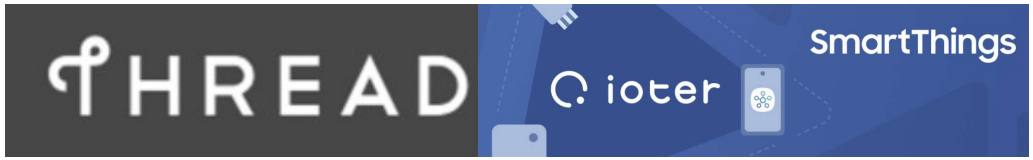

Thread and Samsung-IoTer

Real Time Emulation of Smart Home

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Manjunath N Sataraddi

19-Dec-2024

Contents

Need of Thread

- As per current IoT statistics, there are well over 18.8 billion connected IoT devices around the globe.
- It's expected there will be 40 billion IoT devices by 2030.

Connected IoT devices forecast 2024–2030

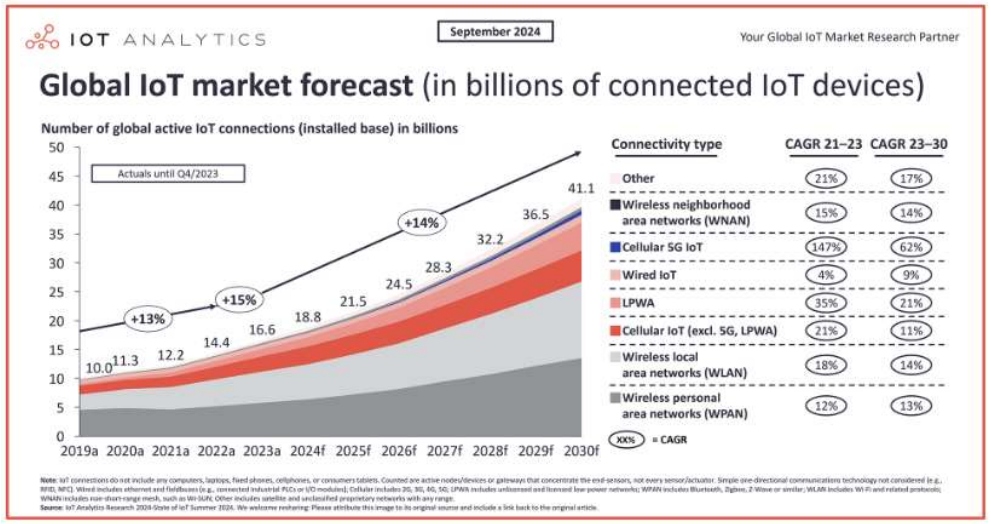
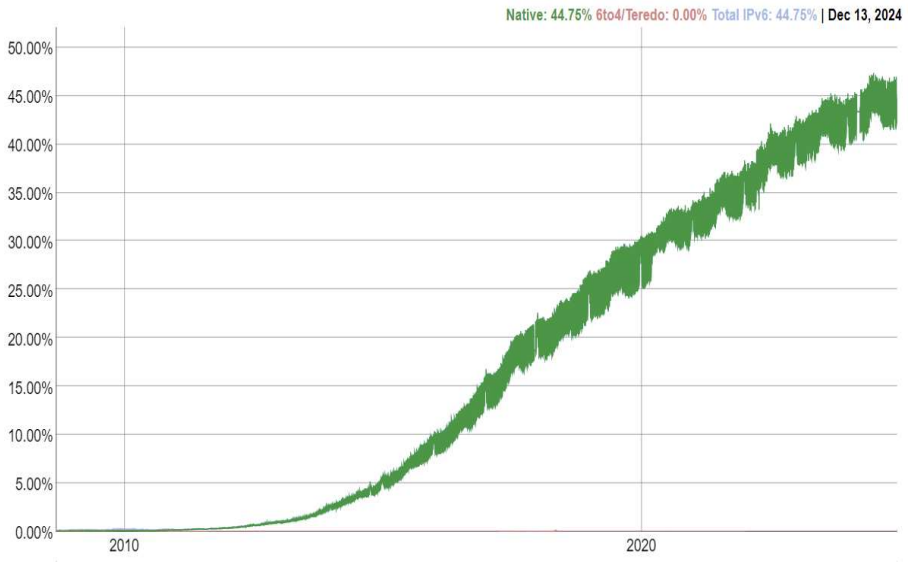


