# Revolutionizing XR Experiences with the Power of the Edge

Rolf Muralt, VP Product

MobiledgeX

# ‹Mobiledge✗›

MobiledgeX is creating a marketplace of edge resources and services that will connect developers with the world's largest mobile networks to power the next generation of applications and devices.
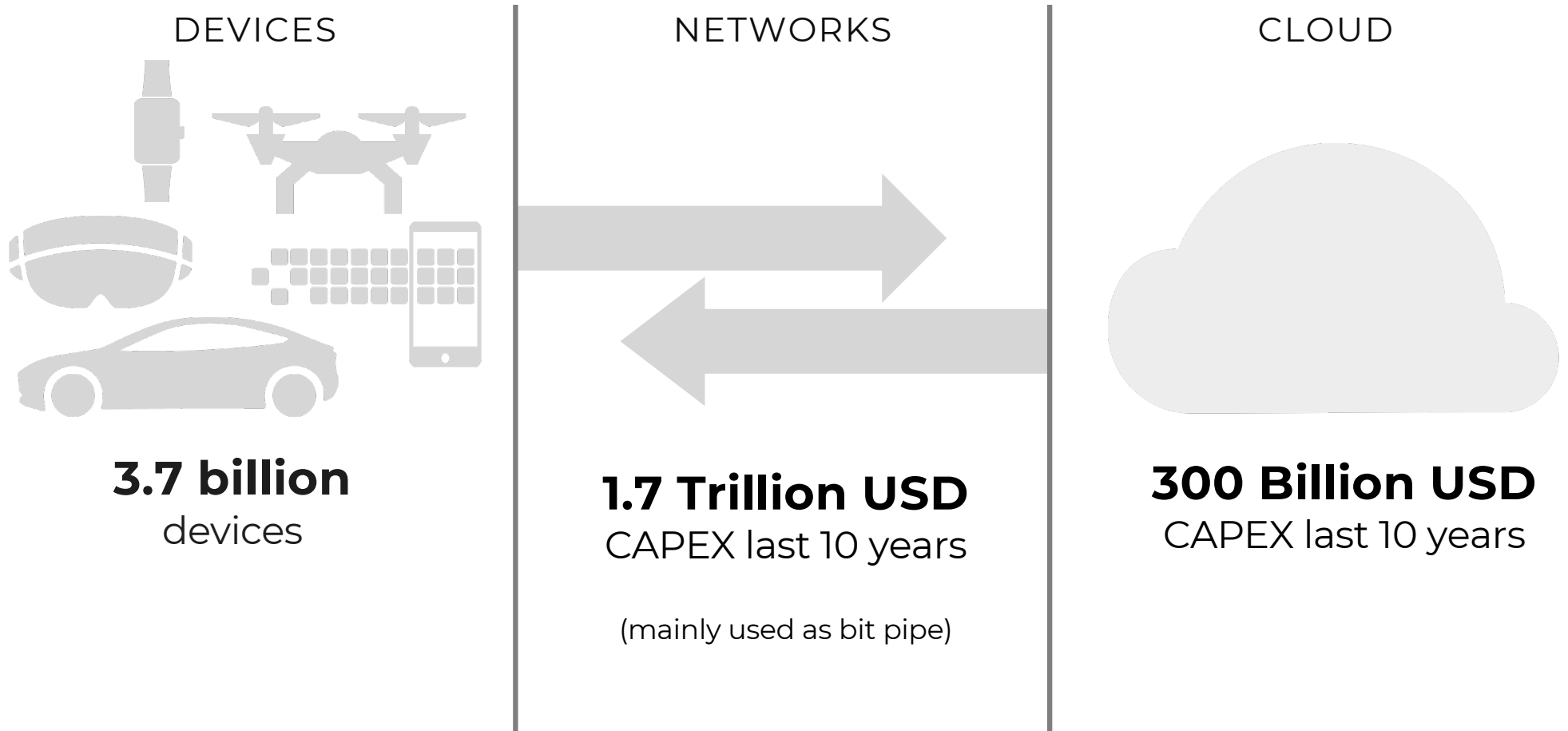
Based in
**San Francisco, California**

