

Unlocking revenue with Network as Code

Enabling new services and value creation
in application ecosystems with 5G capabilities

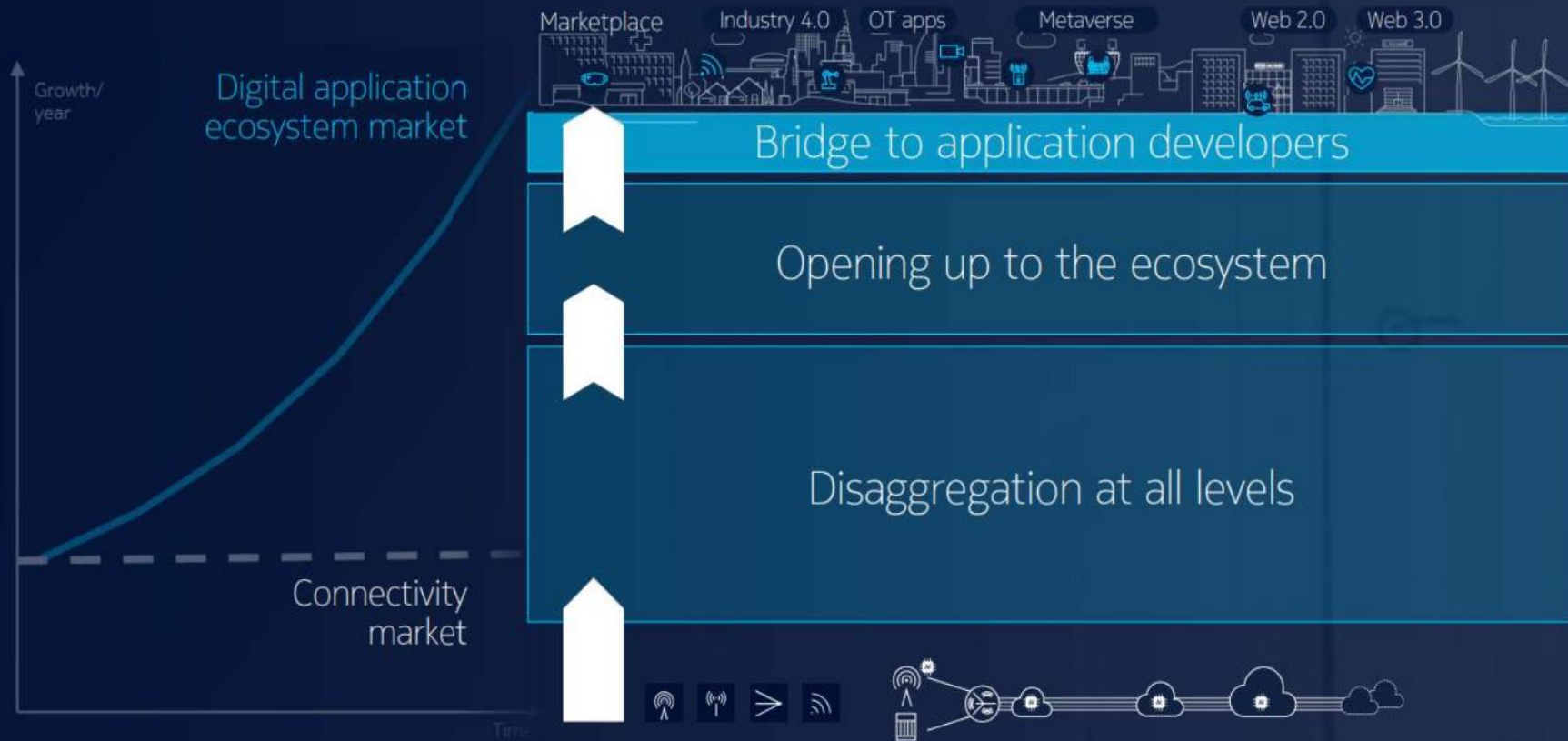
Tom Kristian Berg, Nokia



“ **[Network as Code]** brings openness and programmability to a 5G network, enabling the inclusion of developer and vertical ecosystems for new value creation.”

