Towards 5G validation trials: experiences and outlook

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In brief

67%
international activities

19
countries with local presence

1,722
employees worldwide

A global telecommunication systems and solutions vendor with extensive know-how and a proven track record.

70
countries we export to

3
R&D centers

40
years of experience

Core Offerings – Markets Served

INTRACOM TELECOM

Core Offerings

Wireless Access & Transmission

Intracom Telecom products employ the most advanced field-proven technologies achieving and exceeding the level of performance required by the modern applications for wireless access and backhaul.

Telco Software Solutions

Intracom Telecom has been building and enriching a wide portfolio of advanced telco software solutions, enabling Operators to generate new revenues and boost their Customers' Experience.

ICT Services & Smart City Solutions

Intracom Telecom strategically focuses on the delivery and operation of top-notch services for converged networking and cloud computing solutions. The company also offers a range or Smart City solutions.

Energy Solutions

Intracom Telecom designs, installs and commissions energy-related systems, providing Smart Grids and Energy Management solutions.

Markets Served

Telecom Operators

Utility Companies

Large Enterprises

Healthcare Institutions

Public Authorities

5G Related Products & Services

INTRACOM TELECOM

Wireless Front-/Back-haul

ULTRALiNK
omni BAS-OSDR
WiBAS OSDR **STREETNODE**

- ➤ 1–10 Gbps
- ➤ PtP / PtMP
- ➤ SDR & SDN-enabled
- ➤ Ethernet / CPRI for Backhaul / Fronthaul
- ✓ *Multiple deployments around the globe*

NFV Accelerator Platform

- ➤ Performance & Energy aware placement
  - ✓ 14-30% Power ✓ 30-60% Data Rate
- ➤ Non-disruptive tenant collocation
- ➤ Adaptive SLA-guided NS optimization
- ➤ Automated HW / SW & workload profiling

NFV-ready Virtualized Wi-Fi

- ➤ Multi-access Edge Computing
- ➤ End-to-end Slicing & Multi-tenancy
- ➤ Accelerated Service Deployment
- ➤ SFC support ▸ Rich VNF Library
- ✓ *Completed pilot tests for MGTS (CIS)*

Media Distribution

- ➤ Live TV / VoD / multi-play services
- ➤ Full-fledged: encryption, transcoding, distribution & reception of content –Virtualized components
- ➤ Web, Smart TV/Phone, Tablet Interfaces
- ✓ *Multiple deployments e.g., USA*

