

A zero configuration protocol stack for device-to-device communication in a private Wi-Fi network

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Traditional wireless communication involves many Internet-based services, which makes the availability of an Internet connection mandatory to complete the communication. Furthermore, when introducing new devices into the network, pre-configuration, authentication and granted access rights are must to have.

This research proposes a stack of protocols for discovering peer nodes, establishing connectivity with them and handling communication between those peers in a *Wi-Fi* (Wireless Fidelity) network without Internet connectivity as well as configuration and authentication requirements. In this new protocol, all the nodes in the network becomes objects and the user selects appropriate communication channel based on the communication requirement. It could be voice calling, screen sharing, chatting, video calling, file sharing, data transmission, etc. Since the protocol uses local area network, network traffic is not going out from the local router to the Internet. The protocol's security mechanism is based on different instances. The user is allowed to define his/her own security definition to his/her communication. The protocol supports to network security, application based security, and group based security with encryptions. The research is based on the build and test approach where incrementally developed components of the protocol stack are tested on different *Wi-Fi* security platforms and device platforms and fine-tuned for minimum bandwidth consumption and data losses. Protocol stack is being developed in accordance with several layers of the *TCP/IP* (Transmission Control Protocol/Internet Protocol) model such as application, transport, network and physical. Simple chat application is built with all the proposing components and algorithms in order to proof of the concept.

Our ultimate objective is to apply this new communication protocol to the *IoT* (Internet of Things) environments. Since protocol supports to any *OS* (Operating System) platform and enable *Wi-Fi* communication with any device without any configurations, this can be used as the core communication protocol used by the devices present in an *IoT* environment.

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