Jitin Bhandari, VP of CNS Technology & CTO

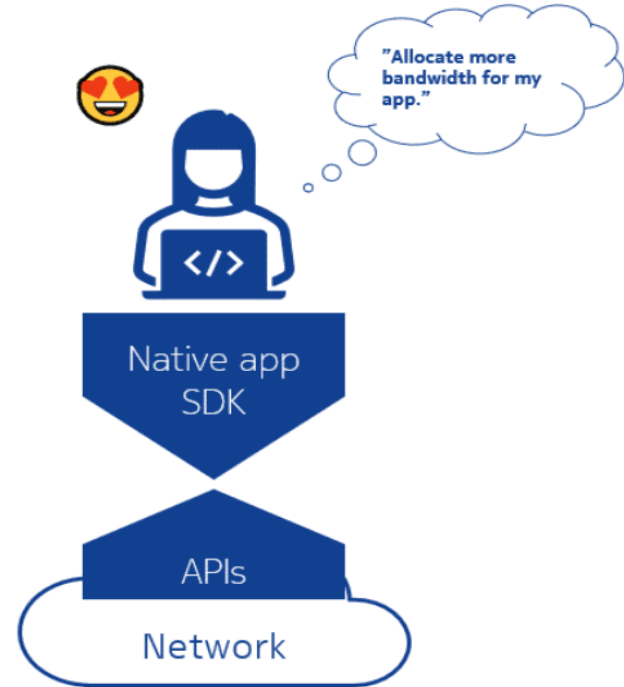
5G and cloud to disaggregate and open your network



Network as Code allows for a way to monetize 5G beyond just providing connectivity.

How? By enabling service providers to connect to a new set of customers - application developers.

Network as Code brings simple network control and awareness to application developers.

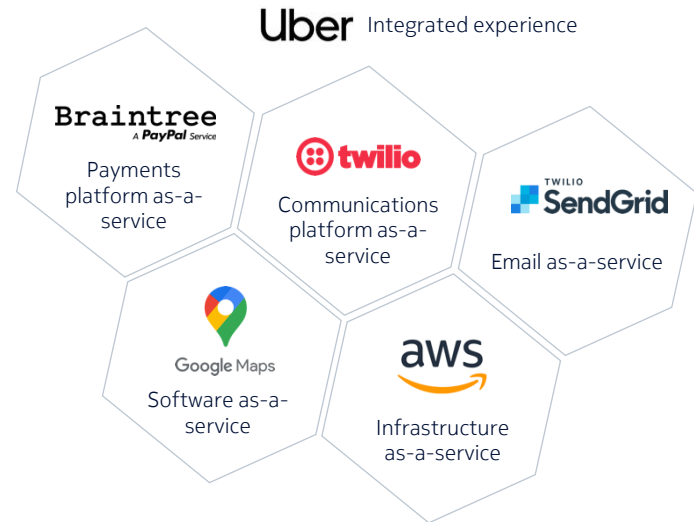


Digital ecosystem value creation

- Businesses create value in digital **ecosystems** and **distributed service chains**
- Ecosystem participants create and share value with each other as a **network of connected services**.
- **As-a-service** models enable ecosystems to innovate, develop and scale offering with **on-demand** access to infrastructure, platforms, applications and other digital capabilities