Image: Global IoT market forecast (in billions of connected IoT devices)

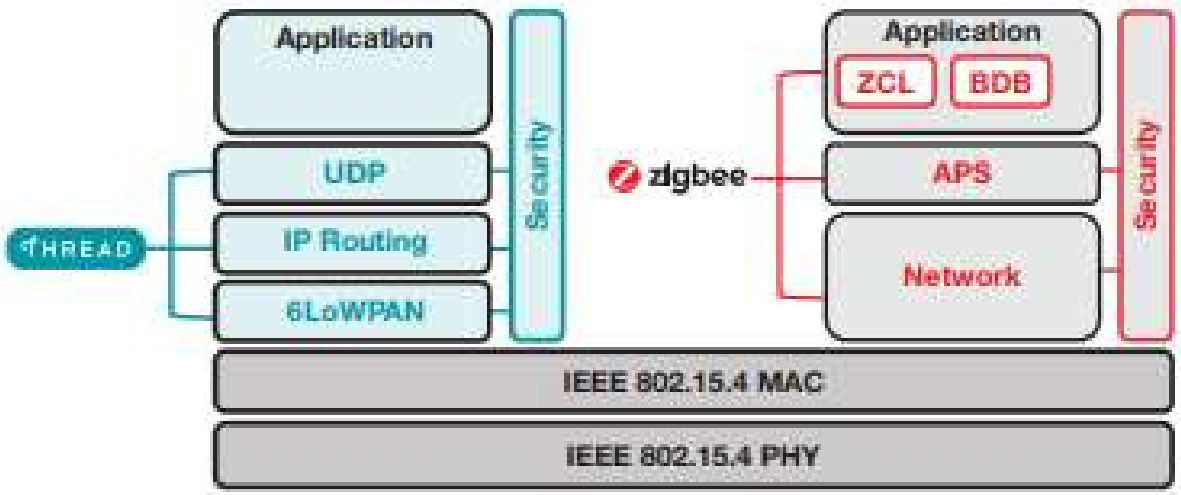
IPv6 Adoption



Reference Links:
https://iot-analytics.com/number-connected-iot-devices/
https://www.google.com/intl/en/ipv6/statistics.html

Need of Thread

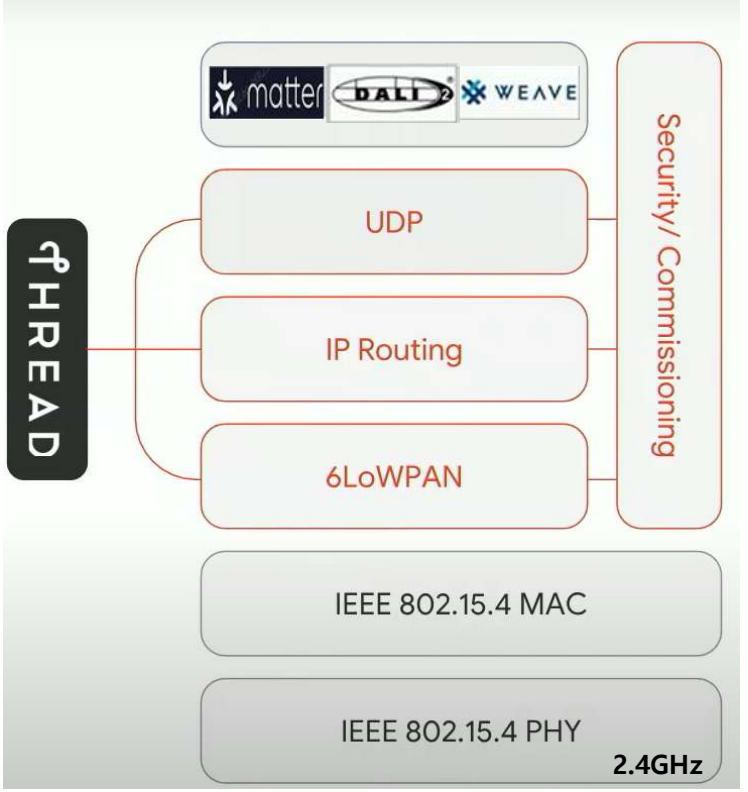
- Zigbee defines all layers in the OSI model
- Non IP mesh network
- Network header (and network addresses) must be adapted to IP
- Payload usually re-secured at IP Gateway and may require some adaptation for IP
- Proprietary translation, hampered end-to-end security



What is Thread?