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5G Research Activities

Network & Service Management

➢ Softwarization of WindPark Networks

➢ Cross-domain Slicing & KPI monitoring

➢ Optimized cross-slice communication

➢ MEC orchestration

➢ IoT Slicing

Advanced Wireless Network Infrastructure

➢ SDN / SDR Wireless Backhaul

➢ Transport Network Slicing

➢ RoF-based Fronthaul

➢ mmWave Beamforming

➢ Terahertz Communications

H2020 / 5G PPP Projects

VIRTUWIND   blue SPACE   5G-VINNI
CHARISMA   TERRANOVA
Speed5G

Phase 1   *Phase 2 / B5G*   *Phase 3*

Standardization

ETSI World Class Standards
NFV & MEC ISGs

I E T F

Technologies / Frameworks

OpenFlow   OPEN DAYLIGHT   OvS Open vSwitch
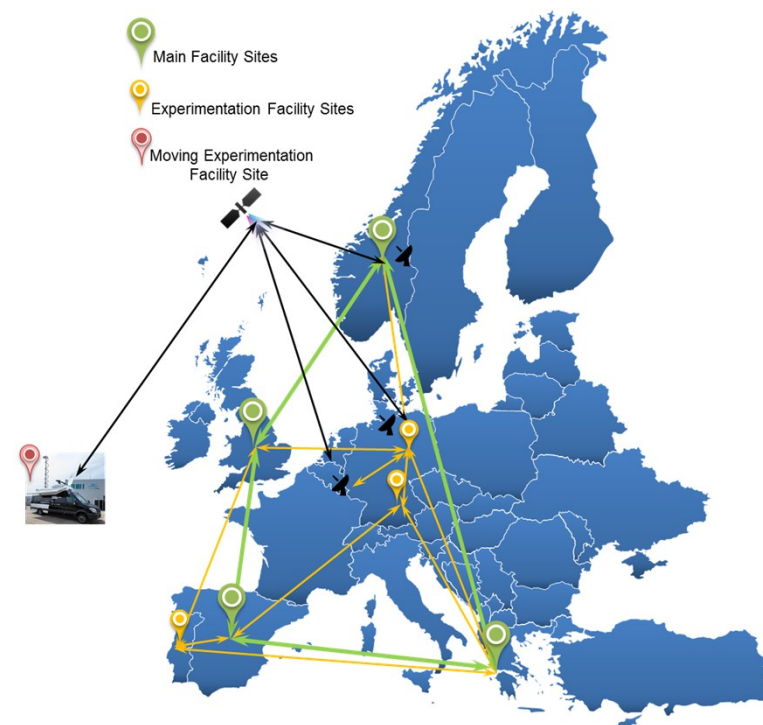
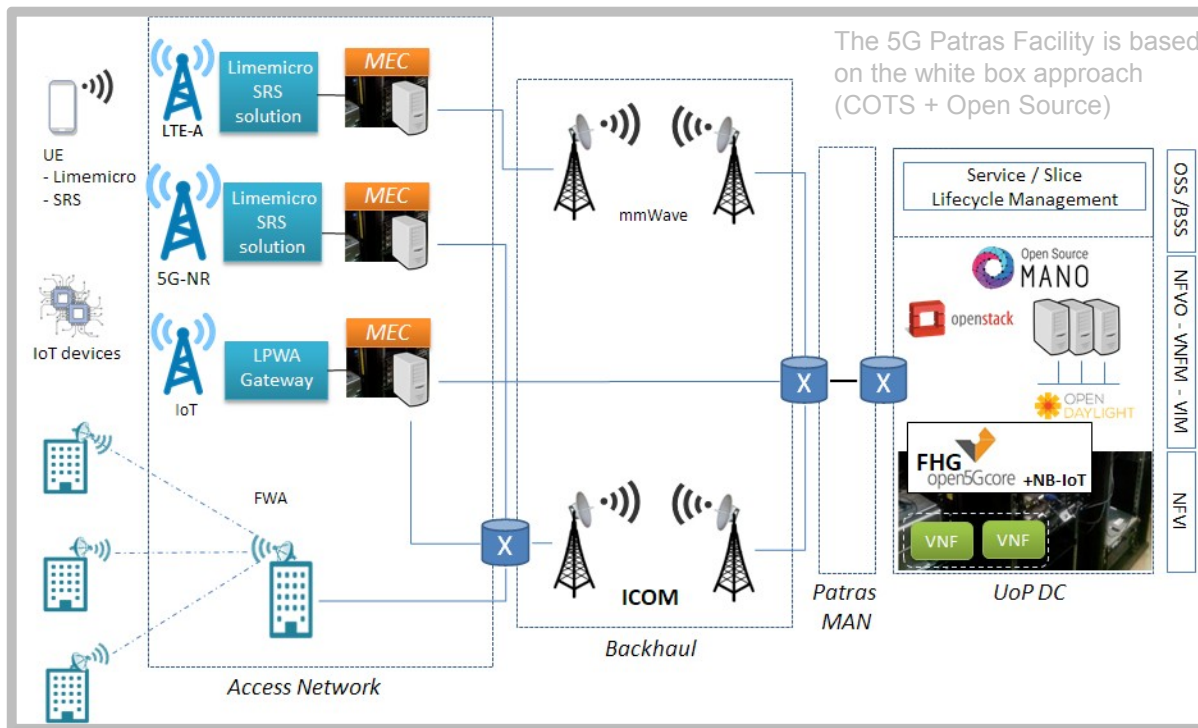openstack   Open Source MANO   OPEN BATON

5

5G PPP Phase 3: 5G-VINNI

- ▶ **Main Facility sites**: E2E 5G-VINNI facility that offers services to ICT-18-19-22 projects with well-defined Service Level Agreements.

  - • Norway (Oslo, Kongsberg)

  - • UK (Martlesham)

  - • Spain (Madrid)

  - • Greece (Patras)

- ▶ **Experimentation Facility sites**: provide environments for advanced focused experimentation and testing possibilities on elements and combinations of elements of the E2E model.

  - • Portugal (Aveiro)

  - • Germany (Berlin)

  - • Germany (Munich)

- ▶ **Moving Experimentation Facility site**: satellite connected vehicle.