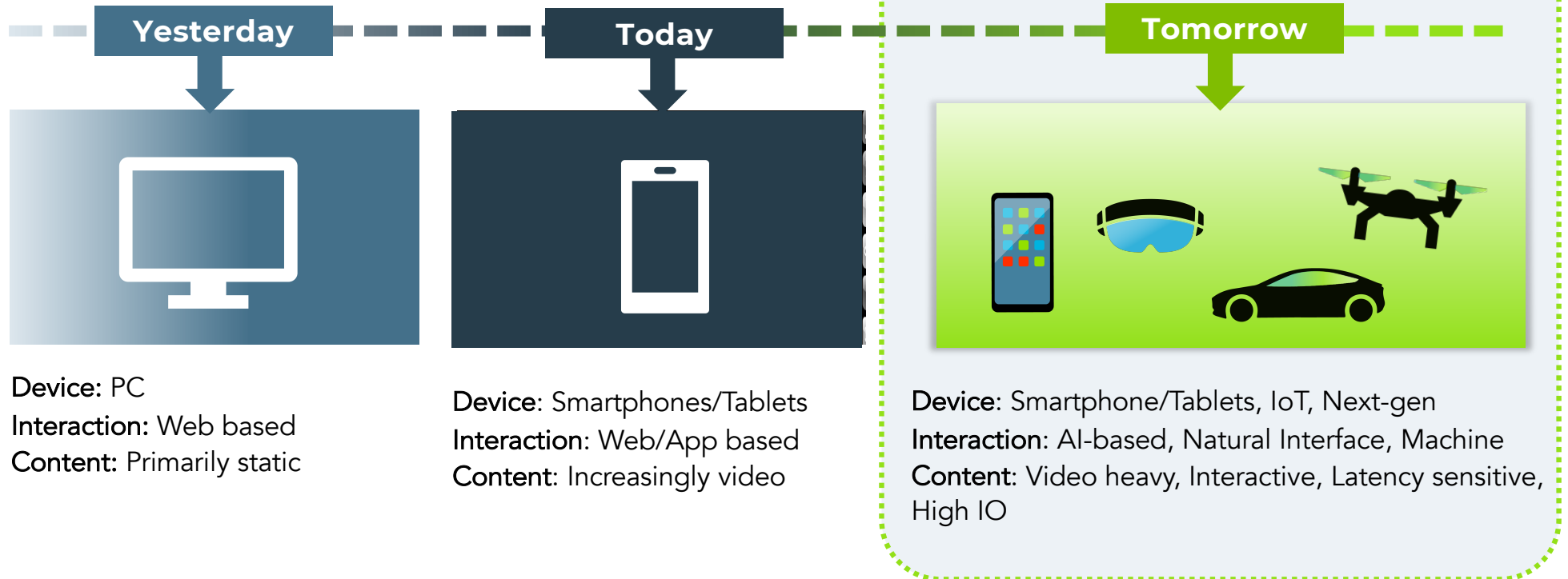Founded by
**Deutsche Telekom** in **2018**

Visit
**Mobiledgex.com**
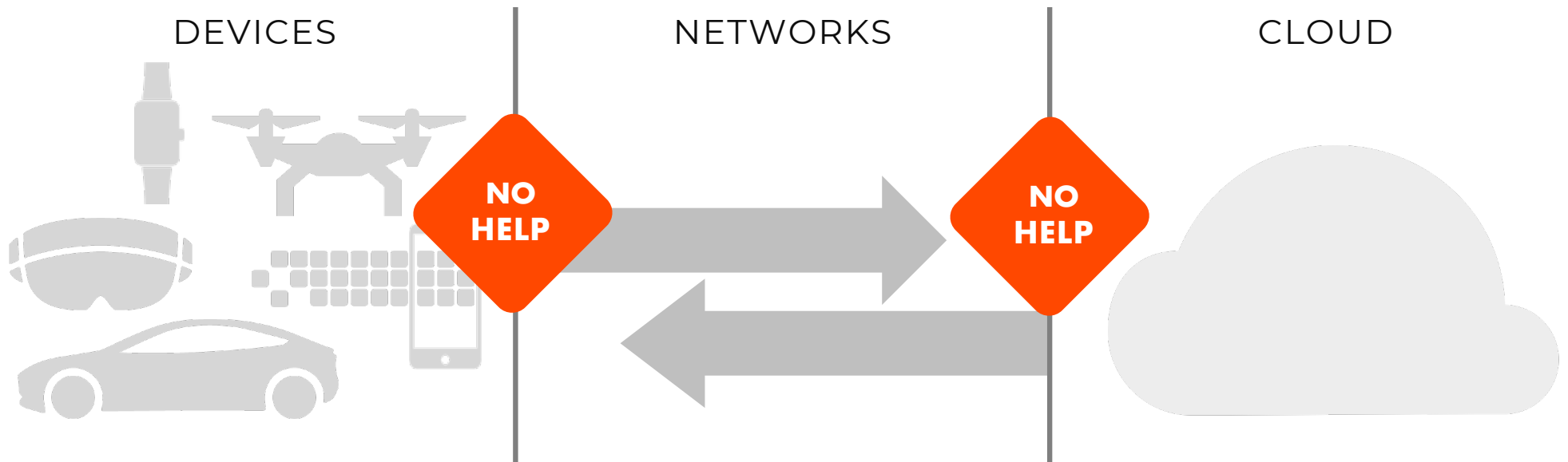
# Current State

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| DEVICES | NETWORKS | CLOUD |
|---------|----------|-------|

**3.7 billion**
devices

**1.7 Trillion USD**
CAPEX last 10 years

(mainly used as bit pipe)

**300 Billion USD**
CAPEX last 10 years

# Emerging new class of applications
## Pervasive and Immersive

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Introducing an emerging class of applications
$\pi$ apps = PI = Pervasive & Immersive

**Yesterday**

**Today**

**Tomorrow**

**Device**: PC
**Interaction**: Web based
**Content**: Primarily static

**Device**: Smartphones/Tablets
**Interaction**: Web/App based
**Content**: Increasingly video

**Device**: Smartphone/Tablets, IoT, Next-gen
**Interaction**: AI-based, Natural Interface, Machine
**Content**: Video heavy, Interactive, Latency sensitive, High IO

