EuCNC 2018 | Ljubljana, Slovenia | June 18-21

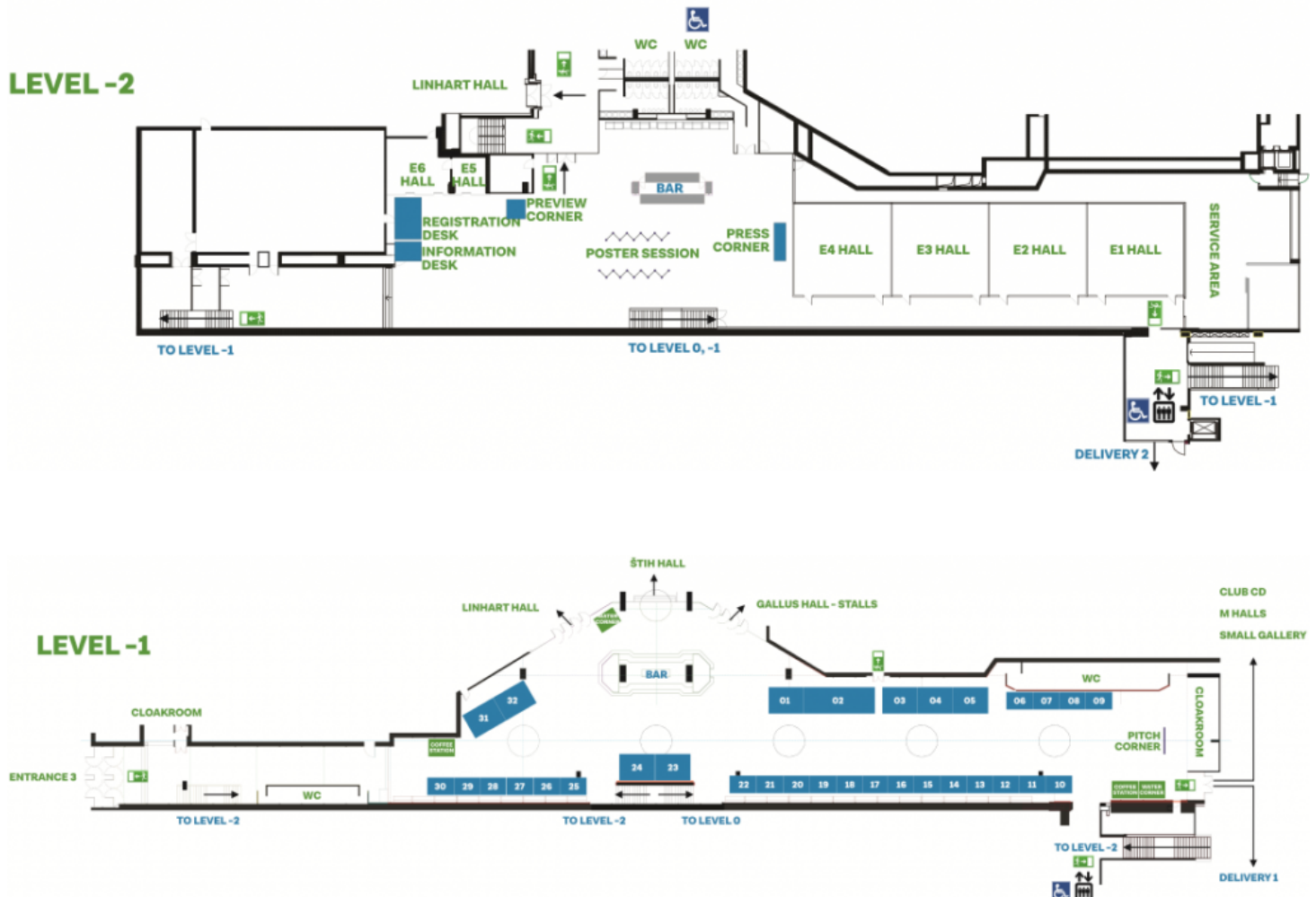# Exhibitions and Demos

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Exhibitions will take place at Cultural and Congress Centre Cankarjev Dom – Foyer 1, in the following schedule:

Tuesday 09:00 – 18:00
Wednesday 09:00 – 18:00
Thursday 09:00 – 12:30

Exhibition Map

Booth #1

ONE5G

ONE5G – E2E-aware Optimizations and advancements for Network Edge of 5G New Radio

ONE5G is a European project which aims at providing technical investigations and recommendations beyond Release 15, moving „5G" to "5G advanced". The objective of the demo is to offer an overview of ONE5G prototyping activities related to factory of the future, enhanced network management, smart city, automotive, critical infrastructure and agricultural use cases.

The demo will showcase the project advancements in areas including: a) small cells multi-connectivity for reliability enhancement in industrial environments; b) advanced link enhancements based on massive MIMO as enablers for smart city applications; c) E2E monitoring schemes based on the actual user quality of experience (QoE) as enablers for the future network management solutions and; d) IoT and big data technologies for supporting critical infrastructure and agricultural use case in underserved areas and; e) video feeds from real trials of cloud robot and tele-operated driving scenarios.

The demonstration aims at: a) showing the validity, the feasibility and the superiority of the different ONE5G components; b) demonstrating the linkage of the prototyping activities with the related verticals; c) showcasing the estimated gains from their adoption in specific verticals; d) demonstrate first real trials.

Booth #2

5G-TRANSFORMER, 5GEx and 5G-CORAL

This exhibition shows demos from 3 different projects that are collaborating together in the area of multi-domain, multi-provider orchestration of services and resources in cloud, edge and fog environments: 5GEx, 5G-TRANSFORMER and 5G-CORAL.

