

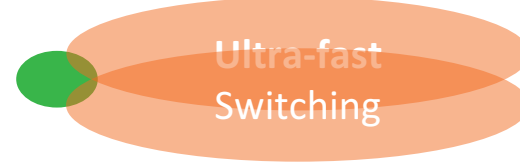
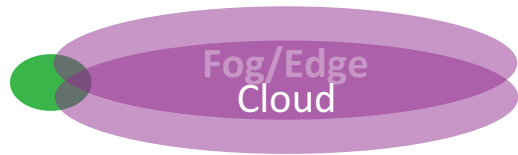
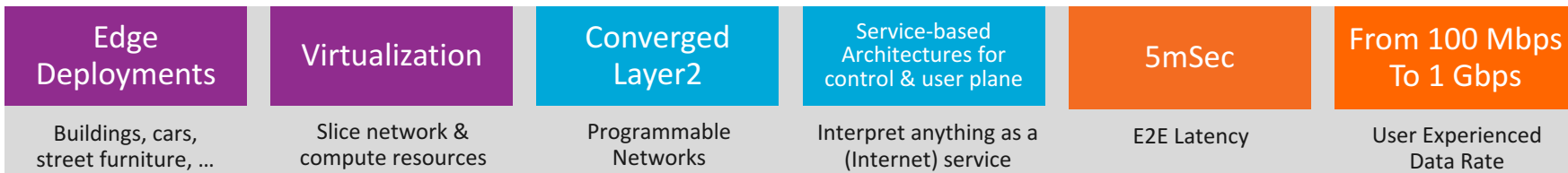


CREATING  
THE LIVING NETWORK.  
**TOGETHER.**

# 5G Networks

## Flexible IP-based Services (FLIPS)

# 5G Network: Observed Trends



# Effects through Virtualization



- **Availability:** virtualized compute entities deployed, replicated, collaborating in the edge network
  - Service just one hop away could be achieved



- **Instantiation:** happens in short time scales
  - Use of containers can push this into seconds timescale



- **Synchronization:** service replicas might have **incomplete** information
  - Rely on backend synchronization (e.g., for content, state, ...)

# InterDigital FLIPS Elevator Pitch

Solution to optimize service request routing on top of emerging L2 technologies, taking into account the changing reality NFV proliferation while providing the desired quantitative and qualitative benefits based on a cost-efficient integration with proliferating SDN transport network

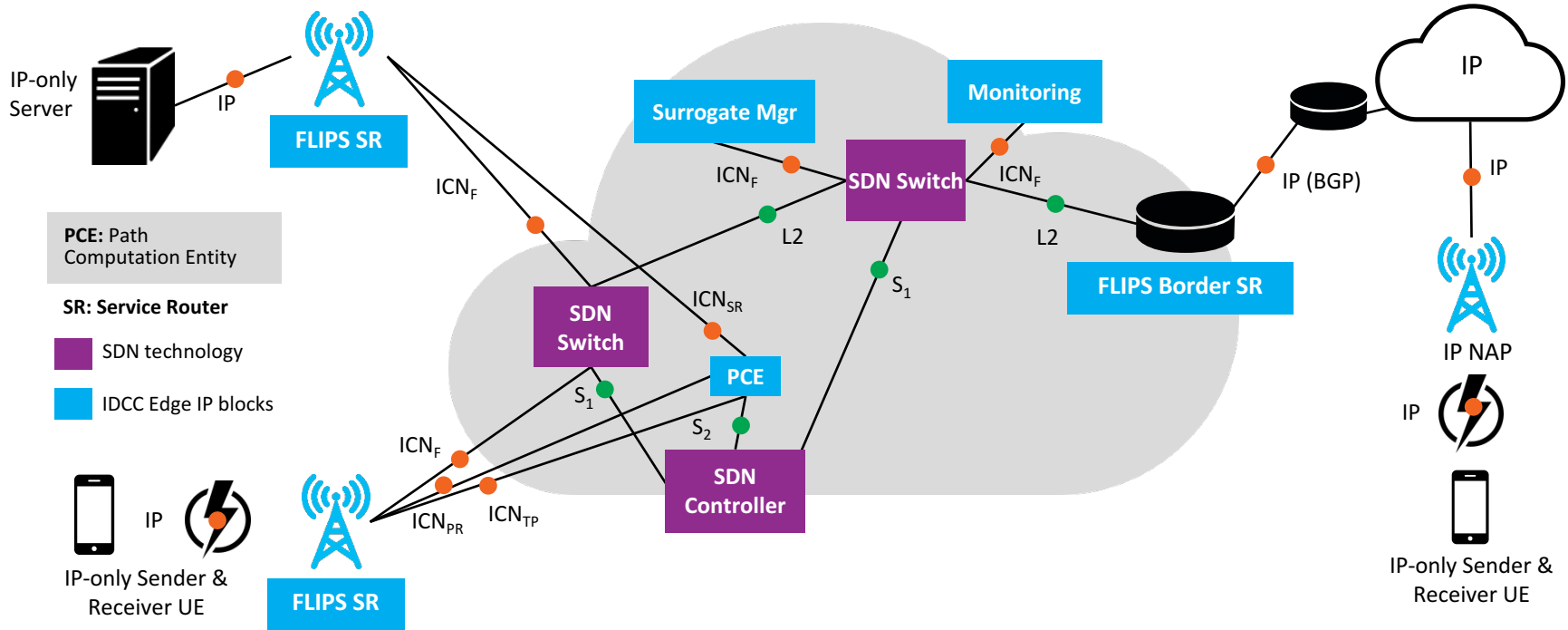
The target for this tech: Telcos & Switch Vendors

