

Preface

Over the last decade, Wireless Sensor Network (WSN) has become very popular research field due to development of low-cost sensors. This network can operate even in harsh environments. Sensors when once deployed cannot be replaced and recharged, due to which WSN is currently facing many challenges. Today, users are interested in timely availability and reliability of data. To provide an insight into the solutions, a thought can be given via hardware and software. Nevertheless, hardware solutions can be costly in setup and difficult to maintain. To cope up with the current requirements, many other solutions are in trend such as development of efficient routing algorithms, collision-free routing protocols, congestion control algorithms, chain-based routing protocols, and energy-efficient routing protocols. However, none of these protocols provides optimum solution for the current challenges. All protocols have their own pros and cons in terms of complexity, scalability, energy constraints, delay tolerance, etc. WSN must employ distributed algorithms to support all the applications due to short-range communication and high-energy consumption features. It must be self-configurable, scalable, and robust. It has provided quite wide application portfolio for different branches such as military, transport, agriculture, industry, and health care. In future, stronger WSN application assortment is expected. In order to make this expansion possible, it is necessary to continually work on the solving of typical questions/problems related to the WSN development, e.g., standardization of communication protocols, the lack of energy-efficient power sources, and the development of new ultra-low-power microelectronic components.

The problematic of WSN is one of actual activities getting to the fore in the European Research Area since the issue of sensor networks was covered through “IoT” in FP7 program and strong continual extension is planned to be included also in Horizon 2020 program, especially in sections such as Smart Transport, Health, and Climate Action covered under Societal Challenges Pillar. Researchers to overcome the problem of energy scarcity and short-range communication of sensors have put enormous efforts forth. It has been realized that routing protocols, which provide multi-hop communication, are more robust and they are showing good

results in terms of energy, scalability, and network lifetime. Multi-hop communication is not a new concept having been around for over twenty years, mainly exploited to design tactical networks. The simplest communication is a peer-to-peer communication formed by a set of stations within the range of each other that dynamically configure themselves to set up a temporary single-hop network. Bluetooth piconet is the most widespread example of single-hop networks. 802.11 WLANs can also be implemented according to this paradigm, thus enabling laptops' communications without the need of an access point. Single-hop networks just interconnect devices that are within the same transmission range. This limitation can be overcome by exploiting the multi-hop paradigm. In this networking paradigm, the sensors form network and cooperatively provide the functionalities that are usually provided by the network infrastructure. Nearby nodes can communicate directly by exploiting a single-hop wireless technology (e.g., Bluetooth, 802.11), while devices that are not directly connected communicate by forwarding their traffic via a sequence of intermediate devices. To turn on more advantages of WSN, we should move to a more pragmatic scenario in which multi-hop communication is used as a flexible and "low-cost" extension of wireless communication.

Therefore, authors would like to provide the overview of recent development in multi-hop routing protocols. It will follow an introduction to the various classifications of routing protocols. Pros and cons of each category will be enlisted. Current research on the various categories of multi-hop routing protocols is given to help the researchers to fine out classification for their protocols. Beginners can make themselves aware about the current trends by the overview of classifications of routing techniques. It is beneficial for the students who being involved in technical studies. The aim of this book is to present some of the most relevant results achieved by applying an algorithmic approach to the research on multi-hop routing protocols. The unique aspect of the book is to present measurements, experiences, and lessons obtained by implementing multi-hop communication prototypes.

Multi-hop Routing in Wireless Sensor Networks
An Overview, Taxonomy, and Research Challenges

Rani, S.; Ahmed, S.H.

2016, X, 69 p. 14 illus., Softcover

ISBN: 978-981-287-729-1