The 5GEx project is creating an agile exchange mechanism for contracting, invoking and settling for the wholesale consumption of resources and virtual network services, which can be provisioned in less than 90 minutes and rapidly invoked. This will enable network operators, applications providers and other stakeholders in the 5G supply chain to deliver new service value for 5G customers and at the same creating and enhancing revenue-generating potential for 5G providers, third party verticals and others in the supply chain.

The 5G-TRANSFORMER project aims to transform today's mobile transport network into an SDN/NFV-based Mobile Transport and Computing Platform (MTP), which brings the "Network Slicing" paradigm into mobile transport networks by provisioning and managing MTP slices tailored to the specific needs of vertical industries.

The 5G-CORAL project leverages on the pervasiveness of edge and fog computing in the Radio Access Network (RAN) to create a unique opportunity for access convergence. This is envisioned by the means of an integrated and virtualised networking and computing

solution where virtualised functions, context-aware services, and user and third-party applications are blended together to offer enhanced connectivity and better quality of experience.

The following demos will be shown:

New virtualization-based roaming solution for multi-domain environments.

Video solution for emergency situations enabling assured connectivity on demand.

Dynamic media service deployment on the top of heterogeneous infrastructure combined from public and private clouds.

Dynamic service request from a vertical, transparently translated to services with different resource requirements, which are the ones finally instantiated.

RNIS MEC LTE, where we demonstrate an LTE network where a robot equipped with an LTE interface is attached to an OpenAirInterface eNodeB and EPC.

Cloud robotics, showing multiple cooperating robots that require synchronization for accomplishing a common task. This coordination is achieved via an edge-fog system.

Booth #3

ORCA

ORCA – Real-time software defined radio (SDR) platforms for advanced wireless research

At EuCNC 2018 we plan to showcase the potential of state-of-the-art software defined radio (SDR) platforms for fast prototyping of 5G and beyond 5G wireless solutions. The main target of the ORCA project is to enable end-to-end networking experiments involving real-time SDR dealing with very diverse QoS requirements (in terms of throughput, data volumes, latency, response time, reliability, availability, etc.) sharing the same wireless technologies, infrastructures and/or spectral bands. To this end ORCA offers open mature, real-time and versatile SDR platforms in several wireless test facilities, supporting heterogeneous technologies and advanced control mechanisms that can cope with extreme (ultra-low latency, ultra-high throughput, ultra-high reliability) and diverging (low AND high data rate, time-critical AND non-time critical) communication needs.

We plan to show two demos, a first demo focussing on low-latency industrial communication, and a second demo on interworking and aggregation of multiple radio access technologies (RAT).

Booth #4

WiSHFUL

WiSHFUL – Wireless Software and Hardware platforms for Flexible and Unified radio and network controL

We aim to present a final project demonstrator of WiSHFUL that will prove that real runtime coexistence/cooperation of deployed wireless heterogeneous networks, even from different operators and vendors, can be achieved by using the WiSHFUL intelligent software control and management framework across a wide range of networking technologies. We shall demonstrate that this is achieved with minimum effort and complexity by using WiSHFUL Unified Programming Interfaces (UPIs) to control the deployed devices during runtime. UPIs are abstracting programming interfaces that can enable transparent and unified control over a wide list of supported devices.

There is no need for the user of WiSHFUL to dig into the specifications of each deployed device to figure out which type of control is supported, as WiSHFUL exposes a wide list of control knobs across the network stack through UPIs. Another objective of our demonstration will be to prove the applicability of the Portable Testbed, a replication of a typical fixed testbed that is able to be transferred and deployed in any location, in supporting deployment of multiple heterogeneous networks in scale, comparable to what fixed testbeds can provide.

Booth #5

eWINE

The eWINE project comprises of three showcases, which target a variety of research challenges from various perspectives including end-to-end wireless connectivity, elastic resource sharing in dense heterogeneous environments, and reconfigurable context based physical layer. The exhibition is about the demonstration of the showcases, where we solicit three integrated demos (one for each showcase) and each demo encompasses and validates the vision of the showcase.

Demonstration 1: In this demo, a basic end-to-end service in a dense wireless scenario using a centralized end-to-end controller running a cognitive loop is presented. Specifically, an integrated end-to-end demonstration is realized by providing an end-to-end connectivity to WiFi, LTE device to device communication, and IOT gateway.

Demonstration 2: In this demo, two independent cognitive loops named inter-technology optimization loop and intra-technology optimization loop are demonstrated for providing an optimization solution for the LPWA technologies including Sigfox, LoRA, and IEEE802.15.4g (subGHz). In the first loop, a spectrum manager based approach is used for minimizing the impact of interference among the technologies and thus, improving the performance. In the second loop, an optimization of the sigfox network is presented via blacklisting the interfering channels in the presence of interference sources.

Demonstration 3: In this demo, an integration of multi-RAT transceiver having various objectives such as sensing and synchronizing LTE-U signals for exploiting used spectrum portions, establishing cross-technology control channel, GFDM per frame, etc is presented.

Booth #6

5GCity

5GCity – Empowering Cities 5G Use Cases / Trials

The 5GCity project aims to develop a distributed cloud and radio platform for municipalities and infrastructure owners acting as 5G neutral hosts. To achieve this, 5GCity platform extends the cloud model to the extreme edge and enables scalable edge management and orchestration. Apart from this, 5GCity also focuses on MEC node virtualization, guest optimizations and network virtualization at the edge to fulfil technical requirements for a 5G neutral host. The motivation for demonstrations at EuCNC 2018 is to show case the technical developments at different fronts in the project at the end of first year of its execution. 5GCity will demonstrate, 1) 5GCity Neutral Hosting (Multi-tenancy), 2) 5GCity Guest Optimization, and 5GCity Edge Orchestrator & VIM.

