2022 - NS - 8D9-DD2 - Security Analysis of Bluetooth Low Energy in Smartwatch - Haimin Ku

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Security Analysis of Bluetooth Low Energy in Smartwatch

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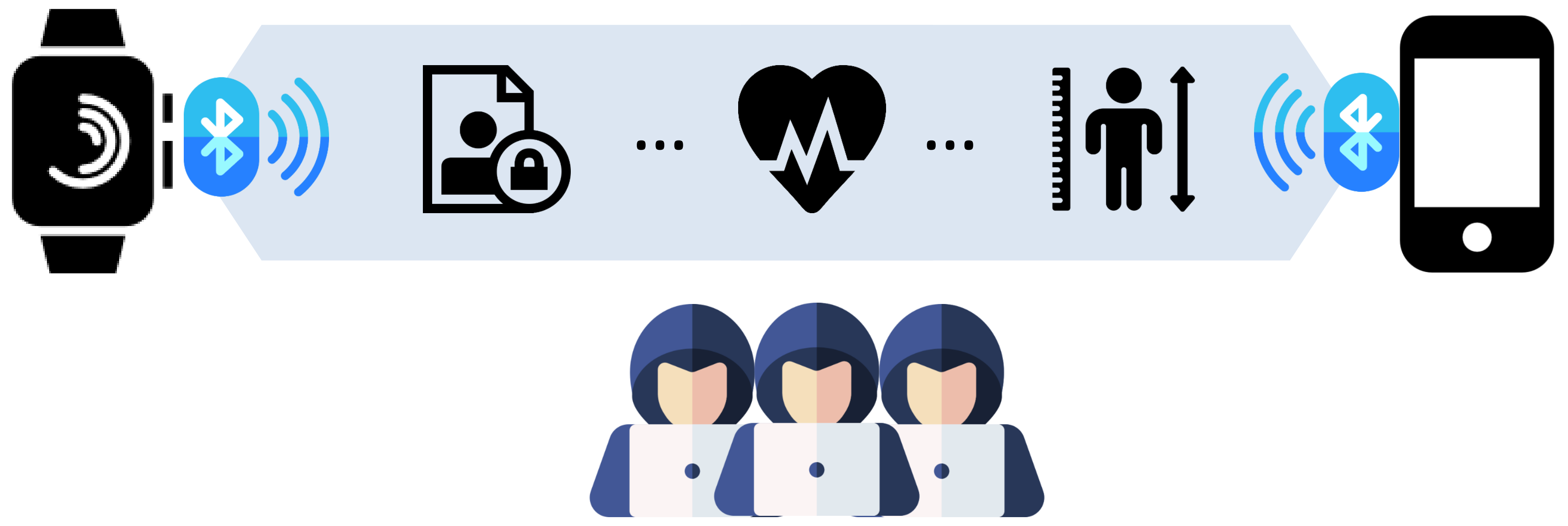
Motivation



Problem: private-sensitive data over insecure BLE connection

Bluetooth Low Energy (BLE) v4.0

- Widely used in smartwatches
- Lightweight but vulnerable
- E.g. illegal device access, fingerprinting, and sensitive information

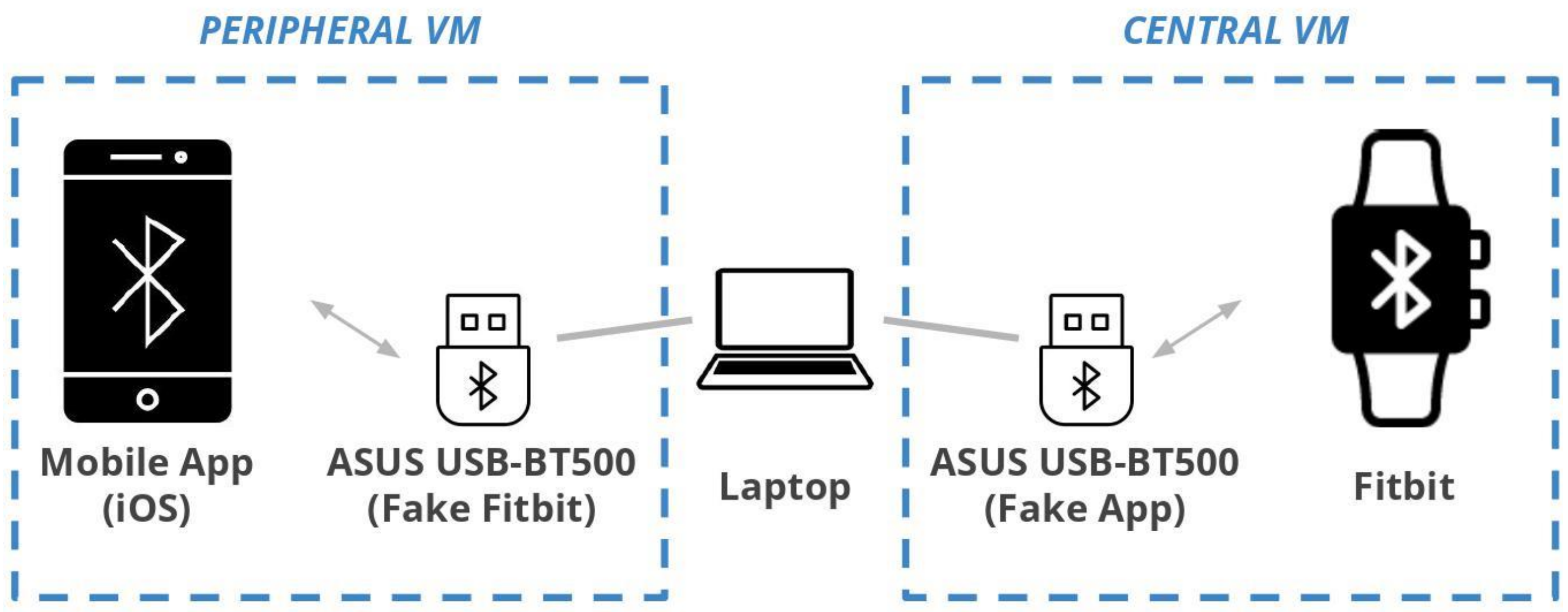
Objective: experimentally demonstrate various BLE attacks

