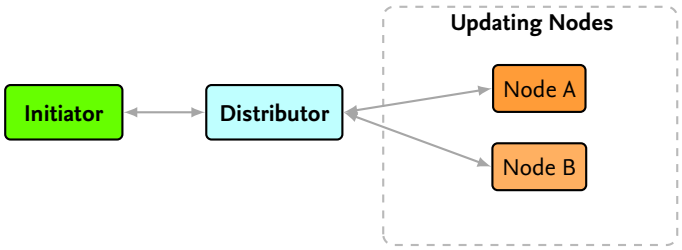
Title: Adaptive and Reliable Bluetooth Mesh Device Firmware Update in Multi-Hop Networks

Bluetooth Mesh is a wireless network technology for connecting many Bluetooth devices over several hops. It is relevant for applications such as smart buildings, lighting systems, and industrial installations where devices stay deployed for a long time and still need bug fixes, security patches, or feature updates.

Bluetooth Mesh 1.1 includes a standardized Device Firmware Update (DFU) feature that can send a new firmware image through the mesh network instead of updating each device manually. In practice, this is challenging because firmware files are much larger than normal mesh messages and must be transferred reliably over multiple wireless hops while the network is still in use. A basic update procedure may work, but that alone does not guarantee that updates are fast, robust, or suitable for real deployments.

This thesis studies how Bluetooth Mesh DFU can be made more reliable and adaptive on commercial development kits in a multi-hop network. The work combines a reproducible experimental evaluation with the development of an improved update strategy that adjusts the DFU process to network conditions.



Different DFU roles in a mesh network.

- Build a repeatable Bluetooth Mesh DFU testbed with commercial development kits.
- Experimentally evaluate the reliability and efficiency of the standardized DFU feature in a multi-hop setup.
- Develop and compare an adaptive update strategy that aims to improve robustness and update performance.
- Derive practical recommendations for using Bluetooth Mesh DFU in realistic deployments.

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