Workshop on Design, Deployment and Testing of Internet of Things Technologies (DDT-IoT)

Side event of the BalkanCom 2018 conference

June 8th, 2018
Faculty of Electrical Engineering, University of Montenegro
Room "Svečana sala, Dekanat"

Final Agenda

Time	Speaker	Affiliation	Topic
09:00-09:15	Mališa Vučinić	University of Montenegro	Opening and a round table
09:15-09:45	Ian F. Akyildiz	Georgia Institute of Technology	Internet of Space Things
	The Internet of Things (IoT) for terrestrial deployments is a major part of next generation 5G wireless systems. However, there are many use cases such as monitoring of remote areas, Internet provisioning to underserved or disrupted regions, or intelligent global transport management, which require a more global, scalable, flexible and resilient solution. In this paper, the Internet of Space Things (IoST), a cyber physical system spanning ground, air and space, is introduced. The IoST is enabled by and builds upon two new technologies. On the one hand, next generation CubeSat technology with multi-band (microwave, millimeter wave, and Terahertz band) communication is proposed as a way to cope with the information and user capacities of the IoST. On the other hand, the use of Software-defined Networking (SDN) and Network Function Virtualization (NFV) provides fine-grained control over the system hardware, improves network resource utilization and simplifies network management. Key parameters in the satellite constellation design, including the number of CubeSats and orbital planes and coverage footprint, are investigated to explore the feasibility of deployment at different altitudes in the exosphere orbit (500 km and above). To this end, IoST is the ultimate cyber-physical system, with much broader application and service domains than traditional IoTs.		
09:45-10:15	Enrico Natalizio	Université de Technologie de Compiègne	5G and UAVs: Synergies to Exploit for an Internet of Intelligent Things
	Cellular-connected UAVs and UAV-assisted 5G communications are the two main research and development directions individuated for UAVs usage in 5G. Cellular-connected UAVs, supported by recent standardization efforts for Long Term Evolution (LTE) systems, considers the UAVs as aerial users of the mobile network, whereas UAV-assisted 5G communications involves the usage of UAVs as a part of the infrastructure to improve the performance of the cellular system. However, the 5G communication paradigm proposes a new way of defining services, based on network functions virtualization and network slicing. Through these mechanisms, 5G consortia envisage the integration of million devices, towards a Massive Internet of Things.		
10:15-10:45	Xavier Vilajosana	Worldsensing	Applications of a Wireless Monitoring System in Critical Infrastructures
	The talk will present a wireless monitoring systems for critical infrastructures. The system is today deployed in 6 continents and is used to control critical assets in the mining, electricity generation and rail infrastructures. Through the talk we will visit some of the use cases and success stories in order to extract requirements for the new generation of wireless technologies.		
10:45-11:00	Coffee break		

Time	Speaker	Affiliation	Title
11:00-11:30	Thomas Watteyne	Inria/Analog Devices	IPv6 over the TSCH mode of IEEE 802.15.4e: Overview of Standardization, Tooling, Open-Source Initiatives and Commercial Products
	Internet of Things (IoT) technology, and in particular its industrial flavor -- 6TiSCH -- is progressing at an incredible pace. It is now possible to instrument a factory floor with hundreds of low-power mesh devices which offer over 99.999% end-to-end reliability, over a decade of battery lifetime, certified security and network-wide synchronization to the us. These networks are going through tremendous developments, and presenting this ecosystem is the first objective of my presentation. This includes standardization, tooling, open-source initiatives and commercial products. Research is being conducted on determinism (guaranteeing latency), size (the "smart dust" project), agility (using multiple radios at the same time) and ranging/localization. My second objective is to show you that these network, although they are an active research topic, are also readily available as building blocks for end-to-end systems and applications, for example through Analog Devices' SmartMesh product lines.		
11:30-12:00	Simon Duquennoy	RISE-SICS	Building Dependable and Future-Proof Low-power IPv6 Networks
	Low-power Internet-enabled devices are a key component of tomorrow's Internet of Things (IoT). This seminar has two distinct parts, both in the context of standard-based IoT systems. First, we present our work on achieving 99.999% delivery in low-power IPv6 routing. We pinpoint the cause of every single packet loss, and propose mitigation strategies that decreases the loss rates by 2-3 orders of magnitude in large-scale experiments (evaluated in five testbeds, up to 350 nodes). In the second part, we present our work on a multi-radio access technology IoT gateway in a 5G context (H2020 5G-CORAL). We present a future-proof architecture, where access points are technology-agnostic and most of the processing is offloaded to the edge. We will also share the latest developments and roadmap of Contiki-NG, the OS for next-generation IoT devices.		
12:00-12:30	Brecht Vermeulen	Ghent University	Automated IoT interop testing using federated testbeds and the F-interop framework
	In this talk, we will demonstrate how the use of testbeds with IoT devices can help in automated interop and conformance testing. For this, we use the software development toolkit and test suites of the F-interop project (www.f-interop.eu, on remote interop and conformance testing) and deploy it fully automatically on testbed resources to do automated nightly interop and conformance testing. For the testbeds, Fed4FIRE (www.fed4fire.eu) tools and testbed resources are used.		
12:30-13:00	Gordana Gardašević	University of Banja Luka	Experimental Characterization of Joint Scheduling and Routing Algorithm over 6TiSCH
	The Internet of Things (IoT) interconnection of a wide variety of devices of any size, at any distance, and providing performances similar like those in wired deterministic networks, posed a strict requirements in terms of data transmission reliability, energy efficiency, throughput, and delay bounds. The concept of deterministic wireless networking assumes precise clock synchronization and flow scheduling, optimized bandwidth usage, and advanced Quality of Service (QoS) guarantees both for data and control traffic. In order to support these requirements in industrial IoT networks and to involve broad research community in standardization activities, open-software and open-hardware prototyping and development has become of crucial interest. The 6TiSCH (IPv6 over the TSCH mode of IEEE 802.15.4e) mechanisms are of a particular importance for the further adoption of IPv6 in industrial standards. This presentation provides the overview of research activities dealing with the definition of novel joint scheduling and routing algorithms for centralised IoT networks, based on OpenMote hardware and OpenWSN software platform		
13:00-14:00	**Lunch break**		
14:00-14:30	Bernard Tourancheau	Université Grenoble Alpes	Wireless Cellular Long-Range Technologies for IoT
	The IoT networking is seeking for a wireless infrastructure. This talk presents the LoRa technology based on spread spectrum modulation techniques among others. This technology is a very popular candidate for IoT applications because it seems to propose a good solution from the coverage and energy budget points of view for an acceptable market price. However the throughput, quality of service, overall capacity and network bandwidth management are still subject of improvement and active research areas.		
14:30-14:50	Elma Hot		Be(e) with IoT
	BeeAnd.me aims to help beekeepers overcome the traditional challenges of beekeeping, by providing beekeepers with technological assistance. Our smart monitoring system is made for beehives. We are collecting data on our cloud and we are analyzing it. Thanks to our data analytics, beekeepers can be alarmed on time if something is happening with their bees. We want to understand bees by using data mining and machine learning algorithms on collected data. With this, we can help increase number of bees, one of the endangered species.		