Booth #7

5G-Xcast

FUTURE5G – Future 5G-XCast production with dynamic spectrum sharing on 2.3 GHz band

5G-XCast provides means to deliver the new audio-visual media, like 4k/8k Ultra-High-Definition Television and Virtual Reality including their consumer interactivity. As a part of media production, wireless links are used between the camera and the Outdoor Broadcasting van or another type of video processing unit. The new audio-visual content requires higher bitrates and more spectrum from the wireless links than the High Definition (HD) video. At the same time, conventional PMSE link bands get other spectrum users. PMSE differs from many other types of spectrum use as being local and having a short time duration.

We demonstrate solutions how PMSE spectrum use can continue in the current form and how it can take the advantage of 5G.

Booth #8

5GCAR

Intermediate results from the 5GCAR project will be demonstrated. Background on key performance indicators, use cases and their requirements. Learnings from the studies on V2X business and spectrum aspects. Highlight of promising V2X cellular and sidelink technology components as well as intermediate V2X architecture findings, together with demonstration work and dissemination activities. To illustrate the ongoing emonstration work, a small-scale demonstrator of the Cooperative Perception for Maneuvers of Connected Vehicles use case is brought to the EuCNC booth and demonstrated here.

The demo consists of some high-level posters as well as more detailed public reports (known as deliverables) on the intermediate results from the 5GCAR project. Flyers and Brochures will be provided to convey a summary of the overall project objectives and goals. The demo also contains a small-scale demonstration, scaled replica of the actual demonstration, with robot-vehicles driving on a table to illustrate aspects of the Cooperative Perception for Maneuvers of Connected Vehicles use case.

Booth #9

COST Association

COST is an EU-funded programme that enables researchers to set up their interdisciplinary research networks in Europe and beyond. We provide funds for organising conferences, meetings, training schools, short scientific exchanges or other networking activities in a wide range of scientific topics. By creating open spaces where people and ideas can grow, we unlock the full potential of science.

COST is the longest-running European framework supporting transnational cooperation among researchers, engineers and scholars across Europe. It is a unique means for them to jointly develop their own ideas and new initiatives across all fields in science and technology, including social sciences and humanities, through pan-European networking of nationally funded research activities. Based on a European intergovernmental framework for cooperation in science and technology, COST has been contributing – since its creation in 1971 – to closing the gap between science, policy makers and society throughout Europe and beyond. As a precursor of advanced multidisciplinary research, COST plays a very important role in building a European Research Area (ERA).

It anticipates and complements the activities of the EU Framework Programmes, constituting a "bridge" towards the scientific communities of COST Inclusiveness Target Countries. It also increases the mobility of researchers across Europe and fosters the establishment of scientific excellence.

Booth #10

Fed4FIRE+

Fed4FIRE+ – Federating testbeds for 5G, IoT, cloud, big data and networking research

A variety of testbeds for (real life) experimentation and testing exist in Europe. Even a lot of them allow open access, but the problem is that the learning curve for using them is typically too steep. Fed4FIRE, as largest federation of testbeds in Europe, helps in this by having simple tools and a single account to access all those testbeds, allowing to do experiments in the fields of 5G, IoT, cloud, big data and networking and even combining them easily. At EuCNC we want to showcase how simple it is to use the testbeds and to combine multiple testbeds in a larger experiment.

Demo 1: "5G network end-to-end cellular virtualized infrastructure provisioning" NITOS testbed is providing state-of-the-art equipment for 5G experimentation. In this demo, we will showcase how the FIRE infrastructure available in the NITOS testbed can be managed through a 5G end-to-end service orchestrator, in order to provision heterogeneous wireless network connectivity in a single geographical domain.

Demo 2: "How to use Femtocells, EPC, NFV, USRPs on the Fed4FIRE testbeds" This demo will show how experiments can be set up easily and remote through Fed4FIRE tools and testbeds.

Demo 3:"Lash 5G" LASH-5G aims at experimenting an end-to-end service and resource orchestration system operating across cloud and network domains able to dynamically select the proper set of VF instances to address latency, adaptability and availability requirements of 5G applications.

Booth #11

5G-RANGE

5G-RANGE – PHY Layer for the 5G Remote Area Applications

Nowadays, the main research efforts on 5G networks aim for improving the data rate, reduce latency and increase the number of connections. Besides these efforts, one important scenario is not being intensively researched, which is the coverage in remote and rural areas. The main goal of the 5G-RANGE project is to conceive and implement a 5G operation mode that can provide reliable Internet access in remote areas, with significant social and economic impacts. 5G-RANGE will provide the telecommunications infrastructure to allow those living in low populate areas to have reliable Internet access. This solution will also support the agribusiness automation, allowing for using IoT for improving farms productions in the so-called smart farms. Other applications, such as road coverage and high-speed train connections, will benefit from the wide coverage provided by 5G-RANGE. The 5G-RANGE PHY must overcome several challenges. Cognitive radio techniques shall be employed to reduce operational costs. Hence, the waveform must have low out-ofband emissions and spectrum flexibility to support dynamic frequency allocation. The waveform also must achieve high spectrum efficiency under a double-dispersive channel with long delay profile. Finally, stateof-the-art channel codes and MIMO schemes must be used to provide robustness for large cell coverage. The main aim of this demonstration is to show the preliminary results achieved by the 5G-RANGE Project in terms of the PHY for Remote Area Applications. The transceiver is entirely implemented in hardware and is able to operate in real-time at high data rates. We will demonstrate that the conceived PHY layer is able to achieve very low out-of-band emissions, which allows spectrum agility by just turning off subcarriers in undesired spectrum bands. The system robustness is assured by a flexible Polar Code, which can be configured to operate at different code rates and by a MIMO diversity scheme to enhance robustness.

