

## Routing Techniques in Wireless Sensor Networks

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### Abstract

The diminution in size and power consumption of digital circuitry, wireless communication and micro electro-mechanical systems (MEMS) are influencing the progression towards the smart dust era. Smart dusts are wireless sensors with own battery power, computing and communication facility. It is envisaged that from the application's perspective, in the area of military, health, environmental, industrial and home automation wireless sensor networks (WSN) will have a significant impact. Accordingly, WSN will witness a huge growth in the near future and both the academia and industry have commenced intensive research. Routing protocol design in WSN is one of the most important areas of active research due to the open issues and its importance.

WSNs usually contain a large number of nodes typically with highly correlated collected data. These networks can be categorized according to the network structure and their protocol operations. Network structure based categorization of WSN can be flat or hierarchical. In flat networks, all the nodes in the networks take the same responsibility, while in hierarchical networks the cluster-heads perform several special functions such as maintaining the clusters and aggregation. To support large-scale wireless sensor network management and local data aggregation, hierarchical routing techniques can be regarded as superior to flat routing approaches. Low power consumption as well as smart way of distributing the load is crucial to the routing protocol design in order to attain elongated WSN lifetime. We have already proposed a distributed routing algorithm; optimized forwarding by fuzzy inference systems (OFFIS) for the flat networks, where the decision is based on the distance power and link uses. In addition, we have proposed a two-layer OFFIS (2L-OFFIS) for environmental data collection in cluster-based sensor networks. In this talk, major routing protocols for the WSNs will be presented and the results will be compared with those that are achievable by the OFFIS and 2L-OFFIS techniques. Simulation results show that the network lifetime can be significantly elongated by utilizing the new protocol in hierarchical sensor networks.

### Bio of Professor Abbas Jamalipour

Abbas Jamalipour holds a PhD from Nagoya University, Japan. He is the author of the first book on wireless IP and two other books, and has co-authored five books and over 175 technical papers, all in the field of wireless networks. He is a Fellow Member of IEEE and IEAust, an IEEE Distinguished Lecturer, the Editor-in-Chief of the IEEE Wireless Communications, and a Technical Editor of several scholarly journals including IEEE Communications, Wiley International Journal of Communication Systems, Journal of Communication Network, etc. Professor Jamalipour has been

very active within the IEEE Communications Society, serving as the Chair of Satellite and Space Communications TC (2004-06); current Vice Chair of Communications Switching and Routing TC; and Chair of Chapters Coordinating Committee, Asia-Pacific Board. He is a voting member of GITC and IEEE WCNC Steering Committee. He has been a Vice Chair of WCNC2003-06, Chair of Wireless Symposium at GLOBECOM2005-07, and a symposium Co-Chair of ICC2005-08, and many other conferences. He has received several prestigious awards including IEEE Distinguished Contribution to Satellite Communications Award, IEEE Communications Society Best Tutorial Paper Award, Telstra Award for Excellence in Teaching, etc.