



Smart5Grid roadshow

13 Junio 2023, 14.00-15.00

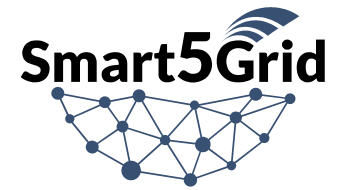
Evento Virtual

Smart5Grid roadshow

Agenda



- Project Overview (Enel Grids)
- 5G Technology, public and private infrastructure overview (i2Cat)
- MEC Server, NAC and Orchestration (Nearby computing)
- OSR, V&V and **Network Application** concept (Atos)
- Spanish pilot, use case (E-Distribución)
- Opportunities for SMEs and experiences from implementers (Nosia)
- Open Debate



Daniele Porcu

Smart5Grid Project Coordinator

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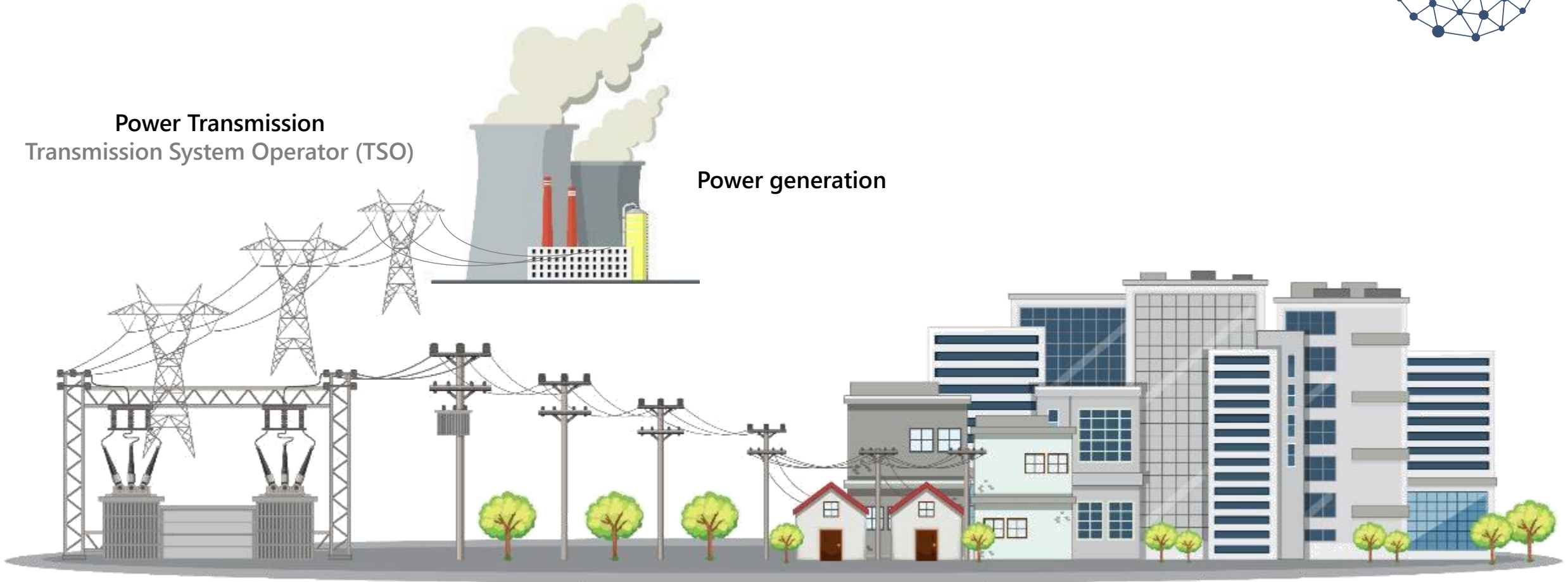
Energy Vertical

Traditional grid



Power Transmission
Transmission System Operator (TSO)

Power generation

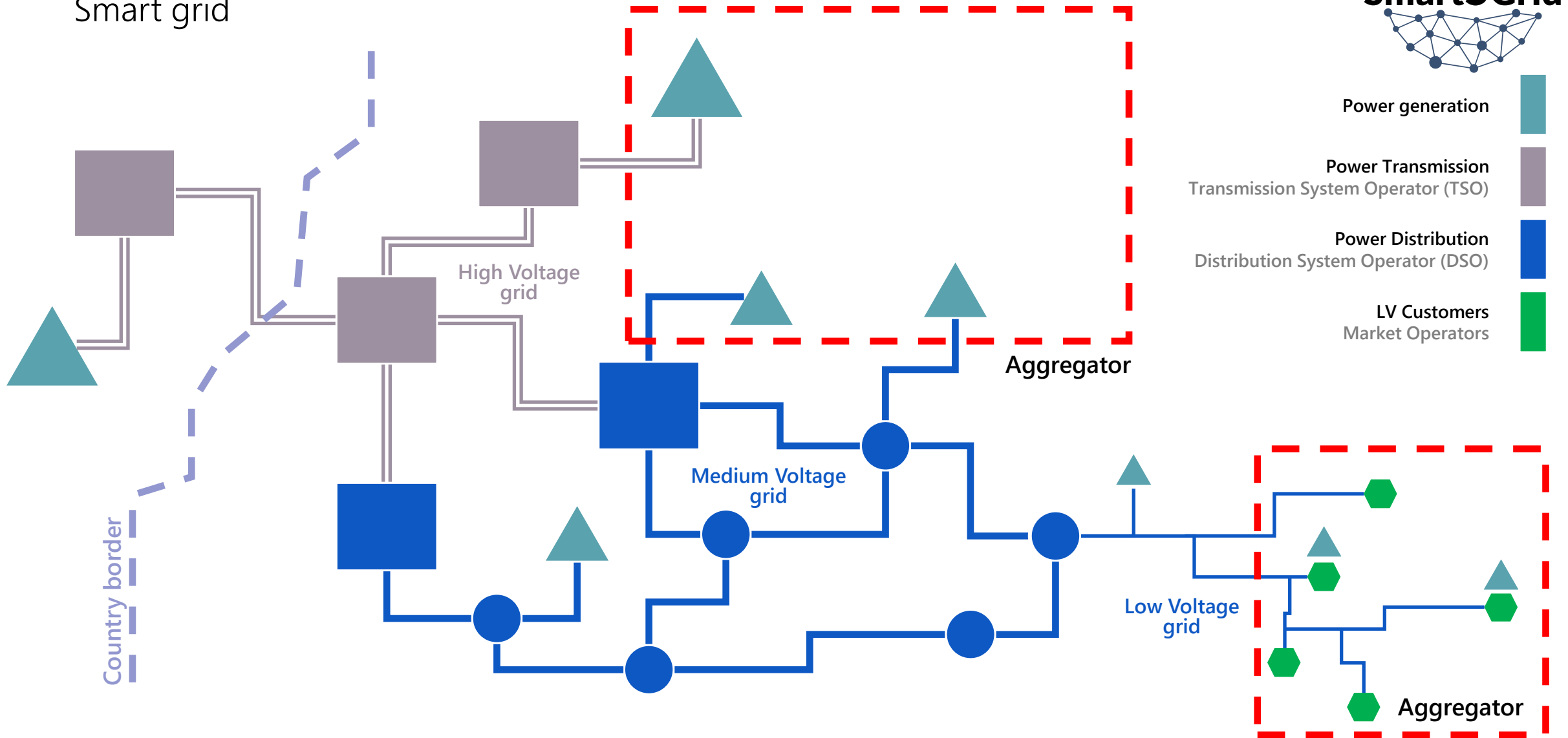


Power Distribution
Distribution System Operator (DSO)

Customers
Market Operators

Energy Vertical

Smart grid



Scenario

Energy industry and need for more fast and reliable communications



High penetration of
Distributed Generation

New actors in the
Energy Market

New generation
of Smart Grids
solutions

Stability issues

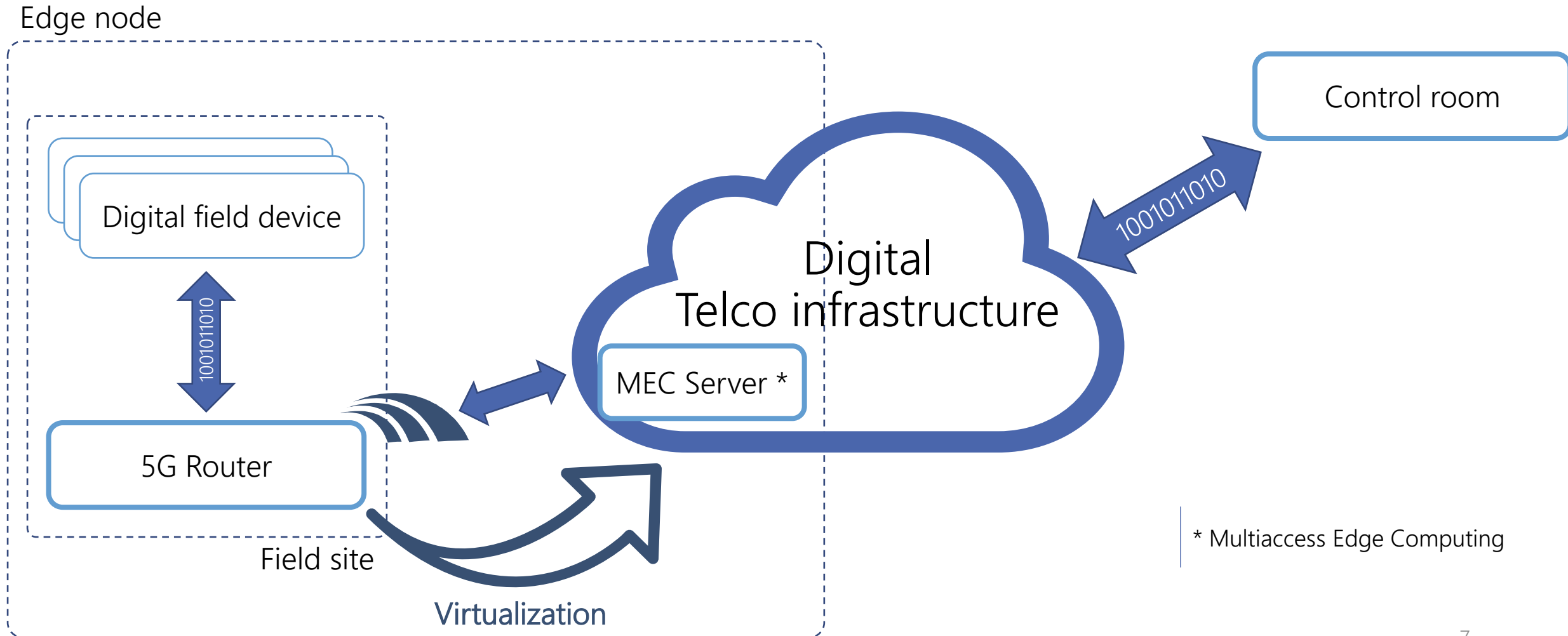
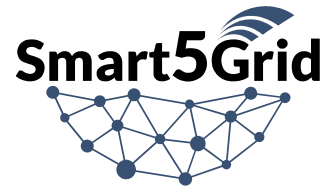
Safety for field
operators

New solutions
from 3rd parties

**Need for
digitalization**

Security and
reliability

5G-based cloud edge computing



* Multiaccess Edge Computing

Smart5Grid

Demonstration of 5G solutions for SMART energy GRIDs of the future



The **Smart5Grid** project aims to investigate the potential of 5G-based Edge-Cloud Computation in the Energy industry, by introducing the concept of **Network App** for simplifying the 5G Complexity. The project testbeds are now available for third-parties' experimenters, fostering the creation of a new market-segment for Network Apps.

