APIs** to Ericsson orchestrator functionality
- **Exposure** of network and service APIs to Enterprise App(s)
- **Orchestration** of the end-to-end service from Enterprise management site
- E2E orchestration and exposure of the solution via Ericsson orchestrator, integrating with AWS CloudFormation API for resource management and optimized workload placement.

AWS: not primary but “partner” for the enterprise  
Telecom: primary but running on AWS infrastructure



— networking

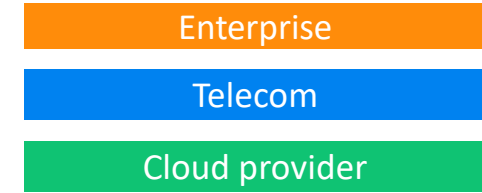
— management



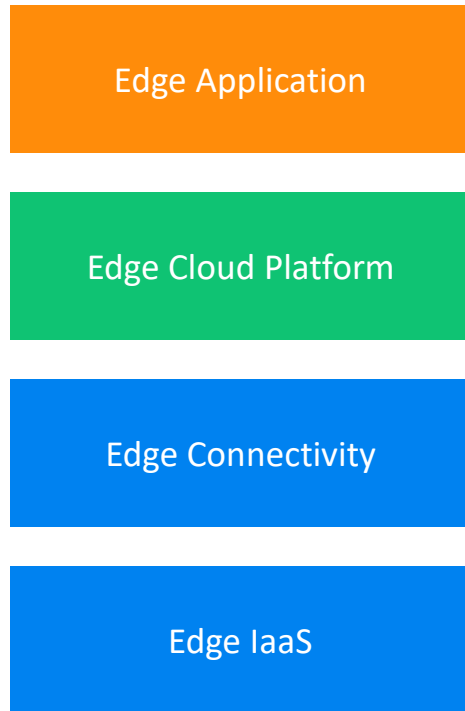
# Matching?



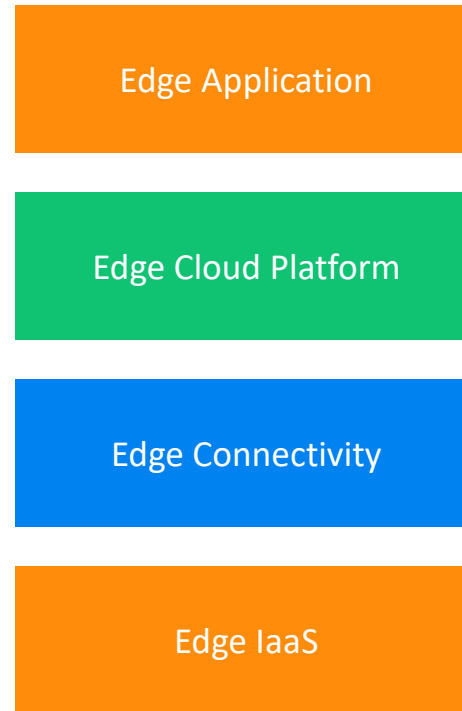
- A: Azure IoT Edge
- B: AWS Outpost
- C: Google Anthos



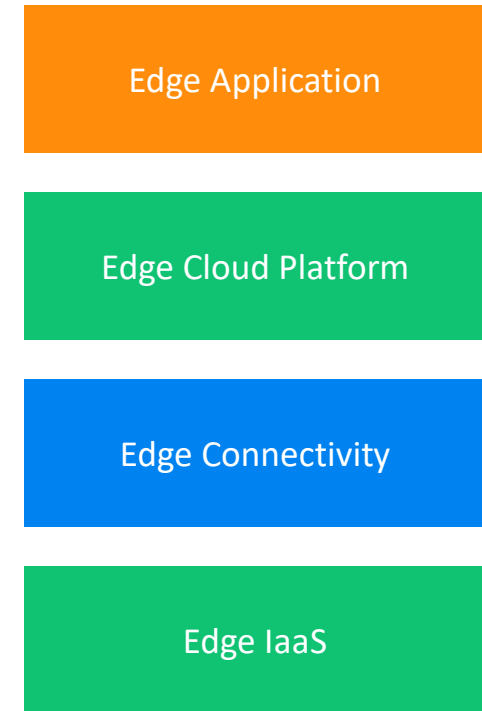
1.



2.



3.

