RIOT and SUIT

Koen Zandberg

TRiBE
inTeRnet BEyond the usual

Overview

- Intro
- Update Architecture Overview
- Device Software Components
- Bootloader
- Demo

Open source platform: RIOT

- 32/16/8-bit MCUs
- Open Standards
- Internet of Things protocols stack

https://github.com/RIOT-OS

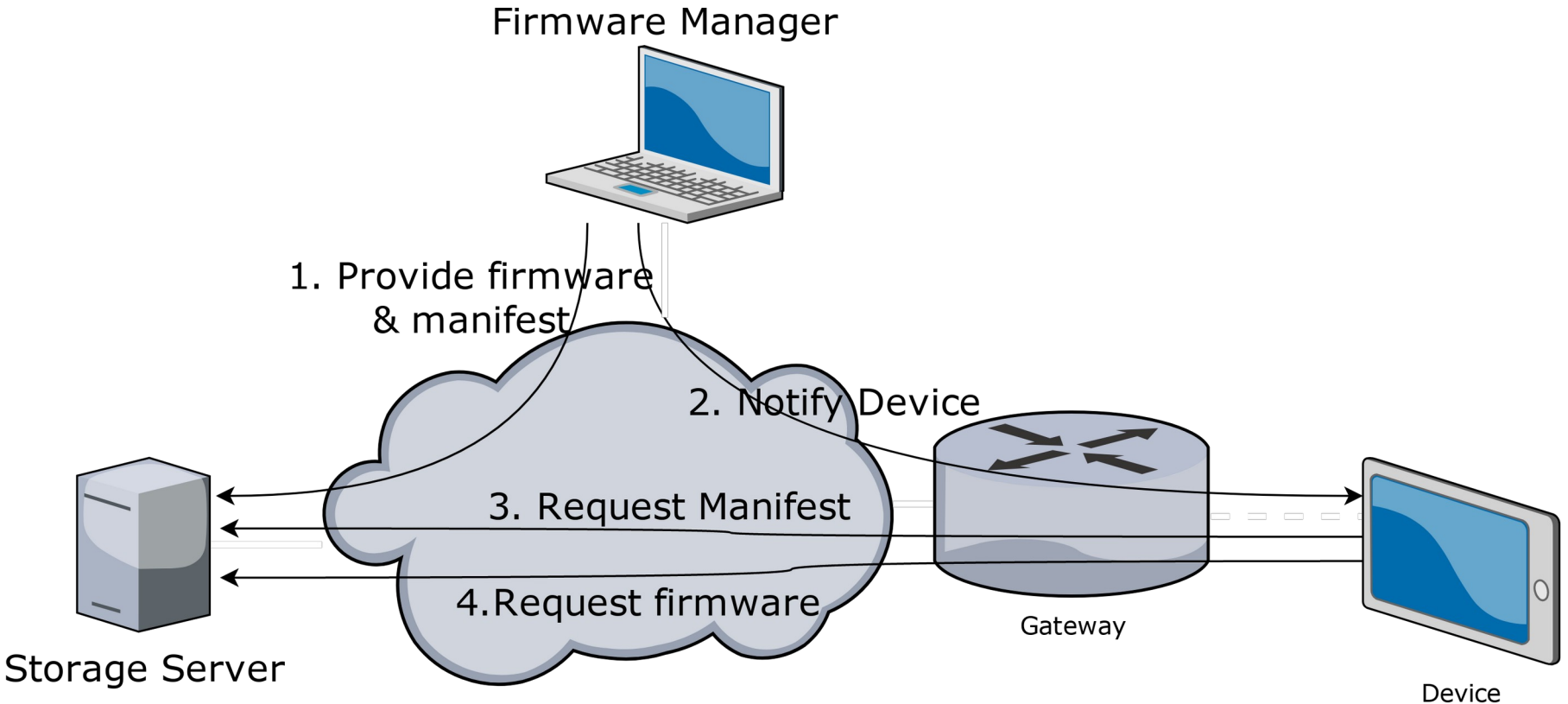
SUIT Implementation

- RIOT SUIT example: https://git.io/suit-updater

Overview

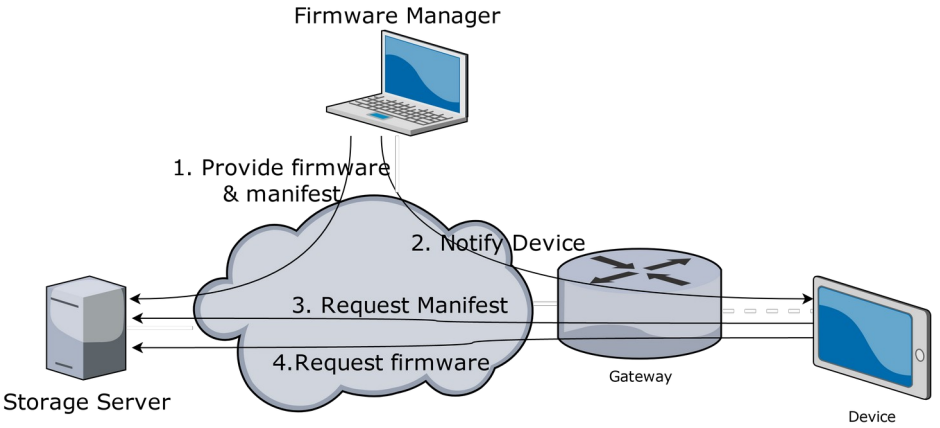
- Intro
- Update Architecture Overview
- Device Software Components
- Bootloader
- Demo