5G ESSENCE

5G ESSENCE – 5G Small Cells for Multitenancy and Edge Services

The 5G ESSENCE project "addresses" the paradigms of Edge Cloud computing and Small Cell-as-a-Service (SCaaS) by fuelling the drivers and removing the barriers in the Small Cell (SC) market, forecasted to grow at an impressive pace up to 2020 and beyond, and to play a "key role" in the global 5G ecosystem. The 5G ESSENCE framework provides a highly flexible and scalable platform, able to support new business models and revenue streams by creating a "neutral host" market and reducing operational costs by providing new opportunities for ownership, deployment, operation and amortisation. Two demonstrations will showcase the system design, concepts and visions developed by the 5G PPP H2020 project "5G ESSENCE".

Enhanced Video Services at the Edge DC: The demo will show the i-EVS (Enhanced Video Services) application leveraging the Multi-Access Edge Computing (MEC) platform hosted in the 5G ESSENCE Edge DC, which provides a virtualized layer and allows the high processing of content at the network edge. The i-EVS offers video transcoding capability as well as Context-Aware and Location-Aware mechanisms, enabling Service Providers to launch new value-added services.

Data traffic characterization & multitenancy at the network edge: 5G-ESSENCE offers content providers cloud computing capabilities at the edge of the mobile network. It is characterized by low latency and high bandwidth, and provides real-time radio network information to applications that can run in this environment. During the exhibition, 5G ESSENCE will focus on two main aspects of the project: the multitenancy in the 5G Cloud Enabled Small Cells (CESCs) and the progresses done in providing the two tier cloud computing services at the edge of the network.

SEMIoTICS

SEMIoTICS Platform

The SEMIoTICS platform will demonstrate an end-to-end IIoT SDN/NFV infrastructure:
A mini cluster of ARM Single-Board Computers (SBCs) will act as the local cloud. The ARM SBCs will act as a set of Compute Nodes, or Hypervisors, that will host all the relevant VNFs (e.g., related to smart actuation, monitoring, and data analytics).
An Odroid C2 minicomputer will act as the Field layer Virtualized IoT gateway that can host VFNs to reduce latency. An 802.15.4 radio module will be employed to interconnect Field devices (smart sensors) with the gateway.

Field layer smart sensors will transmit temperature, humidity, and light intensity values wirelessly over 802.15.4, while their inputs will directly control actuators (e.g., smart light bulbs).

OpenHab IoT platform will be employed for sensor value visualization (charts) which will be displayed on a Tablet.

SDN switching will be employed for the Network Layer.

During our demo, individual VNFs (related to monitoring, actuation, etc.) will be pushed to either the Cloud or the Field layer in real-time by a VNF Manager platform, demonstrating the effect on different KPIs (e.g., latency). SDN control will be employed to prioritize sensor traffic in the presence of competing background traffic.

Booth #14

SHIELD

Next-generation Security-as-a-Service

The objective of the demo is to show the SHIELD solution for twotier network protection based on the Security-as-a-Service (SecaaS) paradigm. The SHIELD security service model includes i) virtual network security functions (vNSFs) deployed into the network and ii) threat/incident detection based on Big Data analytics, exploiting data collected by the vNSFs. vNSFs, as virtual security appliances, achieve a first level of protection by detecting and blocking threats based on known rules. At the same time the SHIELD Data Analysis and Remediation Engine (DARE) collects information from the vNSFs (e.g. flow data and HTTP/DNS logs) and attempts to infer anomalies and incidents which were not detected by the vNSFs themselves.

Booth #15

NGPaaS

Next Generation Platform as a Service

Today's PaaS offerings are tailored mainly to the needs of web and mobile applications developers, and involve a fairly rigid stack of components and features. The vision of the H2020 5GPPP Phase 2 Next Generation Platform-as-a-Service (NGPaaS) project is to enable "build-toorder" customized PaaSes, tailored to the needs of a wide range of use cases with telco-grade 5G characteristics. NGPaaS will demonstrate the platform based 5G design and the 'build-to-order' principle through three PoCs: 1) "one click deployment" of an end-to-end mobile network over a distributed cloud infra-structure FRONT-END/EDGE/CENTRAL/PUBLIC clouds. The Cloud RAN is implemented in a pure software running as containers. The fronthaul network is intent based. Part of the 5G CORE network will be deployed in a public cloud e.g. Amazon, 2) A pilot Dev-for-Operations based on 3 vendors, 1 NGPaaS Operator and 2 Verticals,

demonstrating the "build to Order" of Continuous Integration/ Continuous Delivery (CI/CD) environment for Vendors and for Operators. The Demo will show how life cycle of a VNF can be automatized from code to live production environment, 3) A Telco PaaS using a NGPaaScompliant CORD as the platform, with the Virtualized Network Function as a Service (VNFaaS) service model, to deploy VNFs like virtual routers and firewalls for fixed network and also value-added services like ondemand monitoring of the deployed VNFs.