An IP based, low power, secure mesh networking technology for IOT products.

- Built on proven technologies
  - Thread protocol is application layer agnostic and does not define an application layer
  - Ipv6 and 6LoWPAN – Thread is an Internet Protocol version 6 (IPv6) based mesh network, 6LoWPAN defines how to sent IPv6 packets over 802.15.4
  - IEEE 802.15.4 – the same radio used for Zigbee networking protocol



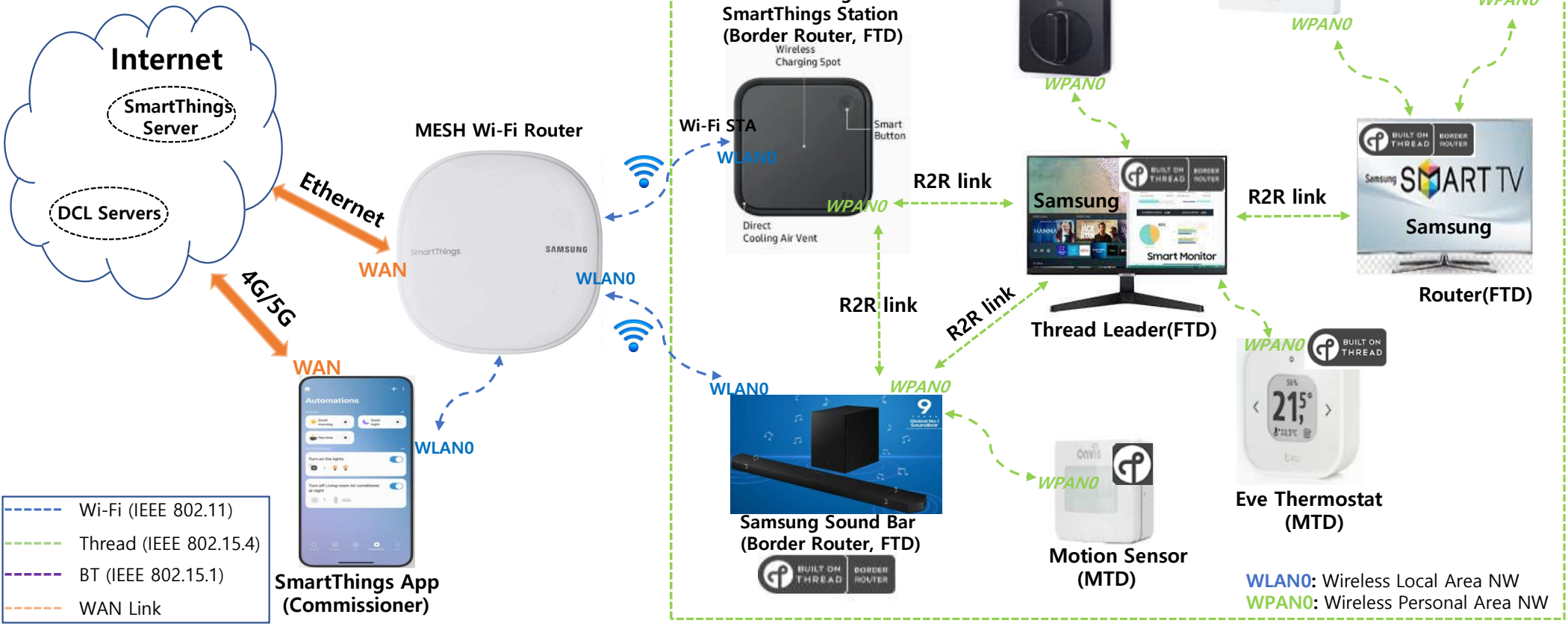
Thread | Mesh Network

Types:

FTD: Full Thread Device
- Radio always ON
- Main Powered
- Router Role

MTD: Minimal Thread Device
- Radio ON(need based)
- Battery Powered
- IoT End Node

