Wearable wireless body-to-body networks, 5G and the internet of things

Description

Arbia, D., Alam, M., Moullec, Y., & Hamida, E.. (2017). Communication Challenges in on-Body and Body-to-Body Wearable Wireless Networks—A Connectivity Perspective. Technologies, 5(3), 43.

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“Wearable wireless networks (wwns) offer innovative ways to connect humans and/or objects anywhere, anytime, within an infinite variety of applications. wwns include three levels of communications: on-body, body-to-body and off-body communication. successful communication in on-body and body-to-body networks is often challenging due to ultra-low power consumption, processing and storage capabilities, which have a significant impact on the achievable throughput and packet reception ratio as well as latency. consequently, all these factors make it difficult to opt for an appropriate technology to optimize communication performance, which predominantly depends on the given application. in particular, this work emphasizes the impact of coarse-grain factors (such as dynamic and diverse mobility, radio-link and signal propagation, interference management, data dissemination schemes, and routing approaches) directly affecting the communication performance in wwns. experiments have been performed on a real testbed to investigate the connectivity behavior on two wireless communication levels: on-body and body-to-body. it is concluded that by considering the impact of above-mentioned factors, the general perception of using specific technologies may not be correct. indeed, for on-body communication, by using the ieee 802.15.6 standard (which is specifically designed for on-body communication), it is observed that while operating at low transmission power under realistic conditions, the connectivity can be significantly low, thus, the transmission power has to be tuned carefully. similarly, for body-to-body communication in an indoor environment, wifi ieee 802.11n also has a high threshold of end-to-end disconnections beyond two hops (approximatively 25 m). therefore, these facts promote the use of novel technologies such as 802.11ac, narrowband-iot (nb-iot) etc. as possible candidates for body-to-body communications as a part of the internet of humans concept.”

Other use cases within recent works targeted real testbeds and implementations in order to evaluate the performance of the wearable wireless networks (WWN) integrated with Internet o things (IoT) in real conditions. Miranda et al. in [5] implemented and evaluated a complete common recognition and identification platform (CRIP) for healthcare IoT. CRIP enables a basic configuration and communication standardization of healthcare "things". Other aspects are also covered, in particula security and privacy, and health device integration. Different communication standards were used to deploy CRIP, such as Near Field Communication (NFC), biometrics (fingerprints) and Bluetooth. In most of the above-mentioned applications, wireless communication is inevitable between various types of devices including sensors, actuators, coordinators, and gateways. Additionally, with the advent of body-to-body networks (BBNs or B2B), the communication is extended from classical "on-body networks/body area networks (BANs)" to modern "body-to-body networks (BBNs)" as shown in Figure 1. Consequently, wearable wireless networks (WWNs) are emerging as a new frontier for future smart applications in Internet of things (IoT) and Internet of humans (IoH). From the viewpoint of WWN "connectivity" in IoT and IoH, BBNd provide multi-hop device-to-device (D2D) communication to extend the end-to-end network coverage. This coincides with the vision of 5G, setting up new challenges towards cooperative and collaborative D2D communication among heterogeneous devices

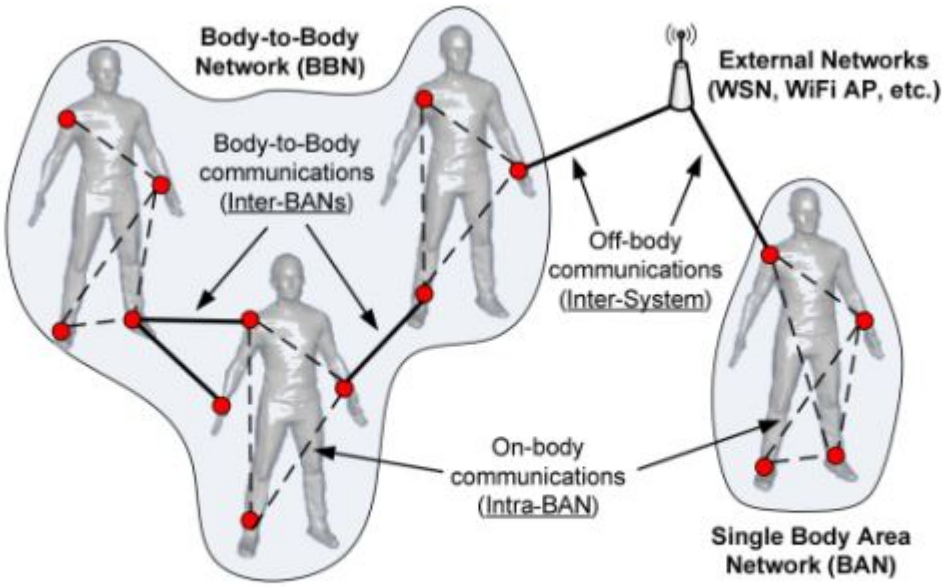

Figure 1. Wearable wireless networks: extending on-body communication to body-to-body and off-body communication. BAN: on-body network.

Category

1. General

Tags

1. 5G

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