

# INT5GENT: A PORTABLE 5G MOBILE SYSTEM FOR RELIABLE PUBLIC PROTECTION AND DISASTER RELIEF (PPDR) OPERATIONS

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# INT5GENT PROJECT OVERVIEW

Int5Gent targets the integration of innovative data plane technology building blocks under a flexible 5G network resource, slice and application orchestration framework, providing a complete 5G system platform for the validation of advanced 5G services.

<b>Call</b>	H2020 – ICT- 2020
<b>Topic</b>	ICT-42-2020: 5G PPP – 5G core technologies innovation
<b>Start</b>	1 <sup>st</sup> of November 2020
<b>Duration</b>	30 months
<b>Partners</b>	15 Partners from 8 countries 8 research institutes & 10 companies



Project coordinator



Technical manager



# MAIN GOAL OF INT5GENT PROJECT

- › The main goal of Int5Gent is to deploy a **holistic 5G system platform** that combines:
  - › Advanced technological blocks for the data plane infrastructure (both at radio and backhaul HW level)
  - › Complete network orchestration through flexible PNF-VNF instances over a generalized NFV Infrastructure (NFVI), extended to edge computational, storage and networking resources.
  - › An intelligent overlay application orchestrator for the vertical services allow a pragmatic approach for the services' deployment, the extraction of analytics and the inclusion of policy criteria.
- › To **integrate innovative solutions at different development layer of the 5G stack** and combine them optimally to deliver 5G solutions to highly demanding vertical industries.
- › **To demonstrate** these in two large testbeds in Barcelona, Spain (FGC-CTTC operational testbed) and in Athens, Greece (COSMOTE – NTUA interconnected testbed)

# TRANSFORMATION OF SERVICES IN 5G AND BEYOND ERA

- › 5G and beyond networks move from **network-driven** to **service-driven approaches**.

4G telecom services based on **generic user classes**



**5G / B5G service** provisioning satisfying flexibly **versatile requirements & KPIs per customer – service basis.**

Simple e2e connectivity



Services entailing **communication services, distributed compute resources**, and additional services such as **monitoring, automation, etc.**