GENERAL INFORMATION

THE CONSORTIUM

**24 EUROPEAN
PARTNERS**

(50% SMEs)

**COVERING
7 EU STATES**

DURATION

3 YEARS

TOTAL BUDGET

8M€





Italian Demo | Olbia
IP monitoring tool for Smart Grids supporting Automatic Fault Detection



Spanish Demo | Barcelona
Real-time power plant operators' safety monitoring



Bulgarian Demo | (Southern region)
DER management and predictive maintenance



Greek-Bulgarian Demo | (Cross-border)
Real-time cross-Country frequency monitoring

the Smart5Grid Consortium

Coordinator



TELCOs



SMEs



EIGHTBELLS
Research & Innovation & Consultancy



NEARBY
COMPUTING

Tech Companies



Universities/Research institutions



DSOs



TSOs



*Linked third-parties of Enel Grids



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5G technology, public and private infrastructure overview

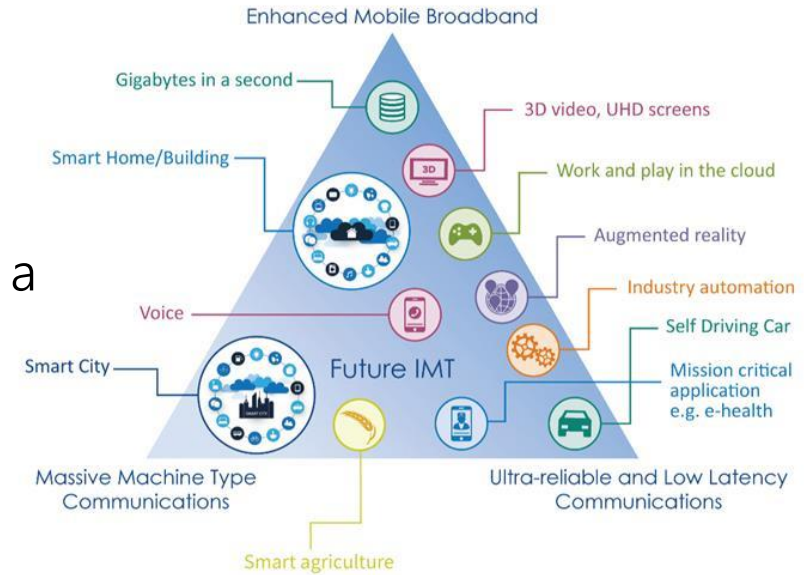


August Betzler

5G Technology



- 5G features new paradigms that enable novel use cases and support for a variety of verticals
 - Support for EMBB, URLLC and mMTC traffic types
 - Network slices for isolation of resources and traffic
 - Very high reliability and availability, low latency, high throughput
- Private 5G networks, compared to public ones, allow for isolation and full control of the resources
 - Dedicated edge computing resources (vs. Cloud) for applications using UPFs for minimal latency and local management
 - NFV MANO: Orchestration + Application management

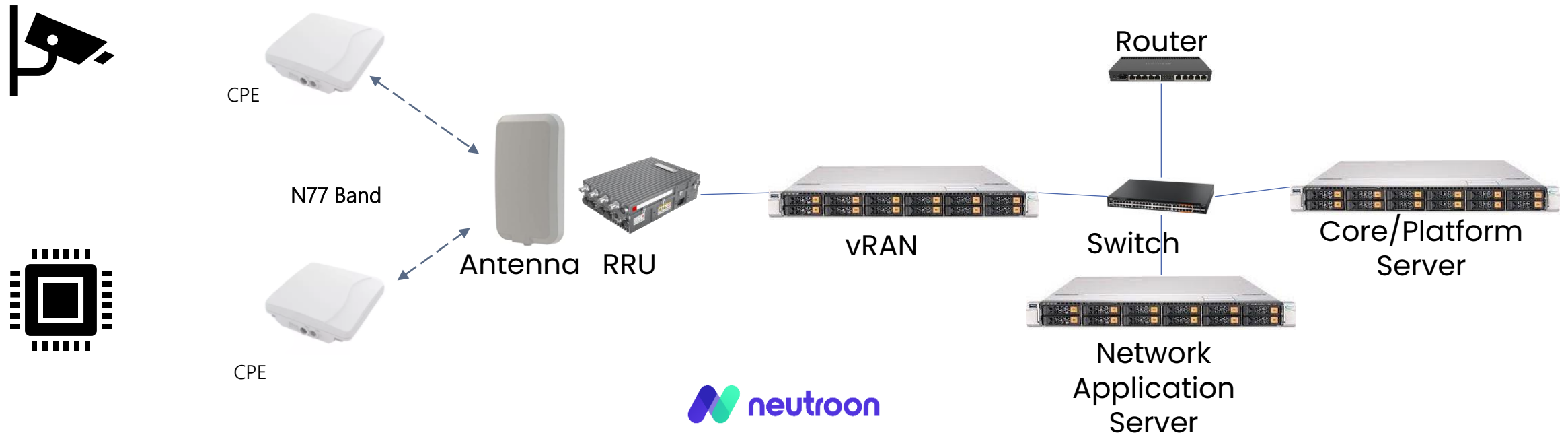


Typical 5G network infrastructure

Example: 5G in the ECOGARRAF electrical substation



- A private 5G SA network is being deployed with the following characteristics:
 - 3 servers: vRAN server, Network Application server, Core/Platform server
 - 1 RRU: Outdoor RRU to provide coverage in the substation
 - Core is based on Open5GS, Release 16
 - Supports creation of slices (computation, (wired/logical) network, 5G NR)



Example of 5G RAN Characteristics



KPIs:

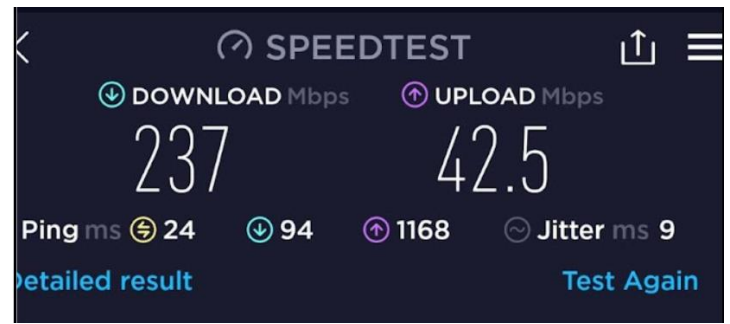
Low Latency

High dedicated throughput



Static CPEs allow for devices to be connected to the 5G network

Pilot radio configuration: 40 MHz in band n77



These values may vary (depending on weather conditions and final setup)



Latency: 13.43 ms average (Device to core)






Fulfilling the needs of targeted applications (Project internal + third party experiments)

Network Application Server Characteristics



Hardware Capabilities:

- 12 vCPUs: Available ~10 vCPUs 
- RAM 32 GB: 16 GB Available 
- SSD: 1.7 TB 

Software Capabilities:

- Openstack as Virtual Infrastructure Manager (VIM)
- Kubernetes Cluster deployed as a VMs over Openstack (dynamic resources according apps needs)
- Helm Tool as a Kubernetes applications manager enabled into the Kubernetes cluster



Limitations:

- Does not include GPU resources

Cloud-oriented Telco Environment



Smart5Grid Layer:

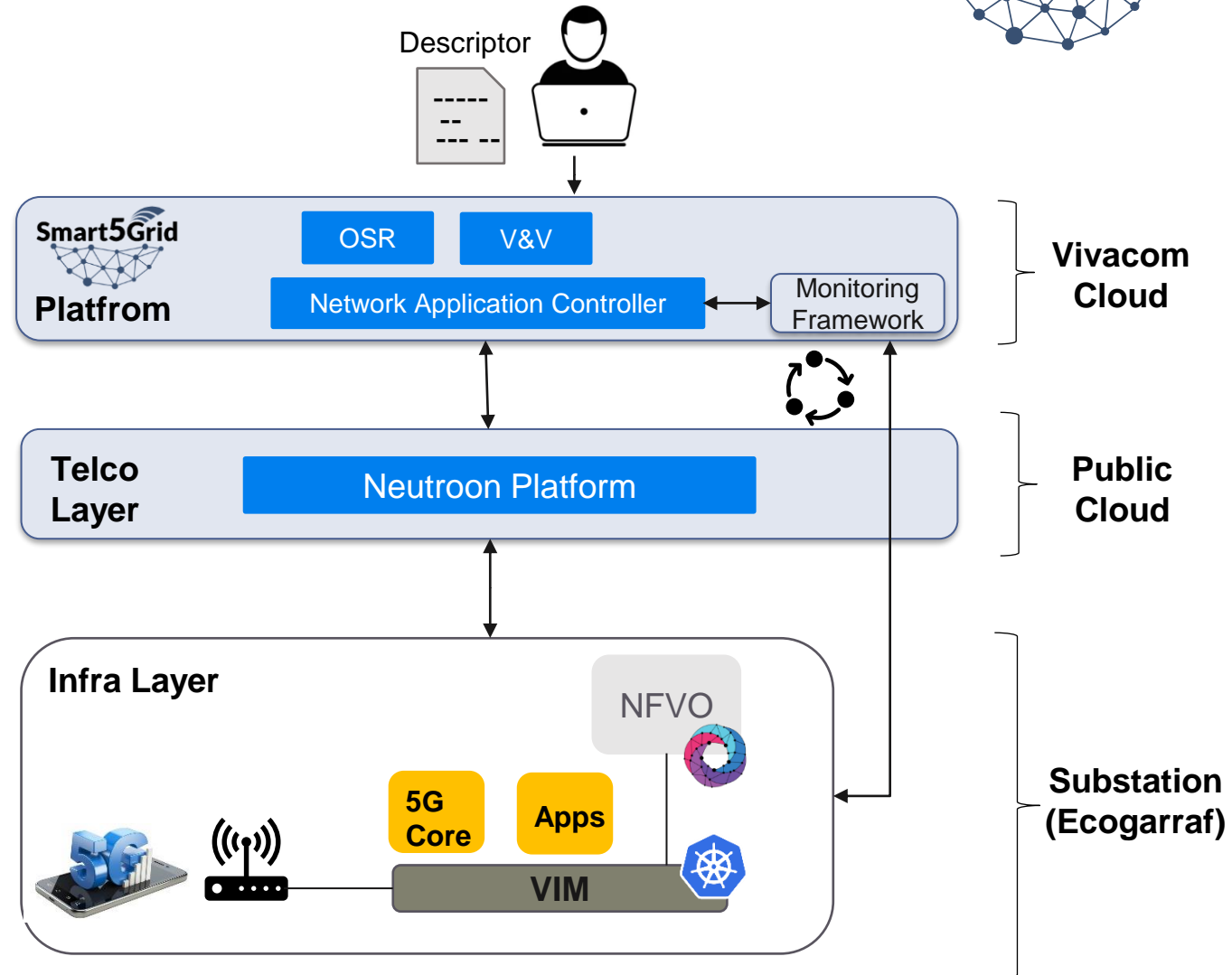
- First point of contact to deploy the Network Applications
- Application Lifecycle Management

Telco Layer:

- Infrastructure lifecycle management
- Management of NFV platform (e.g., OSM, k8s)

Infra Layer:

- Infrastructure lifecycle management (e.g., RAN, servers, VIMs)
- E2E Connectivity



Thank you

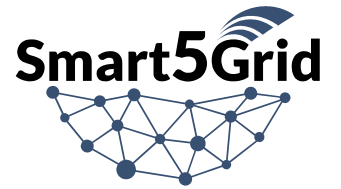
Wishing all the best for our common success!