# Inefficiencies and Obstacles for Developers

**Mobiledge⟨X⟩**

DEVICES       NETWORKS       CLOUD

**NO HELP**
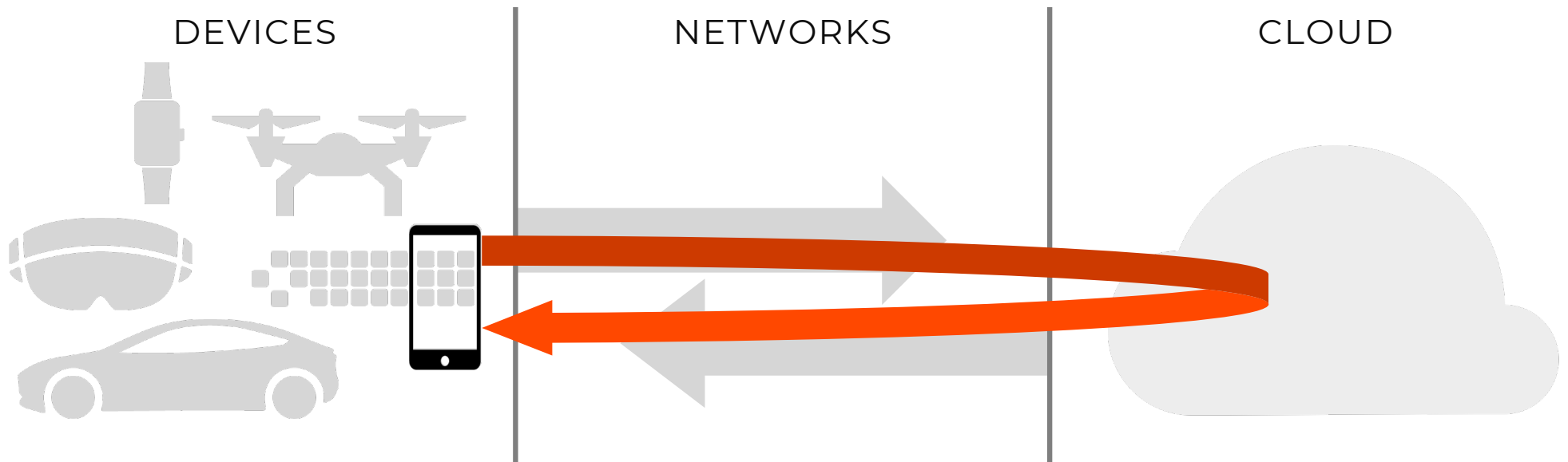
**NO HELP**

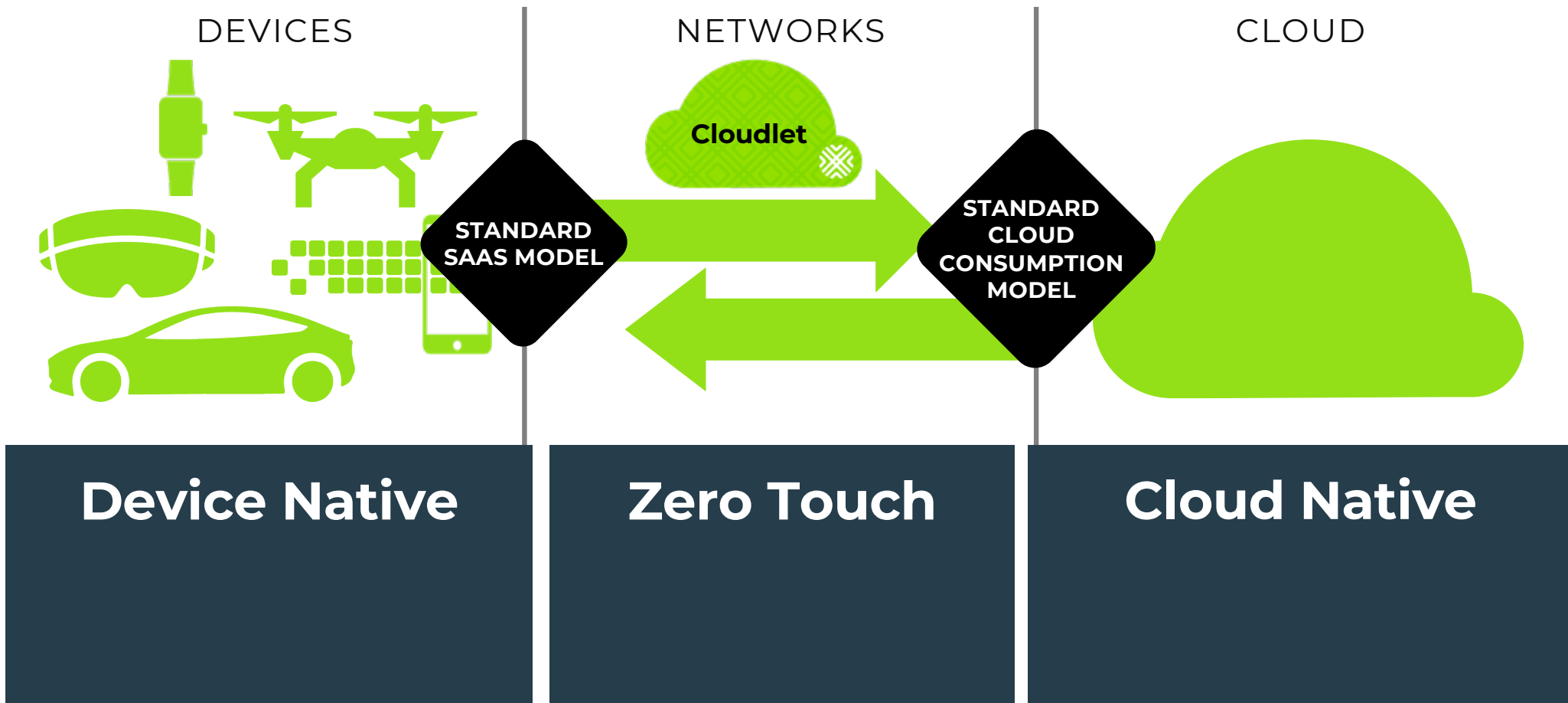| You don't know what is possible | You have to know somebody | You have to figure out the business model every time | Your idea isn't big enough fast enough | All transformations are for internal customers |