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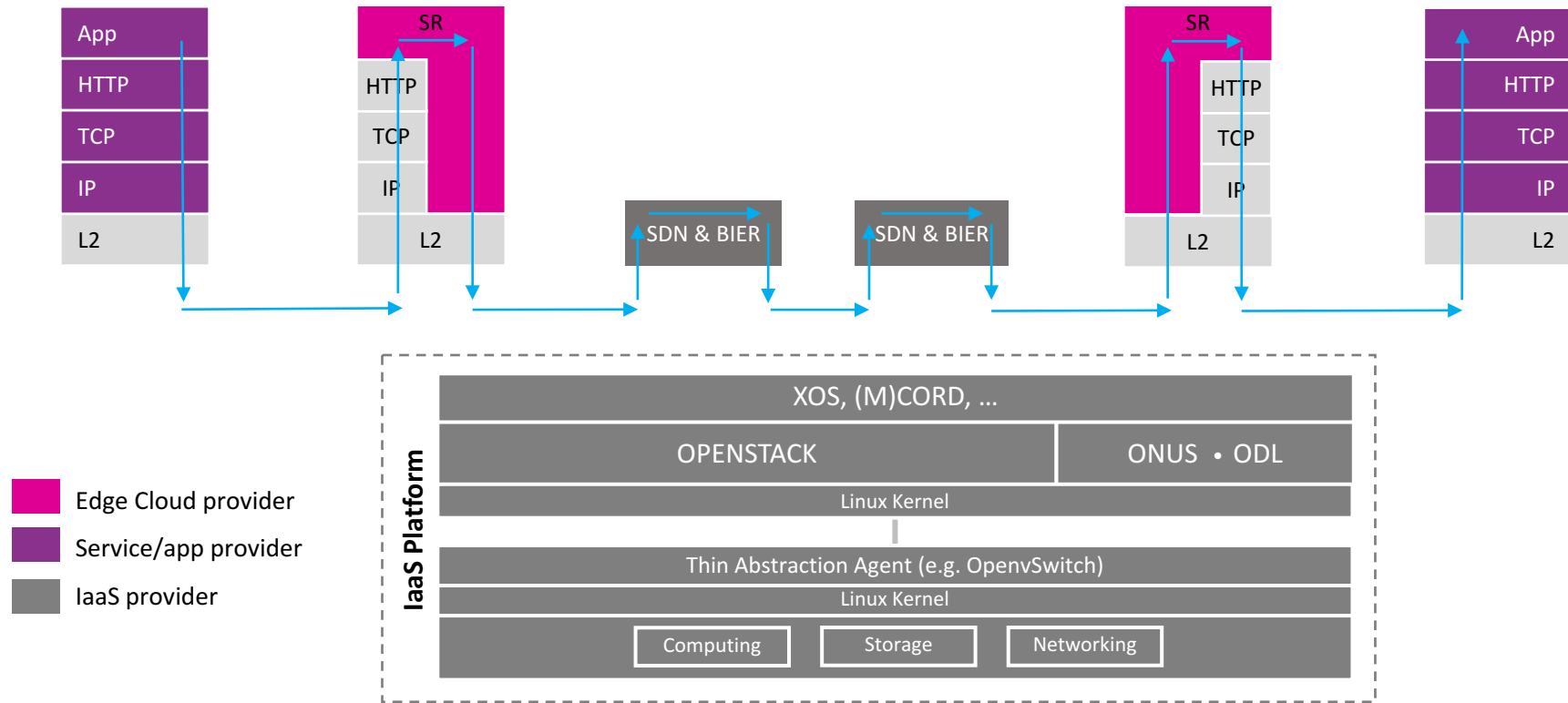
*It looks like IP, it smells like IP, **BUT** with this technology inside networks will simply work better...*

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# InterDigital FLIPS Edge IP Proposition