Update Architecture Overview



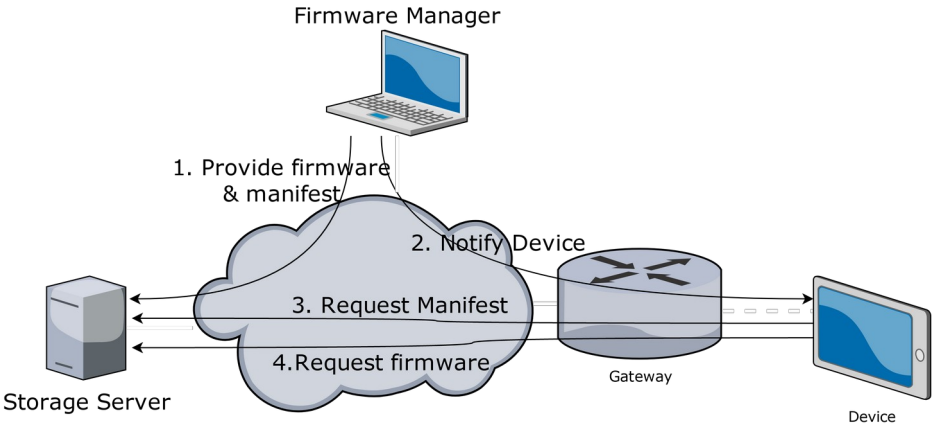
Update Architecture Overview

1. Store firmware and manifest on the server
   - Within the RIOT demo this is the same machine



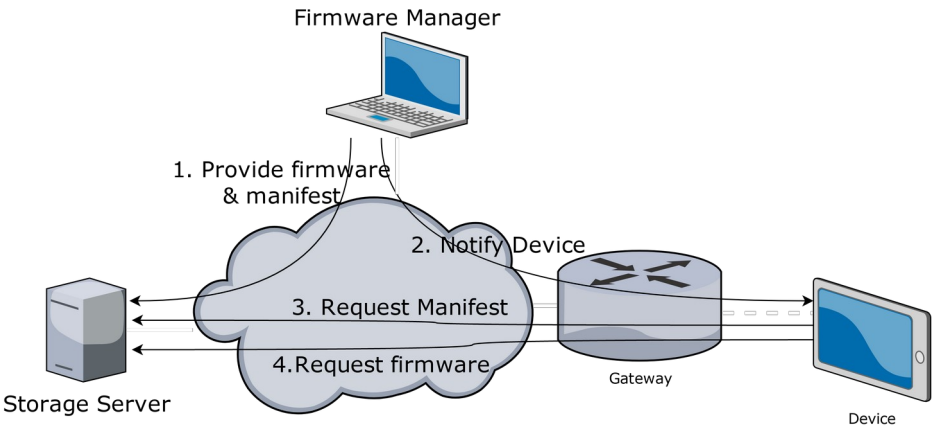
Update Architecture Overview

2. Notify the IoT device that an update is pending



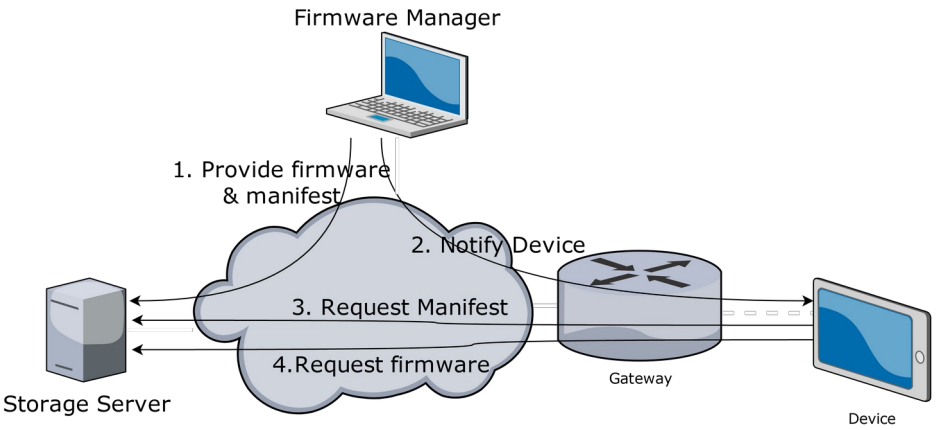