There is a better way

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DEVICES     NETWORKS     CLOUD

Cloudlet

STANDARD SAAS MODEL

STANDARD CLOUD CONSUMPTION MODEL

**Device Native**     **Zero Touch**     **Cloud Native**

# Live in production in Germany



## World's First Public Mobile Edge

## Introducing MobiledgeX Edge-Cloud R1.0

MobiledgeX Edge-Cloud R1.0 enables application containers to be deployed with the same simplicity as over-the-top, hyperscale datacenter-based cloud providers. The product powers compelling new use cases already live in networks today, including:

- Automatically deploying application backends close to users based on their Verified Location and Identity

- Augmented Reality and Mixed Reality Performance Support

- Video & Image Processing That Meets Local Privacy Regulations
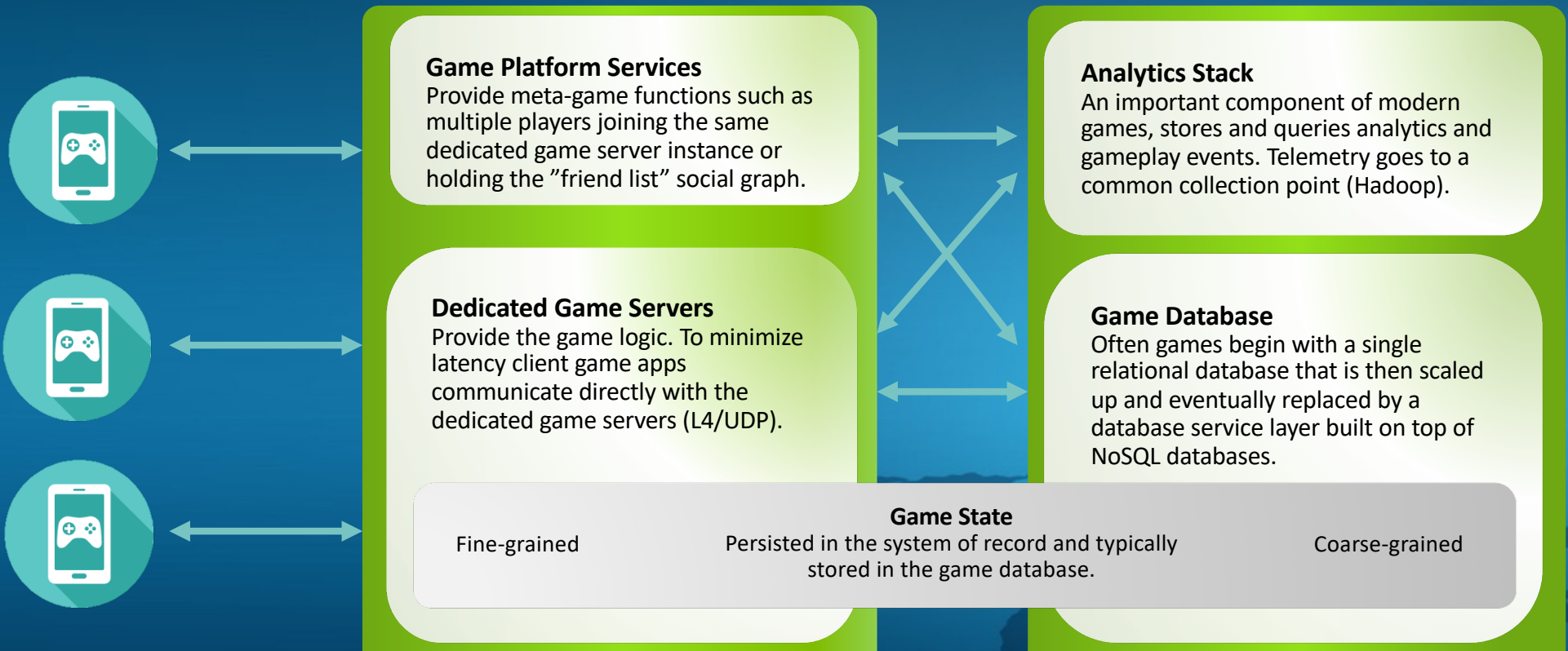
# World's First Mobile Edge Mixed Reality Multi-Gamer Experience