# Deployment at Edge Network



# The FLAME\* Service Delivery Platform

SDN/NFV-based Edge Platform, enabled by InterDigital FLIPS



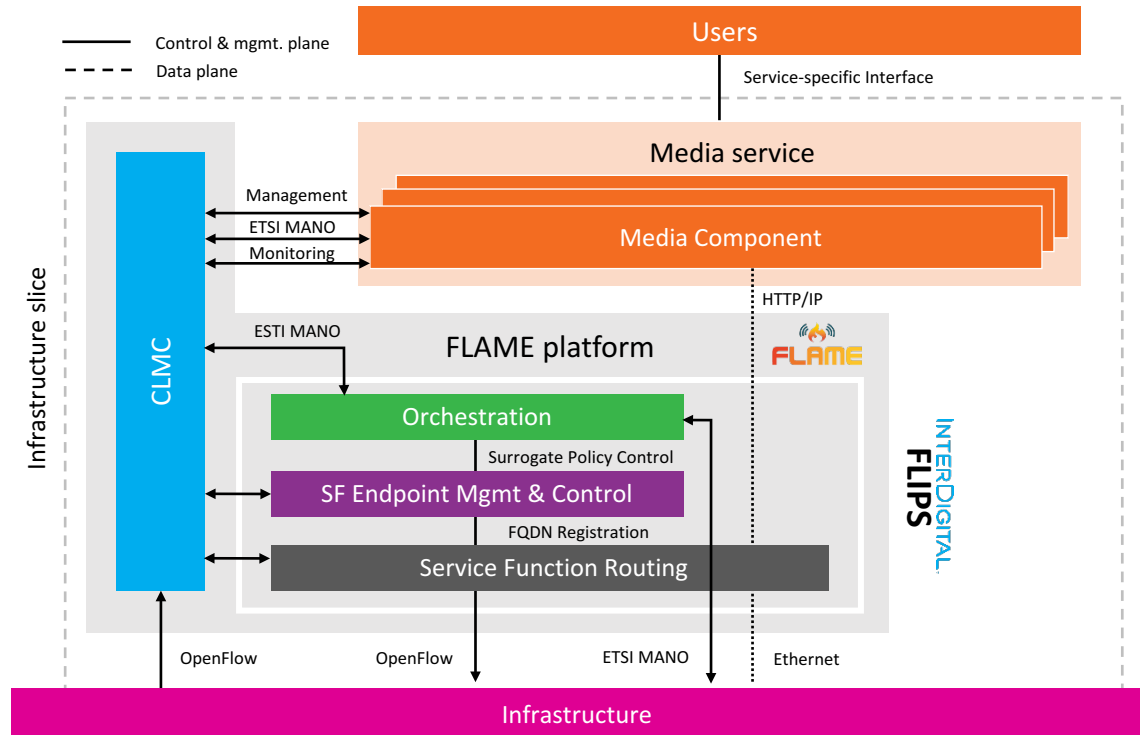
## A new dynamic content production and delivery platform

- Layered modular architecture with cross layer optimization, analytics and control
- Distributed computing models that combine media cloud with mobile edge
- Software-defined infrastructure to support service endpoint management, routing & switching
- Defines a network of media services utilizing infrastructure

## Supporting enhanced Quality of Experience (QoE)

- Personalized, interactive, mobile and localized media services

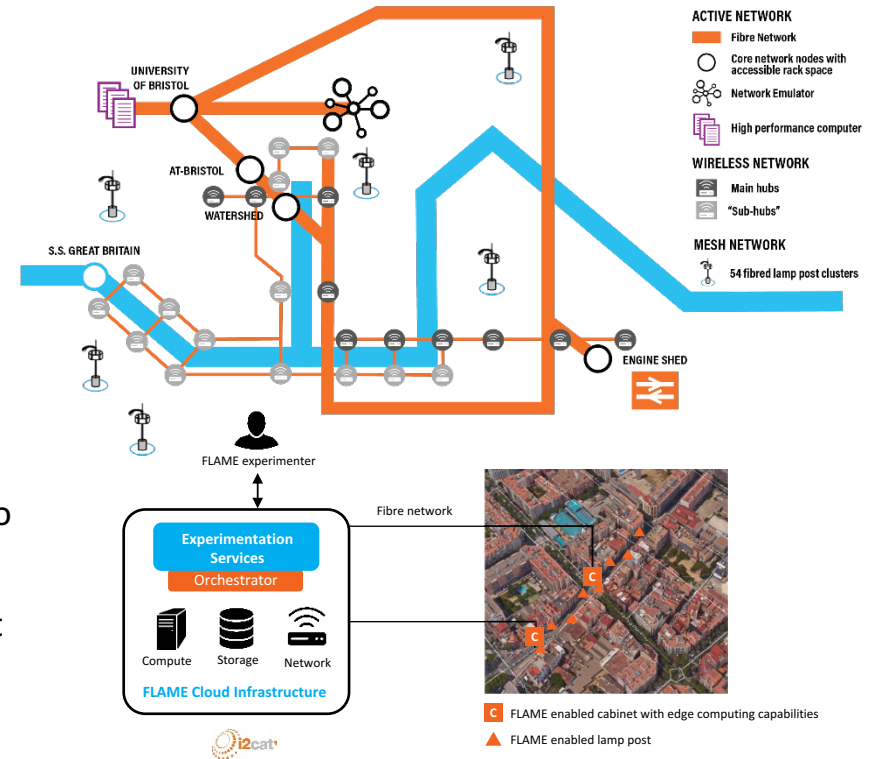
\*EUH2020 funded under grant #731677



# Validation through Urban Scale Trials & Experiments



- Validate platform capabilities by trials conducted by ecosystem partners
  - 5 operator infrastructures
  - 25+ customer trials
- New media formats (AR, VR, 360) and distribution channels
- Engagement with media service providers, content providers, infrastructure operators and beyond
- Trials will be conducted in 3 waves from March 2018 to December 2019
- Public funding available through H2020 FLAME project