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MEC Server, NAC and Orchestration



Nicola Cadenelli



Smart5Grid Network App Controller

June 2023

Network App Controller Definition and Main Features



*“Following a **cloud native approach** in which applications are architected as a set of services that run in Docker containers, Smart5Grid will develop the **Network App Controller** in the system management level, which will house the **MEC offloading** and **Elastic VNF sizing and chaining functions.**”*

- Cloud-native and portable.
- Offer NBI for Network App onboarding (used by V&V Framework and ISVs).
- Manage the lifecycle of Network Apps.
- Edge and cloud infrastructure in the orchestration – either provision new nodes or onboarding existing infrastructure.
- Manage users (RBAC), organizations, and more settings.

Smart5Grid Use Cases



BENEFITS

□ MONITOR AND SECURE SUBSTATIONS

High-resolution 3D sensors combined with AI will support workers during maintenance, avoiding reaching live parts of the power grid.

□ AUTOMATIC POWER GRID FAULT DETECTION

Monitor the power grid remotely and detect failure locations along lines reducing operation costs.

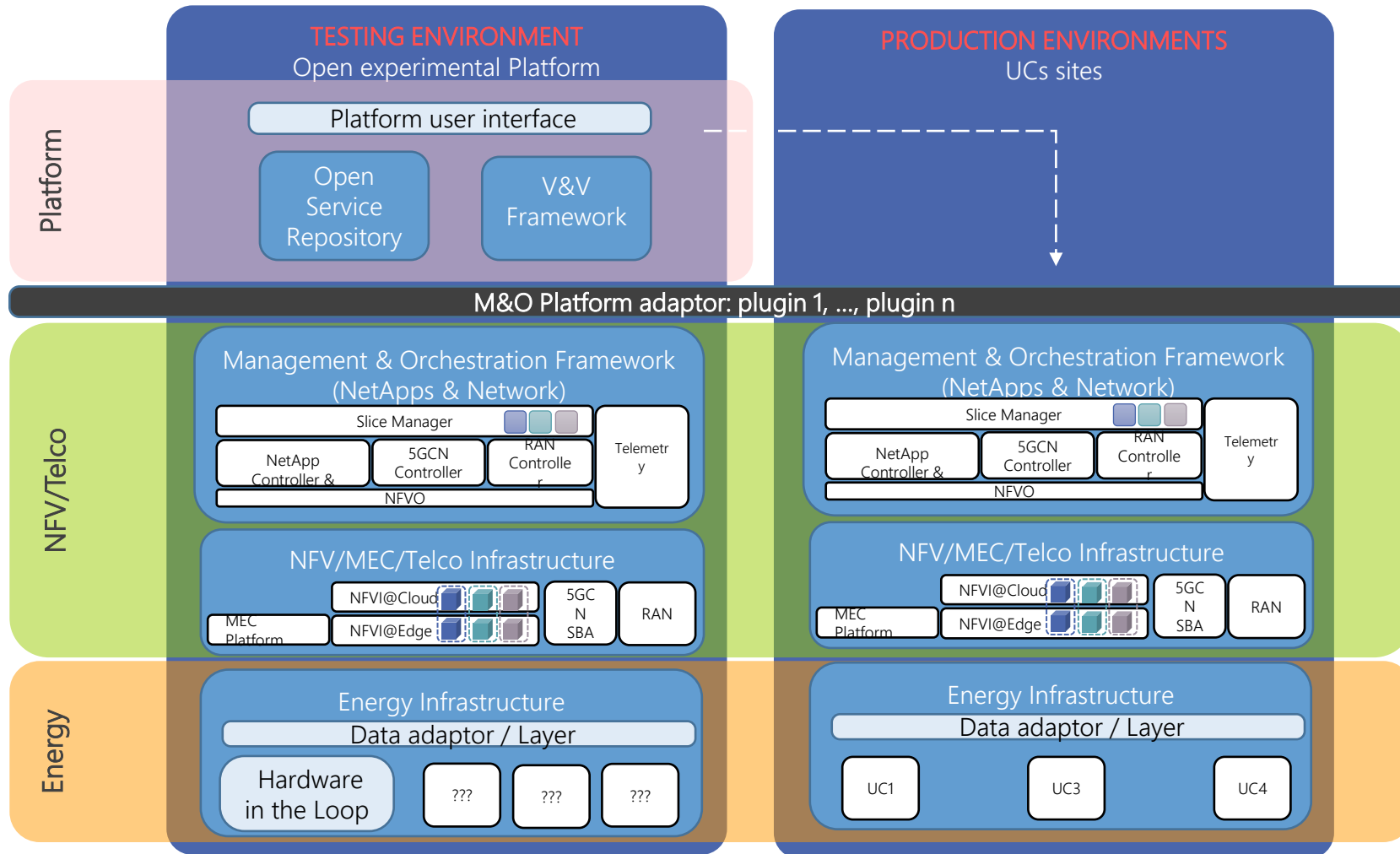
□ REAL-TIME WIDE AREA MONITORING

Aggregate and control data of 1000s of Medium and High Voltage decentralized Renewable Energy Sources and their inverters.

□ REAL-TIME WIDE AREA MONITORING

From Distributed Energy Resources at Medium Voltage levels operated by DSOs to High Voltage levels operated by TSOs, as well as inter-TSO cross-border Regional Security Coordination.

Smart5Grid Architecture





Nearby One as Smart5Grid Network App Controller

June 2023



About NEARBY COMPUTING



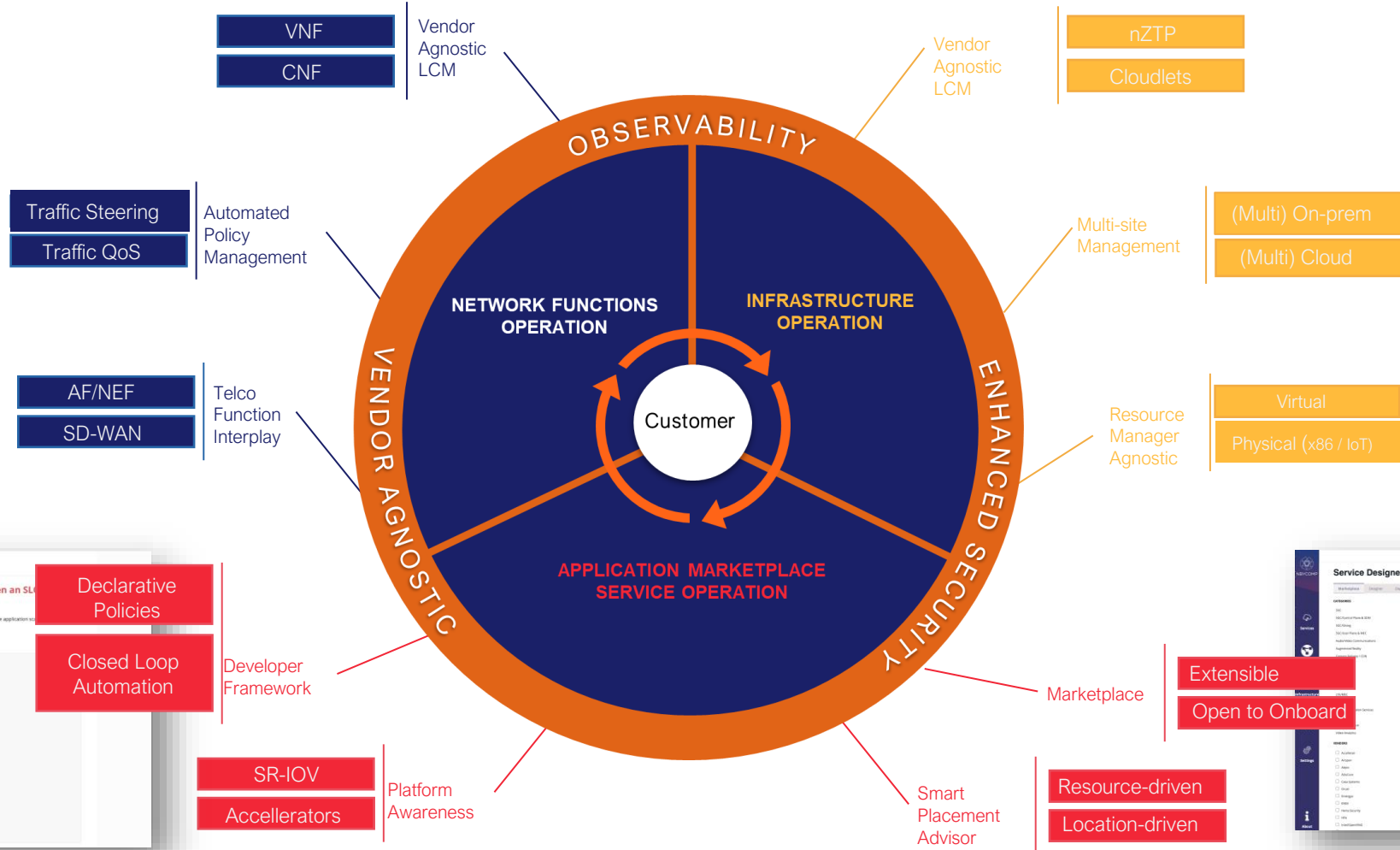
- ❑ Founded in 2018 by leading experts from the Barcelona Supercomputing Center.
- ❑ A Global leader in Edge Orchestration, headquartered in Barcelona.
- ❑ Sales teams in EMEA and APAC.
- ❑ Servicing customers globally through strategic partnerships with Global Systems Integrators and Technology Partners.
- ❑ Backed by strategic investors.

The Lenovo logo, consisting of the word "Lenovo" in white text on a red rectangular background.

The logo for RED ELÉCTRICA DE ESPAÑA, featuring a stylized blue and white graphic of a network or power grid to the left of the text "RED ELÉCTRICA DE ESPAÑA" in black.

The cellnex logo, with the word "cellnex" in a green, lowercase, sans-serif font, followed by a small green signal icon.