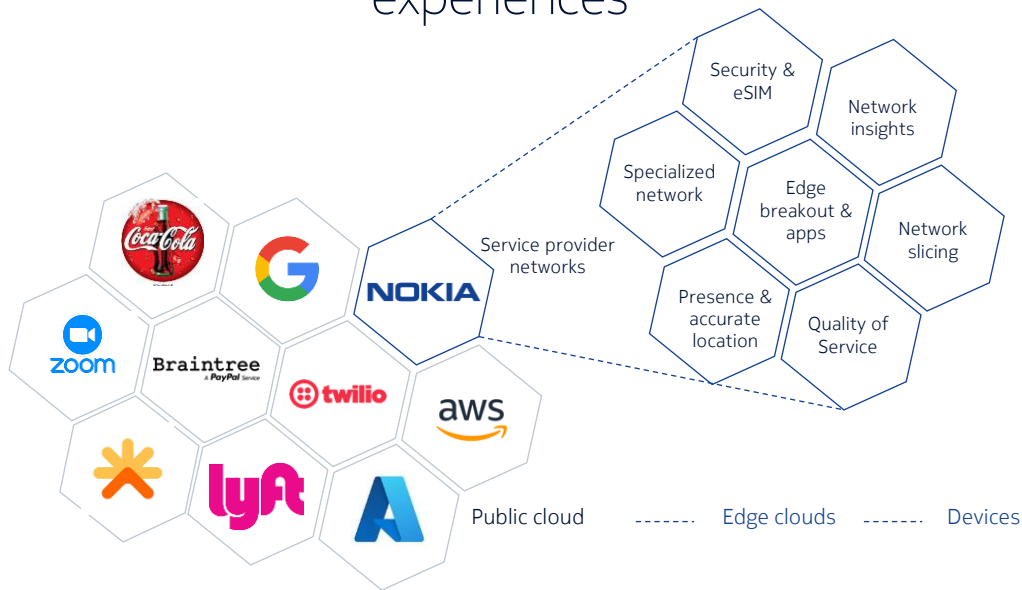
Case Uber

Uber links together as-a-service capabilities and creates an ecosystem-enabled service chain for mobility as-a-service.



Ecosystems
create value
through
distributed
services chains

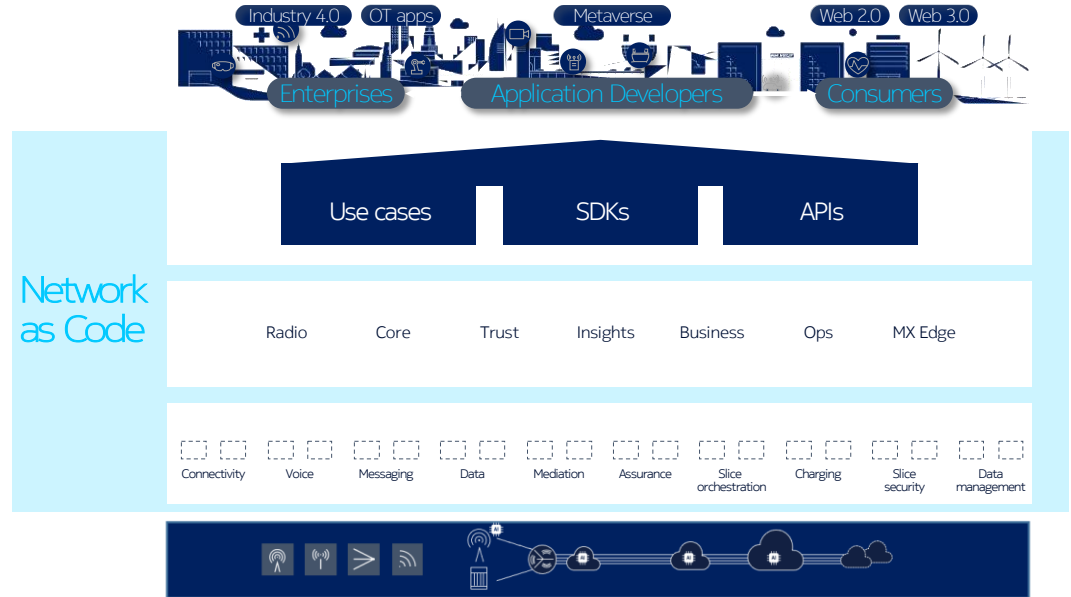
Programmable network capabilities
available for ecosystems will drive
innovation of new services &
experiences



Cloud & Network Services Programmability

Opening your network to evolve your business

- Opening up to the ecosystem
(SaaS based consumption)
- Distributed service chains
- SW centric Network
(multiple new 5G value vectors aggregate into SW services)
- Digital fabric
(SW disaggregation at all levels into capabilities)

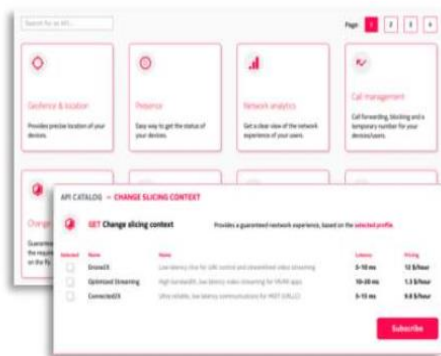


Any access and distributed cloud

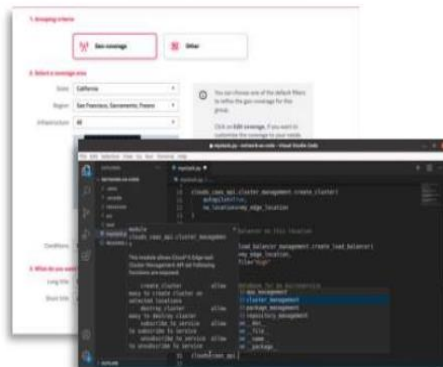
Network as Code how the developer see it