Main Facility Sites
Experimentation Facility Sites
Moving Experimentation Facility Site

Wireless Backhauling

Challenges

▶ Realize 5G roll-out, supporting densification at low deployment costs

▶ Support for high throughput, low latency 5G use cases (enhanced Mobile Broadband (eMBB), Ultra-Reliable and Low-Latency Communications (URLLC))

Contributions

▶ Provide mmWave backhaul and Fixed Wireless Access (FWA) solutions

  • **UltraLink™-GX80** mmWave PtP Ethernet radio @ 70/80 GHz (E-Band), providing a 10 Gbps backhaul capacity, to interconnect the g/eNBs with the core network and the data centre at the Uni. of Patras

  • **WiBAS™ G5** FWA solution (112MHz channel, 1Gbps to subscriber), providing broadband access to public organizations' sites (e.g. University Campus, City Hall, etc.)

▶ Add support for **SDN-based network slicing** to the wireless backhaul and FWA
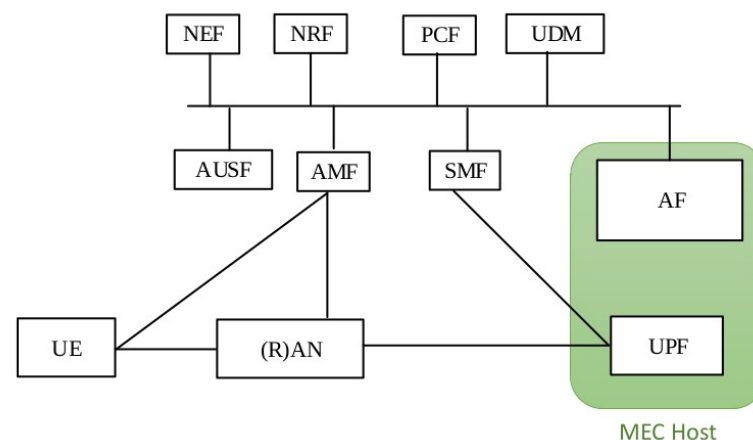
Multi-access Edge Computing (MEC)

Challenge

▶ Integrate MEC with 5G system architecture

▶ Develop and integrate appropriate KPI tools / methods

Contributions

▶ Baseline **service orchestration - MANO**

    ● Application lifecycle management

    ● DNS and traffic flow management

▶ **Mobility support** mechanisms

    ● Location Service for mobility management events

    ● Application context transfer interfaces

    ● User redirection: network/application level

▶ KPI assessment tools for mobile video streaming, AR/VR applications
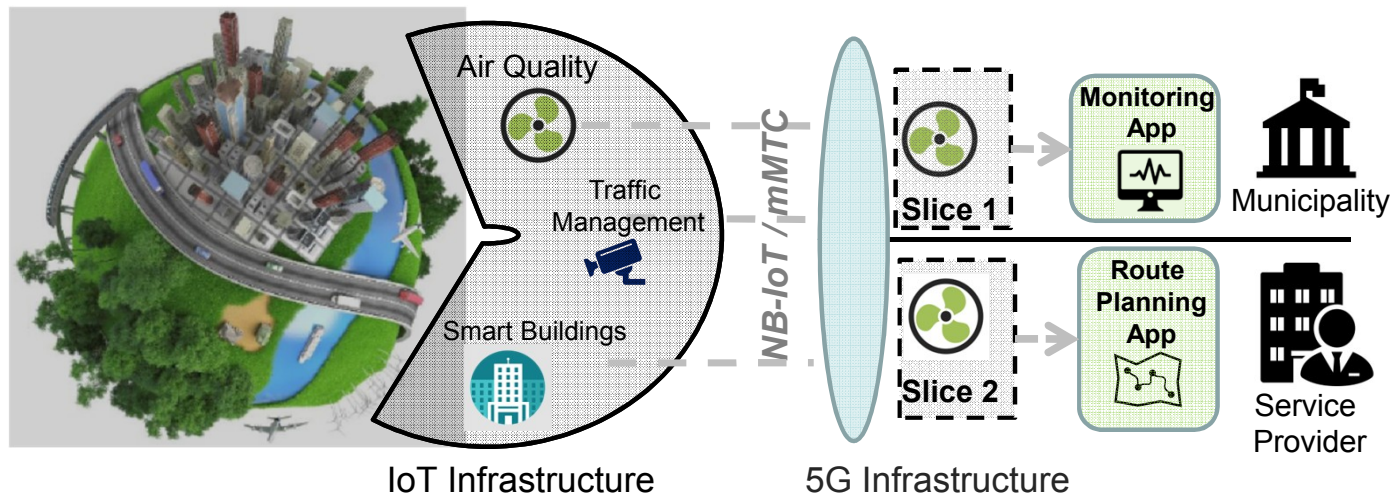
An example of MEC mapping with 5G system architecture