MobiledgeX   NIANTIC   T··   SAMSUNG

- **2,000+ visitors** to multi-player AR game demo with Niantic & Samsung (#1 traffic in Deutsche Telekom's booth)

- Executives from **more than 15 operators** played the game & experienced the developer console

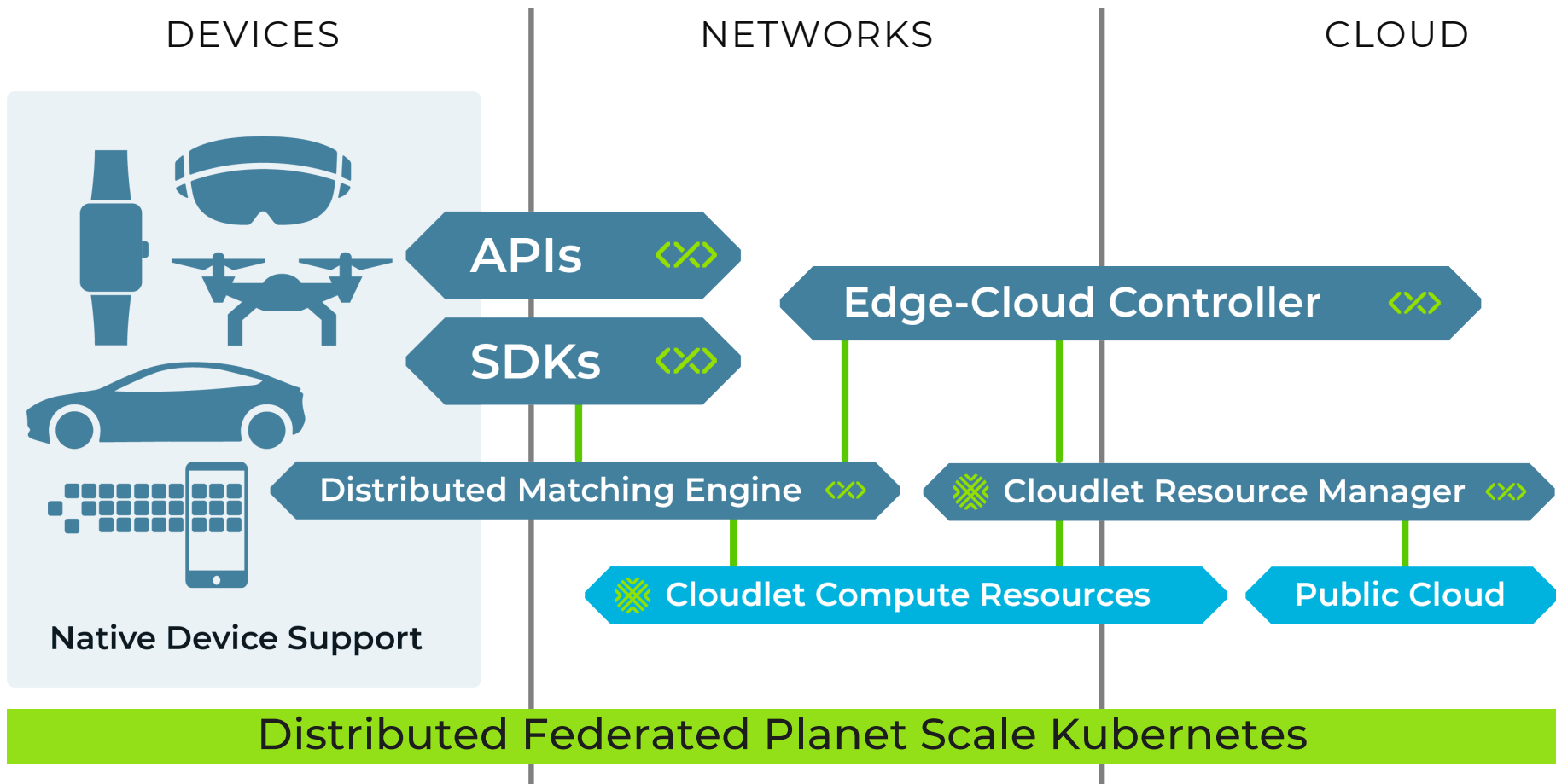- More **than 25 articles** mentioned the demo

# MobiledgeX, Samsung, Niantic, DT

**Game Platform Services**
Provide meta-game functions such as multiple players joining the same dedicated game server instance or holding the "friend list" social graph.

**Analytics Stack**
An important component of modern games, stores and queries analytics and gameplay events. Telemetry goes to a common collection point (Hadoop).

**Dedicated Game Servers**
Provide the game logic. To minimize latency client game apps communicate directly with the dedicated game servers (L4/UDP).

**Game Database**
Often games begin with a single relational database that is then scaled up and eventually replaced by a database service layer built on top of NoSQL databases.