In addition to demonstrations, project-prepared posters, and brochures, a white paper prepared by BT will be released. Entitled 'Network Operator's Perspective on NGPaaS', the white paper addresses key innovative characteristics of the NGPaaS concept, and explores the potential benefits and market opportunities that could arise for network operators.

Booth #16

TRIANGLE

TRIANGLE E2E Testing Services

The TRIANGLE project will showcase a full End-to-End testing demonstration. The Triangle testbed is a full end-to-end system that includes COTS mobile devices, NB-IoT devices, reference mobile applications, full RAN emulation and EPC for 4.9G. The demo will allow the user to access an instance of the Triangle testbed and perform testing on reference applications, by recording customized user flows for mobile applications, the demo will also make use of the remote testbed features to demonstrate the ease of access of the Triangle testing service.

The demonstration will perform automated testing on a set of use cases, including the trending VR by mean of a custom-developed robotic arm for 3D real movements. The demo will show how easy it is to set up App or device testing with the testbed developed by the TRIANGLE project. One important lesson learned from past FIRE projects is the difficulty of accessing and using the different testbeds offered by the community. In the TRIANGLE project, valuing the offer of a good testing experience to the testbed's potential customers, we have developed different entry points to the testbed fitting the different amount of knowledge expected from different customer profiles.

Booth #17

SELFNET

As of today, maintenance and servicing of permanent growing mobile networks require manual intervention of qualified network engineers to ensure a constant high level of service quality, which is very time and cost consuming. Operators need to locate and mitigate different types of problems in the network, such as hardware faults, link failures, performance optimization and security

attacks, to only name a few. The European Commission (EC) and others highlighted already in 2014 that mobile operators spending three times operational expenditures (OPEX) than capital expenditures (CAPEX). With the emerging Fifth Generation (5G) and therefore gaining heterogeneous and complex networks as well as challenging requirements of new use cases, will increase this number further. The network function virtualization (NFV) and software-defined network (SDN) principles of the future core networks allow more flexibility but also enable the option to automate many of that maintenance and management tasks with the help of artificial intelligence (AI).

The EU H2020 SELFNET project is addressing these challenges and developing a self-organized 5G network management framework through virtualized and software-defined networks to support these new technologies. Since this reduce manual interventions by network engineers it is significantly reducing operational costs while at the same time improving the user experience. You can see the following demos at our booth:

Cybersecurity Techniques – The Self-Protection Use-Case

Trust Node – Hardware accelerated Self-Optimization Use-Case

Autonomous VNF fault mitigation – The Self-Healing Use-Case

SELFNET GUI – Your Network Status at a Glance

SDN / NFV – Application Management

AI in 5G – Zero Touch Network in the Self-Healing Context

Booth #18

5GinFIRE

5GinFire testbed by bcom

Because 5G is not only a New Radio interface, how can a project pave the way from current 4G architecture to a 5G-oriented experimental playground? This is the main target of 5GinFire H2020 project and the partners have addressed this challenge during the first of half of the project. Based on cloud infrastructures provided by various partners, 5GinFire built a platform which is compliant with ETSI NFV reference model and relies on carrier grade solution on top of OpenStack (https://www.openstack.org) as a Virtual Infrastructure Manager and on release TWO of Open Source MANO (https://osm.etsi.org) as a VNFs orchestrator.

The main objective is to showcase the capacity of the 5GinFIRE testbed with the ability to deploy a complex Network Service (NS) with Open Source MANO. For this demonstration, the NS is the Unifier Gateway, a VNF developed by b<>com, which provides a multi-access IP connectivity with various radio access technologies (LTE, WiFi, LoRa). It includes 4G core network functions like MME and HSS but already takes benefit from an SDN framework to introduce pre-5G concepts like CUPS (Control and User Plane Separation). It interconnects with legacy WiFi access points and 4G LTE eNodeB. The key point of such an integration in Open Source MANO is the time-to-deploy, with the target to deploy a full core network within a few minutes.

Booth #19

5G-MoNArch

The focus of the 5G-MoNArch project is on developing a flexible, adaptive, and programmable mobile network architecture for 5G, and to bring these concepts to practical implementation. The basic architecture concepts such as network slicing and user-/control-plane separation are completed and enhanced with a number of vertical use case-driven innovations, e.g., a cloud-enabled network protocol stack, inter-slice control and management, resource-elastic network functions and resilient and secure network functions. These innovations support the requirements of two use cases, which are worked out, namely, network slicing for industrial resilient and secure applications, and network slicing for resource elastic media & entertainment use cases.

5G-MoNArch implements these two use cases into dedicated real-world testbeds: The Hamburg Smart Sea Port representing industrial applications, and the Turin Touristic City representing media & entertainment use cases. The demonstrator, posters and video material presented at the exhibition provide an insight to the ongoing research work of 5G-MoNArch, and intermediate results from the project's requirements and development phases. This material shall leverage discussions with visitors from industry and academia, showcase the advances of the underlying technical concepts, and enable to gather further feedback on the project's work an approach.

Booth #20

5GTANGO

5Gtango – 5G Development ˝and Validation Platform for Global Industry-Specific Network Services and APPs

5GTANGO puts forth the flexible programmability of 5G networks with i) a NFV-enabled Service Development Kit (SDK), ii) a validation and verification platform with advanced validation and verification mechanisms for VNFs/Network Services qualification (including 3rd party contributions), and iii) a modular Service Platform with an innovative orchestrator in order to bridge the gap between business needs and network operational management systems. The combination of the proposed SDK toolkit, validation and verification platform and the service platform realises an extended multi-modal NFV DevOps model between service developers, telecom operators and vertical industries, increasing operational efficiency, facilitating the implementation and validation of new services and accelerating the adoption of NFV technologies.