Roles:
- End Device
- Router
- Border Router
- Thread Leader



Thread Group

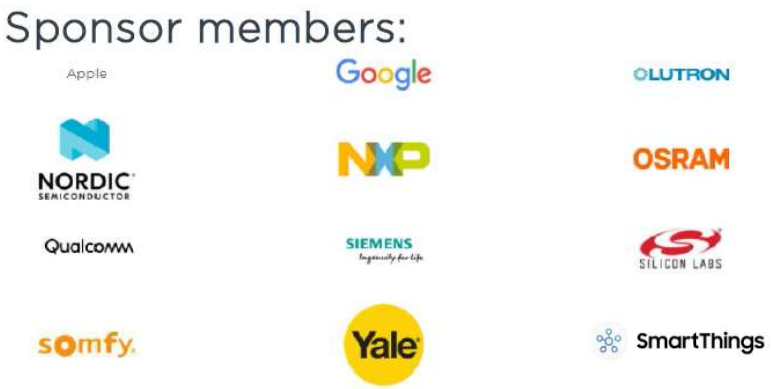
Mission

- Thread Group brings the Internet to IoT devices through its IP based, low power, secure mesh networking technology.

Vision

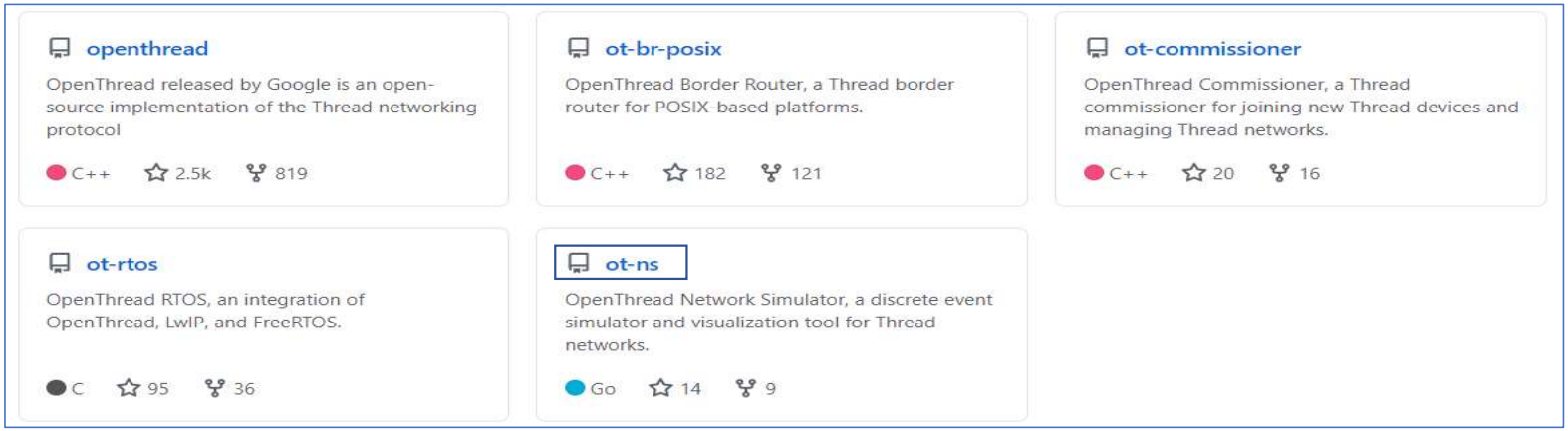
- To serve as the foundation of the Internet of Things by seamlessly connecting devices where we live and work.

- A Standardization body for creating, maintaining, and developing Thread protocol specification.
- Educate product developers and consumers on the key features and benefits of Thread.
- Ensure a great user experience through rigorous, meaningful product certifications