Time	Speaker	Affiliation	Title
14:50-15:20	Keoma Brun-Laguna	Inria	SolSystem: A Turn-Key Solution for Real-World IoT
	In 2013, 85% of the peach production in the Mendoza region (Argentina) was lost because of frost. Because less fruit was produced in the region, 600.000 less work days were needed to process the harvest between November 2013 and March 2014, a reduction in workforce of 10.600 people. Across the Mendoza region, frost has caused a loss of revenue of roughly 100 million USD in the peach business alone. We present SolSystem (http://solsystem.io), our monitoring solution that is currently deployed in Argentina to predict frost in peach orchards (http://savethepeaches.com). This solution is also used in other applications, including smart marinas in France (http://smartmarina.io), and snowpack monitoring in California (http://snowhow.io). We compare the deployments and show how it delivers high reliability in various real-world environments.		
15:20-15:40	Božidar Škrbić	University of Montenegro	LiveGate: a New IoT Web Solution
	The talk will give a brief presentation of LiveGate, an Internet of Things platform developed within BIO-ICT project at University of Montenegro, that aims to simplify the development of IoT applications and services and their operation by providing a set of out of the box software modules that are typically needed for their realisation. Through the presentation we will take a look at LiveGate's architecture, technologies used for the platform's creation, and possible use cases and future improvements.		
15:40-16:00	**Coffee break**		
16:00-16:20	Jonathan Muñoz	Inria	Benefits of Implementing IEEE802.15.4g in Wireless Sensor Networks
	The "g" amendment to the IEEE802.15.4 standard defines three new physical layers (PHYs): SUN-O-QPSK, SUN-FSK and SUN-OFDM . Each of these is capable of transmitting a complete data packet at variable data rates, and has the possibility of being used in the sub-GHz and the 2.4 GHz bands. They offer radio links where the widely used 250-kbps O-QPSK PHY cannot be used. In this talk, we will see how this technology can be compared to what is used today for smart building applications. In addition, we provide some ranging results and see how this can enable more efficient WSN deployments.		
16:20-16:40	Tengfei Chang Fabian Rincon	Inria	OpenTestbed: an OpenWSN/OpenMote Testbed for F-Interop
	OpenWSN (www.openwsn.org) is an Open Source Implementation of 6TiSCH Standard protocol stack. It is the reference implementation of 6TiSCH Interoperability events. OpenMote is an advanced IoT device for Low Power Wireless Sensor network deployment. The Open Source testbed (Opentestbed) is a testbed with OpenMote-B, the latest OpenMote devices, running the OpenWSN implementation. The testbed involves multiple functionalities to manage the testbed such as source code uploading, network status information gathering and mote control like reset, flash etc. With the OpenMote-B and OpenWSN, OpenTestbed serves as a tool for benchmarking the 6TiSCH protocol stack.		
16:40-17:00	Yasuyuki Tanaka	Inria	The 6TiSCH Simulator
	In this talk, we will present the de-facto standard 6TiSCH simulator tool (https://bitbucket.org/6tisch/simulator/src/master/), that enables you to simulate 6TiSCH networks and estimate their performance in a flexible manner. It is written purely in Python and implements the core protocols of 6TiSCH such as IEEE 802.15.4e (TSCH), 6top Protocol, and RPL. We will give an overview of the simulator as well as the hot features which have been introduced recently.		
17:00-17:20	Radomir Klazca	Sorbonne Université	Continuous Development, Integration and Testing in Research Projects on European Federated Testbeds
	I will present F-Interop online platform that enables users with performance, conformance and interoperability testing for different protocols (CoAP, 6Tish) for variety of IoT devices. I will also tell about CI/CD approach that we have chosen for project software development.		
17:20-17:40	Felipe Moran	ENSTA	Synchronizing Things Using SmartMesh IP
	What if TSCH networks were used not only for data transmission? A requirement for a working low-power TSCH networks is a synchronization as tight as possible between modules of the network and this synchronization can be exploited by elements external to the network. This talk will present some of the details of this implementation and results comparing industry accepted time sources such as GPS to using TSCH as a source.		