Distinction between **retail and corporate customers**

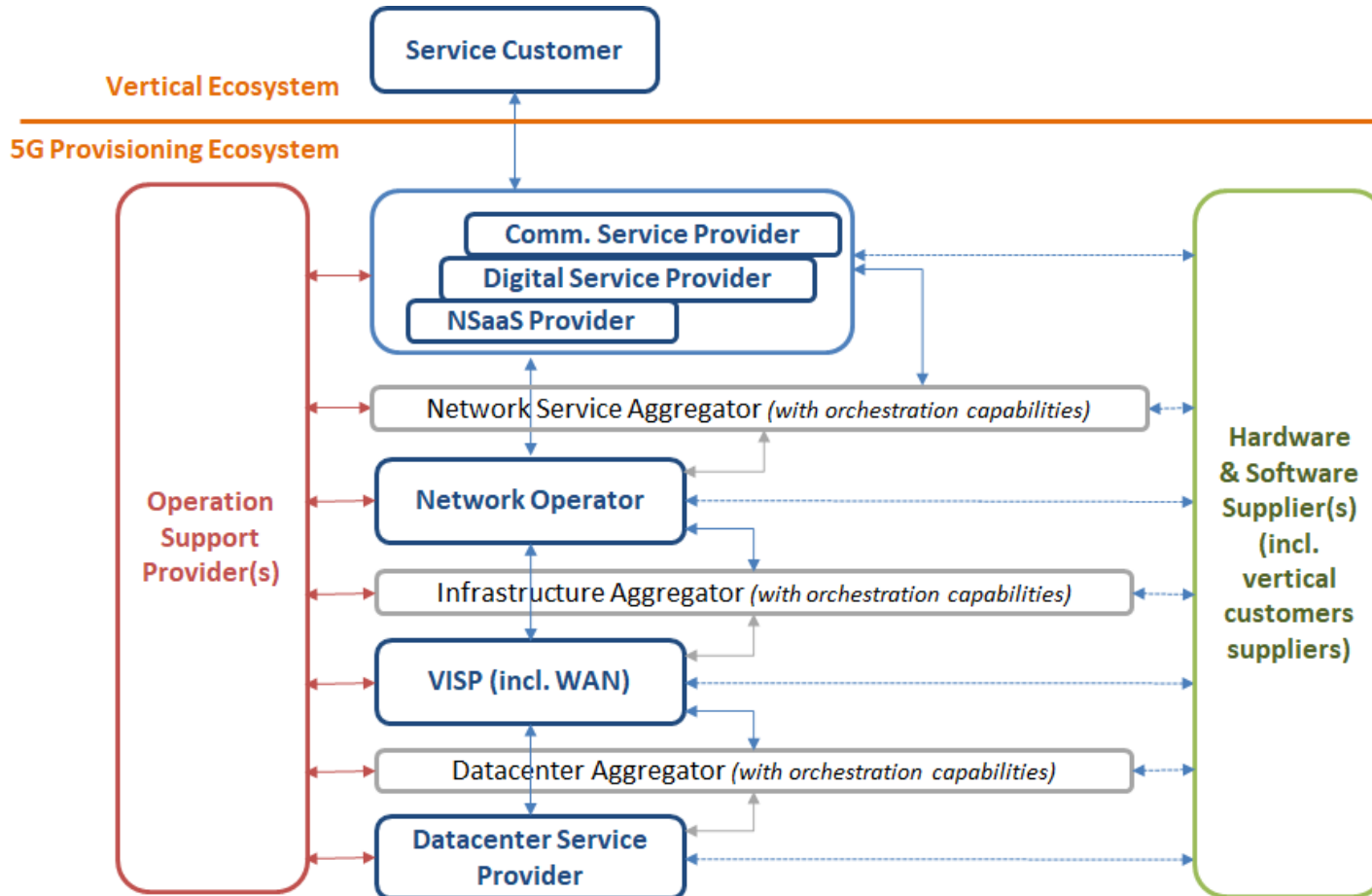


Distinguishing different “**vertical industries**” with **particular needs.**

Transformation is also **reflected in Standardization** (e.g. 3GPP TRs focus on vertical industries requirements and KPIs, layered service provisioning).

# VERTICALS AND 5G SERVICE PROVISIONING ROLES

## 5GPPP Layered 5G and Beyond Service Provisioning



- › **Service Customer (SC):** Vertical Industry
- › **Service Provider (SP):** Designs, builds, operates services using aggregated network services, as CSP, DSP, NSaaS (Network Slice as a Service) Provider
- › **Network Operator (NO):** Orchestrates resources, from multiple (VISPs) virtualisation infrastructure SP
- › **VISP:** Operates virtualisation infrastructure (networking or computing) & provides services