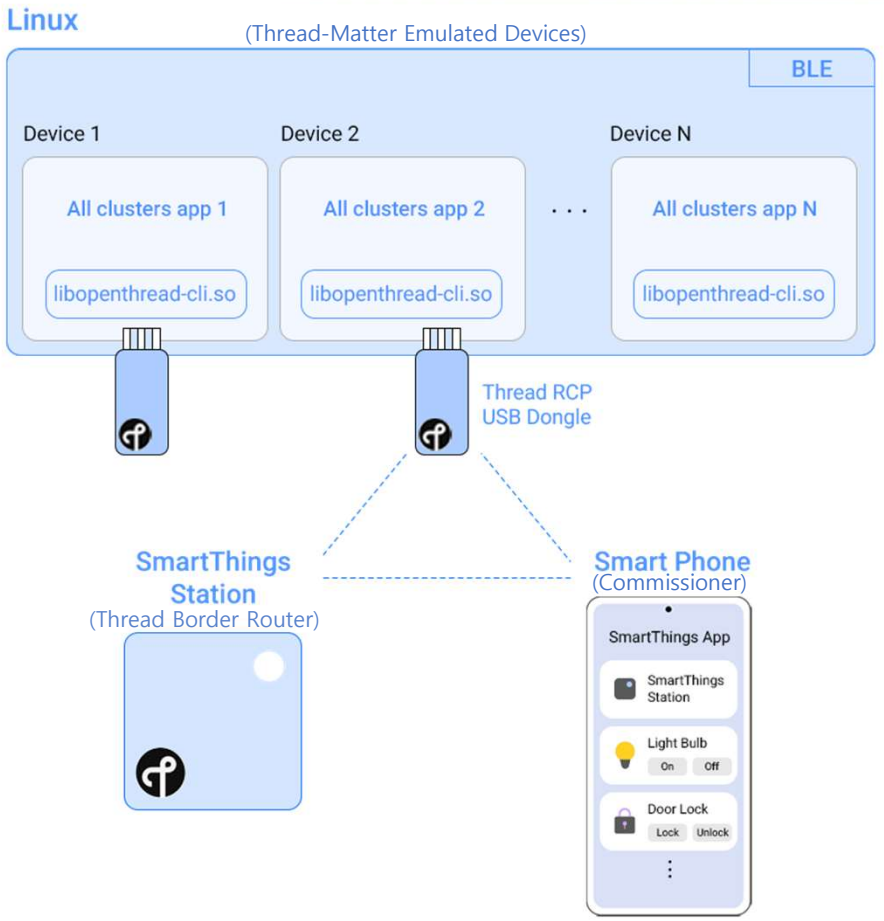
OpenThread Project

- OpenThread released by Google is an open source implementation of Thread networking protocol
- Key Components
  - Core Stack – Implementation of Thread specification
  - Border Router – Implementation of Thread Border Router
  - Commissioner – Implementation of Thread Commissioner
  - Network Simulator – Simulate large scale Thread networks
- Licensed under BSD-3. Hosted on Github - https://github.com/openthread/
- More info about OpenThread available in https://openthread.io/