Target device: Fibit Alta HR device

What to focus: pairing process

Why? exchange secret keys to encrypt communication channel

Man-in-the-Middle Attack



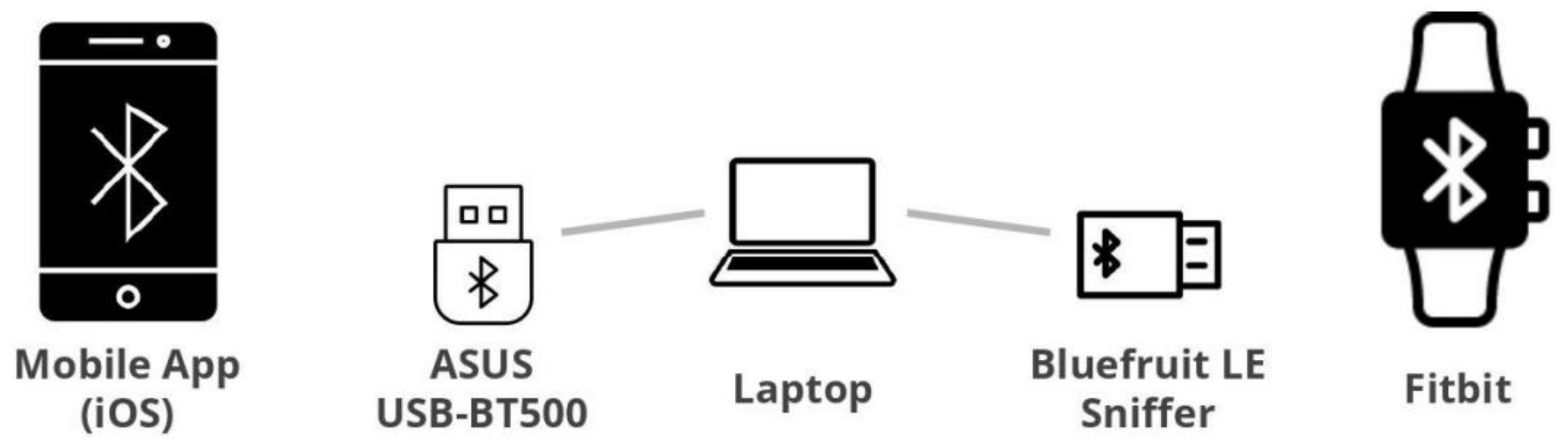
Methodology

❶ Find Fibit's MAC address by scanning
❷ Discover Fitbit's Info (services, characteristics, etc)
❸ Make a copy of Fibit using the info
❹ Trick mobile app to connect to fake Fibit
❺ Forward all data to the original Fitbit via fake app

Result: success

▪ By capturing and modifying packets from the fake connection, we replayed a synchronization with the manipulated data

Brute-force Attack



Methodology

❶ Capture packets via Wireshark
❷ Check the paring event in packets using Crackle
❸ Try paring with a random secret key
❹ Repeat ❸ until success

Result: fail

▪ Fitbit relies on its own encryption method which hinders to capture the paring event in the packet

Conclusion

Overall, Fitbit Alta HR provides a mature level of BLE security mechanism.
Nevertheless, our study demonstrates that the prior vulnerabilities on BLE v4.0 are still existing on Fibit Alta HR.
Future work: attacks on other paring methods of BLE v4.0.

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