Fine-grained

**Game State**
Persisted in the system of record and typically stored in the game database.

Coarse-grained

Better responsiveness for massively scalable multiplayer/AR games

# MobiledgeX Edge-Cloud

<Mobiledge X>

DEVICES  NETWORKS  CLOUD

APIs <X>

SDKs <X>

Edge-Cloud Controller <X>

Distributed Matching Engine <X>

Cloudlet Resource Manager <X>

Cloudlet Compute Resources

Public Cloud

**Native Device Support**

Distributed Federated Planet Scale Kubernetes

# Three Technical Pillars

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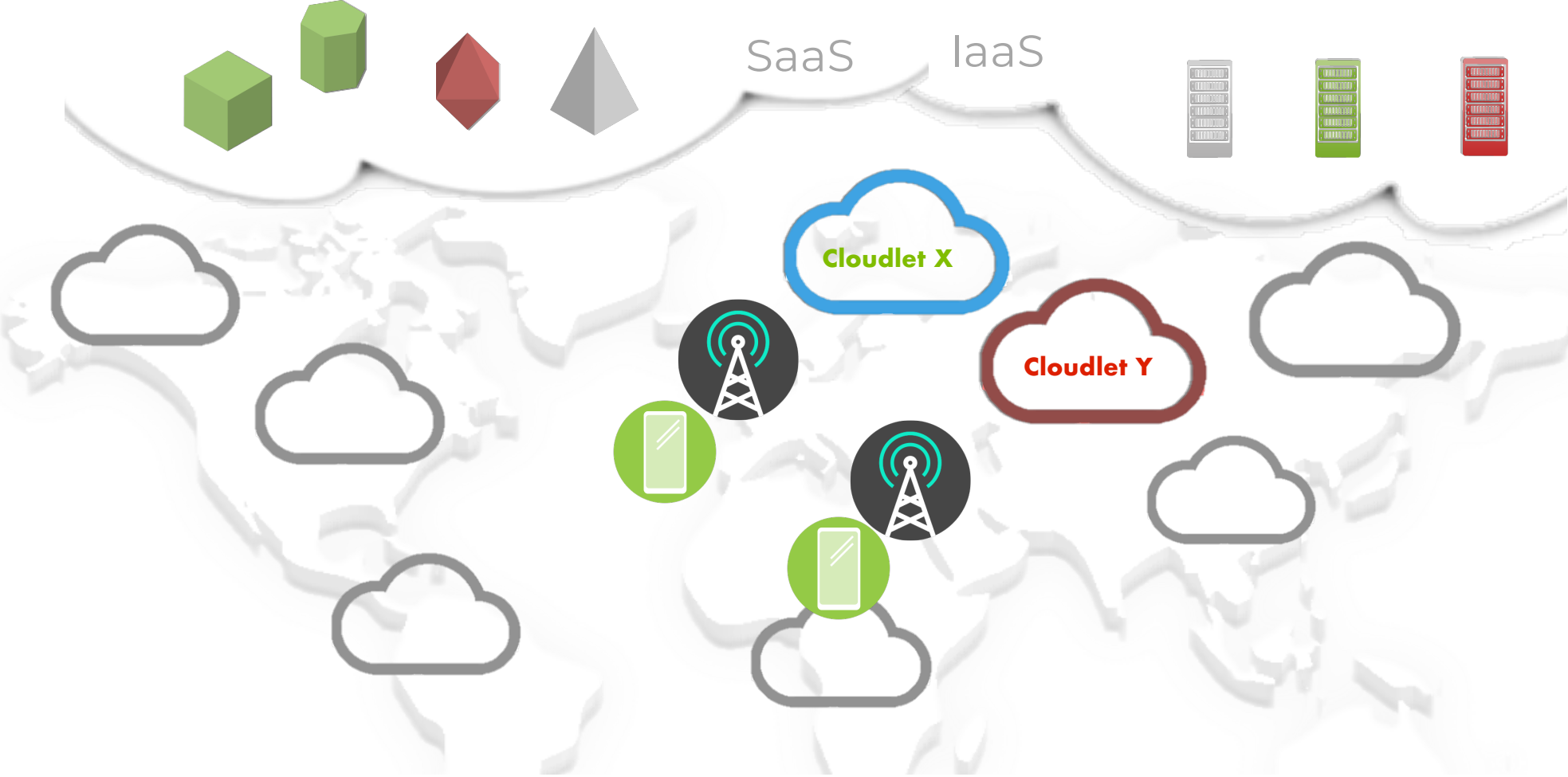| | | |
|---|---|---|
| Bringing Cloud Closer to Users/Devices | Managing Privacy: Federated, Distributed, Planet Scale Container Orchestration System | Safer Edge with Trusted Users, Applications and Networks |