Nearby One's Feature Set in One Slide



```

# Examples + Blocks + C. SLO-drive Workload Scaling: Scale up a workload when an SLO is not met

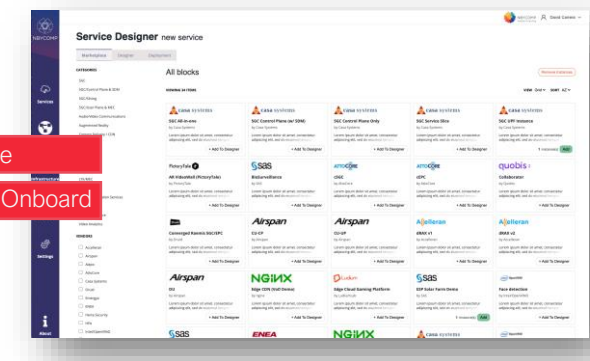
c. SLO-drive Workload Scaling: Scale up a workload when an SLO is not met

This is a sample application that uses the scalinger agent to make sure that when the selected SLO is not met the application is scaled up.

Here is the Application deployment descriptor:

Listing 17 Application deployment descriptor

1 # yaml-language-server: $schema=https://kubernetes.io/schema/latest.yaml
2 apiVersion: apps/v1
3 kind: Deployment
4 metadata:
5   name: scalinger-agent
6   namespace: default
7 spec:
8   replicas: 1
9   selector:
10    matchLabels:
11      app: scalinger-agent
12    matchExpressions:
13      - key: app.kubernetes.io/component
14        operator: In
15        values:
16          - scalinger-agent
17   template:
18     metadata:
19       labels:
20         app: scalinger-agent
21         app.kubernetes.io/component: scalinger-agent
22     spec:
23       containers:
24         - name: scalinger-agent
25           image: ghcr.io/nearby-sensor/scalinger-agent:0.1.0
26           ports:
27             - containerPort: 8080
28             - containerPort: 8081
29           volumeMounts:
30             - name: config
31               mountPath: /etc/scalinger-agent
32             - name: logs
33               mountPath: /var/log/scalinger-agent
34       volumes:
35         - name: config
36           configMap:
37             name: scalinger-agent-config
38         - name: logs
39           emptyDir: {}
40   
```



Vendor agnostic by design





Quick Demo

Nearby One as Smart5Grid NAC: Infrastructure

One public Network App Controller for n sites (UCs, edge sites, private or public cloud)

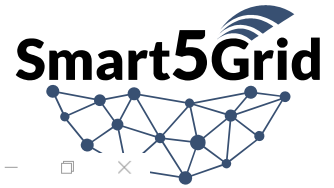


A screenshot of a web browser displaying the Smart5Grid Infrastructure management interface. The browser's address bar shows the URL: smart5grid.nearbycomputing.com/app/infrastructure/site/f91bb869-d24d-455a-a74f-94a5ccedbe4b/overview. The interface has a dark blue sidebar on the left with icons for Services, Designer, Infrastructure (selected), Alerts, Settings, and About. The main content area is titled "Infrastructure" and shows a tree view of "ORGANIZATIONS" under "Smart5Grid", including "Wind3 - UC1", "Vivacom - UC3n4", and "NearbyComputingHQ". Below this, there are tabs for "Overview", "Inventory", and "Provisioning (Beta)". The "Overview" tab is active, showing details for a site with ID "f91bb869-d24d-455a-a74f-94a5ccedbe4b". The "Description" field contains the text "Partners involved in UC1, UC3, and UC4". The "Location" field is accompanied by a map of Europe and the Mediterranean region, showing a green marker for "wind3-0001" in Italy and another green marker with the number "2" in Bulgaria. The map includes labels for various cities and seas like the Adriatic, Tyrrhenian, and Aegean Seas.

Provide L7 network overlay to manage sites behind firewalls and NATs

Nearby One as Smart5Grid NAC: Net.App Marketplace

Onboarded Network App are available for deployment from a central marketplace



Service Designer new service

Marketplace Designer Deployment

CATEGORIES

- H2020
- NetApps
- Smart5Grid

VENDORS

- NearbyComputing
- Software Company
- Stam srl

VIEWING 9 ITEMS

VIEW Grid SORT AZ

 MQTTBrokerUC4 by Software Company MQTT Broker for Advisory service + Add To Designer	 NetappUC3 by Software Company Run Time Production Monitoring and Predictive Maintenance services + Add To Designer	 NetappUC3sql by Software Company Postgre SQL server for UC3 + Add To Designer	 NetAppUC4 by Software Company vPDC, WAM and Advisory services + Add To Designer	 NetAppUC4sql by Software Company Postgre SQL server for UC4 + Add To Designer
 PrometheusMonitoring by Software Company Monitoring of UC3 and UC4 services with Prometheus + Add To Designer	 Smart5Grid NetApp Tester by NearbyComputing A Smart5Grid NetApp tester for NearbyOne using the Helm information model 0.1.0 to 0.1.1 + Add To Designer	 Stam_NetApp_UC1 by Stam srl Netmonitor from STAM (UC1) + Add To Designer	 TEST by NearbyComputing + Add To Designer	

Nearby One as Smart5Grid NAC: Net.App Chaining



NearbyComputing x +

smart5grid.nearbycomputing.com/app/service-designer/designer

Smart5Grid Downloads Nicola Cadenelli

Service Designer new service

Marketplace Designer Deployment

Selected blocks

- MQTTBrokerUC4 by Software Company version 1.0.44
- NetAppUC4 by Software Company version 1.0.44
- NetAppUC4sql by Software Company version 1.0.11

Configure MQTTBrokerUC4

BLOCK FIELDS BLOCK DESCRIPTOR

Block Descriptor READ ONLY

Block Values ✓

THEME visual studio dark

```
1 annotations:
2   displayName: MQTTBrokerUC4
3   vendor: Software Company
4   apiVersion: v2
5   description: MQTT Broker for Advisory service
6   icon: https://blocklogos.s3.eu-west-1.amazonaws.com/smart5grid.png
7 keywords:
8   - Smart5Grid
9   - H2020
10  - NetApps
11 maintainers:
12  - name: Software Company
13    name: MQTTBrokerUC4
14    type: application
15    version: 1.0.44
16
```

Nearby One as Smart5Grid NAC: Net. App Status



NearbyComputing x +

smart5grid.nearbycomputing.com/app/services

Smart5Grid Downloads Nicola Cadenelli

Services

NAME	STATUS	DEPLOYED	USER	ACTIONS
^ PrometheusMonitoring (service chain)	READY	6/1/2023, 10:21:49 AM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
^ PrometheusMonitoring	READY	6/1/2023, 10:21:49 AM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
^ Test Network App in UC3&4 cluster 0001 (service chain)	READY	5/15/2023, 12:53:45 PM	ea847d76-a217-4e16-9b51-b4c34a6cf6da	...
^ UC3 NetApp (service chain)	READY	6/9/2023, 5:17:51 PM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
^ NetappUC3	READY	6/9/2023, 5:17:51 PM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
• chart-deployment-mqttbroker-5mwv8 kind: ChartRelease	READY			...
• chart-deployment-pm-24cp8 kind: ChartRelease	READY			...
• chart-deployment-rtpm-zr9qx kind: ChartRelease	READY			...
• chart-deployment-mqttbroker kind: ChartDeployment	READY			...
• chart-deployment-pm kind: ChartDeployment	READY			...
• chart-deployment-rtpm kind: ChartDeployment	READY			...
^ UC3 Postgre SQL server (service chain)	READY	5/26/2023, 1:55:10 PM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
^ UC4 MQTT Broker (service chain)	READY	5/29/2023, 10:30:32 AM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
^ UC4 NetApp (service chain)	READY	6/9/2023, 5:18:31 PM	9ad75838-d95d-4824-b040-a6f46cfc3551	...

NEARBY COMPUTING

Services

Designer

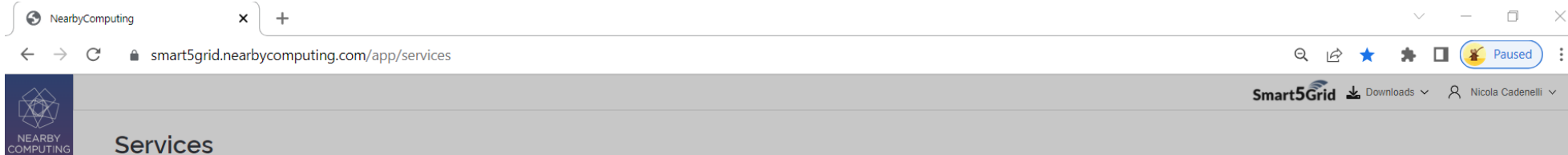
Infrastructure

Alerts

Settings

About

Nearby One as Smart5Grid NAC: Net. App Definition and Logs



Services

NAME
^ PrometheusMonitoring (service chain)
^ PrometheusMonitoring
^ Test Network App in UC3&4 cluster 0001 (service chain)
^ UC3 NetApp (service chain)
^ NetappUC3
• chart-deployment-mqttbroker-5mwv8 kind: ChartRelease
• chart-deployment-pm-24cp8 kind: ChartRelease
• chart-deployment-rtpm-zr9qx kind: ChartRelease
• chart-deployment-mqttbroker kind: ChartDeployment
• chart-deployment-pm kind: ChartDeployment
• chart-deployment-rtpm kind: ChartDeployment
^ UC3 Postgre SQL server (service chain)
^ NetappUC3sql
^ UC4 MQTT Broker (service chain)
^ UC4 NetApp (service chain)

Manifest: chart-deployment-mqttbroker-5mwv8

```
1  apiVersion: blocks/v1beta1
2  kind: ChartRelease
3  metadata:
4    creationTimestamp: "2023-06-09T15:17:51Z"
5    generation: 1
6    name: chart-deployment-mqttbroker-5mwv8
7    namespace: 9385a7eb-eeab-4a6b-a8d1-b41d21364c83
8    ownerReferences:
9      - apiVersion: blocks/v1beta1
10        blockOwnerDeletion: true
11        controller: true
12        kind: ChartDeployment
13        name: chart-deployment-mqttbroker
14        uid: bcd4c7b6-14af-47ae-9976-af72532393e3
15        resourceVersion: "279009"
16        uid: 0f8e856e-b400-46b9-9164-0eb88228e526
17  spec:
18    chart: mqttbroker
19    k8sClusterName: bc8a8ffa-edc5-4372-a8d8-4fcae054e040
20    k8sClusterSelector:
21      matchLabels:
22        site.nbycomp.com/c584c115-3c0a-4d9c-a379-01032d373431: "true"
23    repo:
24      url: https://registry.nearbycomputing.com/chartrepo/smart5grid-apps/
25      values: '{}'
26      version: 1.0.44
27    status:
28      phase: Ready
29
```

READY 6/9/2023, 5:18:31 PM

Services

NAME
^ PrometheusMonitoring (service chain)
^ PrometheusMonitoring
^ Test Network App in UC3&4 cluster 0001 (service chain)
^ UC3 NetApp (service chain)
^ NetappUC3
• chart-deployment-mqttbroker-5mwv8 kind: ChartRelease
• chart-deployment-pm-24cp8 kind: ChartRelease
• chart-deployment-rtpm-zr9qx kind: ChartRelease
• chart-deployment-mqttbroker kind: ChartDeployment
• chart-deployment-pm kind: ChartDeployment
• chart-deployment-rtpm kind: ChartDeployment
^ UC3 Postgre SQL server (service chain)
^ NetappUC3sql
^ UC4 MQTT Broker (service chain)
^ UC4 NetApp (service chain)

Logs: chart-deployment-mqttbroker-5mwv8

```
1  [{"id":"event:30389fc0-4ac0-4d09-92ba-ef8d1494f865.278968","eventType":"Normal",
  "lastTimestamp":"2023-06-09T15:17:56Z","message":"Installing helm chart.",
  "reason":"Install"}]
```

