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**Secure Seamless Bluetooth Low Energy Connection Migration for Unmodified IoT Devices**

**Abstract:**

At present, Bluetooth Low Energy (BLE) is dominantly used in commercially available Internet of Things (IoT) devices –such as smart watches, fitness trackers, and smart appliances. Compared to classic Bluetooth, BLE has been simplified in many ways that include its connection establishment, data exchange, and encryption processes. Unfortunately, this simplification comes at a cost. For example, only a star topology is supported in BLE environments and a peripheral (an IoT device) can communicate with only one gateway (e.g. a smartphone, or a BLE hub) at any given set time. When a peripheral goes out of range and thus loses connectivity to a gateway, it cannot connect and seamlessly communicate with another gateway without user interventions. In other words, BLE connections are not automatically migrated or handed-off to another gateway. In this paper, we propose SeamBlue, which brings secure seamless connectivity to BLE-capable mobile IoT devices in an environment that consists of a network of gateways. Our framework ensures that unmodified, commercial off-the-shelf BLE devices seamlessly and securely connect to a nearby gateway without any user intervention.

**Existing System:**

Carrying the gateway along with a mobile IoT device seems like an option, but it is not always feasible as it causes disconnections of other IoT devices that are either static or moving in a different direction from the gateway. For instance, if a personal smartphone is used as a gateway for the IoT devices deployed for a home automation system, BLEenabled IoT devices may get disconnected when the smartphone is taken outside of the home. Similarly, in a hospital scenario, patients wearing BLE enabled IoT devices may move inside and outside of the hospitals for which simple smartphones may not be used as a BLE gateway. Furthermore, IoT devices and gateways deployed in battlefields and agricultural farms can be mobile, and in these use cases continuous connectivity through smartphones is not be a viable solution.

**Proposed System:**

We propose a framework that ensures secure seamless communication between an unmodified, BLE-enabled mobile IoT device and a remote service in a network of static or mobile BLE gateway environments, without requiring pairing-bonding and connections to individual gateways.

\_ We develop a systematic approach based on static program analysis to identify the state variables in the BLE code base that are required for transferring pairing-bonding and connection information from one gateway to another gateway.

\_ We propose two approaches – partial stack cloning and full stack cloning - for capturing a snapshot of connection states at the current gateway and then updating them at the next gateway during BLE connection migration.

\_ We propose a gateway selection mechanism for transferring the connection state to the most suitable gateway when an IoT device requires to migrate its connection and there are multiple gateways in its range.

\_ We design a secure sharing of connection information between two gateways so that adversaries cannot obtain the pairingbonding keys and connection parameters while the connection is migrating.