Supporting developer journey

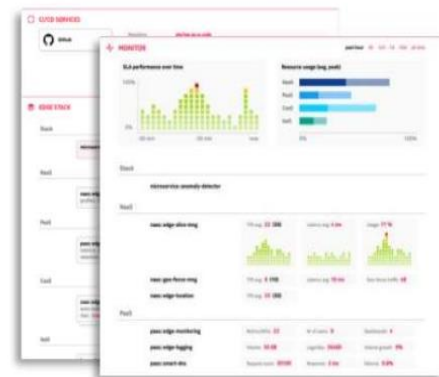
1. Browse marketplace & subscribe to APIs



2. Configure & code services



3. Deploy & monitor services



Network as Code
Cloud



Catalog

Charging

- subscriptions
- charging

Configurations

Monitoring

- Services
- EZE service chain

Data analytics & monetization

Service discovery & security (API GW & service mesh)

Network as Code

1. Simple & empowering network platform for application developer ecosystems

Network as Code platform

Hyperscaler platforms

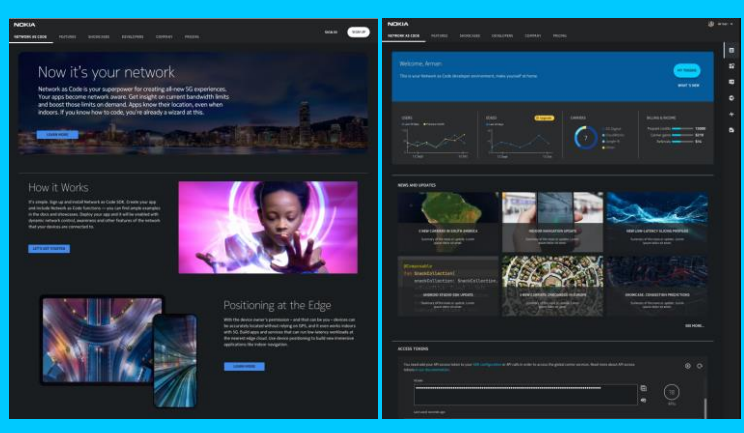
Security management

Developer services

- Examples / documentation
- Available functions / API & app catalogs
- Showcases
- Developer environment / SDKs
- News and updates
- Access tokens
- Billing and income
- Analytics



Developer



Application user

Application

SaaS support services

Network as Code SaaS

Customer

SaaS delivery team

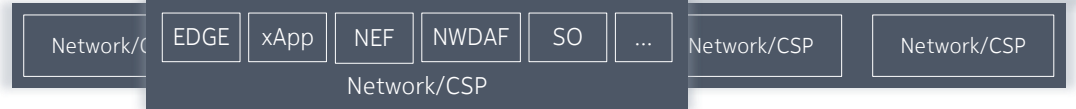
SaaS business management & operations

Network as Code services

API gateway services

Operations flow

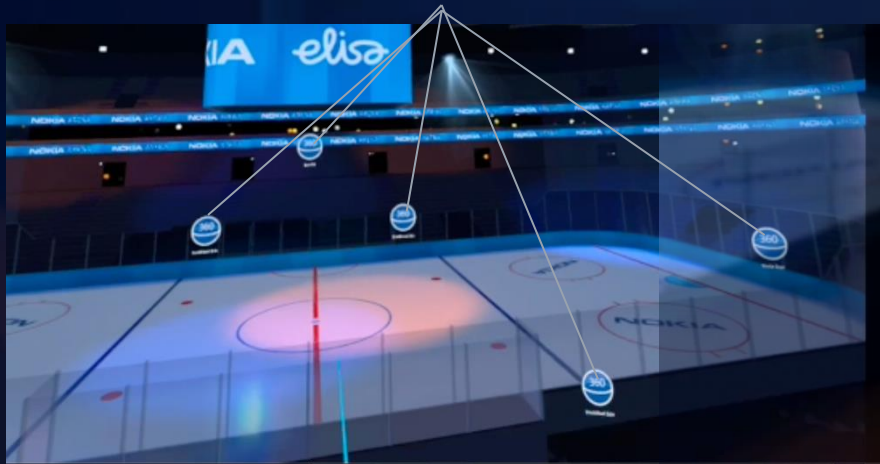
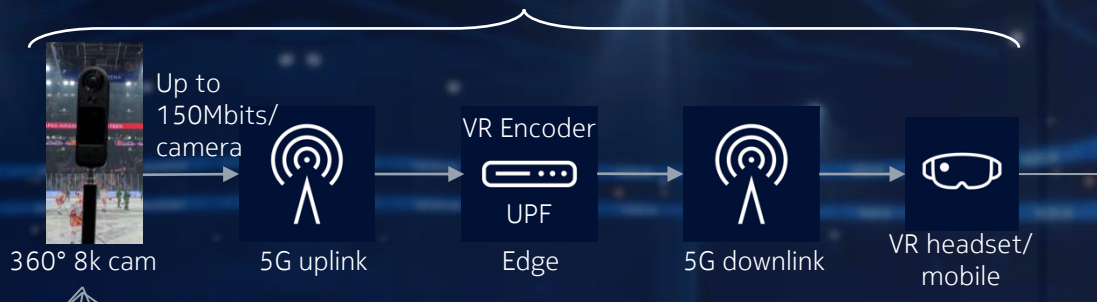
Application flow