READY 6/9/2023, 5:18:31 PM 9ad75838-d95d-4824-b040-a

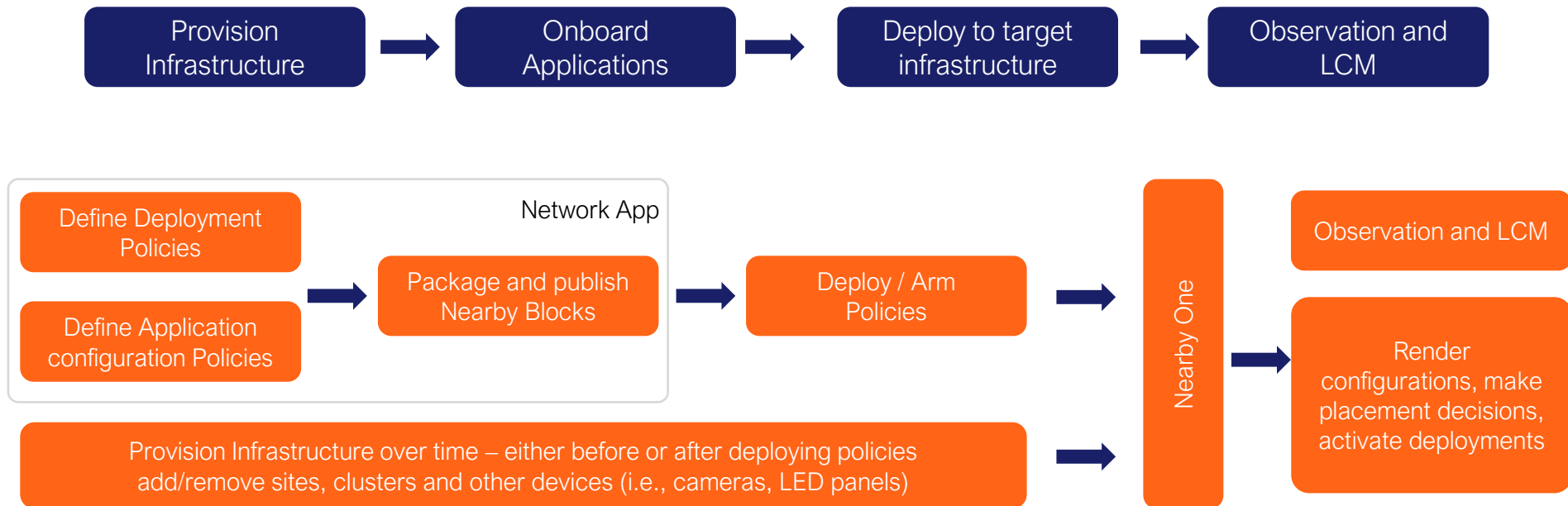
Deployment by policy

Paradigm shift: decoupling deployment/configuration from infrastructure



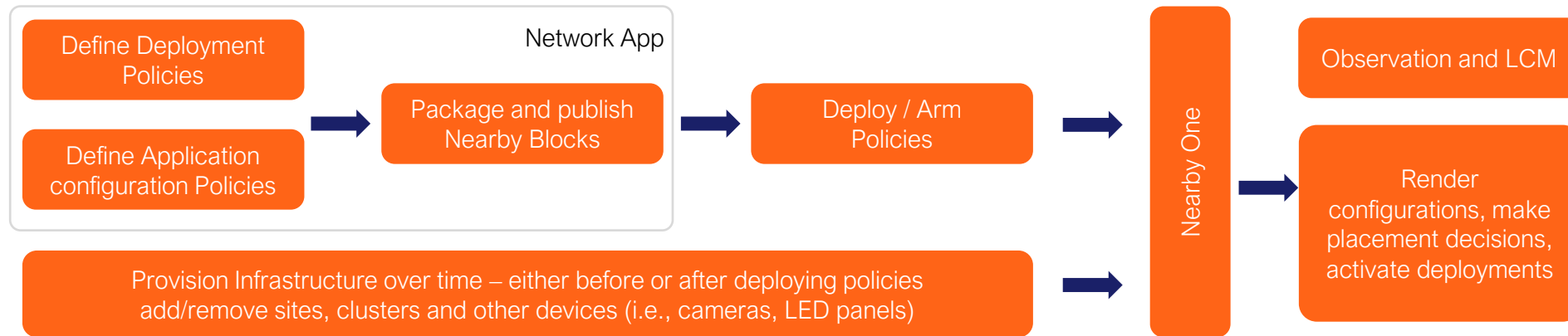
Deployment by policy

Paradigm shift: decoupling deployment/configuration from infrastructure



Deployment by policy

Paradigm shift: decoupling deployment/configuration from infrastructure



Example of use

Deploy a service policy (even before any cluster or site is registered) to make sure there is one video analytics instance up and running for each camera located in any of my customer sites (i.e., substations, telco edge site), and ensure each instance will run in the closest cluster to the associated camera.

Smart5Grid Use Cases



BENEFITS

□ MONITOR AND SECURE SUBSTATIONS

High-resolution 3D sensors combined with AI will support workers during maintenance, avoiding reaching live parts of the power grid.

□ AUTOMATIC POWER GRID FAULT DETECTION

Monitor the power grid remotely and detect failure locations along lines reducing operation costs.

□ REAL-TIME WIDE AREA MONITORING

Aggregate and control data of 1000s of Medium and High Voltage decentralized Renewable Energy Sources and their inverters.

□ REAL-TIME WIDE AREA MONITORING

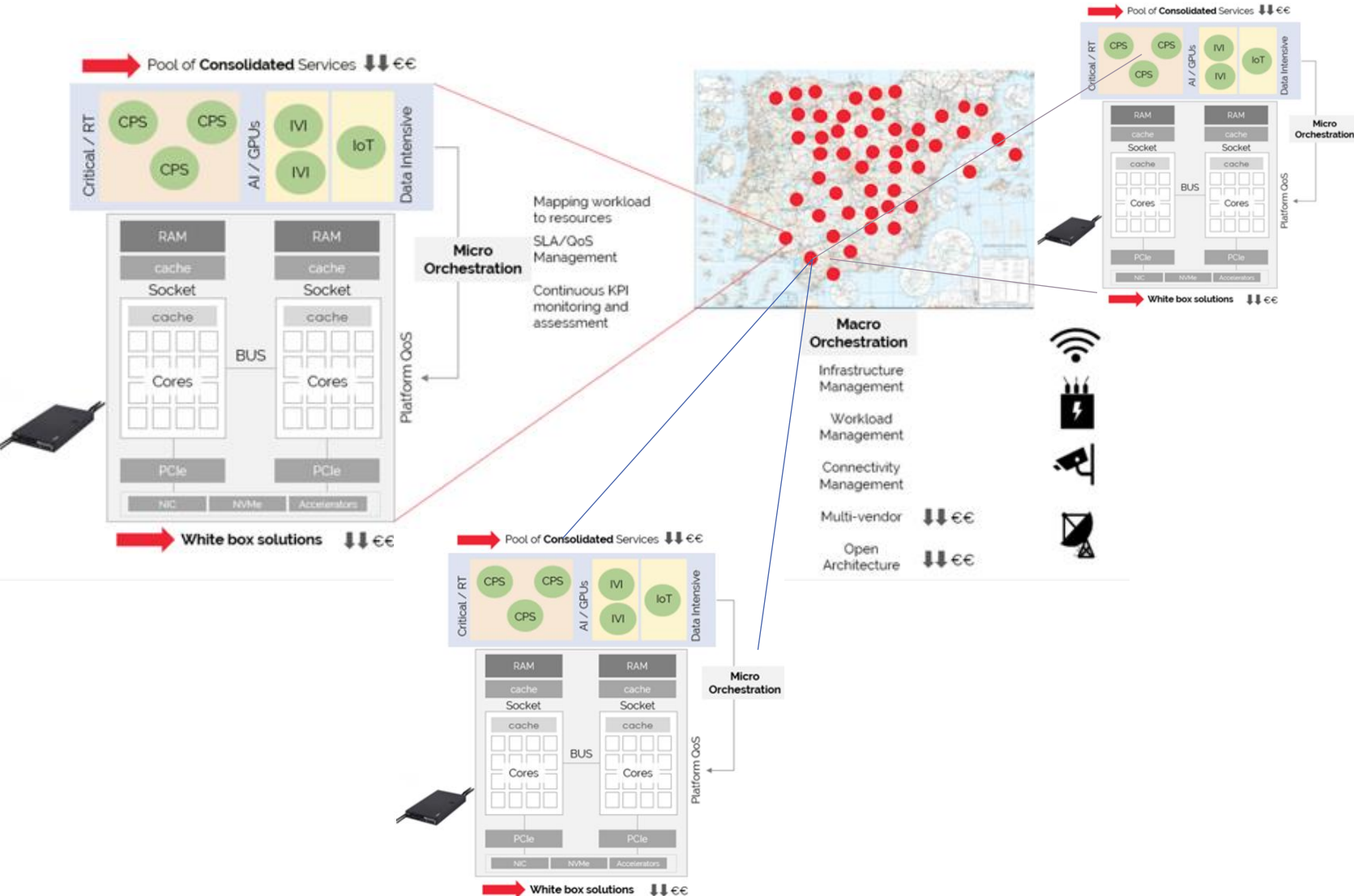
From Distributed Energy Resources at Medium Voltage levels operated by DSOs to High Voltage levels operated by TSOs, as well as inter-TSO cross-border Regional Security Coordination.

Markets- Utilities-Virtualized Substations

GRUPO RED
ELÉCTRICA

redeia

Smart5Grid



BENEFITS

CRITICAL LOW-LATENCY (2 ms) PROTECTION AND SCADA SERVICES

Provide guaranteed performance and reproducible QoS to critical protection services thanks to the offered micro-orchestration and custom provisioning profile to set BIOS settings (Hyperthreading, CPU frequencies, caches, etc) and more.

COLLOCATION WITH ANCILLARY SERVICES

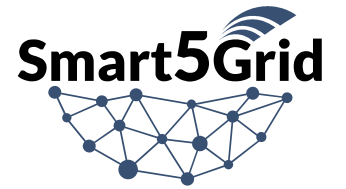
Other services can be deployed without impacting the performance of critical services.