# Working with Partners Across Horizon 2020

## Platform providers

### Partners (38)

InterDigital, ATOS

## Vendors

Huawei, NEC, Intracom, Thales

## Content

Disney Research, VRT Belgium

## Operators

Deutsche Telekom, Orange, Telenor  
Guifi.net, Avanti, Primetel

## SMEs

CTVC, Ell.i, Martel Consulting, Ubitech,  
B-COM, Eurescom, Nextworks

## Municipalities

Barcelona, Bristol-is-Open

## Academia & Research Institutes

Athens University of Economics & Business,  
Aalto University, RWTH Aachen, TU Munich,  
Cambridge University, University of Essex,  
TU Kaiserslautern, i2CAT, iMinds, King's College  
London, Fraunhofer Fokus, IT Aveiro,  
IT Innovation, University of Bristol, ETH Zurich



EUH2020 funded under grant #643990  
<http://www.point-h2020.eu>



EUH2020 funded under grant #644663  
<http://rife-project.eu>



EUH2020 funded under grant #731677  
<http://www.ict-flame.eu>



Unfunded effort in the 5G Private Public  
Partnership Programme  
<http://www.5g-control-plane.eu>



**13.5MIL EURO**

**Combined H2020 Funding**



Showcased as **ETSI MEC PoC**  
Successful **5G network trial in 2017**

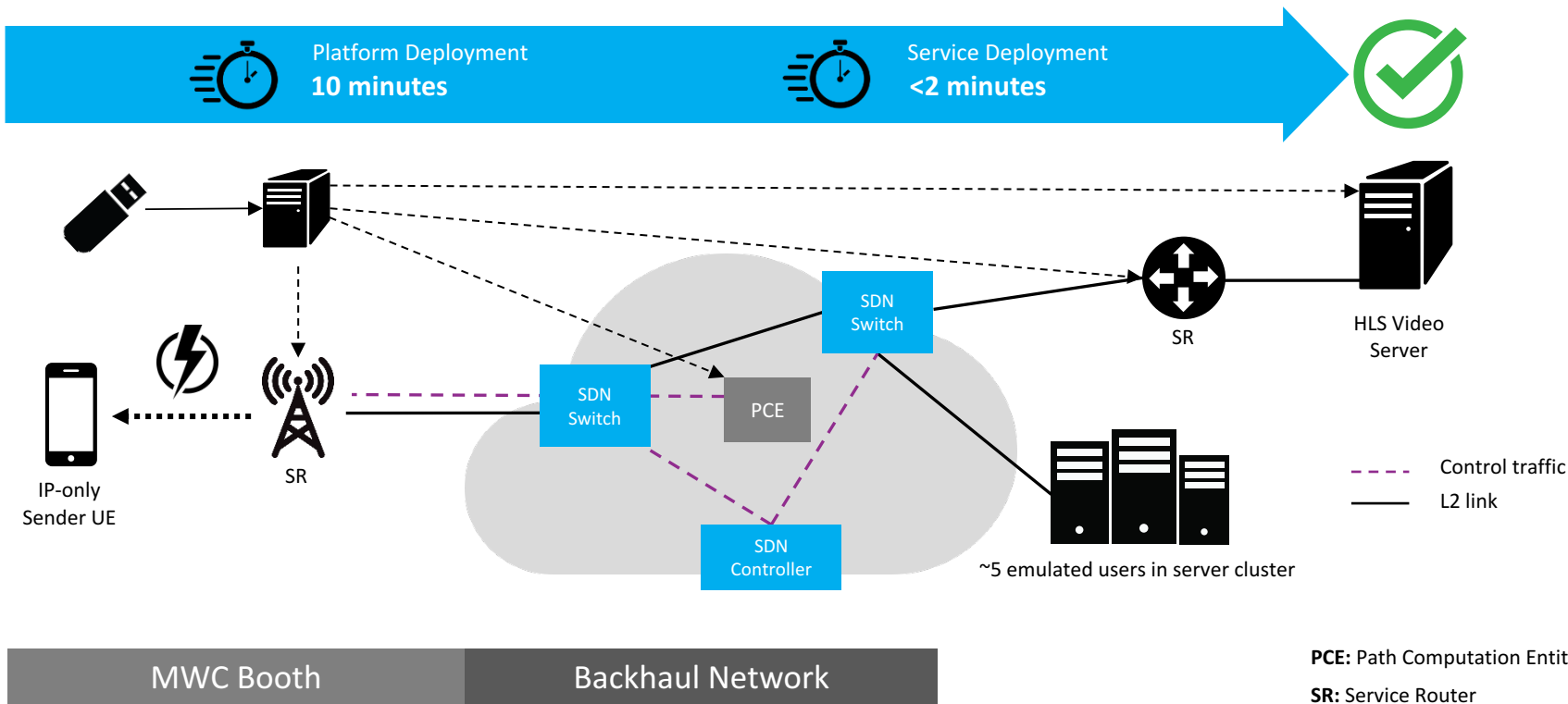
# 5G Networks – Demo 1

## FLAME-on-a-Stick

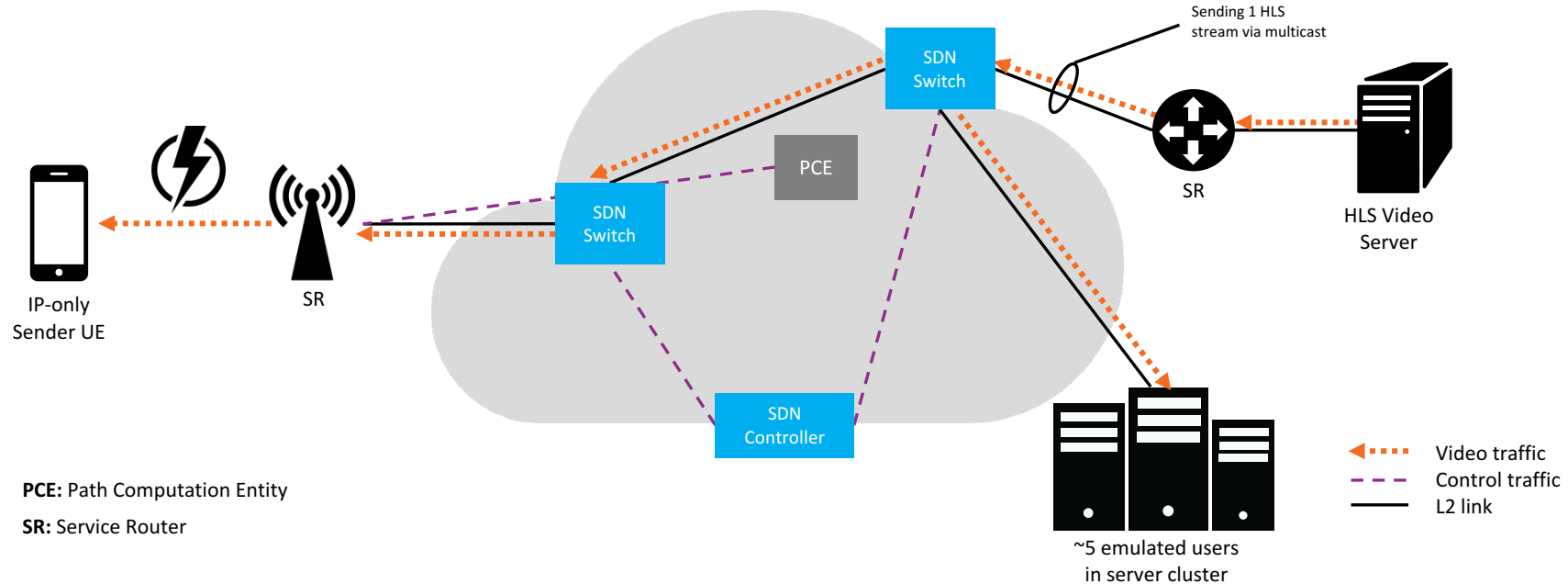


# Boot-Your-Own Infrastructure

...From a memory stick!

