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GUEST EDITORIAL

Special Issue on the Internet of Things (ISCC 2020)

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This Special Issue comes really timely for relevant research communities, and provides a valuable contribution in the emerging field of Internet of Things (IoT). After a thorough review process, 10 papers, covering diverse topics in the IoT research area, have ultimately been selected (invited) from IEEE Symposium on Computers and Communications (ISCC) 2020 edition in this special issue. All articles were reviewed by at least two independent referees. The articles were evaluated for their rigor and quality, and also for their relevance to the theme of our Special Issue. We eventually received 6 articles for publication, some of which after multiple revisions. Considering that we selected the papers based on their scientific quality and the strength of their contributions, we are delighted to present a consistent special issue, covering a large set of problems in the Internet of Things.

The article "*Thorough Performance Evaluation & Analysis of the 6TiSCH Minimal Scheduling Function (MSF)*", focuses on the distributed resource allocation issues of the 6TiSCH architecture. The 6TiSCH architecture bases itself on IEEE Std 802.15.4–2015 Time Slotted Channel Hopping (TSCH) Medium Access Control (MAC) protocol to enable high reliability communication in Wireless Sensor Networks (WSNs). In particular, it manages the construction of a distributed communication schedule that continuously adapts to changes in the network. This article provides a thorough description of the 6TiSCH architecture, the 6TiSCH Operation Sublayer (6top), and the Minimal Scheduling Function (MSF). It then investigates its behavior and reactivity from low to high traffic rates by employing the Python-based 6TiSCH simulator.

Using the same set of standards but this time specifically for a target application, the article "*IoT Network Management within the Electric Vehicle Battery Management System*", tackles the Battery Management System (BMS) of an Electric Vehicle (EV). BMS is a system designed to ensure safe operation of the battery pack, and report its state to other systems. It is a distributed system, and the communication between its sub-modules is performed through wired buses. This article studies the opportunity to use a wireless technology named IEEE Std 802.15.4 Time Slotted Channel Hopping, a standardized protocol for low power and lossy networks, instead of wired technology for the battery management system.

The article "*Towards Reliable IEEE 802.15.4 g SUN with Re-transmission Shaping and Adaptive Modulation Selection*" focuses on the reliability performance of the IEEE 802.15.4 g Smart Utility Networks (SUN) technology. This article proposes and evaluates two mechanisms aimed at improving the communication reliability of IEEE 802.15.4 g SUN in industrial scenarios: Re-Transmission Shaping (RTS), which uses acknowledgements to track channel conditions and dynamically adapt the number of retransmissions per packet, and Adaptive Modulation Selection (AMS), which makes use of reinforcement learning based on Multi-Armed Bandits (MAB) to choose the modulation that provides the best reliability for each packet re-transmission.

The article "*A Constrained Monitoring Protocol for the Internet of Things*", deals with Simple Network Management Protocol (SNMP). Network monitoring has been traditionally conducted using SNMP: a network monitoring protocol that allows network administrators to keep track of every node in the network and ensure that it behaves correctly. This article presents the Constrained Monitored Protocol (CoMP): a lightweight resource-efficient alternative to SNMP that targets the low-end devices of the Internet of Things (IoT). Moreover, it proposes a cross-protocol CoMP-SNMP proxy that operates at the border router of the resource-constrained network and enables the efficient monitoring of resource-constrained IoT devices using CoMP from existing SNMP-based network monitoring infrastructures.

Finally, two articles deal with LoRaWAN, Long Range Wide Area Network (LoRaWAN) technology. LoRaWAN allows connecting devices that require long-range and

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low-cost communication services. These technologies are aimed for IoT applications such as smart meters that can tolerate long transmission delays and only need a narrow band to periodically transmit a small amount of data. In this context, the adoption of this technology brings new challenges due to the densification of IoT devices, which causes signal interference and affects the QoS directly. On the other hand, the LoRaWAN transmission configurations' flexibility allows higher management to use end-device parameters, allowing better resource utilization and improved network scalability. The article "*Evaluation of an Adaptive Resource Allocation for LoRaWAN*" evaluates an adaptive solution that defines the best LoRaWAN parameter settings to reduce the channel utilization and, consequently, maximize the number of packets delivered, while the article "*Comparing the Performance of NB-IoT, LTE Cat-M1, Sigfox, and LoRa for IoT End Devices Moving at High Speeds in the Air*" explores the performances of LoRaWAN technologies. This article reports and compares the performances of these technologies in high-speed mobile conditions in the air.

Georgios Z. Papadopoulos (No photo) received the MS. (MIEEE) serves as an Associate Professor at the IMT Atlantique in Rennes, France. Previously, he was a Postdoctoral Researcher at the University of Bristol, while he received his Ph.D. from University of Strasbourg, in 2015 with honors. Dr. Papadopoulos has participated in numerous international and national R&D projects, and has received several grants for young researchers, including the prestigious French national grant ANR JCJC in 2017. He has been involved in the organization and program committee of many international events, such as IEEE GLOBECOM'21, IEEE ISCC'20, IEEE DIPI'19, IEEE CSCN'18. Moreover, he has been serving as Associate Editor for Wireless Networks journal and Internet Technology Letters (ITL) since 2018, and for Transactions on Emerging Telecommunications Technologies (ETT) since 2020. He is author of more than 70 peer-reviewed publications in the area of computer communications, networks, and cybersecurity. Moreover, he actively participates at the IETF standards organization with multiple drafts in the ROLL, DetNet, 6lo, and RAW Working Groups. His research interests include Industrial IoT, 6TiSCH, LoRa & LPWAN, Battery Management System, Smart Grid, Cybersecurity. Dr. Papadopoulos has received the Best Ph.D. Thesis Award granted by the University of Strasbourg, and he was a recipient of two Best Paper Awards (IFIP Med-Hoc-Net'14 and IEEE SENSORS'14).

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