MICRO&MACRO ORCHESTRATION FROM A SINGLE-PANE OF GLASS

Monitor and manage multiple sites from one remote dashboard. Plan upgrades rollout using blue/green or canary deployments



NEARBY
COMPUTING



Thank you



Barcelona – nearbycomputing.com – info@nearbycomputing.com



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OSR, V&V and Network Application concept

Atos

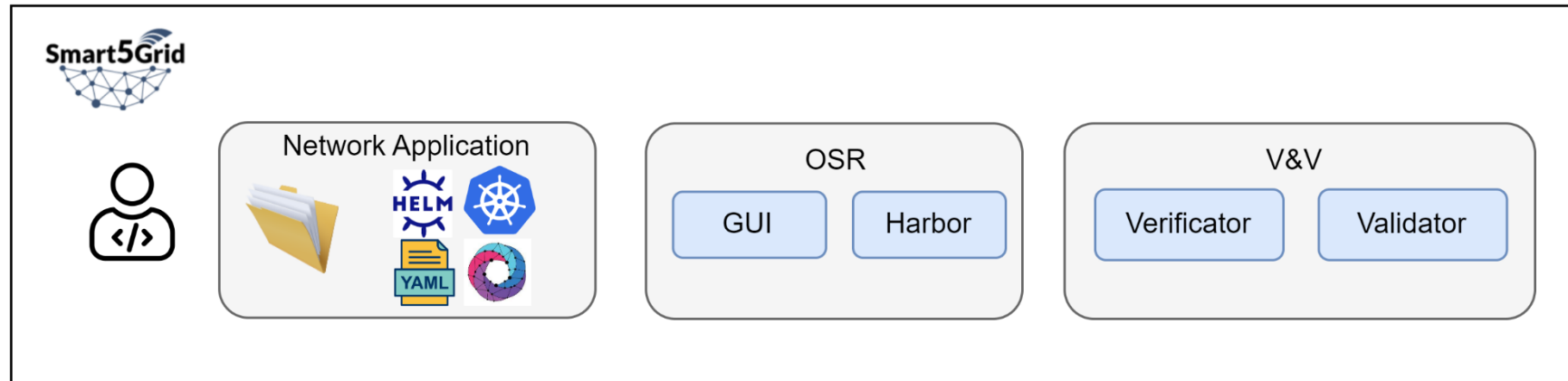
Guillermo Gomez

Content



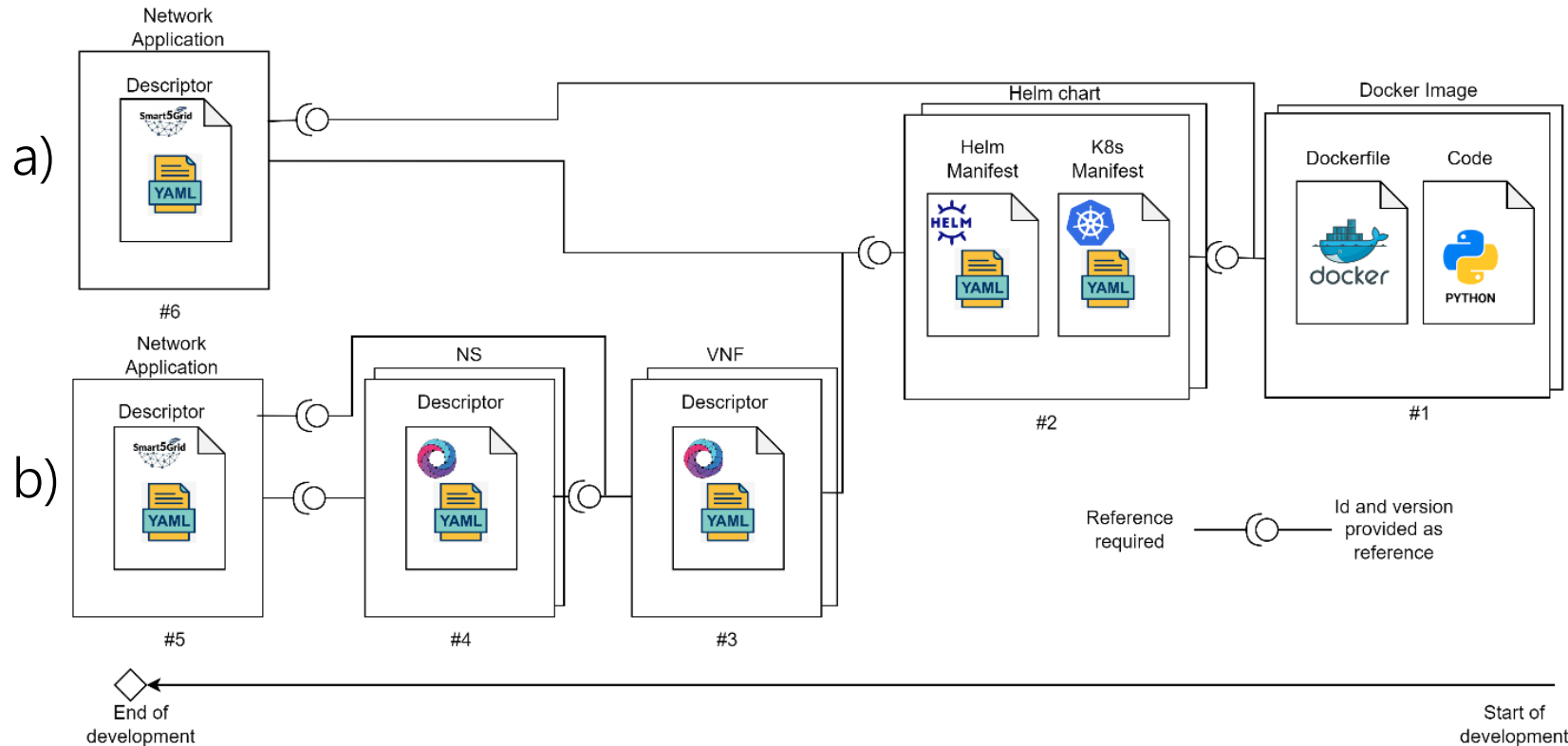
- Concepts & Relationships
- Network Application Technologies
- Network Application Information Model
- Network Application Development
- Network Application Example

Concepts & Relationships



- **Network Application**
 - Cloud-Native vertical applications
 - ETSI NFV support
 - ETSI OS MANO (OSM)
 - Abstraction from the network
 - Ease of use
- **Open-Source Repository**
 - Entry point to the Platform.
 - Commercial-grade CN Registry
 - Storage and Reusability
 - Trust, Quality and Control
 - Gitlab integration for devs
- **Verification and Validation**
 - Static Code Analysis.
 - Syntax
 - Integrity
 - Topology
 - Dynamic Code Analysis.
 - Onboarding
 - Deployment
 - Decommission

Network Application Technologies



Artefacts involved in the delivery of a Network Application

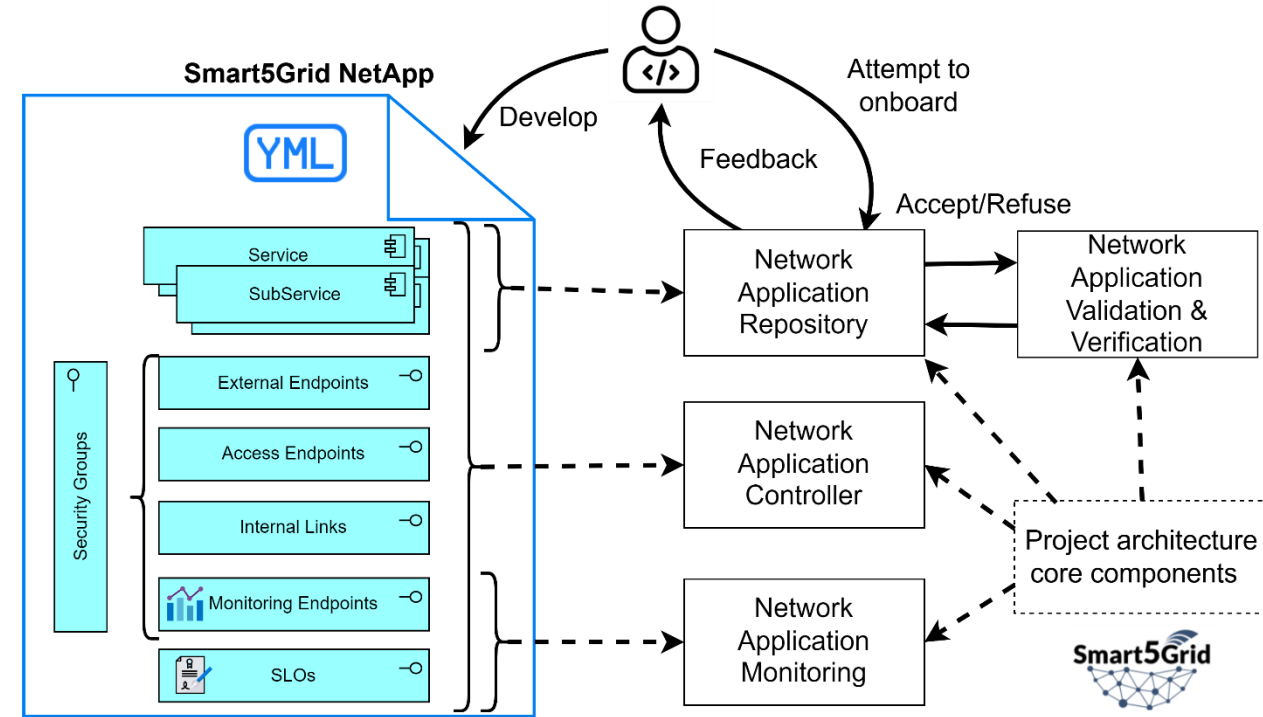
- Cloud Native (CN) app + Network Application Information Model (IM) -> Docker, K8s, Helm, Yaml, OSM
- Orchestration tools:
 - a) Commercial CN Solution for all Verticals:
 - NearbyOne
 - b) ETSI OpenSource MANO for Telco
 - OSM + NAC

Network Application Information Model

Description and capabilities



- Declarative model (YAML)
- NetApp organized as collection of service + subservice.
 - Allows chain of services
 - Reusability of services and subservices by-design
- Abstracts the complexities of the network.
- Exploited by the V&V, NAC and Monitoring framework



Network application IM to Smart5Grid Platform components mapping

Network Application Development

Summary of steps



- #1. Standard CN development:
 - Application logic in any programming language and environment. [\[1\]](#).
 - Docker container. [\[2\]](#).
 - No additional requirements to work as a Network Application
 - Helm chart. Example. [\[3\]](#)
 - No additional requirements to work as a Network Application
 - #2.* Create an OSM package:
 - VNF (CNF/KNF): The [Information Model](#) (IM) of the VNF descriptor is based on the [specification SOL001](#) adapted to the YANG models as part of [SOL006](#).
 - NS: The [IM](#) is defined in the [SOL007 specification](#) adapted to the YANG models as part of [SOL006](#).
- * Only for Telco Network Applications
- #3. Create and package the Network Application descriptor. [D4.1]
 - OSR provides a GitLab template folder [D3.3]
 - NearbyOne includes a plugin that translate to its internal requirements

Network Application Example (Telco)



```
netapp:
  im-version: 0.1.0
  name: $TELCO_NETAPP_NAME
  description: Telco NetApp example
  provider: ATOS
  version: $TELCO_NETAPP_VERSION
  service-format: osm
  services:
    - name: $APPLICATION_NS_ID
      package: $APPLICATION_NS_ID-$APPLICATION_NS_VERSION.tar.gz
      subservices:
        - name: $APPLICATION_VNF_ID
          package: $APPLICATION_VNF_ID-$APPLICATION_VNF_VERSION.tar.gz
      values: |
        foo: bar
      sap:
        - name: mgmtnet

  monitoring-endpoint:
    service-ref: $APPLICATION_NS_ID
    sap-ref: mgmtnet
    url: $MONITORING_URL

  external-endpoints:
    - name: external-endpoint1
      service-ref: $APPLICATION_NS_ID
      sap-ref: mgmtnet
      security-group-rules:
        - id-ref: http
```

```
access-endpoints:
  - name: access-endpoint1
    service-ref: $APPLICATION_NS_ID
    sap-ref: mgmnet
    security-group-rules:
      - id-ref: ssh
    policies:
      - key: latency
        value: '6'

SLOs:
  - name: number of connected PMUs
    expression: rate(PMUs_number[5m])
    metric: PMUs_number
    threshold: '10'
    threshold-type: GT
    action:
      target-ref:
        target-service-ref: $APPLICATION_NS_ID
        target-subservice-ref: $APPLICATION_VNF_ID
      action-step: trigger-scale-up
    granularity: '3'
    cycles: '4'

security-group-rules:
  - id: http
    description: http rule
    direction: ingress
    ether-type: ipv4
    protocol: tcp
    port-range-min: 80
    port-range-max: 80
```

```
$TELCO_NETAPP
|_descriptor.yaml
|_vnf-packages
|_$APPLICATION_VNF_ID-$APPLICATION_VNF_VERSION.tar.gz
|_ns-packages
|_$APPLICATION_NS_ID-$APPLICATION_NS_VERSION.tar.gz
|_helm-charts
|_APPLICATION_CHART-CHART_VERSION.tgz
```

Telco Network Application content 2

```
tar -czvf $TELCO_NETAPP_NAME-$TELCO_NETAPP_VERSION.tar.gz
```

Thank you

Wishing all the best for our common success!