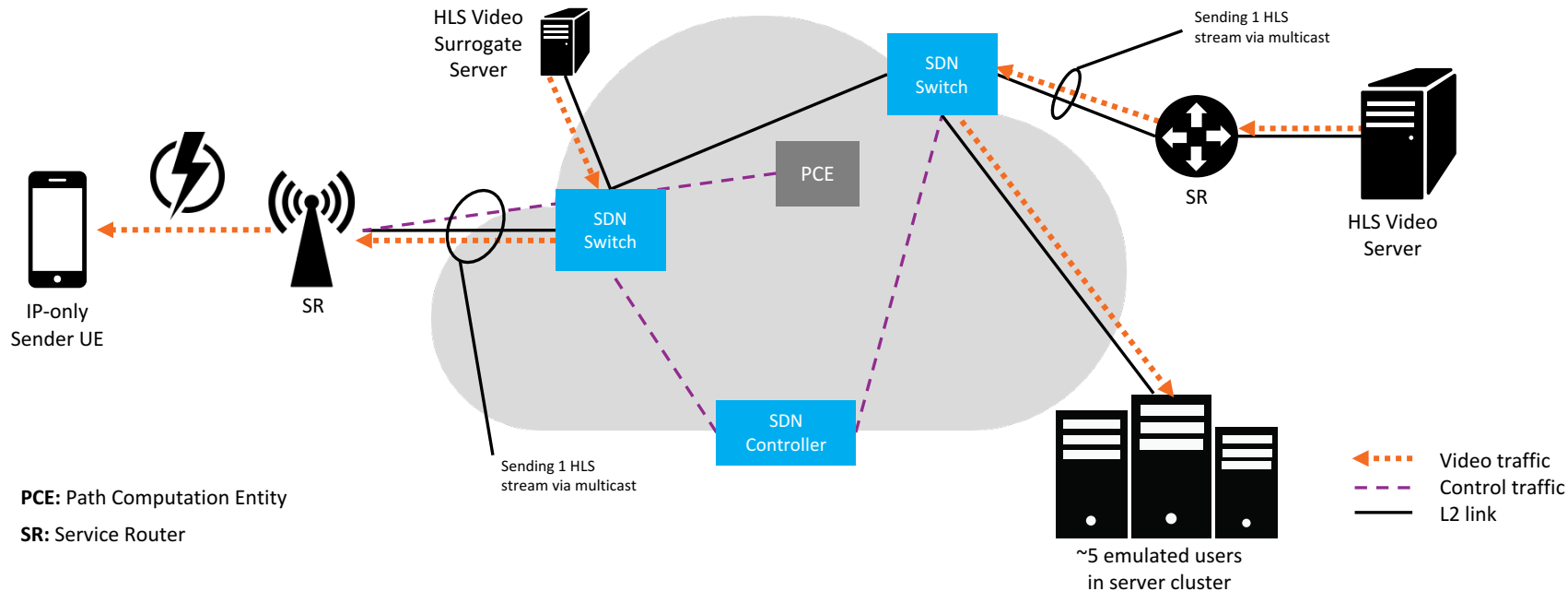


# Demo Aspect 1: Multicast Gain Equals Number of Users



Aspect 1 demonstrates the multicast gain as well as the reduced server load through multicast delivery of HTTP responses in HLS video streaming scenario.

# Demo Aspect 2: Surrogate Server for Latency Reduction with Switch-Over Times of <1s



Aspect 2 demonstrates the latency reduction and video quality improvement through surrogate server at MWC.

# 5G Networks

## The Disintegrated Terminal

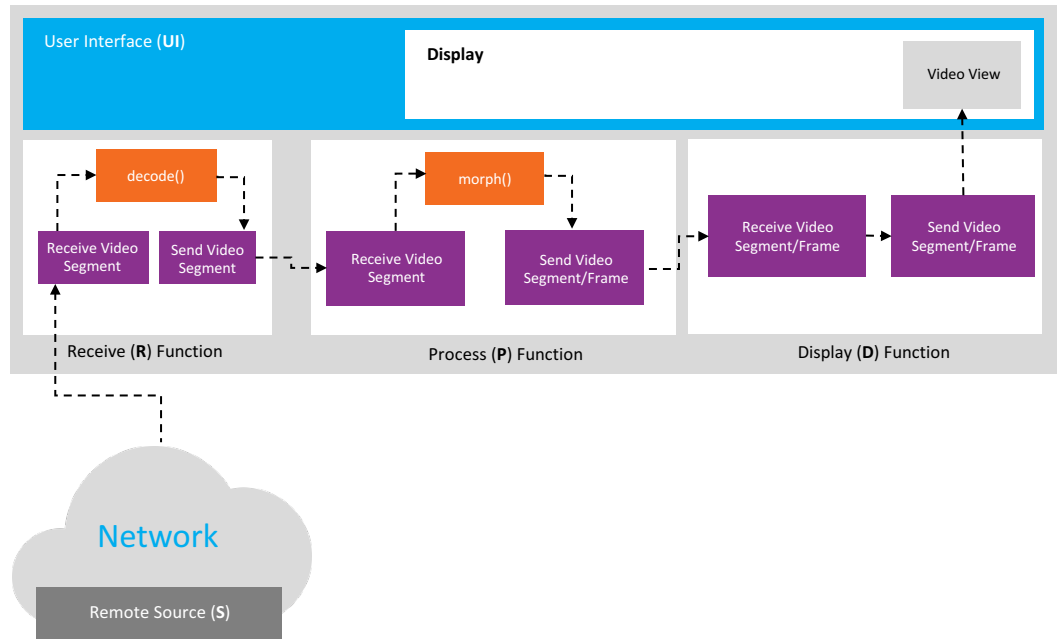


INTERDIGITAL.