Edge-Cloud Offers a per country architecture for addressing country- specific data privacy laws while offering a global marketplace and single pane of glass to developers
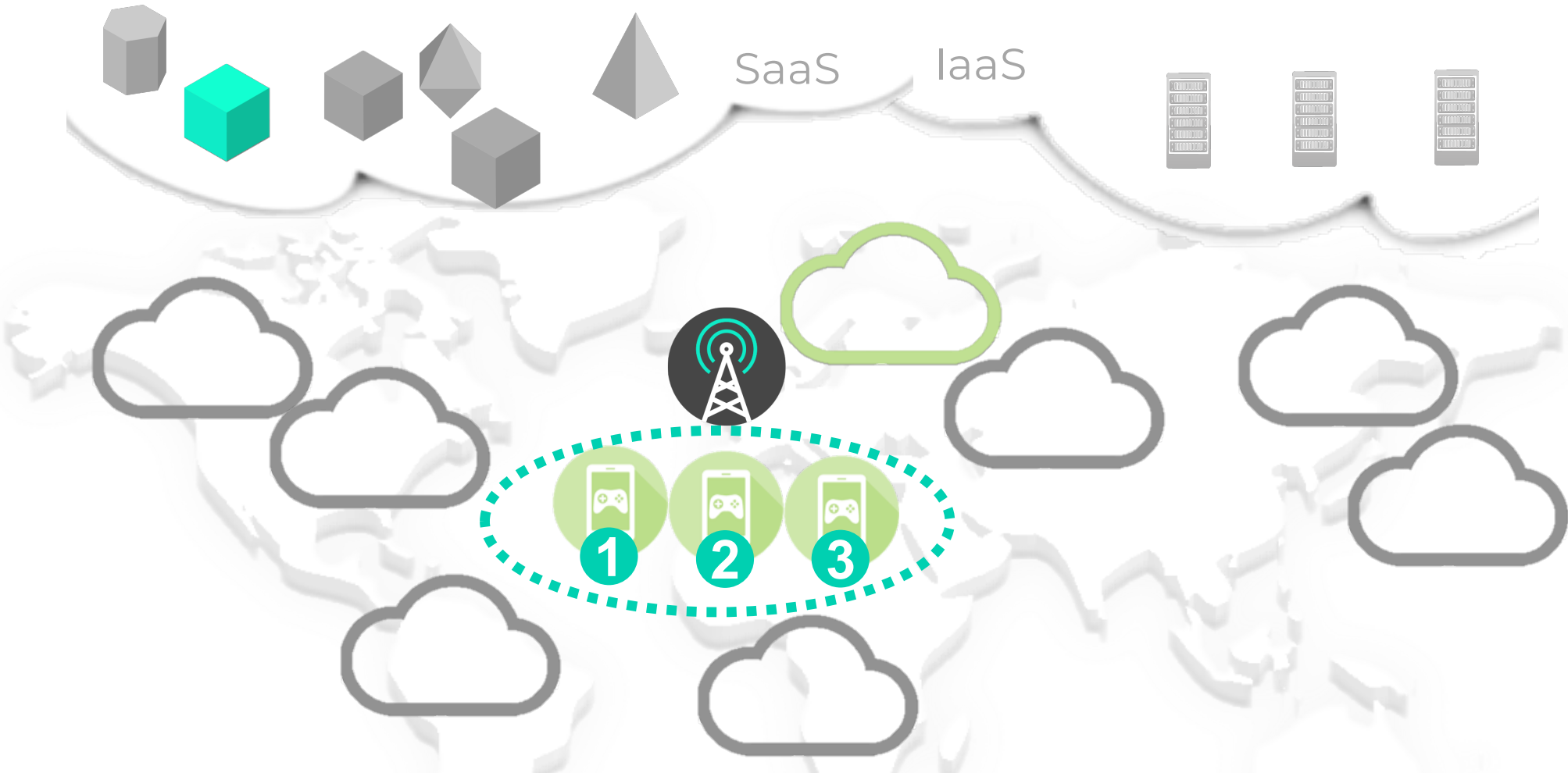
# Bring cloud closer to device
## Make backend Mobile

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SaaS          IaaS

Cloudlet X

Cloudlet Y

# Devices Group and work together
## Device and Dynamically Discovered, Grouped & Controlled

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SaaS    IaaS

# Managing Privacy
## FEDERATED DISTRIBUTED PLANET SIZED KUBERNETES

*Global, Homogeneous*

**1**

**Distributed Federated Global Control Plane:**
Global required data – Developer enablement, introspection, settlement, developers, global policies, applications registry.

