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Multiuser Positioning

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ABSTRACT

Abstract—In this contribution we present a concept to exploit device-to-device (D2D) links for localization by defining a multiple access ranging scheme for radio nodes by using the multicarrier signal structure in LTE. Typically ranging between multiple radio devices in ad-hoc networks is performed by a (random) time division multiple access scheme which has limits especially when the nodes are moving. The proposed frequency division multiple access (FDMA) scheme permits simultaneous uni-directional ranging between the nodes by comparing the received signal strength (RSS) with a known path loss model. A key advantage of the RSS method is that it does not rely on synchronous clocks between the nodes and works in a heterogeneous network with radio devices that offer multiple different RATs. The ranging performance is one of the performance factors of ranging based positioning algorithms. We aim on improving localization by building ranging and communication links between devices. Therefore, D2D communication exploits the common link to improve ranging between the devices by adding known pilot signals instead of data. Our results based on cooperative and geometric algorithms show the benefits through mobile-to-mobile cooperation.