Smart5Grid roadshow

13 Junio 2023, 14.00-15.00

Evento Virtual



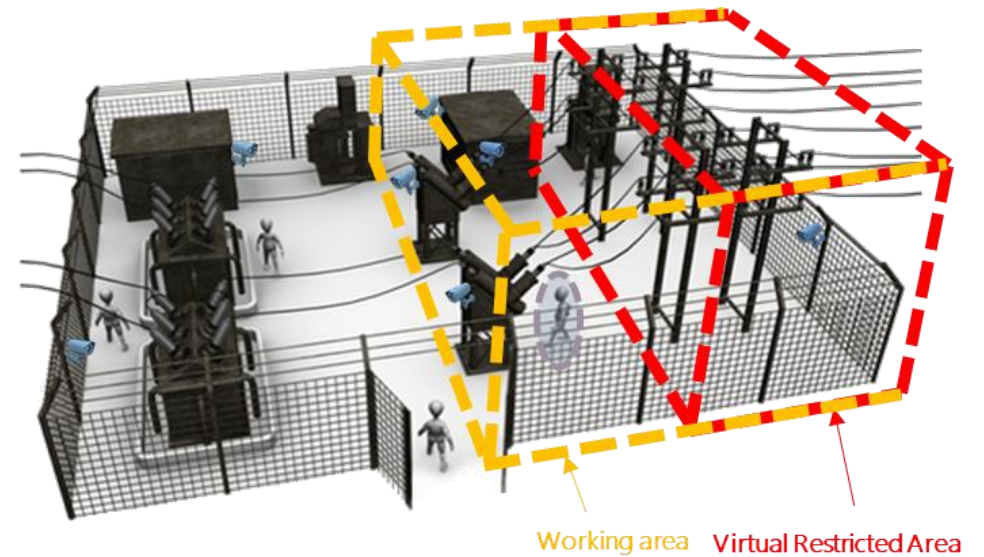
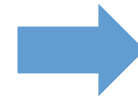
Spanish pilot, use case

e-distribución

Ana Romero

UC2 Spanish Demo

Remote Inspection of Automatically Delimited Working Areas at Distribution Level



 EcoGarraf, Barcelona Primary Substation (66 kV)



Business Goals

Safety improvement

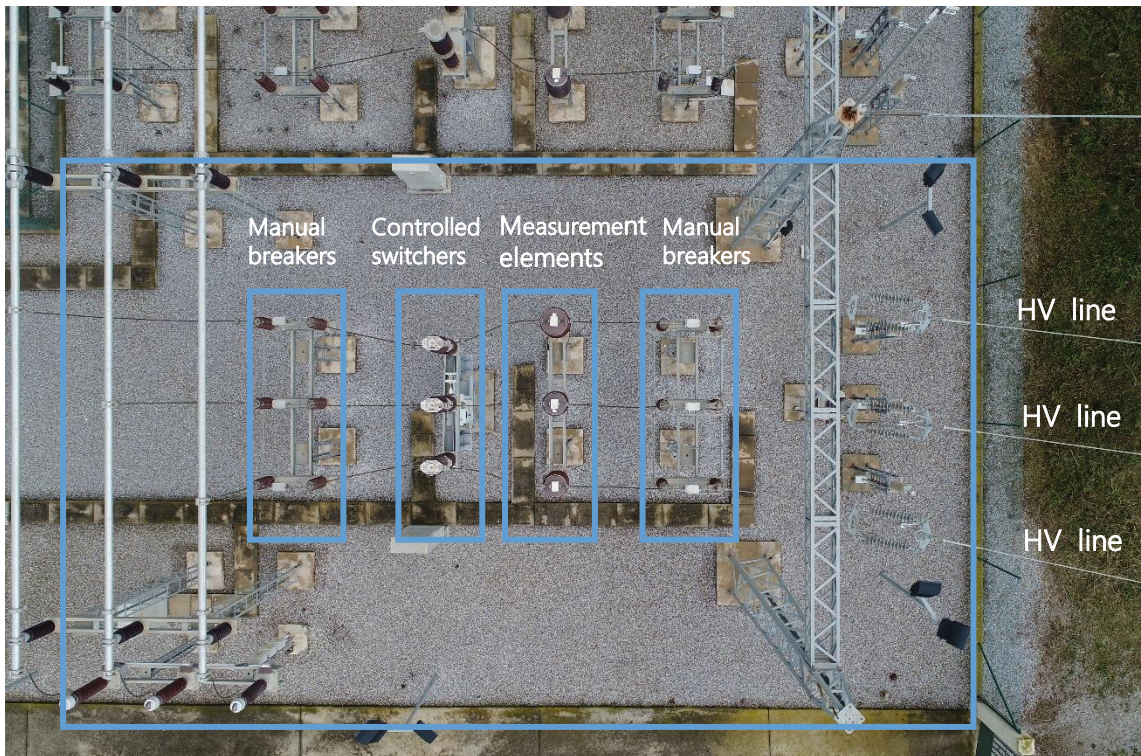


Bordering a safety zone in a volumetric way, Supporting field technicians

Using Real time tracking system (sensors and cameras)

Communicated through 5G private network (ultra reliable low latency communications)

Edge computing capabilities, enhanced mobile broadband and AI processing



Advantages vs Legacy solutions

Remote Inspection of Automatically Delimited Working Areas at Distribution Level



Real time tracking system

- Reinforcement of current safety procedures by using sensors (UWB) and cameras.

5G NR network

- Transmission of the information fast and reliable.

Network App and Edge Computing

- Minimum end-to-end delay.

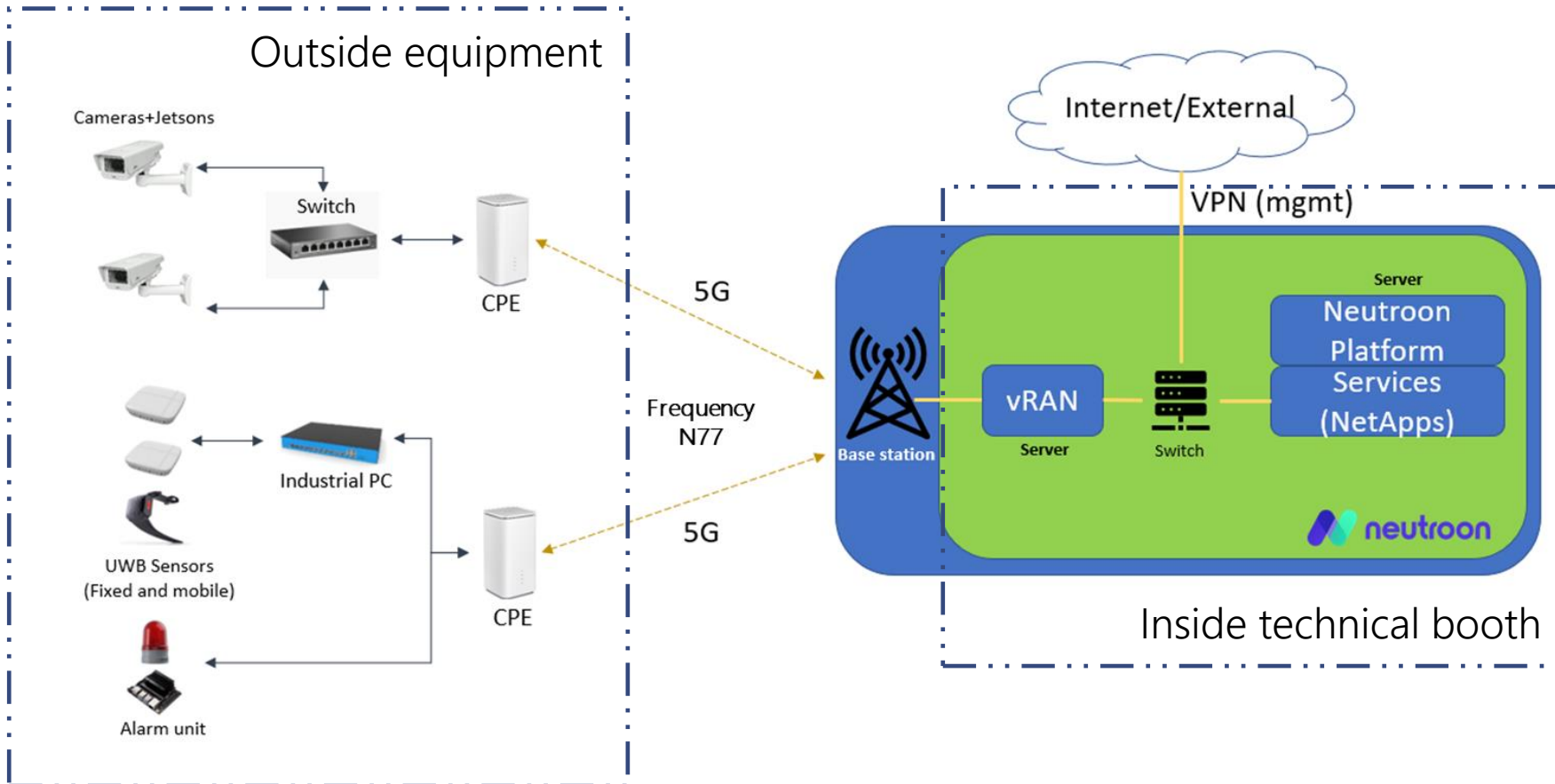
Performance improvement

- Fast image & AI processing.
- Delimitation is performed in real-time.
- Safety improvements. Cost reduction.



Field platform implemented

Architecture peculiarities

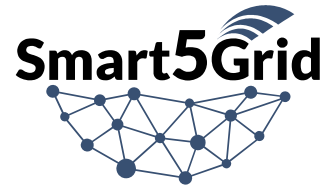


Network components:

- RRU R15 band N77
- Directional antenna
- vRAN R15 connection via CPRI
- 5G Core
- MEC server
- 5G CPEs outdoor
- Router and Switch

Network App

Remote Inspection of Automatically Delimited Working Areas at Distribution Level

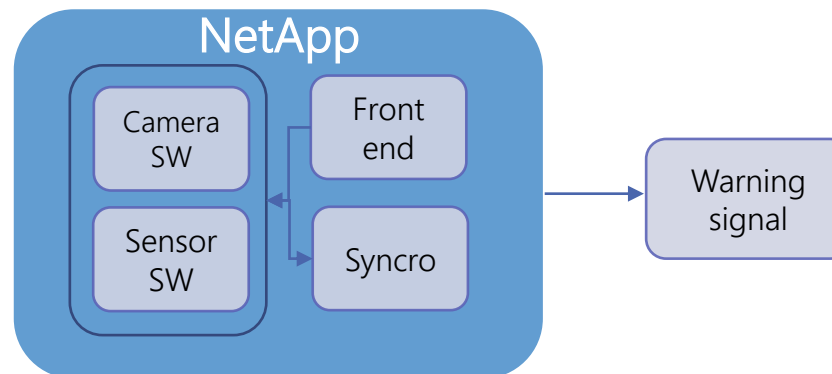


Objectives

- Tracking function and AI recognition system.
- Triggering an alarm and notifying the worker in case of any security breaches.

