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Editorial

Special Section on Autonomic and Opportunistic Communications

It is our great pleasure to introduce this Special Section of the Journal, focused on Autonomic and Opportunistic Communications. We strongly believe autonomic and opportunistic properties will be a key feature of the Future Mobile Internet. The huge proliferation of mobile devices with wireless networking capabilities makes it possible to foresee a Future Internet environment in which users' mobile devices will spontaneously network together and build self-organizing wireless networks for enabling users interaction and content exchange. This will be a natural enabler for the take off of User Generated Content and other user-centred networking models in the area of pervasive mobile networks.

While this perspective opens up exciting application opportunities, several research challenges have still to be addressed. Spontaneous mobile networks are typically less stable than the conventional Internet, and therefore nodes must embed greater "intelligence" with respect to Internet core nodes for the network to operate efficiently. More in general, a Future Internet incorporating a huge number of possibly mobile devices is likely to require more "distributed intelligence", which should enable localised decision making in order to scale up in size and complexity while remaining efficient. Autonomic and opportunistic communication technologies will play a key role from this standpoint, as they will allow individual nodes to be aware of their networking environment, reason about it, and act accordingly.

The four papers in this special section provide outstanding examples of autonomic and opportunistic solutions for Future Internet protocols. The first three papers consider opportunistic networking environments, i.e., self-organising mobile networks in which the existence of continuous multi-hop paths cannot be granted. The paper, "Distributed Estimation of Global Parameters in Delay-Tolerant Networks" by A. Guerrieri et al. proposes and analyses fully distributed protocols for estimating global parameters, such as the number of nodes in the network, the maximum, minimum or other aggregates of parameters available at individual nodes. Different approaches are proposed and compared in terms of accuracy of estimation, and guidelines are provided to select the most suitable approach in practice. The second paper,

"HYMAD: Hybrid DTN-MANET Routing for Dense and Highly Dynamic Wireless Networks" by John Whitbeck et al. proposes a routing protocol for opportunistic networks in presence of "clouds" of well connected nodes, where different clouds are bridged by mobile nodes that visit them. HYMAD actually breeds the two paradigms of conventional MANET routing (within clouds) and opportunistic networks (between different clouds), and outperforms routing protocols conceived for one of these environments only. The third paper "Privacy and Confidentiality in Context-Based and Epidemic Forwarding" by A. Shikfa et al. considers the fundamental problem of guaranteeing privacy in context-aware opportunistic routing. It investigates the achievable privacy level with respect to the trusted communities assumptions, and exploits searchable encryption and identity-based encryption to enable forwarding while preserving user privacy. Finally, the fourth paper "Random Walk with Jumps in Large-scale Random Geometric Graphs" by L. Tzevelekas et al. considers autonomicity in random walk settings, and investigates the properties of directional jumping in geometric random graphs to reduce revisits and increase the dissemination information effectiveness. The employment of jumping in a random geometric graph is shown to be advantageous for non-dense topologies like wireless sensor network environments in which the traditional random walker approach may be significantly ineffective due to bottleneck links.

As a whole, we think this selection of papers represents a very interesting showcase of the potential of autonomic and opportunistic communication technologies in the perspective of the Future Internet. We would like to thank the authors of the selected papers for contributing their high quality work, and the reviewers, who significantly contributed to the quality of this special section.

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