**100's**

**Distributed Zonal Control Plane:**
Country required data – local policies, devices/users, compliance, governance

*Local, Heterogeneous*
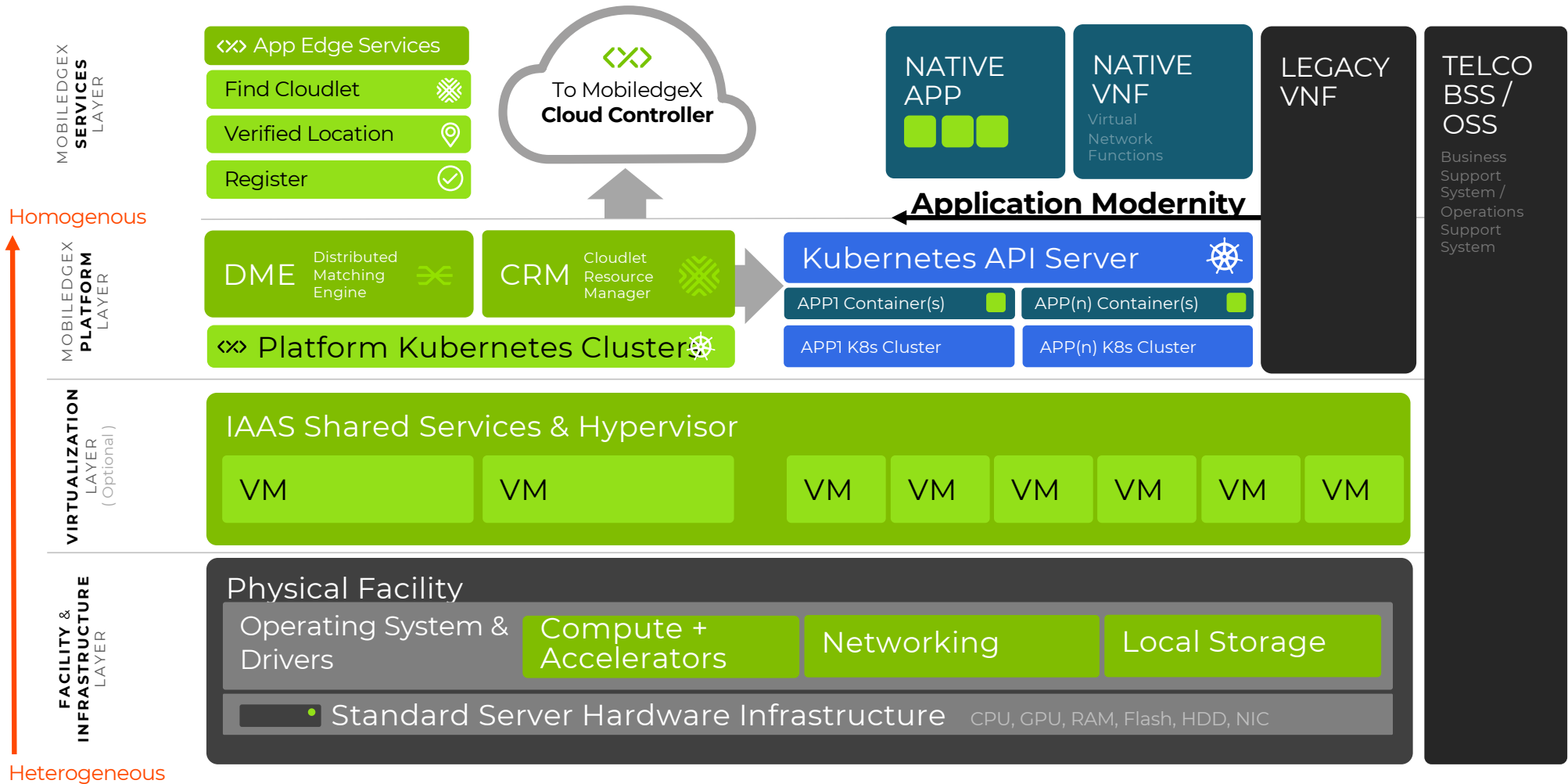
**100,000's**

**Cloudlet Assurance, Integrity and Governance:**
Operational required data – device specific data, status, instantiation, performance, usage,

20-100M Devices Across the Planet interacting with the system at any given time. Creating services using devices, networks, clouds as one global entity with federated policies and local compliance

# Building a Safer Edge Architecture

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**MOBILEDGEX SERVICES LAYER**

- <x> App Edge Services
- Find Cloudlet
- Verified Location
- Register

To MobiledgeX **Cloud Controller**

NATIVE APP

NATIVE VNF
Virtual Network Functions

LEGACY VNF

TELCO BSS / OSS
Business Support System / Operations Support System

**Application Modernity**

Homogenous

**MOBILEDGEX PLATFORM LAYER**

DME — Distributed Matching Engine

CRM — Cloudlet Resource Manager

<x> Platform Kubernetes Clusters

Kubernetes API Server

| APP1 Container(s) | APP(n) Container(s) |
| APP1 K8s Cluster | APP(n) K8s Cluster |

**VIRTUALIZATION LAYER (Optional)**

IAAS Shared Services & Hypervisor

VM  VM  VM  VM  VM  VM  VM  VM

**FACILITY & INFRASTRUCTURE LAYER**

Physical Facility

| Operating System & Drivers | Compute + Accelerators | Networking | Local Storage |

Standard Server Hardware Infrastructure  CPU, GPU, RAM, Flash, HDD, NIC

Heterogeneous

# Developer Communities & Open Labs



**Why LF Edge?** To consolidate disparate industry edge initiatives.

**Why MobiledgeX?** To drive the correct approach, delivery and industrialization of a distributed federated control plane.



**Why TIP?** To drive innovation, financial performance and efficiency in all aspects of telecom infrastructure.

**Why MobiledgeX?** To ensure accessibility and maximum utilization potential from the perspective of market demand.



**Why hub:raum?** DT initiative to accelerate 5G and edge customer understanding and adoption potential.

**Why MobiledgeX?** To get early market access to potential demand and needs and ensure delivered edge services meet those needs.



MobiledgeX is not a direct member, but is participating via Deutsche Telekom to showcase certain edge use-cases with other operators.



**Why OEC?** Academic partnership and consolidation of industry players to best understand what is possible/needed.

**Why MobiledgeX?** Access and participation in edge computing knowledge, value, learnings.



**Why WWT/Advanced Technology Lab?** Certify vendor infrastructure configs that can then be delivered with industrial scale and cost.

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# Thank You!

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