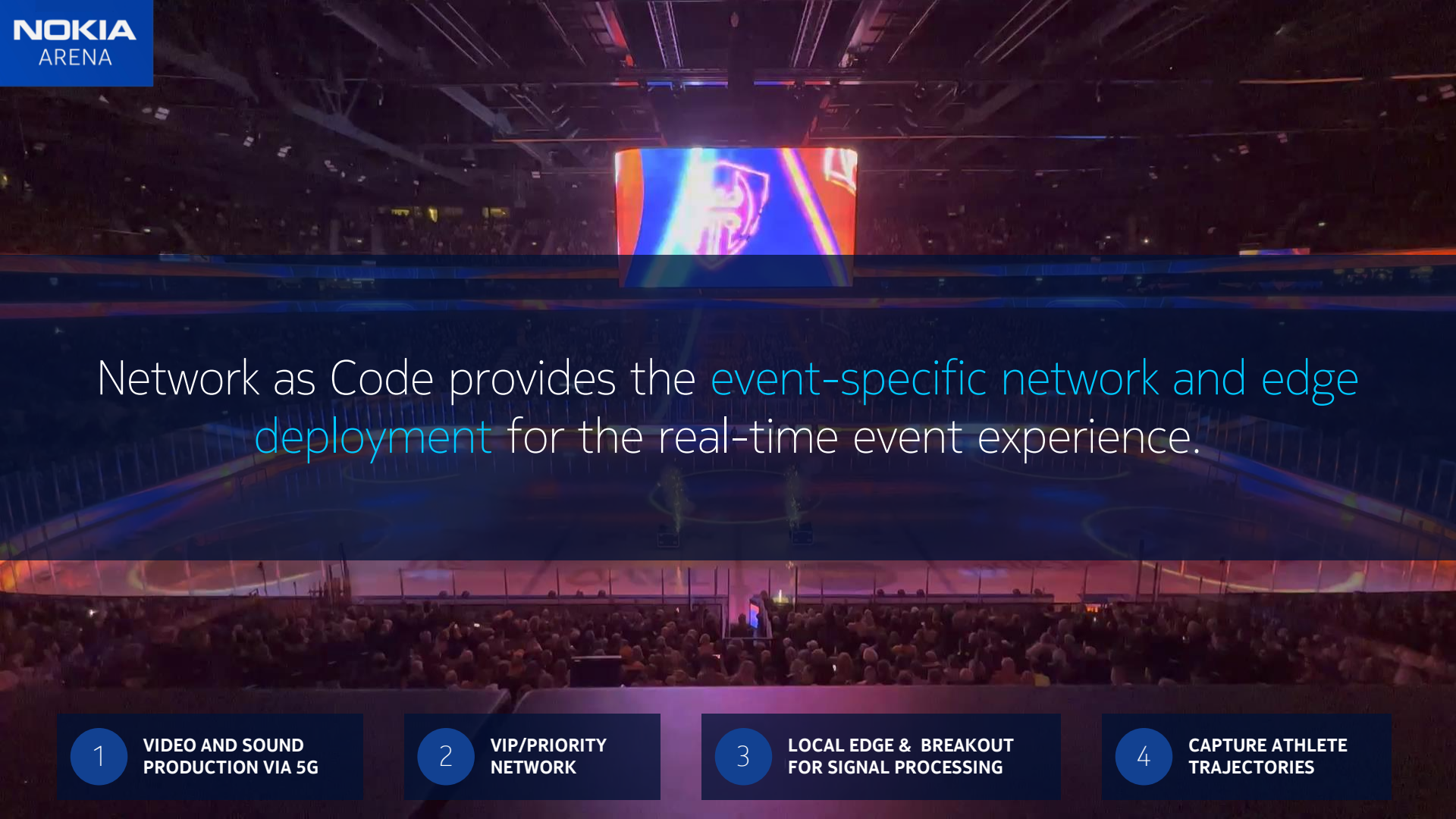


Immersive XR event experiences @ Nokia Arena

Network as Code

- Event network
- Device policies
- Indoor positioning





Network as Code provides the **event-specific network and edge deployment** for the real-time event experience.

1

**VIDEO AND SOUND
PRODUCTION VIA 5G**

2

**VIP/PRIORITY
NETWORK**

3

**LOCAL EDGE & BREAKOUT
FOR SIGNAL PROCESSING**

4

**CAPTURE ATHLETE
TRAJECTORIES**

Network as Code SDK

Why create SDKs?

Make APIs faster and easier to consume.

Abstract away unnecessary API request details.

Take advantage of modern programming language features.

Add further enhancements on top of what the API provides.

IMAGINE-B5G

Deploying network slices in application code

```
network_service.deploy(
    name="active_drone"
    profile="low_latency"
    nw_location="my_edge_zones"
)
```

Accessing network data in application code

```
device_presence(drone.present)
if drone.present:
    drone.nw_state=connected"
```

Dynamic change of network slice in application code

```
network_service.change(
    device=drone.id
    service="active_drone"
)
```

Service design & deployment

- Network slices catalog
- Network and application configuration
- Network and application deployment
- Device activation

Service monitoring & data feeds

- Device presence feed
- Device location feed