The demo will cover the three phases for the development, validation & verification and deployment of an Industry-specific virtualized application. An example of VNF will be used in order to demonstrate the presented 5GTANGO release 1. First, using the SDK it will be packaged as VNF. Later, V&V Platform will be used to verify and validate the packaged VNF. Finally, Service Platform will deploy a network service using the validated and verified VN.

Booth #21

MATILDA

MATILDA – Orchestrating 5G Ready Emergency Services

The vision of MATILDA is to design and implement a holistic 5G end-to-end services operational framework tackling the lifecycle of design, development and orchestration of 5G-ready applications and 5G network services over programmable infrastructure, following a unified programmability model and a set of control abstractions. It aims to devise and realize a radical shift in the development of software for 5G-ready applications as well as virtual and physical network functions and network services, through the adoption of a unified programmability model, the definition of proper abstractions and the creation of an open development environment that may be used by application as well as network functions developers. Intelligent and unified orchestration mechanisms will be applied for the automated placement of the 5G-ready applications and the creation and maintenance of the required network slices.

The objective of the demonstration is to showcase the first release of the MATILDA orchestrator capabilities based on 5G Ready Emergency Services Use Case demonstration.

Booth #22

INTERNET INSTITUTE

INTERNET INSTITUTE Ltd. (ININ) is an innovation intensive SME, specialized in QoS and QoE measurement solutions, quality assurance systems and services, and emergency response and intervention management tools for public safety needs. We have expertise in 5G performance and quality metrics development and validation, 5G benchmarking and end-to-end KPIs validation, and quality monitoring and SLA assurance for orchestrated 5G infrastructures and services. Also, we are experienced in design and deployment of reliable and resilient 5G infrastructures for public safety needs.

We will showcase two products at our booth at EuCNC 2018. ININ addresses telco, corporate and vertical industrial sectors with our qMON (quality MONitoring) portfolio for quality monitoring and SLA assurance, benchmarking and end-to-end validation of communication infrastructures and services. In addition, with iMON (Intervention MONitoring) portfolio, we specialise in design, development and integration of on-site and backhaul critical communications solutions and intervention monitoring tools and apps for the public safety sector. We cooperate tightly with PPDR (Public Protection and Disaster Relief) practitioners and we are involved in several R&D and piloting projects addressing the delivery of future proof communication systems, services and apps for 112 and emergency response needs.

ININ is active in R&I and industrial projects domain and is part of the 5G PPP Phase 2 program (project MATILDA, www.mati lda-5g.eu). We work on monitoring and QoS and QoE evidence collection capabilities in the 5G-orchestrator solution. Also, we are involved in

planning and implementation of 5G vertical use cases for the emergency response domain, including piloting in realistic environments in joint cooperation with PPDR practitioners. Our particular interests for upcoming 5G research are: quality assurance of mobile, fixed and cloud systems, including 5G performance and quality metrics development and validation, 5G testing, benchmarking and 5G end-to-end KPIs validation; quality monitoring and SLA assurance for 5G infrastructures and services; and R&I and piloting of resilient real-time 5G critical infrastructures, and specialised 5G deployments for public safety, automotive and intelligent transport, and smart grid verticals.

Booth #23

5G PPP SMEs

5G PPP SMEs – SMEs Expertise and Innovation in the 5G Domain

European Small and Medium-sized Enterprises (SMEs) provide great added value in developing innovative concepts and solutions that are key to boost the establishment of 5G technologies and their adoption across several vertical industries. SMEs have the agility and flexibility required in a fast evolving technical and market landscape. They increasingly collaborate with large industrial companies and research organisations to develop disruptive technologies for the global market, playing an important role in piloting and deploying 5G technologies. Visit the 5G PPP booth to meet selected SMEs presenting their latest 5G achievements.

Internet Institute, based on the advanced BI tools the demonstration, will show in a graphical way the status of the mobile network and state of running services.

Martel Innovate will present a demo showcasing the Orchestra Cities platform, developed in collaboration with two other SMEs (Ubiwhere and Therapaenis).

Montimage will present a demonstration of monitoring of performance and detection of security breaches in SDN/NFV environment.

Nextworks will present a preliminary demonstration of a service driven Network Slicing Management component for 5G Mobile Transport and Computing Platforms, with instantiation of ultra-high definition media distribution functions over virtual CDNs.

Trust-IT Services will show a video of 5G verticals within the 5G PPP, market potential and standardization, illustrating how SMEs and other EU companies are contributing to the transition to 5G with high potential impacts for the EU Digital Single Market.

Ubiwhere will present a demo showcasing the important role of an open access model, or neutral host, is in the upcoming 5G era.

Visiona will present the preliminary developments of two virtual functions for media processing and drone flight control (vMPA and vDFC) being developed as part of Use Case 2 Preventive Maintenance of Critical Infrastructures within NRG-5 project.

WINGS-ICT Solutions will be distributing flyers and promotional materials presenting their latest innovative solutions.

Learn more about these SMEs online!

Booth #24

5G PPP – The 5G Public Private Partnership

The 5G Public Private Partnership (5G PPP) has been initiated by the EU Commission and industry manufacturers, telecommunications operators, service providers, SMEs and researchers. The 5G PPP will deliver solutions, architectures, technologies and standards for the ubiquitous next generation communication infrastructures of the coming decade.

The objective of the exhibition booth is to increase the visibility of 5G PPP among everyone working on 5G. It will provide overview information on the PPP overall as well as summary information of individual projects in current Phase 2. This will help visitors to find out what projects are working on and how to get in touch with them.