Source: ETSI White Paper No. 24 MEC Deployments in 4G and Evolution Towards 5G, ISBN No. 979-10-92620-18-4
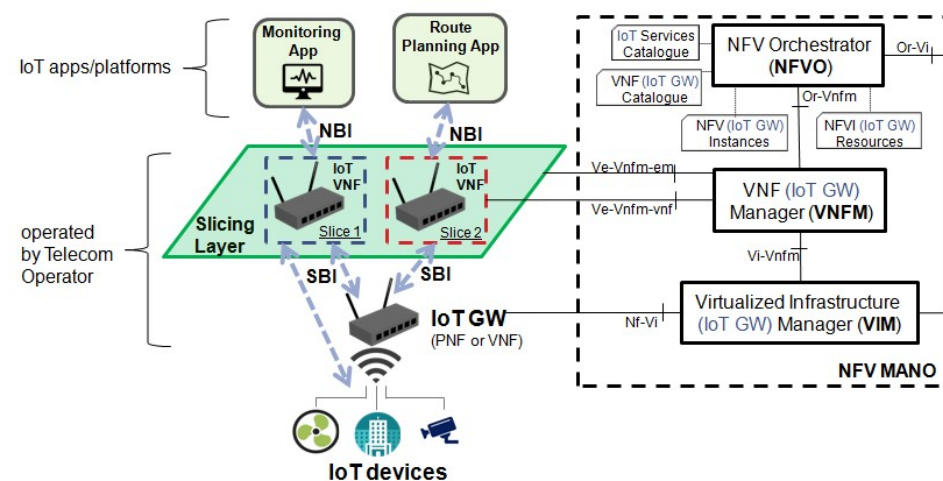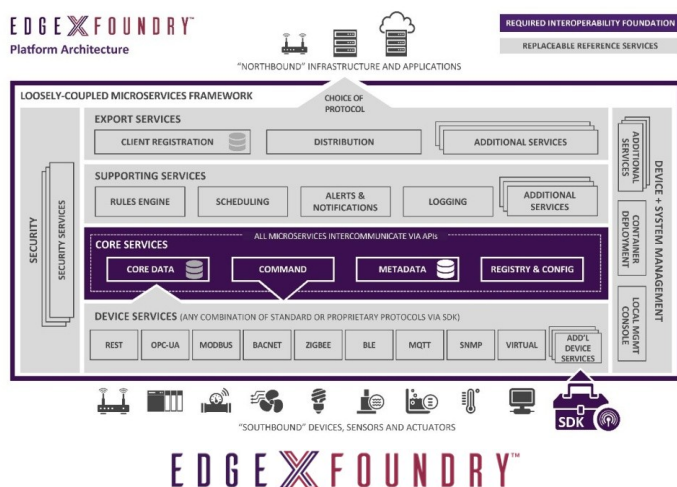
IoT Slicing

Challenge

▶ Enable IoT infrastructure sharing - Focus on Smart City / Infrastructure environments

  • New market opportunities for IoT infrastructure providers

▶ Extending 5G infrastructure slicing model to the IoT domain

  • Synergy between 5G operators and IoT infrastructure owners

Contribution

▶ Design and implementation of a **Virtualized IoT Infrastructure Management** component

- Equivalent to an **IoT Gateway Hypervisor**
- Resource allocation, scheduling, conflict resolution, etc.

▶ Integration within **5G-VINNI MANO**

▶ Flexible architecture based on **micro-services**

Towards Vertical Trials

Infrastructure support

- Wireless backhauling for facility extensions
- MEC orchestration – KPI tools
- IoT Slicing: multiple verticals/applications sharing IoT infrastructure

ULTRALINK

omni BAS-OSDR

WiBAS OSDR **STREETNODE**

Enhanced Video Streaming Services / vCDN - eMBB

- High resolution and/or VR/360 video streaming
- User Generated Content / Personalization / multi-party streaming / social networking
- AR and Video Analytics application support: streaming / MEC infrastructure

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Multiple Vertical domains

- **Media & Entertainment**: large event coverage (sports, festivals, *etc.*)

- **PPDR**: first responders video sharing
  drone-based surveillance / coordination
  crowd-management, etc.