- Network service SLI
- Localized network conditions

Dynamic service adjustments

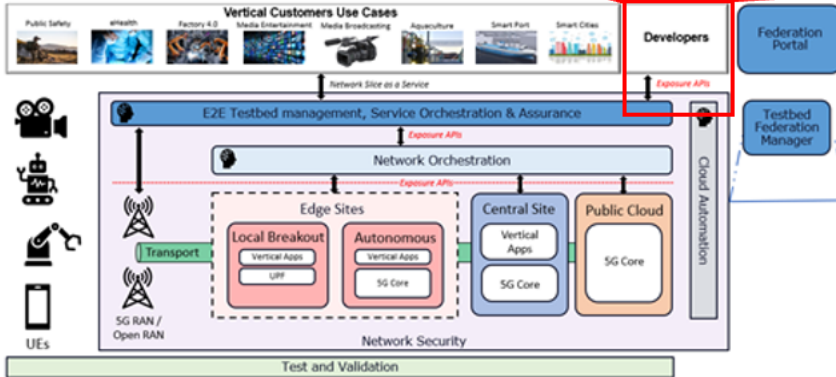
- Adjust device policy
- Change device network slice
- Change local application routing
- Change application location

API abstraction

API abstraction

API abstraction

Exposure APIs (network, orchestration and edge cloud)



Participant number	Participant organisation name ²	Short name	Country
1 (Project Coordinator)	Universitat Politècnica de València	UPV	Spain
2 (Technical Manager)	Telenor ASA	TNOR	Norway
3	Telefonica Investigación y Desarrollo SA	TID	Spain
4	Alice Labs SA	ALB	Portugal
5	Nokia Spain SA	NOK-S	Spain
6	Altranportugal, SA	CAP	Portugal
7	Samsung Electronics (UK) Limited	SRUK	UK
8	Keysight Technologies Denmark ApS	KEY	Denmark
9	Ubiquiti, Lda	UW	Portugal
10 (Innovation Manager)	Airbus DS SLC	ADS	France
11	Fundación de la Comunidad Valenciana para la investigación, promoción y estudios comerciales de Valenciaport	FV	Spain
12	Eurecom	EUR	France
13	Instituto de Telecomunicações	ITAV	Portugal
14 (Open-calls Technical Manager)	Universitet i Oslo	UjQ	Norway
15 (Open-calls Admin Manager)	Waterford Institute of Technology	WIT	Ireland
16	Athens University of Economics and Business - Research Center	AUEB	Greece
17	Nokia Networks and Solutions OY	NOK-F	Finland

END

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