Update Architecture Overview

3. The IoT device requests the manifest from the server.
   - Here the SUIT manifest parsing starts



Update Architecture Overview

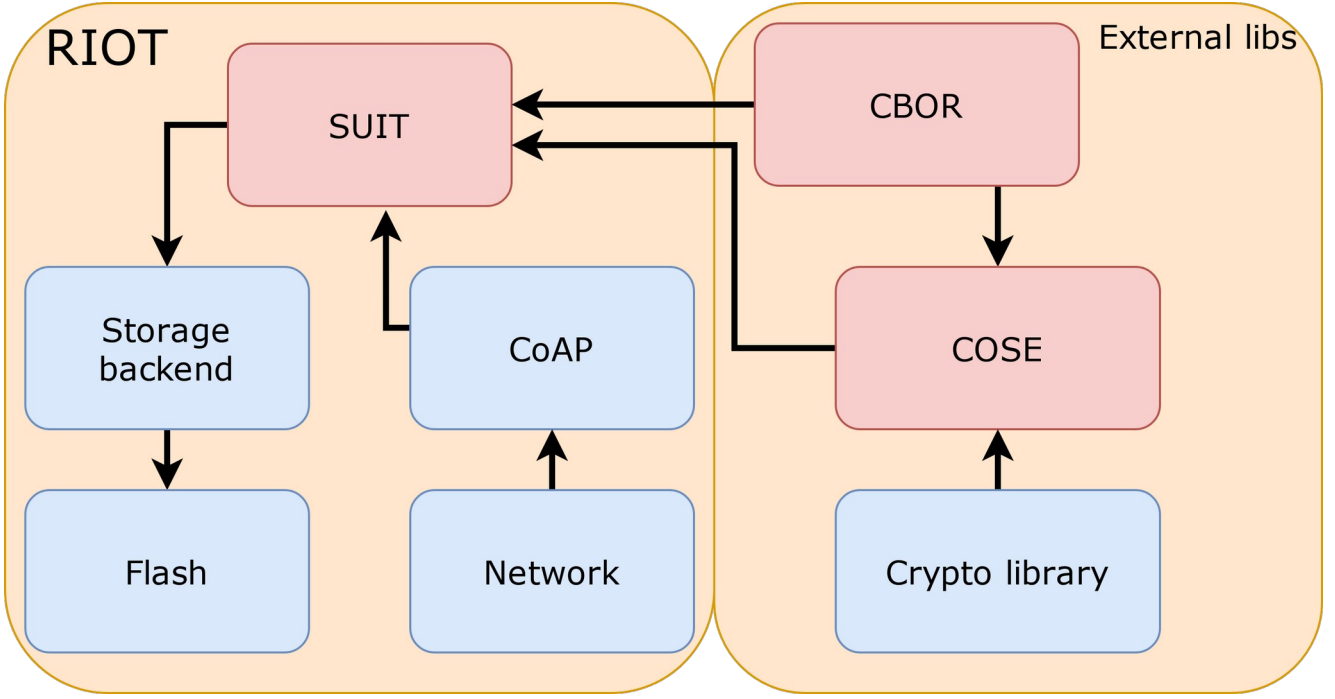
4. The IoT device downloads the firmware from the server.
   - Immediately streamed to the device flash, we skip the install