- **Smart X-culture**: precision agriculture/fish farming, field monitoring

- **eHealth:** ambulance support/remote
  expert guidance, *etc.*

- **Automotive**: see-through overtaking
  infotainment, *etc.*

thank you

For more information, visit
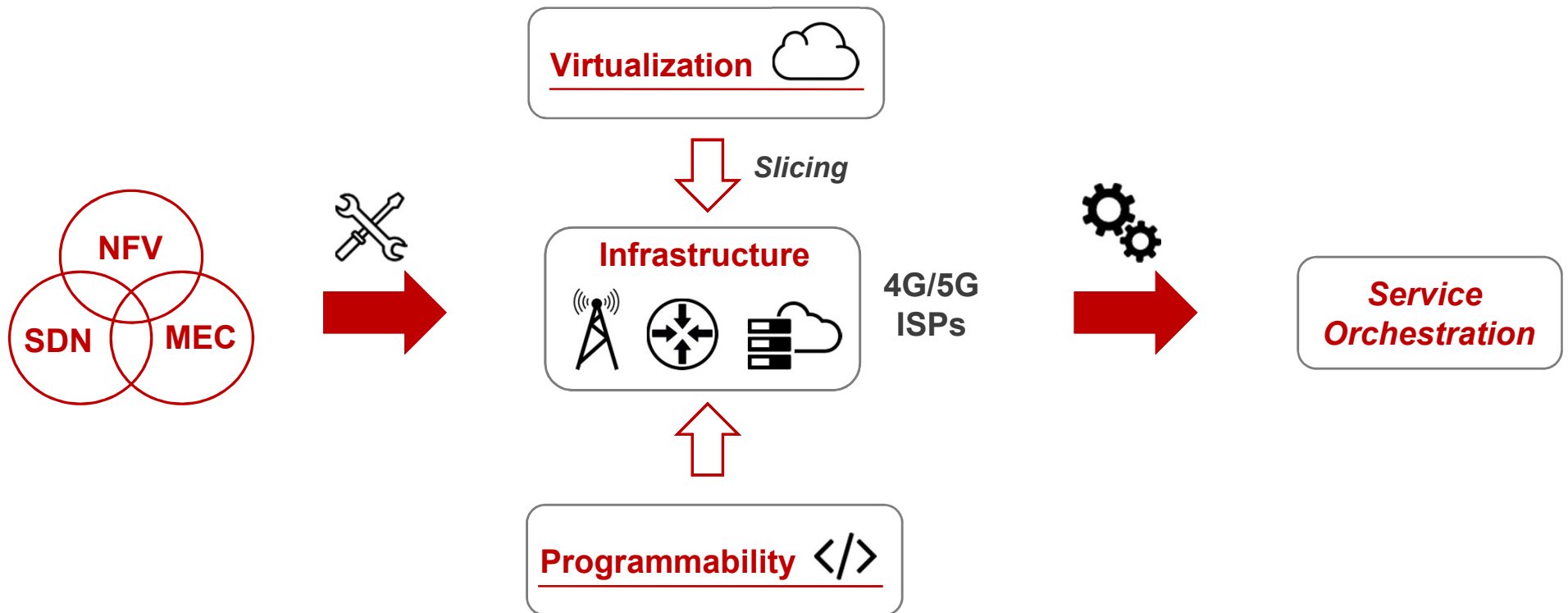**www.intracom-telecom.com**

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NFV

SDN   MEC

Virtualization

Slicing

Infrastructure

4G/5G
ISPs

Programmability

Service
Orchestration

Service Orchestration

Focusing on **Verticals** – Network Services

Media distribution

(Industrial) IoT

Edge oriented – (not limited)

Multi-access: WiFi, 4G, 5G

Single and **multi-domain**

4G/5G , ISPs

Leveraging on **multi-tenancy**

Cross-slice synergies and value-added service composition

Service Orchestration

Zero-touch
Resource allocation
Lifecycle management
Resilience
Auto-scaling
Optimizations
…