Booth #25

SaT5G

SaT5G – Satellite and Terrestrial Network for 5G: Demonstration of Satellite Integration Towards 5G

SaT5G is a European Commission H2020 5G PPP Phase 2 funded project, whose vision is to develop a cost effective "plug-and-play" satcom solution for 5G to enable telcos and network vendors to accelerate 5G deployment across all geographies and multiple use cases. Among other objectives, the SaT5G project aims to demonstrate selected key 5G features and use cases across three main EU testbeds, currently under development, two of which involving geostationary (GEO) and nongeostationary (MEO) in-orbit satellites.

Building upon the currently ongoing work and intermediate results available within the SaT5G project, this demo aims to progress the State-of-the-Art and demonstrate over-the-air selected 5G features and use cases for satellite network integration using an existing in-orbit geostationary satellite system. In particular, the objectives of the demo are:

To demonstrate over-the-air the 3GPP core network integration of satellite networks using an SDN/NFV/MEC-enabled pre-5G construction testbed currently under development with an in-orbit geostationary satellite system;

To demonstrate key satellite backhauling features for 5G networks;

To showcase 5G use cases towards efficient edge delivery of multimedia content based on content caching and CDN integration enablers;

To exercise the intermediate testbed demo setup, incorporate feedback and lessons learnt and, thus pave the way forward for the upgrade of the testbed towards the next planned SaT5G over-the-air demonstrations, as well as identify the subsequent SaT5G standardization activities to be undertaken with respect to 3GPP and ETSI;

To showcase key benefits of satellite integration into the 5G network of networks, through an innovative live over-the-air demonstration and in front of a wide audience, mainly comprising of terrestrial stakeholders.

Booth #26

SLICENET

RAN Runtime Slicing System

The proposed demo has the three main objectives highlighting several important aspects of network slicing developed in the context of SliceNET project, including

Showing how the network slicing runtime system enables the dynamic creation of slices with QoS support, while providing functional and resource isolation among different slices (e.g. verticals).

Characterizing the efficiency and flexibility of the proposed RAN runtime to partition and allocate radio resources among different slices based on the service QoS and the corresponding SLAs.

Demonstrating a novel plug & play RAN execution environment provided to chain network control applications so as to customize and control RAN slices as per service requirements.

The considered demos has applications in multiple use-case considered in the SliceNet project such as e-Health belonging to the uRLLC slice type, where QoS is of paramount importance to support time-critical video transmission between the on-the-spot paramedic and doctors in the hospital and in the vicinity of the incident.

Booth #27

5G PPP IoRL

Early results supporting improved indoor 5G service delivery through the integration of visible light communication (VLC) with mmWave remote radio heads

The 5G PPP Internet of Radio Light (IoRL) project strives to improve indoor 5G connectivity and service delivery by integrating visible light communication and mmWave Remote Radio Heads. The conceived framework offers significant improvement concerning several 5G KPIs in indoor environments, whilst minimizing interference, power consumption and EM exposure and providing location accuracy of less than 10 cm.

The objective of the exhibition is to showcase some early results from the IoRL project, demonstrating the potential of the technical solution. The preliminary results of the integration of 5G New Radio access point with 5G UE will be presented. The exhibition should serve also as a meeting point where IoRL partners can discuss with the other 5G PPP projects how IoRL technology can be combined with their solutions to reach the 5G PPP performance objectives.

Booth #28

FUTEBOL

FUTEBOL – Federated Union of Telecommunications Research Facilities for an EU-Brazil Open Laboratory

The FUTEBOL project is an H2020 project with the target of building a multi-institutional federated laboratory across Europe and Brazil. The experimental facilities of the FUTEBOL project are open-access to the researchers and students worldwide. The demonstrations we are showing in this booth are the latest experiments running on the FUTEBOL federated testbeds. Through the demonstrations we target to disseminate the testbeds of the FUTEBOL project and the innovative experiments running on these testbeds, with the coverage of these following research areas:

Wireless and optical network convergence for Cloud-RAN

Licensed shared access for extending LTE capacity

by multiple FUTEBOL partners (Trinity College Dublin, imec, VTT, IT).

Booth #29

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Booth #30

EuCNC 2019 VALENCIA

EuCNC 2019 is the 28th edition of a successful series of a conference in telecommunications, hosted in Valencia, Spain. EuCNC 2019 will be co-located with the Global 5G Event, which brings together the world 5G industrial associations: 5G-IA, IMT-2020, 5G-Forum, 5GMF, 5G-Brasil and 5G-Americas.

Booth #31

JOŽEF STEFAN INSTITUTE

The Department of Communication Systems at Jožef Stefan Institute, a local co-host of the EuCNC 2018, has a long tradition of participating to international collaborative research in the domains of wireless and mobile communications, parallel computing, and sensor networks. Currently it is contributing to five H2020 projects (eWINE, Fed4FIRE+, DEFENDER, NRG-5 and SAAM), covering different aspects from basic and applied research to prototyping, piloting and testbed experimentation. Some of the recent achievements demonstrated at the booth include.

Wireless research testbed supported Continious Integration for LoRa firmware development (DEMO 1): Demonstration of the Continuous Integration (CI) framework implemented in the LOG-a-TEC testbed on an example of LoRa firmware development. Built from a set of open source tools and a social coding platform, the framework is showcasing how multiple developers, simultaneously working on the same code-base, can use automated testing on a real testbed to discover the integration problems and fix them early in the development process.