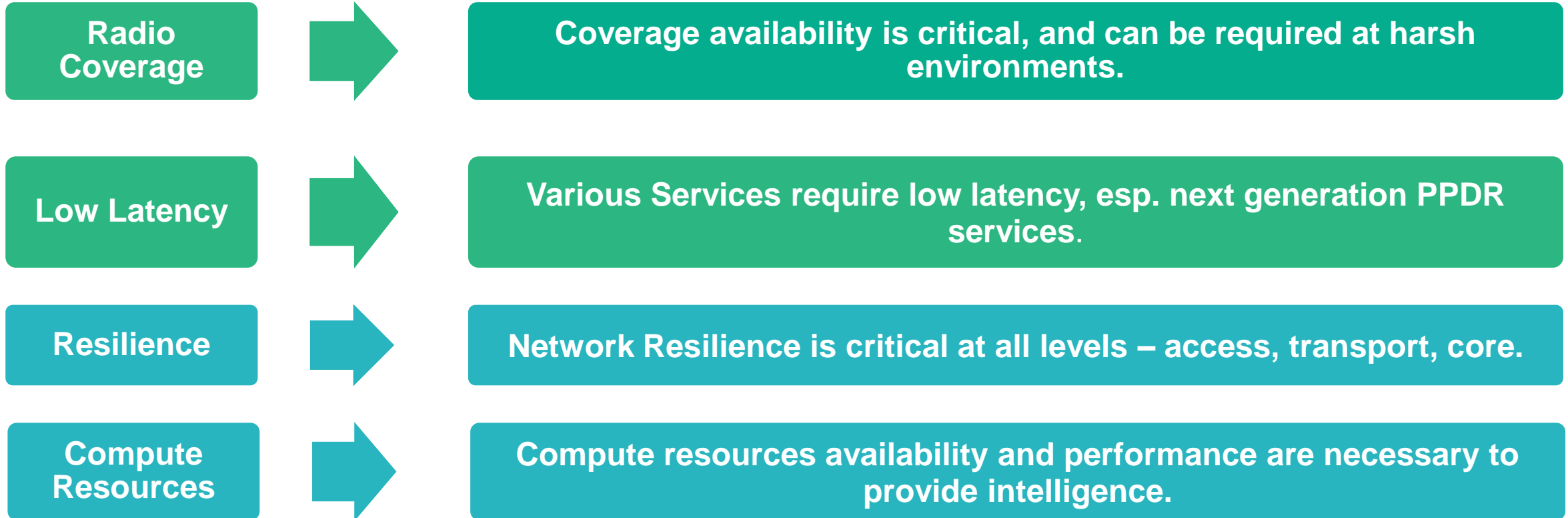
PPDR Communications are increasingly being complemented by Intelligence (ITU), they follow ICT advances, and a layered roles approach is visible.

## Indicative enhanced PPDR Services

- › Search and rescue support using emergency robots and unmanned aerial vehicles (UAVs)
- › Sensing of the affected areas using high definition (real-time) video streaming and massive Internet of Things (IoT)
- › Situational – Contextual awareness
- › Multimedia messaging
- › High accuracy location services and mapping
- › Mission-critical voice services.

...To be provided in day-to-day operations as well as under disaster circumstances.

# PPDR SERVICE REQUIREMENTS



**Communication and Compute services  
co-provisioning**

# PPDR SERVICES TRANSFORMATION

- › The PPDR vision creates the need for:

## *Technically*

- › Extended 5G network availability along with compute resources availability
- › Advanced PPDR services deployed ad-hoc
  - › Makes room for new stakeholders to innovate and engage.

## *Business-wise*

- › PPDR ecosystem - stakeholder roles layered approach:
  - › **PPDR Application Providers** (MC-services for PPDR users e.g. Police, Firefighters, Medical services)
  - › **PPDR Network Provider** (Telco-based Logical Network, NPN, 5G Slice or purposely built 5G RAN)
  - › **PPDR Infrastructure Provider** (Providing Private and Public IaaS infrastructure)



# INT5GENT PROJECT OVERVIEW

- › Int5Gent addresses the PPDR verticals and explores innovative network deployments reflecting:
  - › The service transformation trends from the PPDR perspective.
  - › The PPDR stakeholder roles layered approach
- › **Main Partners involved:**
  - › COSMOTE (5G network & Operator IaaS testbed),
  - › Internet Institute (Slovenia) (solution for Portable NVFI & 5GS),
  - › SIKLU Communication (Israel) (mmWave mesh),
  - › UBITECH (Greece),(Application Orchestrator),
  - › Nextworks (Italy) (Network Orchestrator)
  - › Intracom (MC- drone application).

