Editorial

Recent Advances in Smart Communication Protocols and Algorithms

Jaime Lloret[*]

Universidad Politécnica de Valencia, Spain

Abstract: This Special Issue includes selected papers from the third International Workshop on Smart Communication Protocols & Algorithms (SCPA 2013), that took place in Budapest, Hungary, in June 9, 2013. This Workshop was organized in conjunction with the IEEE International Conference on Communications. This paper explains the work included in the best 6 papers of the workshop.

Keywords: Smart Algorithms, Smart Protocols.

1. INTRODUCTION

The use of any one or several intelligent methods and techniques (such as machine learning techniques, decision making techniques, knowledge representation, network management, network optimization, problem solution techniques, etc.) in communication protocols and algorithms has lead to appearance of Smart communication protocols and algorithms. They allow an intelligent communication between network devices and smart data transfer between them. Intelligent methods and techniques allow dynamic planning, adapting, and taking decisions based on their perception of the network conditions, or the user behavior, in order to take the appropriate actions and learn from the consequences of their actions.

Intelligent algorithms are able to use the information gathered from the protocol to perceive the behavior of an activity in a location, plan actions according to the input data, take into account of what is happening in the environment, and take the appropriate decisions using an intelligent reasoning engine. Smart protocols and algorithms let a system achieve goals such as decide which scenario is the best based on a specific purpose, or perform an environment prediction. Moreover, they could improve future decisions by learning from the past.

In order to have a smart system, the intelligent can be included in the packet [1] or in the network [2] or in the end nodes [3]. Moreover algorithm, the information to be used in the intelligent algorithms can be obtained from the environment [4, 5], or from the network behavior [6, 7].

Following the same procedure as in SCPA 2011 [8] and SCPA 2012 [9], in this special issue we have elected the best papers of the workshop in order to let the authors extend their work.

The six papers selected for this special issue present a communication protocol and/or algorithm, furnishing impor-

tant contributions to the state of the art and offering, at the same time, an important updated overview about emerging communication technologies for Smart Communication Protocols and Algorithms. They are completely fit for the purpose of the journal "Recent Advances in Communications and Networking Technology" providing the most updated research on new advances in communications and networking technology.

It is our belief that this special issue will help the readers to better understand and know the new advances in Smart Communication Protocols and Algorithms. Last, we would like to thank the authors for submitting their papers in this special Issue and for their hard work performed to leverage the quality of this publication. We would also like to thank the reviewers for their timely useful reviews and for their constructive comments. Finally, we wish to express our thanks to Joel Rodrigues, Editor-in-Chief of the Journal Recent Advances in Communications and Networking Technology, for his help and cooperation in this publication.

2. SELECTED PAPERS

This section provides the explanation of all accepted papers for this special issue.

In [10], H. Fonseca *et al.* propose a real time tracking system for Wi-Fi networks based on trilateration. The system uses RSSI values in passive mode, which are returned by the different wireless network interface cards. It does not send any specific data to the positioning system server application, which implies having no relationship between the positioning system and the device whose position is being estimated. Moreover, it is easy to deploy and cheap. Authors evaluated the accuracy of the system in different scenarios obtaining good precision level.

Ramon Sanchez-Iborra *et al.* use in [11] two statistical propagation models to evaluate the performance of a VoIP wireless transmission system under different fading environments from a Quality of user Experience (QoE) perspective in terms of MOS (Mean Opinion Score). They also compare their results with free space cases. Their assessment

*Address correspondence to this author at the Universidad Politécnica de Valencia, Spain; Tel: +34609549043; Fax: 34962849313;
E-mail: jlloret@dcom.upv.es

is performed using a computer simulation. They measured the effect of fading over system coverage range and VoIP capacity, using different codecs (G711 A-law at 64 Kbps and G726 at 24, 32, or 40 Kbps) and different bandwidths (11 Mbps and 54 Mbps) on wireless local area networks using IEEE 802.11g. Results show that in scenarios affected by fading channels VoIP communications suffer a noticeable drop in the achieved QoE and the network coverage area and the VoIP system capacity are also negatively impacted.

Sandra *et al.* present in [12] the development of a Wireless sensor Network using IEEE 802.15.4 technology, which nodes monitor vital signs of sheep and goats in order to intelligently detect when a flock is being attacked by wild animals. The paper includes the design and implementation of all circuits needed to implement the system and provides the simulations of circuits to check their correct operation. Moreover, nodes are endowed by an intelligent energy saving approach. Their proposal is based on monitoring the frequency heart and corporal temperature of each animal and sending it to the server which is in charge of processing all data, running a smart algorithm and to decide if there is an episode of collective stress on flocks of goats and sheep caused by any predator attack. Changes in vital signs of animals activate the alarm signal to alert the person in charge of the livestock facility and activate audible and visual alarms. The intelligent algorithm avoids false positives through storing and tagging the kinds of alarms generated along the time.

In [13], M. Báguena *et al.* present VACaMobil, a VANET Car Mobility Manager module for the OMNeT++ simulator. It lets users create complex scenarios with realistic vehicular mobility by defining the desired average number of vehicles, along with its upper and lower bounds, which are maintained throughout the simulation. Authors state that it is the first tool able to generate SUMO driven nodes (cars, buses, or trucks) in a vehicular network while ensuring the stability of some user-defined parameters (average, maximum, and minimum number of vehicles). They compared their proposal with other commonly used methods having better results. Moreover, VACaMobil lets the user manage when a new vehicle must be introduced in the network, it is able to assign a random route from a predefined set to each vehicle, and it is able to determine which type of vehicle should be added.

In a previous work, E. Logota *et al.* proposed Advanced Class-based resource Over-Reservation (ACOR) system, which reduces QoS control signaling overhead and increases resource utilization without incurring QoS violation. However, ACOR is too sensitive to the number of paths and resorts to per-flow signaling when links are congested. In [14], authors propose the Extended-ACOR (EACOR), which extends ACOR architecture by reducing the performance dependency on paths' density on bottleneck interfaces. It introduces a mechanism for efficiently tracking congestion information throughout a network and minimizes the synchronization frequency specially during critical periods of congestion. EACOR is designed to scale large networks with reduced signaling while keeping all ACOR benefits in terms of support for QoS differentiation, QoS violation avoidance and resource utilization efficiency. Authors demonstrate the

efficiency and cost-effectiveness of EACOR over ACOR both analytically and by simulations.

In [15], I. Petiz *et al.* present a method to detect attacks over WPA-enabled routers with Wi-Fi Protected Setup (WPS) based only on the amount of generated traffic. It is based on a monitoring station that exclusively analyzes traffic flows from the router by accessing the contents of wireless frames. The detection methodology uses a multiscale decomposition and analysis procedure, which is able to accurately identify each intrusion attempt. The proposed method detects brute force WPS attacks based on the analysis of low level statistics (the frame counting process) of the traffic sent by an attacked router.

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