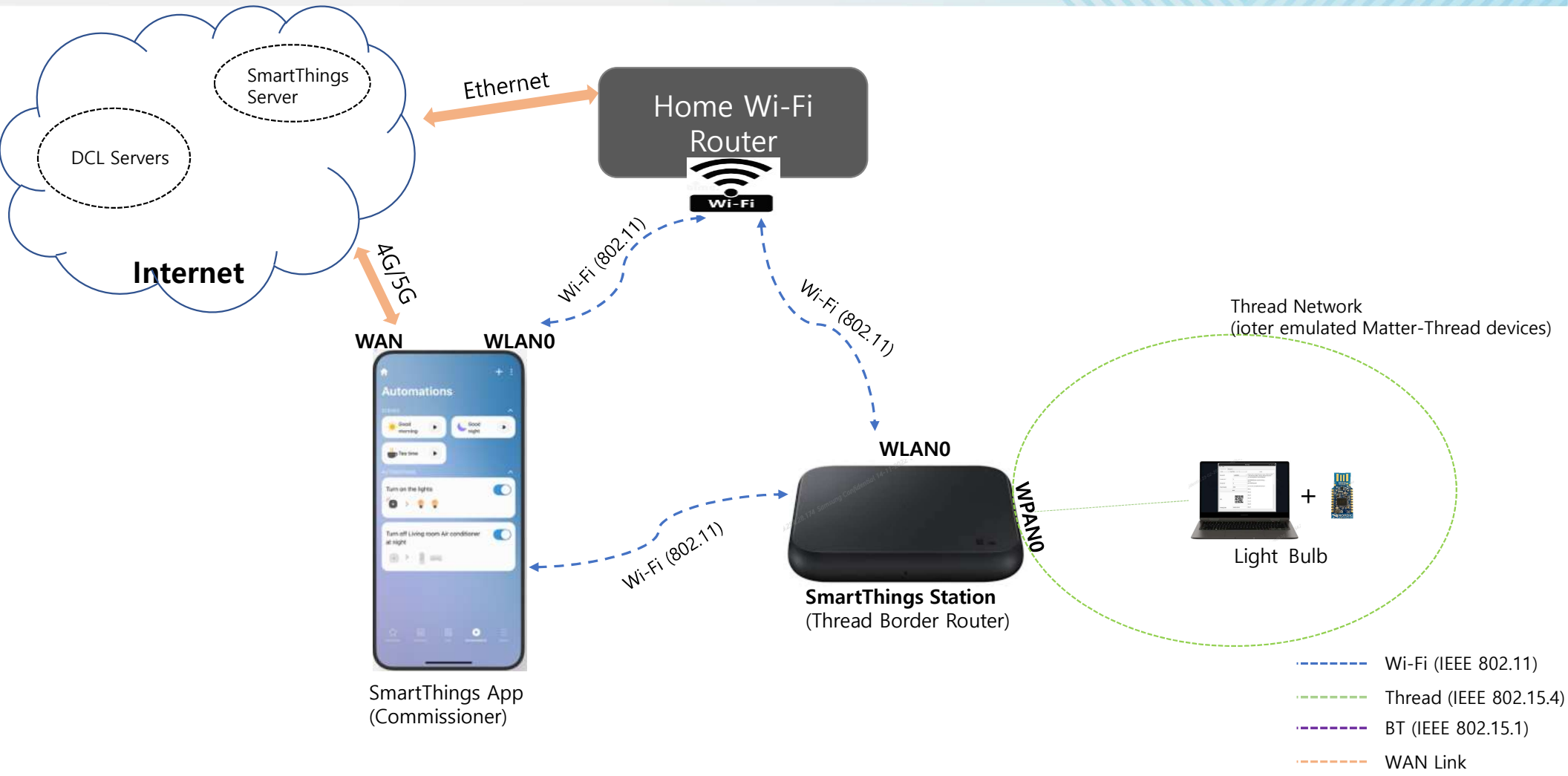


How IoTer works?

- IoTer emulates all Matter supported devices with a Linux PC and Thread RCP dongle.
- IoTer runs the all-clusters-app of Matter on a Linux PC to emulate multiple instances of various Matter supported IoT nodes.
- Each of these IoT nodes uses the underlying Thread RCP-based USB dongle (radio) for data transmission.
- By using the SmartThings Station as a border router and the SmartThings Application along with emulated IoT nodes, we can configure a smart home.