**Everyday operations**



**Large events**



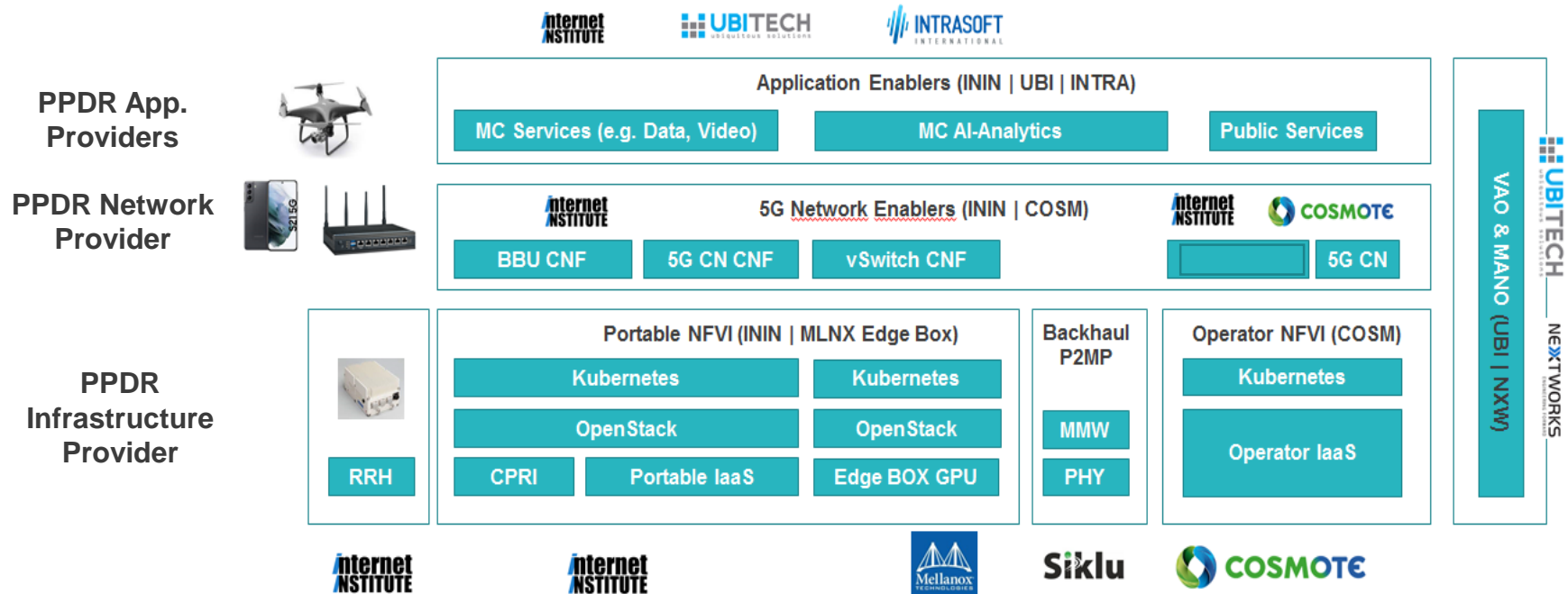
**Extreme situations**



# INT5GENT SOLUTION FOR D2D OPERATIONS

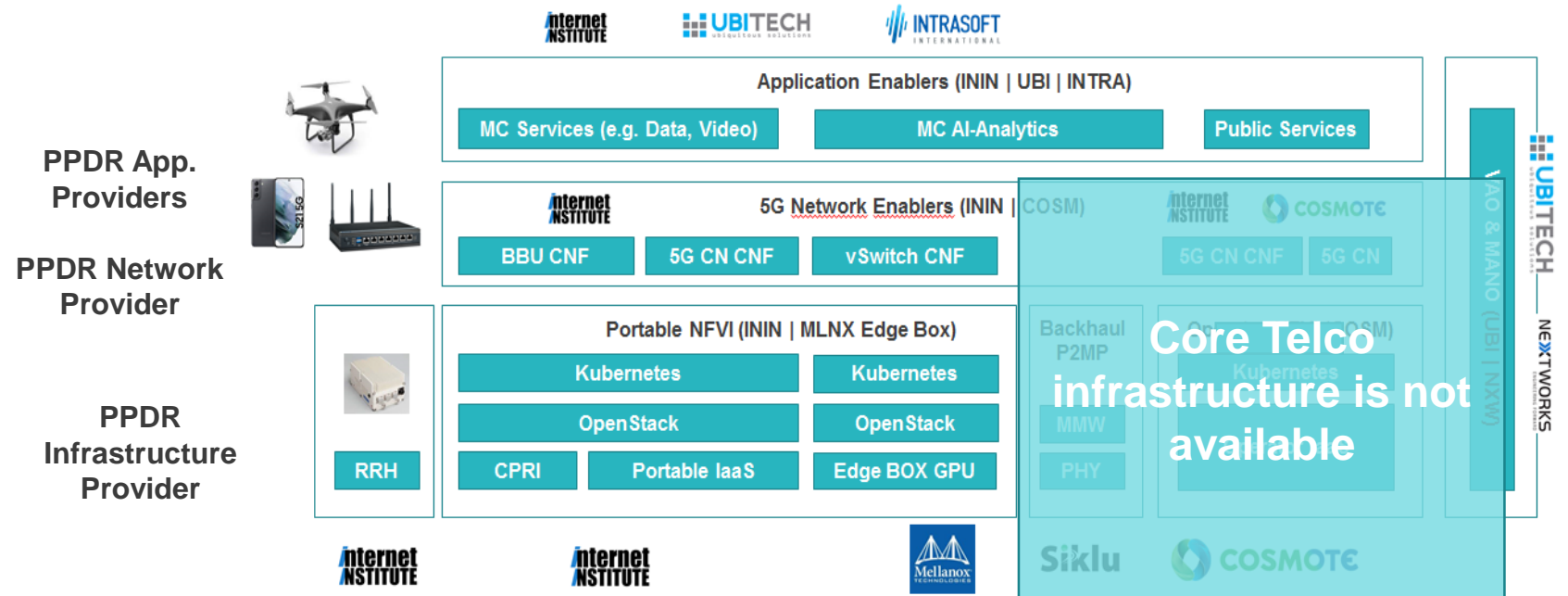
- › Day-to-day operations require:
  - › On-demand but scheduled provisioning of network coverage & MC services in areas lacking coverage.
- › Int5Gent solution:
  - › **Ad-hoc automatic deployment of 5G access network segments (for PPDR) at a compact server – edge box (as portable laaS), and resilient mm-Wave mesh transport network (gNB & MEC).**
  - › Along with quick and automated deployment of reliable PPDR services (resilient drone-based real-time video streaming services using cloud native principles and AI-based edge processing).

- Proposed concept **exploits private and public 5G.**
- Architecture follows PPDR stakeholder roles