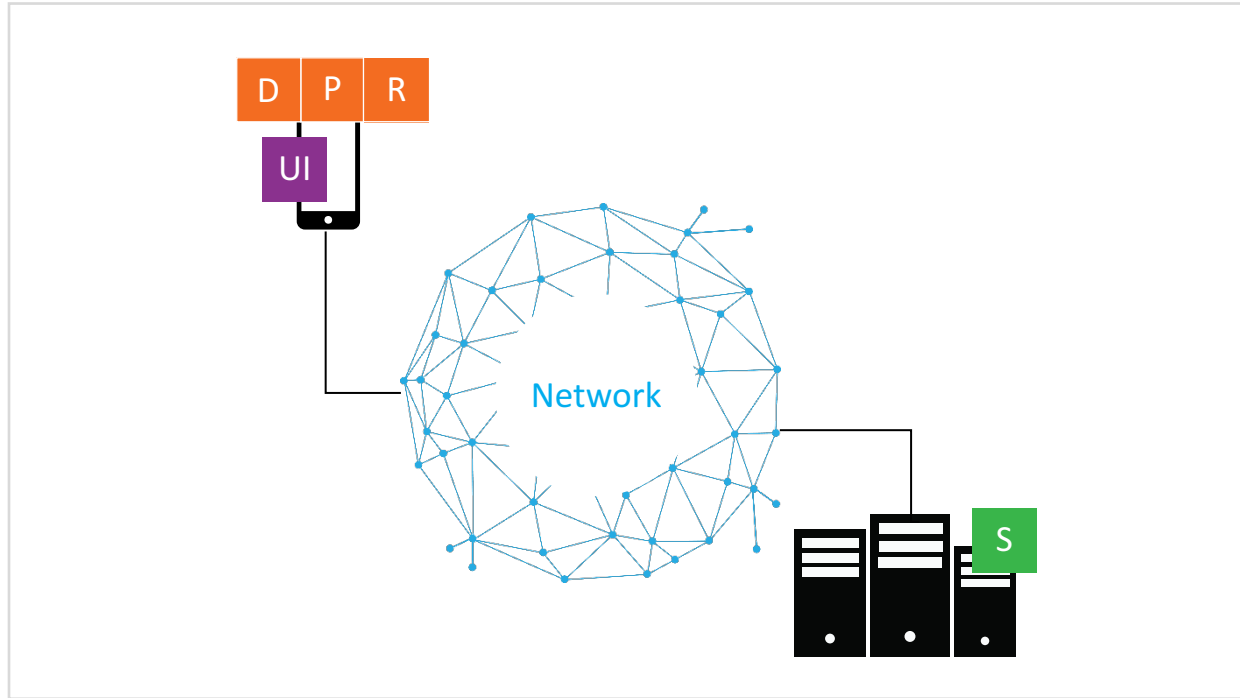
# Disintegrate Your Terminal

## ...Flexible Function Offloading in Your Own Service Deployment

- Modular mobile app with HTTP-like interface for inter-process communication (IPC)
- Internal logic decides
  - To use efficient IPC if module exists on device
  - To use FLIPS-based routing to nearest network-based module if module does not exist on device
- Example: Simple video morphing app
  - UI to control local module availability



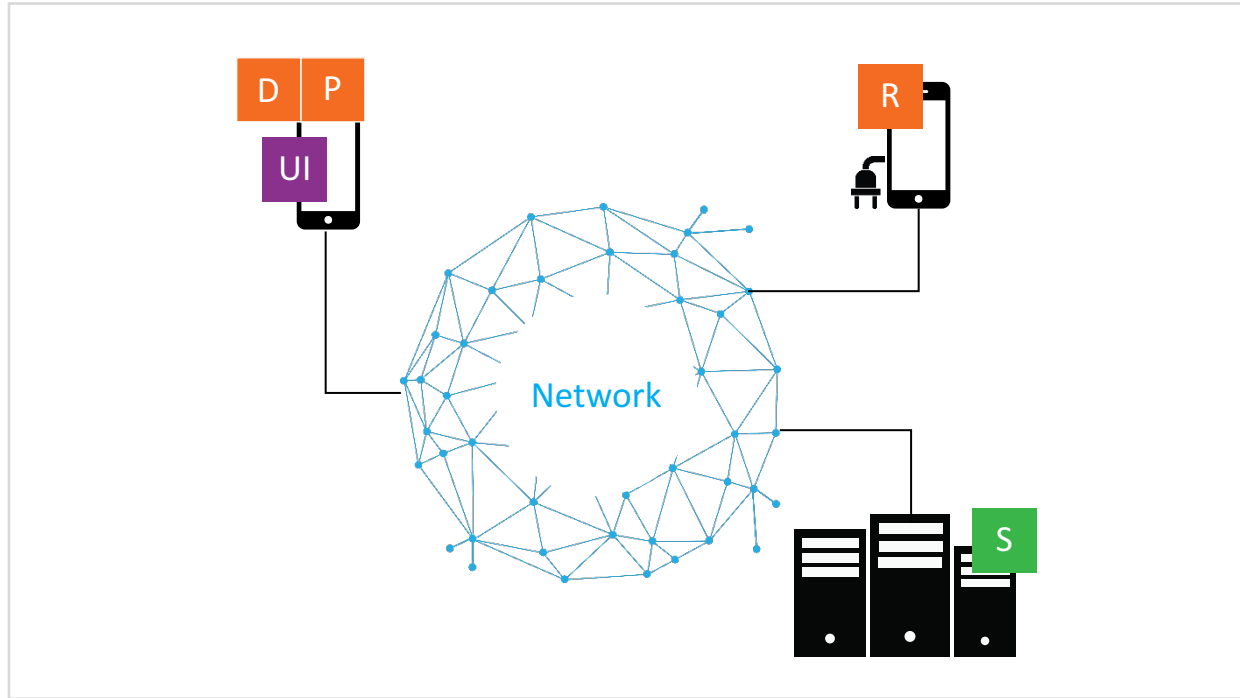
# Monolithic Application



- UI User Interface
- D Display Function
- P Process Function
- R Receive Function
- S Remote Source