Overview

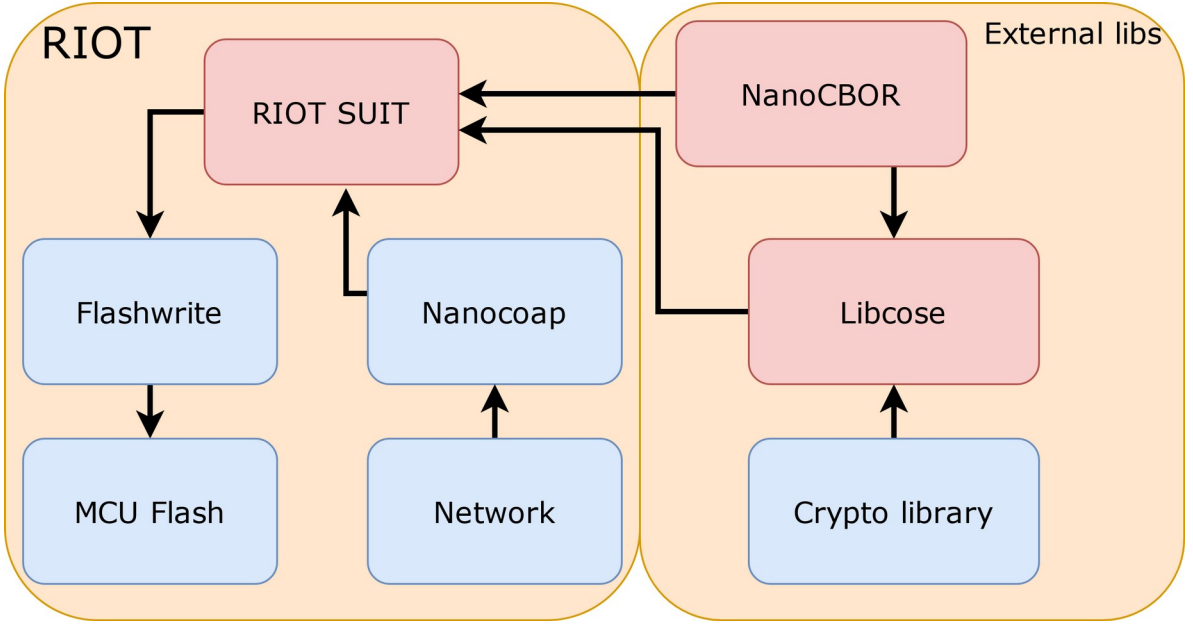
- Intro
- Update Architecture Overview
- Device Software Components
- Bootloader
- Demo

Device Software Components



Device Software Components

- Main components
  - SUIT Parser
  - NanoCBOR
  - Libcose



Device Software Components

- NanoCBOR
  - Pull style CBOR parser
  - 600B – 800B decoder
  - Optimized for parsing fixed schema structures
  - https://github.com/bergzand/NanoCBOR

Device Software Components

- Libcose
  - Embedded COSE library
  - Multiple crypto backend support
  - https://github.com/bergzand/libcose

Device Software Components

- SUIT parser
  - Using NanoCBOR and Libcose
  - Iterates over the CBOR maps
  - Jumptable-style design based on the map keys

Device Software Components

- Flash Writer
  - Dual slot A/B architecture
  - Writes the firmware directly to the flash of the device (to the other slot)
  - Version number used to select the slot

Overview

- Intro
- Update Architecture Overview
- Device Software Components
- Bootloader
- Demo

Bootloader

- Just another RIOT firmware
  - Iterate over the slots
  - Determine whether the header is valid
  - Determine which valid firmware has highest seq. number
  - Boot the selected firmware
  - See:

    https://api.riot-os.org/group__bootloader__riotboot.html

Demo / Walk-through

- Update a payload on RIOT with SUIT. No need for IoT hardware! See:

  https://github.com/RIOT-OS/RIOT/blob/master/examples/suit_update/README.native.md