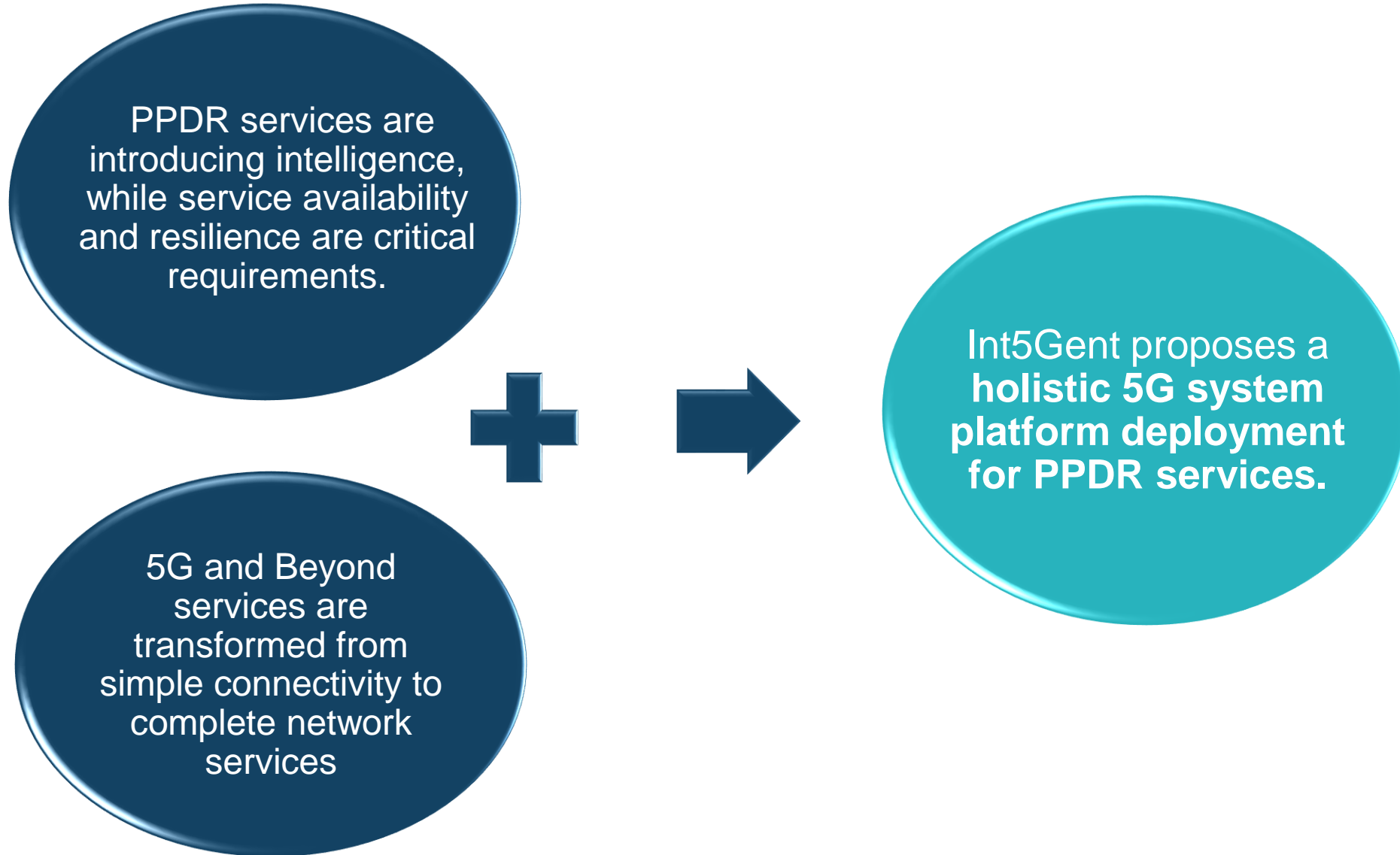
# INT5GENT SOLUTION FOR DISASTER SITUATIONS

- › PPDR in case of disaster situations require:
  - › Resilient solution in case of partial or total public network unavailability.
- › Int5Gent solution:
  - › **Ad-hoc automatic deployment of complete 5G network (for PPDR) at a compact server – edge box (gNB, MEC, 5GC).**
  - › Along with quick and automated deployment of reliable PPDR services (resilient drone-based real-time video streaming services using cloud native principles and AI-based edge processing).



- › **Network Orchestration layer** will provide functionalities for:
  - › Application's high-level requirements mapping into 5GQI
  - › 5G Network Slices' modelling
  - › Application's quota arbitration and reservation
  - › E2E Network Slice composition and orchestration
    - › Radio Network Slice subnet (vBBU) orchestration at the @Portable Edge NFVI PoP
    - › 5G Core Network Slice subnet (v5GC) orchestration at the @Portable Edge NFVI PoP
    - › mmWave backhaul transport network management and control
    - › Application's quota management
  
- › **Application Orchestrator layer** will provide functionalities for:
  - › Bindings with state-of-the-art cloud orchestrators (k8s or OpenStack)
  - › UI-based application onboarding
  - › UI-based application policy definition
  - › Automated Application graph composition
  - › Application components' lifecycle management, orchestration, scaling
  - › Data analytics and monitoring dashboard

# SUMMARY



# THANK YOU

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