

# disTributEd Secure LocalizAtion (TESLA)

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*Abstract:*

The fifth generation (5G) of networks is expected to provide significantly higher bandwidth and faster data rates with potential for interconnecting myriads of heterogeneous devices (sensors, agents, users, machines, and vehicles) into a single network (of nodes), under the notion of Internet of Things. The ability to accurately determine the physical location of each node (stationary or moving) will permit rapid development of new services and enhancement of the entire system. In many outdoor environments, this could be achieved by employing global navigation satellite system (GNSS) which offers worldwide service coverage with good accuracy. However, installing a GNSS receiver on each device in a network with thousands of nodes would be very expensive in

addition to energy constraints. Besides, in indoor or obstructed environments (e.g., dense urban areas, forests, and canyons) the functionality of GNSS is

limited to non-existing, and alternative methods have to be adopted. Many of the existing alternative solutions are centralized, meaning that there is a sink in the network that gathers all information and executes all required computations. This approach quickly becomes cumbersome as the number of nodes in the network grows, creating bottlenecks near the sink and high computational burden. Therefore, more effective approaches are needed. As such, this project aims at developing novel distributed solutions for target localization in large-scale networks, in which nodes have restricted energy resources. Besides guaranteeing good localization performance (both in terms of localization accuracy and computational complexity), the main goal of the project will be to provide secure solutions (localization in malicious environments, i.e., in the presence of one or more internal/external attackers whose objective is to impede our fundamental desire to achieving high accuracy). This malicious setting raises the bar even higher in terms of difficulty of the problem but is of paramount importance in many practical applications.