Capabilities

- Continuously process inputs from UWB sensors and cameras deployed in substation.
- Detecting whether a worker has accessed a forbidden area.
- Final work report including KPIs.



Target market & opportunities

Remote Inspection of Automatically Delimited Working Areas at Distribution Level



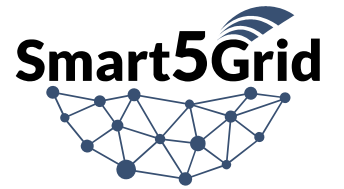
Target market

Any company interested in raising security level by delimiting zones (DSOs, power generation plants, industrial facilities, etc).



Opportunities

- Safety improvement is our first goal.
- Reducing failures in the network and cuts in power supply (Government's penalties).
- It will also help to improve the company's social image.
- We are open to collaborate with other SMEs.



Thank you

Wishing all the best for our common success!



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Opportunities for SMEs and experiences from implementers

Sergio Cadenas



Demonstration of 5G solutions for SMART energy GRIDs of the future

This project has received funding from the European Union's *Horizon 2020* research and innovation programme under grant agreement n° 101016912



Who we are?

SME Company manufacturer and rep of safety & labelling industrial products.

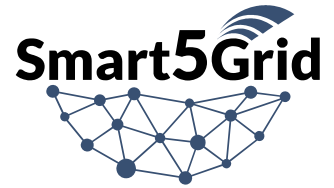


- ALIS TECH develops Real Time anticollision solutions for forklifts, safety led warning systems for the industry and safety taylor solutions like 3D detecting systems for cranes.
- During Corona 'shutdown' standard product range sales went to 0 and we developed our FDS Fever Detection System (non existing industrial solution at that time), finding components on the market and matching them and programing them in a short time. In 3 months we're ready to serve the first units. Logically we had to readjust the systems as we had no realistic time to essay the protos.
- This action saved the company.

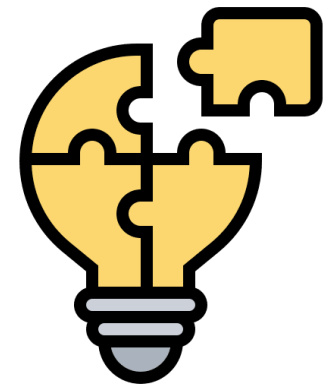


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The project, a gate for success but a challenge



- Integration with other partners is the big challenge. And stepping out of the standard range of products development is something this kind of SME's can handle but normally according to their own calendar.
- Why? SME company like NOSIA – ALIS developing calendar is strongly exposed to internal issues. If any of this occurs, running projects has to be stop due to lack of resources and not enough 'lung',
- Employes fluctuation
- Cash flow (unpayments from customers i.e.)



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Use case 2 personal SME experience

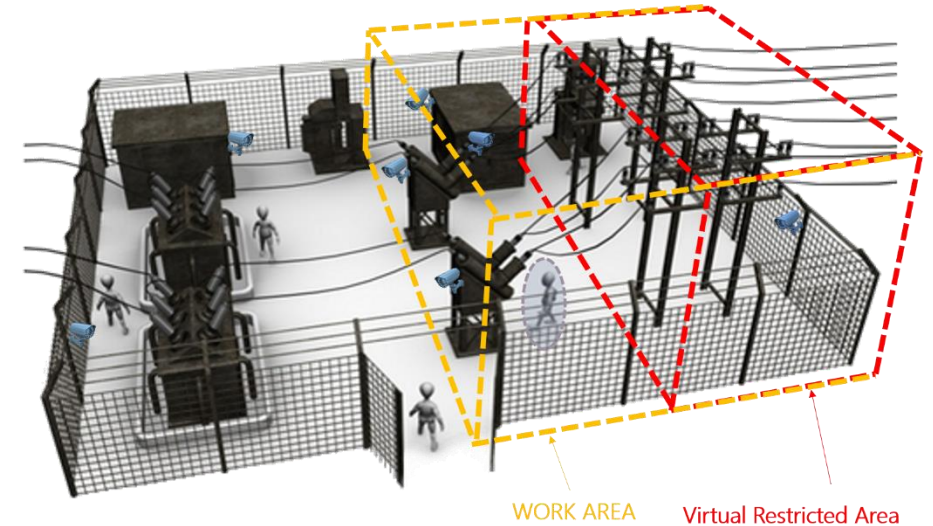


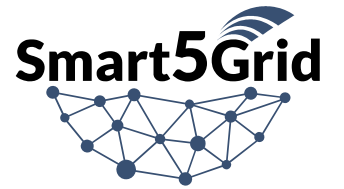
PROS

- Technology development
- Market exploring
- Partnership network

CONS

- For a SME company being in a teamwork of structural different size creates a neckbottle on communication flow.

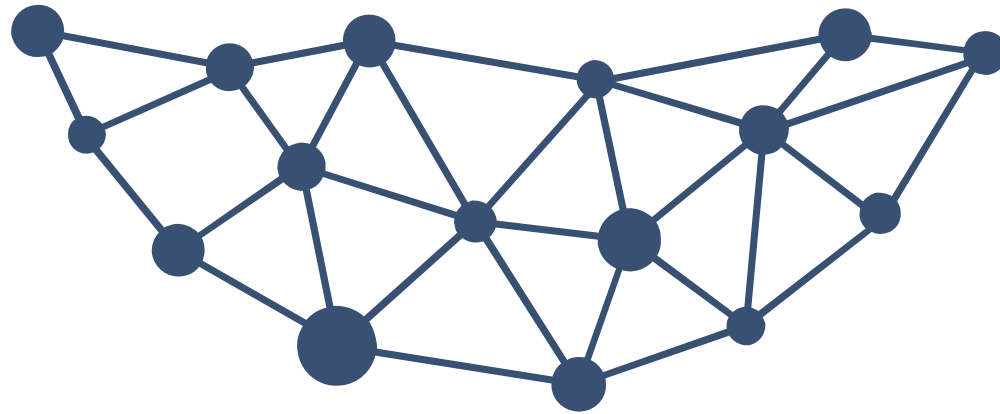




Thank you

Wishing all the best for our common success!

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Demonstration of **5G** solutions for
SMART energy **GRIDS** of the future



**Our testbeds are
open for external
experimenters**



**build and test
your own
Network App**

Third-parties experimentation

Available tools



OSR

Open Service Repository



V&V Framework
Validation and Verification

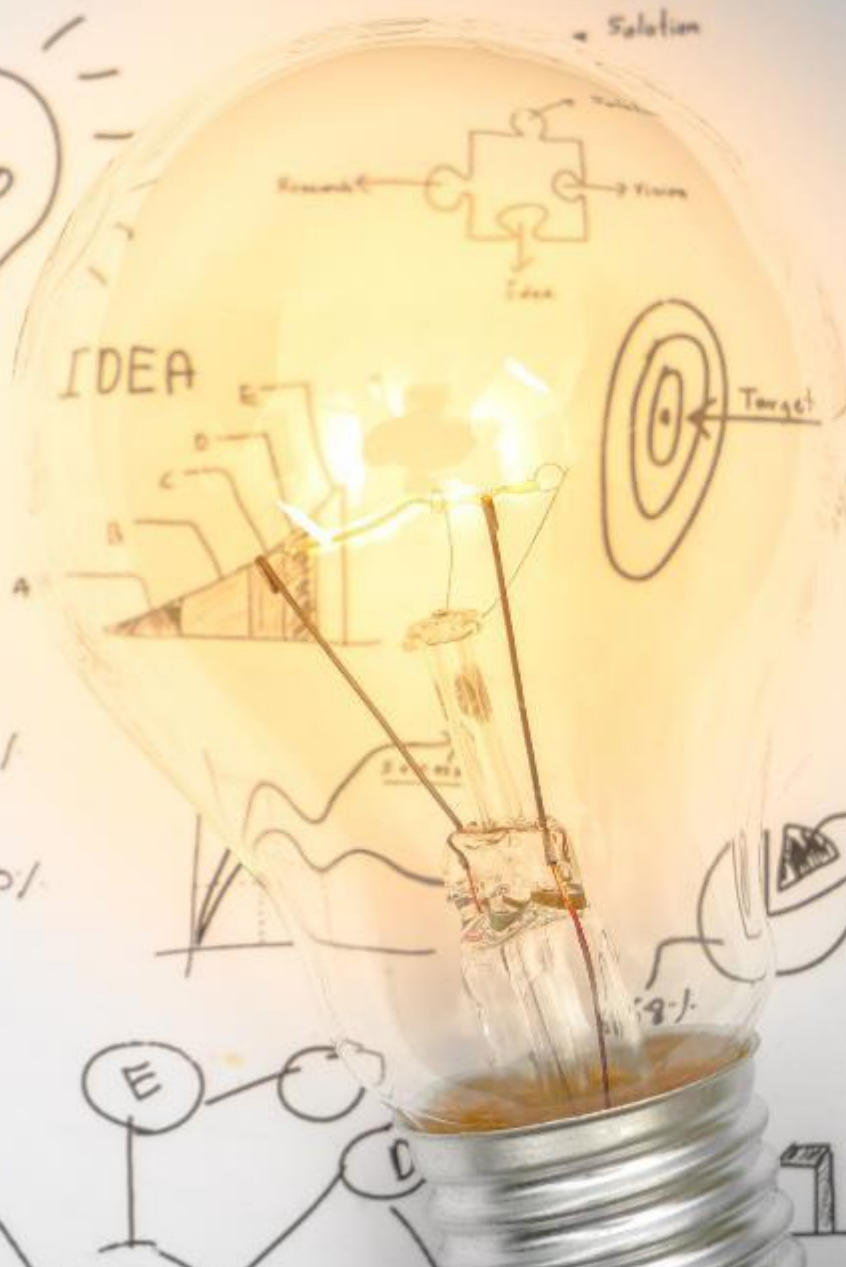


Contact desk

Remote support for developers

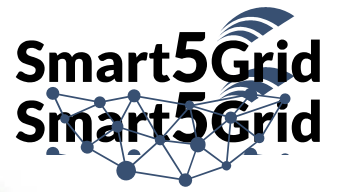


Foster flexibility and scalability



Network Application

one approach for multiple uses



The 5G Infrastructure Public Private Partnership

5G PPP Phase 3, Part 6: 5G innovations for verticals with third party services & Smart Connectivity beyond 5G





Dissemination

All the experimenters will be listed in our channels, we will showcase all Network Apps to our stakeholders, you will meet the European Commission to present your successful story!

Join us!
Follow us!
Like us!



[smart5grid.eu]



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This project has received funding from the European Union's *Horizon 2020* research and innovation programme under grant agreement n° 101016912



Open discussion



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