Lloret, J. (2013). Recent Advances in Smart Communication Protocols and Algorithms. Recent Advances in Communications and Networking Technology. 2(2):63-64. doi:10.2174/22150811020213122121371 1.

Recent Advances on Smart Communication Protocols & Algorithms

Jaime Lloret

Universidad Politécnica de Valencia, Spain

E-mail: jlloret@dcom.upv.es

Abstract

This Special Issue includes the 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 Protocols, Smart Algorithms.

1. Introduction

The use of any of 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 have made the 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 dynamically 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 consciousness 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 intelligence can be included in the packet [1] or in the network [2] or in the end nodes [3]. Moreover, 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 important 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 & Algorithms. They completely fit the purpose of the journal "Recent Advances in Communications and Networking Technology" providing the most update research on new advances in communications and networking technology.

It is our believe that this special issue will help the readers to better understand and know the new advances on Smart Communication Protocols & Algorithms. Last, we would like to thank the authors for submitting their papers to 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 on 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 is not sent 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 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 on 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 send it to the server which in charge of processing all data, running a smart algorithm and 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 especially 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.

References

[1] B. Schwartz, A.W. Jackson, W.T. Strayer, Wenyi Zhou, R.D. Rockwell, C. Partridge, Smart packets for active networks, IEEE Second Conference on Open Architectures and Network Programming Proceedings. OPENARCH '99. 26-27 Mar 1999, Pp. 90 – 97

[2] Miguel García, Irene Bellver, Jesús Tomás and Jaime Lloret, Intelligent IPTV distribution for Smart Phones, Chapter of the book Multimedia Services and Streaming for Mobile Devices. Challenges and Innovations, IGI Global. January 2013.

[3] Nabil Ali Alrajeh and Jaime Lloret, Intrusion Detection Systems based on Artificial Intelligence Techniques in Wireless Sensor Networks, International Journal of Distributed Sensor Networks. Vol. 2013, Pp. 1-6. 2013. doi:10.1155/2013/351047

[4] Diana Bri, Sandra Sendra, Hugo Coll, Jaime Lloret, How the Atmospheric Variables affect to the WLAN Datalink Layer Parameters, The 6th Advanced International Conference on Telecommunications (AICT 2010), Barcelona, Spain, May 9-15, 2010.

[5] Diana Bri, Marta Fernández-Diego, Miguel García, Francisco Ramos, Jaime Lloret, How the Weather Impacts on the Performance of an Outdoor WLAN, IEEE Communications Letters. Vol. 16

Issue 8, Pp. 1184-1187. August 2012. 10.1109/LCOMM.2012.060812.120090
[6] Jaime Lloret, Miguel Garcia, Marcelo Atenas, Alejandro Canovas, A QoE management system to improve the IPTV network, International Journal of Communication Systems. Vol. 24, Issue 1, Pp. 118-138. April 2010
[7] Jaime Lloret, Alejandro Canovas, Jesus Tomas and Marcelo Atenas, A Network Management Algorithm and Protocol for improving QoE in Mobile IPTV, Computer communications, Vol. 35, Issue 15, Pp. 1855-1870. September 2012. 10.1016/j.comcom.2012.06.002
[8] Joel J. P. C. Rodrigues, Smart Communication Protocols & Algorithms, Network Protocols and Algorithms, Vol 4, No 2 (2012), Pp. 1-4
[9] Nuno Rodrigues, Rui Sousa, Paulo Salvador, António M. Nogueira, Characterization and Modeling of Top Spam Botnets, Network Protocols and Algorithms, Vol. 4, Issue 4 (2012), Pp 1-26.
[10] Hugo Fonseca, Paulo Salvador and António Nogueira, Network-based Wi-Fi Localization Solution, Recent Advances in Communications and Networking Technology, 2013.
[11] Ramon Sanchez-Iborra, Maria-Dolores Cano and Joan Garcia-Haro, On the Impact of Rice and Rayleigh Channel Characterization on VoIP Services: a QoE Approach, Recent Advances in Communications and Networking Technology, 2013.
[12] Sandra Sendra, Ferran Llario, Lorena Parra and Jaime Lloret, Smart Wireless Sensor Network to Detect and Protect Sheep and Goats to Wolf Attacks, Recent Advances in Communications and Networking Technology, 2013.
[13] Miguel Báguena, Sergio M. Tornell, Álvaro Torres, Carlos T. Calafate, Juan-Carlos Cano and Pietro Manzoni, A Tool Offering Steady-State Simulations for VANETs, Recent Advances in Communications and Networking Technology, 2013.
[14] Evariste Logota, Carlos Campos, Susana Sargento, and Augusto Neto, Scalable Resource and Admission Control in Class-Based Differentiated Networks, Recent Advances in Communications and Networking Technology, 2013.
[15] Ivo Petiz, Eduardo Rocha, Paulo Salvador and António Nogueira, Detection of WPS Attacks based on Multiscale Traffic Analysis, Recent Advances in Communications and Networking Technology, 2013.