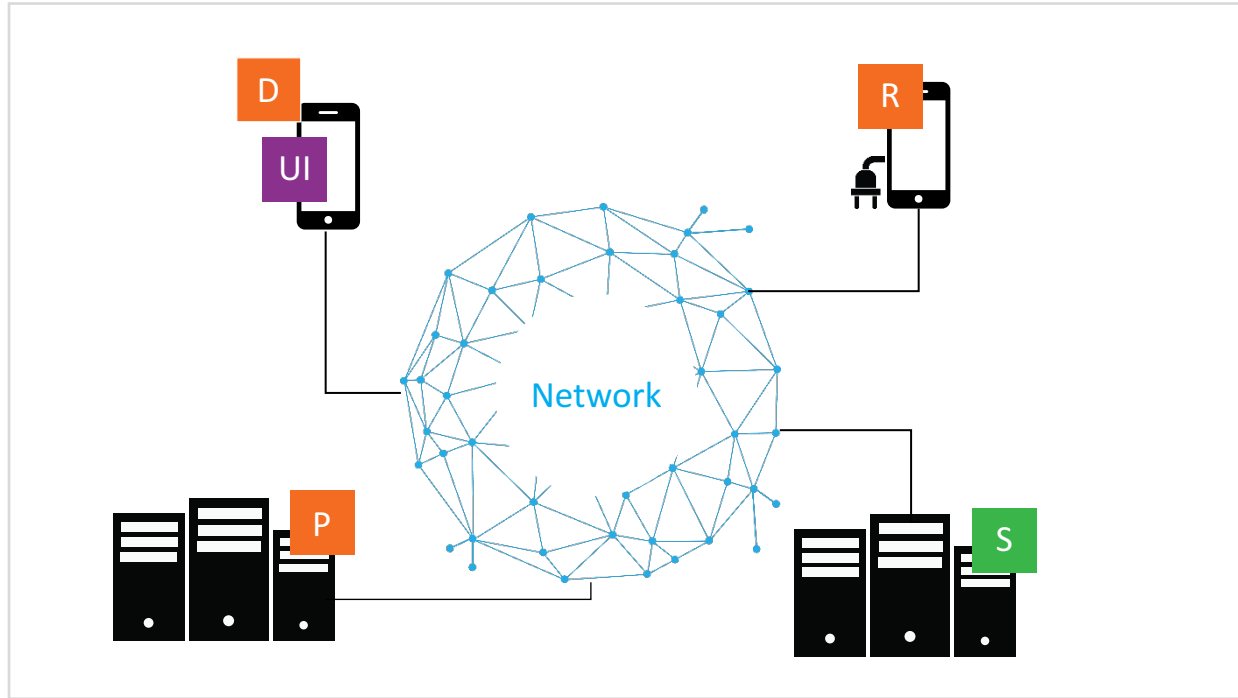


# Use a Powered Mobile Nearby



- UI** User Interface
- D** Display Function
- P** Process Function
- R** Receive Function
- S** Remote Source

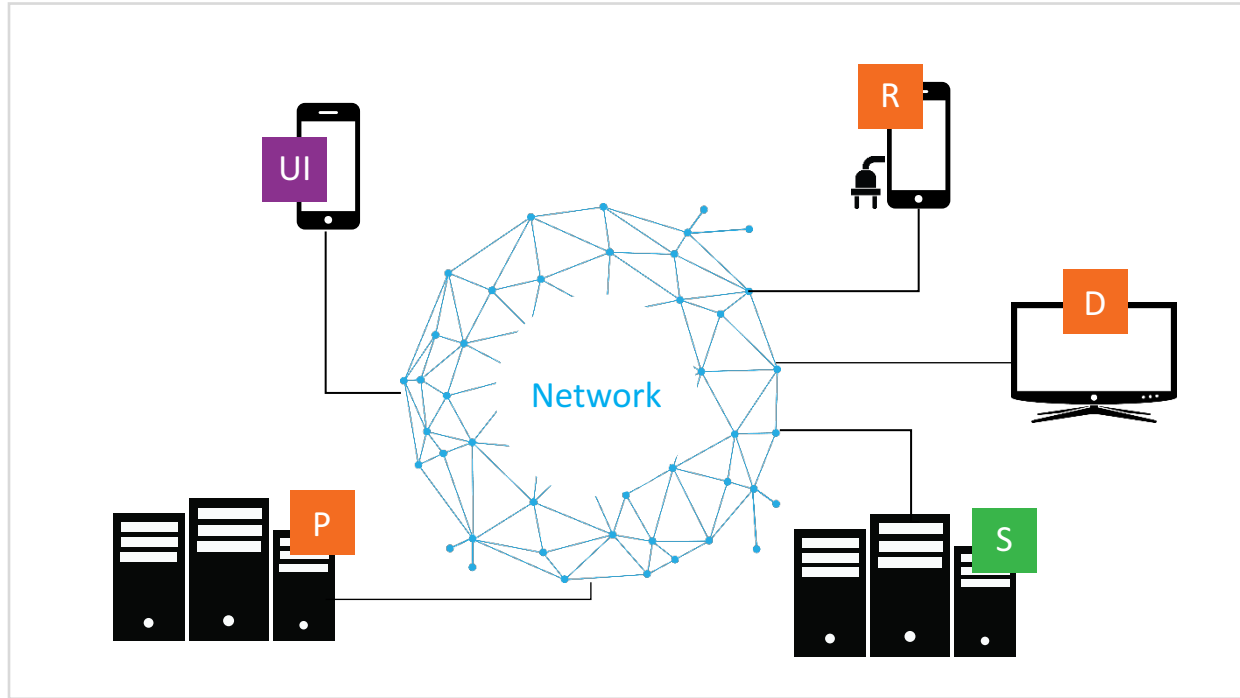
# Use Network Assistance for Processing



- UI** User Interface
- D** Display Function
- P** Process Function
- R** Receive Function
- S** Remote Source

# Use Nearby Smart TV for Display

...but keep control on your device



- UI** User Interface
- D** Display Function
- P** Process Function
- R** Receive Function
- S** Remote Source