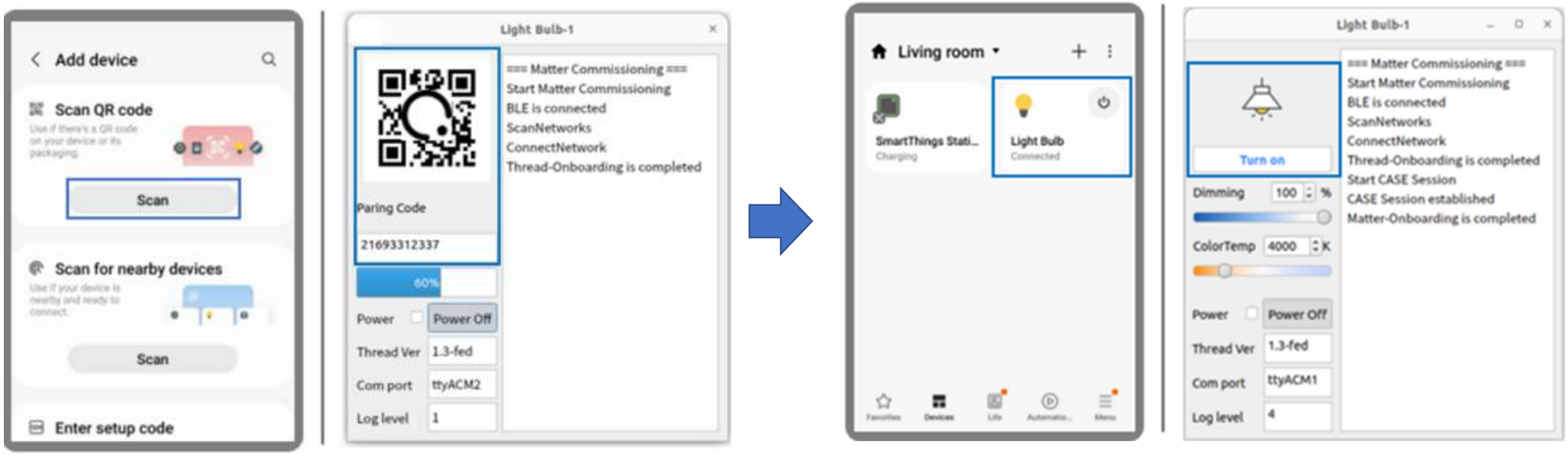


IoTer | Onboarding



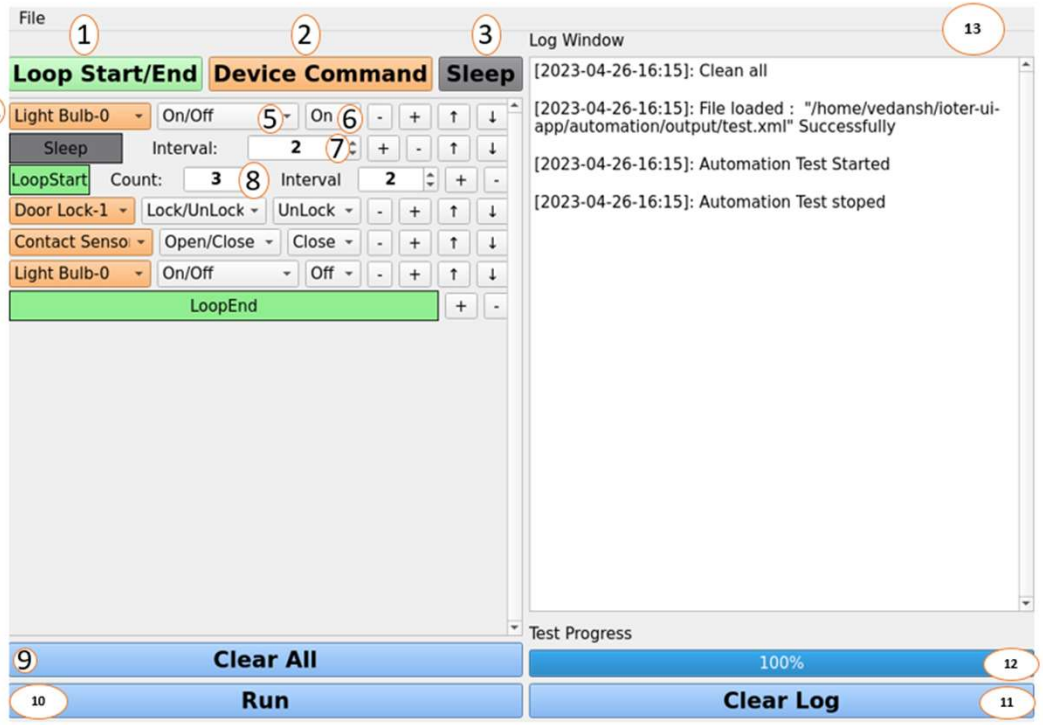
IoTer | Onboarding

- In the SmartThings App, click on the add device button in the upper right corner. Use Scan QR code or Scan for nearby devices to start onboarding
- After onboarding your virtual device, your device is now controllable from within the SmartThings app.



IoTer | Automation Testing

Use Automations to validate the connectivity and stability of various IoT device types.



1.Starts/ends the loop.
2.Add a command for the onboarded device.
3.Add sleep for a given interval as specified below.
4.Device type (light bulb, contact sensor, etc.).
5.Supported commands for the onboarded device.
6.Device command's value (for example, light bulb is On or Off).
7.Sleep interval, in seconds.
8.Loop count and loop interval, in seconds.
9.Clear all loops and commands.
10.Run the automation script.
11.Clear the log window.
12.Script completion progress bar.
13.The log window, showing activities including script loads, executions, saves, and number of successful/ unsuccessful commands.

IoTer

Benefits:

- **Flexibility** - Multiple types of IoT devices can be implemented using a single RCP dongle.
- **Multi-Device Support** - Each RCP dongle supports a single device. ioter supports up to 10 RCP dongles at a time.
- **Low Cost** - Limited expenses for testing various IoT device types.
- **Time Saving** - Virtual devices on demand - no need to search for and procure multiple IoT device types.
- **Easy To Use** - Quickly configure and control various IoT device types.
- **Automated Testing** - Repeated testing through scripts can validate device stability and connection.

Supported IoT devices:

- Light Bulb
- Door Lock
- Contact Sensor
- Temperature Sensor
- Humidity Sensor
- Light Sensor
- Window Covering
- Occupancy Sensor
- OnOff Plugin

More info about ioter available in https://developer.samsung.com/smartthings/

Thank You