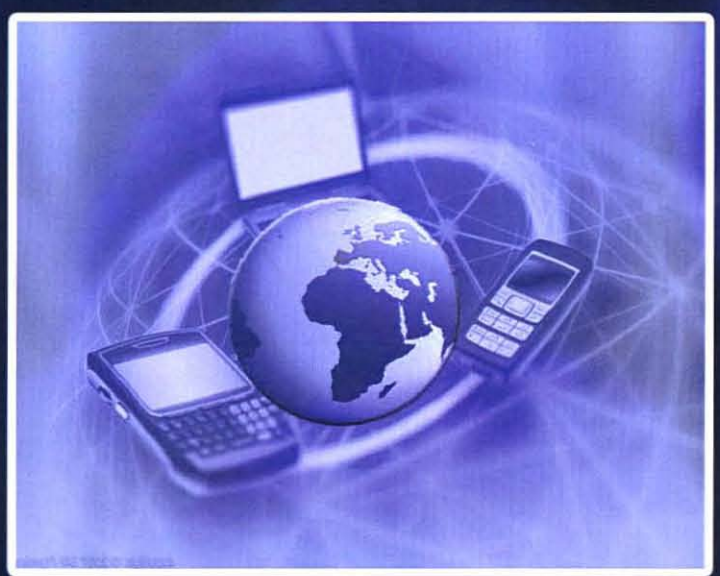
Research Issues in Wireless

Communications and Networking

Farhat Anwar
Wajdi Al-Khateeb



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CHAPTER 22

Feasibility Analysis of Integrated Hybrid Systems of Wireless Sensor Networks and Conventional Networks

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22.1 WIRELESS SENSOR NETWORK INTEGRATION WITH CONVENTIONAL NETWORKS

WSN integration can be conceptually defined as the seamless and coherent integration of WSN with other (existing) networks e.g. Internet or 3G mobile networks, etc. WSN is an excellent source of ambient information. The ambient information considered as physical context contains bulk of contextual data (e.g. temperature, location, humidity etc). However, the challenge is how such information can be exchanged consistently with existing networks (e.g. IMS or Internet). Moreover, emerging applications and services require ambient information to be available to external network in order to support wide range of services by utilizing ambient information. As shown in pertinent research works in this field, the integration of WSN with existing network may be based on two approaches: one is gateway-based and another one is overlay-based [1, 2]. In a gateway-based approach, every sensor node in WSN has a proprietary interface to relay data to a gateway. The gateway implements different sets of protocol and information mappings in the form of standardized interface (e.g. HTTP, and SIP) accessible to any user or application in an external network. For overlay-based approach, every sensor or some selected sensors in WSN implement a compatible protocol stack (e.g. IP, HTTP, and SIP) of an external network; So that the host in the external network can communicate directly with sensors. The sensor nodes that implement an external network protocol stack are called overlay nodes and form an overlay-network [3]. The subsequent sections detail the evaluation of state-of-the-art hybrid systems with respect to the evaluation criteria.

22.2 EVALUATION CRITERIA

In this section of this chapter, the criteria for the integration of WSNs with IMS are clearly and logically established. This section recommends the following design criteria and these criteria are an improved set of an earlier proposed set of criteria in a research work [3, 4].

- *Criterion 1*: The approach should support all possible WSN sensing capabilities in IMS. The sensing capabilities refer to different types of sensed data (spatial, environmental, and physiological) accessible to IMS services.
- *Criterion 2*: The approach should allow WSN data to be exchanged in a standard IMS format (PIDF) and also support the aggregation of data based on individual or group of sensors (Sugano, Fujimoto, Klyne, Bateman, Carr, Peterson, 2004).
- *Criterion 3*: Support of information management of different types of physical world entities (e.g. persons, places, objects etc.) in IMS. Currently IMS only support user (person) as a subscribed entity. The WSN can provide information related to different user entities e.g. what's the current: location of a 'user A' (person), temperature of a 'corridor' (place), and spot of a 'car' (object) in parking lot.