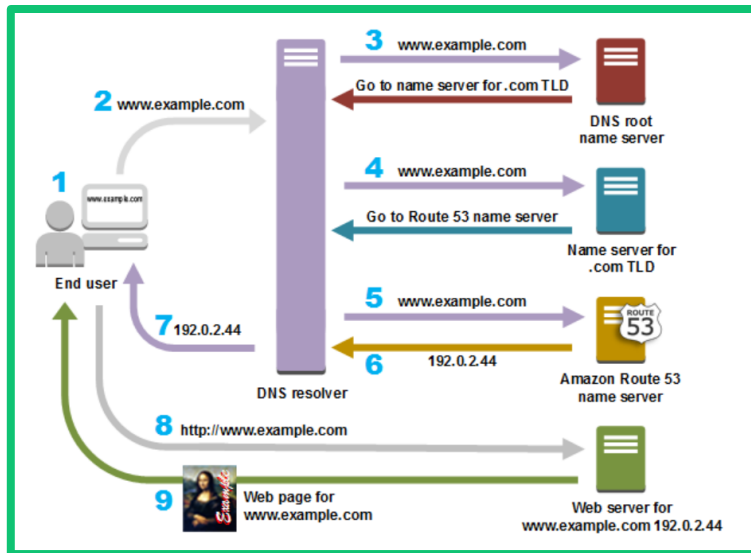


# Edge service discovery (4 ways)

(Getting the IP address for my edge application)



- AWS route 53\*(1.)
- Works today
- Setup latency: e.g. gcping\*(2)
- Internet Service Provider
- Works today with well-configured devices
- EASDF\*(3)
- 3GPP SA6 critical services architecture\*(4)
- Quick discovery
- Service continuity support
- Heavy device impact



5G Core: Edge Application Server Discovery Function

DNS set to be served by the ISP



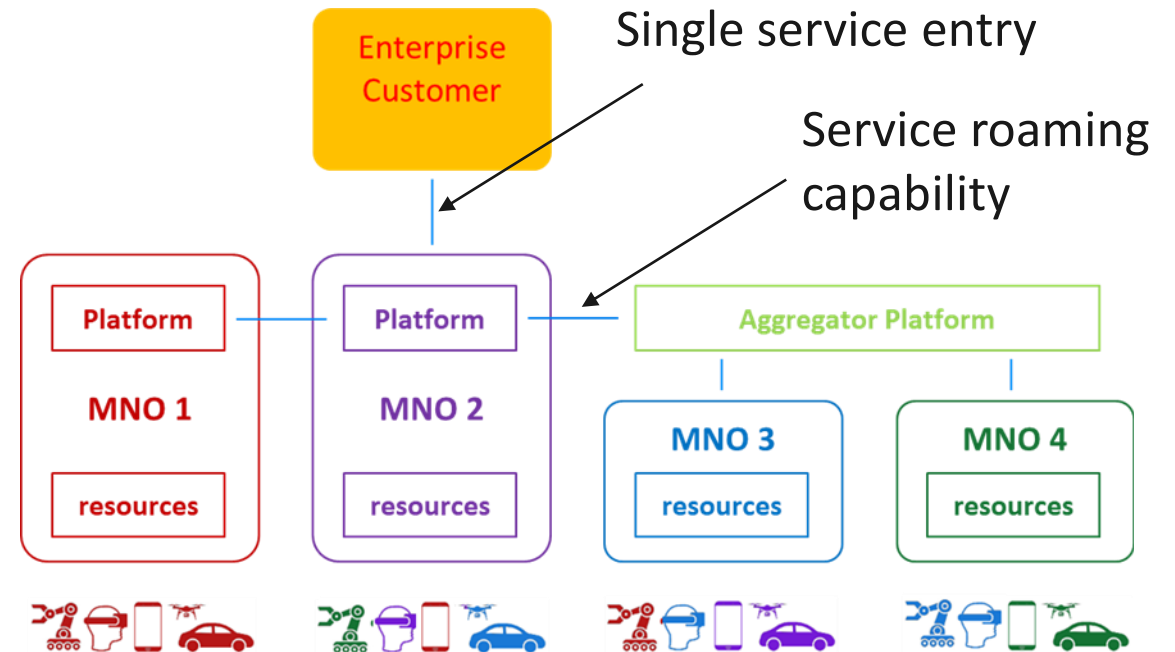
5G Core: Edge Exposure functions

Added value discovery funct.

# GSMA Operator Platform Europe: Edge cloud continuum



- Multi-cloud technologies in the cloud are developed for cost saving
  - DB from AWS, AI from Google
  - Portability between platforms
- Operators in a country may have contract with different cloud service providers (including themselves)
  - Multi-cloud technology at the operators is the ability to roam edge services within the border (e.g. airport) and countries (e.g. connected cars)
- GSMA OPG: Federated Edge Services
- Edge Cloud Continuum: EU initiative



## Key Takeaways



- Hyperscale cloud providers are starting to build edge computing solutions to provide local and low latency services
- Telecoms are partnering with HCPs for cost saving and testing edge platforms for 3<sup>rd</sup> party applications
- Edge computing redefines the value chain for HCP and CSP Enterprise business
- Several federation and defragmentation technology, common goals



Thank you!  
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