Adapting ETSI SmartBAN to eHealth

Matti Hämäläinen, Dr.Sc., Tuomas Paso, M.Sc.
Centre for Wireless Communications, University of Oulu, Finland

Introduction: The current trend in healthcare provision is going towards personalized and remote services, which are provided outside of hospitals or other care units, thus benefitting an eHealth approach. The place to collect health data is more often person's/patient's home. This procedural change sets new requirements for the personal medical devices as well as their connectivity solutions. Dealing with personal health data means that security, privacy, and trust need to be in the highest level; to protect personal sensitive data but also to provide reliable data for healthcare professionals' use. Not only dependable connectivity but also compatible data presentation and format are needed to open markets to various vendors, which enables way towards cheaper devices and better security of device supply. European Telecommunications Standards Institute (ETSI) is working towards a connectivity standard for smart body area networks (BAN), which could fasten this progress.

SmartBAN in Brief: The ETSI Technical Committee (TC) Smart Body Area Network (SmartBAN) is answering the increasing needs to provide reliable and seamless connectivity solutions for individuals' remote healthcare and wellbeing status monitoring. The standard defines physical layer (PHY) and medium access control layer (MAC) protocols, but also mechanisms for security and semantic interoperability provision in such a way that the remote monitoring solution is easy to use in and adapt to heterogeneous communications environment [1]. The driving forces have been energy efficiency, good co-existence with other existing radio technologies sharing the space, and to provide priority channel access for emergency traffic. As ETSI SmartBAN is flexible and future proof concept, it can be easily adapted to operate with all the existing radio standards, as well as being compatible with future 6G and beyond technologies [2]. Based on the one-hop star topology (amendment to support relay functionality is to be published soon), SmartBAN permits cost effective BAN network installation. The network coordinator, called as a hub, contains the highest intelligence and computing power within a network. This makes it possible to exploit cheaper nodes, which can be focused, e.g., on specific vital sign measurement or some other preliminary defined action. One envisioned SmartBAN network is formed by one hub and up to 16 simpler nodes. However, for practical realization, it is assumed that there are less than 8 nodes in one network, thus carried by an individual. All the measured data can be directed to centralized data records via the hub, or presented locally, e.g., using a smart phone or watch (which can also act as a hub.) In the standard, efficient solutions for heterogeneity as well as interoperability management are included, thus SmartBAN is interoperable in technical, semantic, and informational levels. Due to the unified metadata presentation, the SmartBAN data can be unambiguously described, which enables, e.g., automated data analysis and alarm handling. SmartBAN's modular semantic reference model, ontology and architecture are harmonized, e.g., with the corresponding oneM2M specification for Internet of Things (IoT) applications [1], which also improves its interoperability with other systems.

Discussion: The targeted use-cases where SmartBAN can be adopted are heavily focused on different kinds of eHealth and eWelfare applications, such as fall, sleep, apnea, abnormal cardiac rhythm or activity monitoring, etc.; just to name few [3],[4]. As SmartBAN enables high priority emergency traffic and better spectrum utilization via unused transmission time usage by primary node, it will significantly improve the spectrum usage and faster channel access in crowded environments, such as hospitals accommodating lots of persons using wearables, or when there is an immediate need to transfer high priority data. The nodes and wearables to be included in the SmartBAN network can be selected on-demand, depending on the monitoring purpose. The standard itself does not restrict utilization of any kind of sensor.

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References:

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