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Applicability of Bluetooth routing ad-hoc networks for efficient communication

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In the age of Internet of Things, we expect devices other than computers to communicate with similar or different types of devices. These devices have to be designed in a specific way to communicate and achieve a predefined set of objectives. Hence, the devices need to be aware of with whom they should communicate and what, with what infrastructure and operational environments such as cars, door-locks, refrigerators, health information devices which could create intelligent systems that communicate over the Internet with information/computer systems. On the road, cars may move in a lane one after the other, swiftly engaging in lane changes, slowing down through intersections, accelerating when required, turning left and right after each block. If these vehicles can continuously communicate with each other to exchange status updates on its movement and drivers' actions, smooth operation of vehicles on roads could become a reality. Cars need to know who is behind them, front of them, and passing them, in order to send messages forward, backward or around each one of them. The study describes two instances (event of braking and road condition of a location) where cars communicate depending on information collected through ad-hoc networks, built upon sharing critical information and a selection of topologies and protocols depending on the objective of the network. The study proposes Bluetooth routing ad-hoc network to provide conceptual framework for dynamic ad-hoc networks where a set of devices can quickly form in a network based on their relative position, continue to maintain the network as new nodes join and leave, and disband once the objective of the network is accomplished. Specialty of this situation is that each node should know who are directly nearby or next to them, and from which direction, in order to communicate specific messages, and when required, a node should be able to reach a group of nodes in a given direction, but out of direct communication range, through intermediary nodes that route communications. A signal such as Wi-Fi would reach longer distance than Bluetooth, confusing this critical discovery process by reaching irrelevant devices faraway. Currently, this area has not been studied specifically. Concept was validated by having a group of devices arranged in a line, being able to discover each other, communicate with each other based on their relative physical positon in the group, and pass simple messages between them. Bluetooth communication uses low power radio signals in a limited range, compared to strong Wi-Fi signals that travel longer distances. Bluetooth ad-hoc routing networks can handle discovery and peer negotiations efficiently and even let stronger, long-distanced Wi-Fi signals make communication between the nodes where required, based on the established Bluetooth ad-hoc network.

Keywords: Ad-hoc networks, Bluetooth, Bluetooth routing, Intelligent systems, Internet of Things