Automatic detection of wireless spectrum events from streaming spectrum sensing data (DEMO 2): Demonstration of a scalable, technology agnostic system that is able to automatically detect wireless spectrum events from streaming spectrum sensing data. Without any prior training, it enables the consumption of the events as they are produced, as a statistical report or on a per-query basis. The system delivers actionable information to humans and machines and enables better spectrum and network resource management as well as QoS provisioning.

UWB-based indoor localization (DEMO 3): Demonstration of a ultrawideband (UWB) indoor localization application based on measured ranges (time of flight) between tracked nodes and fixed reference anchor nodes. The application uses non-line of sight (NLoS) classification model and ranging error estimation model for localization error mitigation, both based on convolutional neural networks (CNNs).

Demonstration of continuous power quality assessment in a data center (DEMO 4): Demonstration of the continuous power quality assessment system deployed at a data center and aimed at designing automation strategies for downtime reduction, efficiency improvement, and coordination with the power grid. Such systems are increasingly important in data centres due to their large power

consumption, mission critical operation and a significant share of non-linear loads with impact on the degradation of power quality and energy efficiency.

Phasor measurement units as a showcase for 5G in smart grids (DEMO 5): Demonstration of electricity distribution grid real time monitoring using Phasor Measurement Units (PMU). Huge amount of phasor measurements (50 samples of magnitude and phase per second) that need to be transferred securely and in real time are the key input to the distribution system state estimation (DSSE) or other advanced smart grid monitoring/management applications, representing one of important application areas for 5G technologies.

Personal ECG monitoring device (DEMO 6): Demonstration based on a medical-grade wireless ECG body sensor of small dimensions, flexible design and seven-day power autonomy, designed at JSI and commercialized by SAVING under the trademark Savvy. The ECG body sensor supports real-time monitoring of the heart rhythm via personal smart device, representing a healthcare 5G vertical application example requiring high throughput per device and in certain environments, such as hospitals, rehabilitation centers and elderly homes, very high density of such devices. The demonstration will also show the possible use of the sensor for collecting contextual information about the user.

Booth #32

UNIVERSITY OF LJUBLJANA

The Laboratory for Telecommunications (LTFE) and the Laboratory for Multimedia (LMMFE) are based at the Faculty of Electrical Engineering, University of Ljubljana. With more than 40 associates, top experts from various professional fields and industrial partners, they are one of the leading pioneering research groups. The laboratories strive to establish a creative environment for the students, partners and employees by successfully harmonizing ICT research, pedagogical and project work. By pursuing knowledge of the highest degree, hands-on experience and business excellence they pave the way to new ideas, solutions and results. With more than 60 years of experience and tradition they can take up any challenge in contemporary and future fields of telecommunications and ICT.

Propulsive research teams are developing and implementing research projects in various fields, and apply the insights to different sectors of the economy. LTFE and LMMFE are highly committed to the research, development, pilot integration and trials of technologies and system solutions, examples of which will be demonstrated at EuCNC 2018, as follows.

NEXt Generation Emergency Services (DEMO 1): In NEXES were developed the research and development of next generation emergency services that integrate IP-based communication technologies and interoperability. NEXES delivers innovation to 112 services across Europe, enabling the use of total conversation capabilities in emergencies, the exploitation of improved location information and the advantage of Internet-enabled connectivity.

Electrical switch wih Ethereum blockchain support (DEMO 2): SWEATHER is based on end-to-end prototype system comprised of IoT devices decentralized applications (DAPPs) and user interfaces. It is a practical application of blockchain technologies in IoT devices. It enables control of electric switch via Ethereum blockchain transactions. The user can book electric charging slot and pay for consumed time/energy via Ethereum network.

A Sports Application in the World of Upgraded Reality (DEMO 3): Within the project we developed a solution that will allow the user to monitor sports transfers with additional information in the world of upgraded reality. The application runs on the Microsoft HoloLens header display and displays real-time statistics for various sports statistics and provides simple betting related to the various events in the game. The main focus of development is on providing superior user experience and ease of use.

Rehabilitation of Precise Movements of the Upper Limbs in the Virtual Reality Environment (DEMO 4): We developed a system for the rehabilitation of precise movements of the upper limbs in the virtual reality environment. The game was developed in close cooperation with the University Rehabilitation Institute Soča, where the solution is tested and used. The game has several difficulty levels and allows you to track the movements of the user in the rehabilitation process. The solution works by using Oculus Rift's virtual glasses and the Leap Motion sensor, which serves to track the movements of the upper limbs of the user.

Digitally enabled learning and knowledge sharing for enterprises (DEMO 5): E-CHo is a system that helps companies, banks, educational organizations to introduce advanced technology solutions for e-learning and multimedia learning, thus enabling: lower training expenses, use learning to increase business performance, streamline the exchange of key knowledge among employees, effectively established certification of staff or partners, systematically transfer knowledge into multimedia content and train a large number of employees in a very short time.

Opto-electronic oscillator (DEMO 6): An opto-electronic oscillator presents a prectical application for the next generation of 5G mobile and wireless networks based on millimeter-wave technology. The application of a single-loop, opto-electronic oscillator is designed for 39 GHz and will be implemented in the central-station of an upcoming 5G mobile and wireless network. The aim of this configuration is to decrease the complexity of the base-stations for a next-generation system and provide an economic advantage for upcoming 5G networks. The system is designed to avoid the power penalty due to the chromatic dispersion, is temperature stabilized to have a long-term stability and has a low sidemodes effect to ensure a low phase noise.

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7th #Global5GEvent: 2019 June 17th-18th#EuCNC2019: 2019 June 18th-21th

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