Editorial

Ad Hoc Networks for Disaster Scenarios and/or Threat Detection

Federico Barrero,[1] Sergio Toral,[1] Princy Johnson,[2] Mesut Günes,[3] and Eleana Asimakopoulou[4]

[1]Department of Electronic Engineering, University of Seville, 41092 Sevilla, Spain
[2]School of Engineering, Technology and Maritime Operations, Liverpool John Moores University, Liverpool L3 3AF, UK
[3]Communication and Networked Systems (ComSys), Institute of Computer Science, University of Munster, 48149 Münster, Germany
[4]University of Derby, Derby DE22 1GB, UK

Correspondence should be addressed to Federico Barrero; fbarrero@us.es

Disaster scenarios and threat detection systems present interesting niche applications for ad hoc and wireless sensor networks that can be used to showcase novel communication techniques to deal with unexpected conditions emerging from such scenarios. There is an opportunity to develop techniques suitable for the 21st century, where people mostly communicate with each other using smart mobile devices such as iPhones. Communication among victims and crewmembers involved in rescue operations is crucial in order to alleviate disaster consequences and save lives, for example, enabling a quick response from security forces to threat detection situations. However, cellular-based communications may not be possible after a disaster due to the damages caused to the telecommunication infrastructure, leaving many people isolated and unprotected, and therefore having catastrophic consequences for humanity.

The scope of the special issue is to encourage new advances and developments in this field, while showcasing the recent developments to the scientific community. The presented survey in the field, which addresses the applicability of such multihop ad hoc networks in disaster response scenarios, will surely help new researchers to assimilate the expertize level and rapidly contribute to the field with new developments. A detailed description of the existing multihop ad hoc network paradigms applicable to disaster response scenarios is discussed within the work, where types of communications, wireless technologies, and research directions in the field are analyzed. A thorough review of the existing

work for each ad hoc paradigm is also introduced in the survey paper, where the necessity of interoperability among different ad hoc paradigms is highlighted. Finally, a review of the future open challenges for multihop ad hoc networks in disaster response scenarios is strategically shown to start new developments in the area.

The experiences and platforms case studies, demos, and prototype testing systems based on sensor networks included in the special issue will show the utility of the wireless sensor networks when managing disaster scenarios, which can be used in forest fire fighting operations to propose ways for approximating the actual shape of the fire, assuming efficient fire detection dissemination layer in charge of broadcasting fire detection events. A similar proposal discusses a real-world pilot implementation customized for fire fighter services in Slovenia, where a survivable heterogeneous emergency communication system is proposed that combines professional and commercial off-the-shelf equipment that communicates over mobile and satellite links. The system is developed to support public safety agencies in their day-to-day operation and disaster relief missions.

Ad hoc communication paradigms are also stated, and new research ideas are introduced to the research community in the real-time data collection and decision making, security and privacy, and system integrity and reliability fields, when sensor networks are used in disaster scenarios and/or threat detection. Also, the existing clustering methods, which can be considered an important tool for efficient communication

in an intermittent Pocket Switched Networks, are evaluated to minimize communication overhead and then modified to ensure communication links between disjoint nodes.

An interesting solution for distributed computing trust is also presented as an effective method to minimize threats in wireless sensor networks, where trust and satisfaction are built based on Ebbinghaus forgetting regular and spatial correlations. Then, misbehaviors can be effectively suppressed in the network security area, and the proposed method can recognize and handle entity attacks more effectively than other mechanisms.

We hope that the special issue can stimulate further research interests in the ad hoc networks field, with particular application to the disaster scenarios and/or threat detection areas, where much more work is for sure expected in the coming years.

Federico Barrero
Sergio Toral
Princy Johnson
Mesut Günes
Eleana Asimakopoulou