



Towards a redundant, robust, secure and reliable IoT network

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Introduction

Backend Architecture

Setup

Conclusion

What is IoT ?

A network of physical objects not limited to devices, vehicles, buildings and other items that can collect and exchange data.

What is IoT ?

Everything that can be connected will be connected:

- Sensor
- Car
- Building
- City

Low Power Wide Area Network

Low Power Wide Area Network (LPWAN) especially aim to achieve:

- Low power → long battery live time
- Wide area

At CERN LoRaWAN have been chosen (see HEPIX fall 2017)

Important information regarding LoRa

- Optimize the battery lifetime of the device
- High range
- Packet size should not exceed 51 Bytes
- Network is subject to the duty cycle

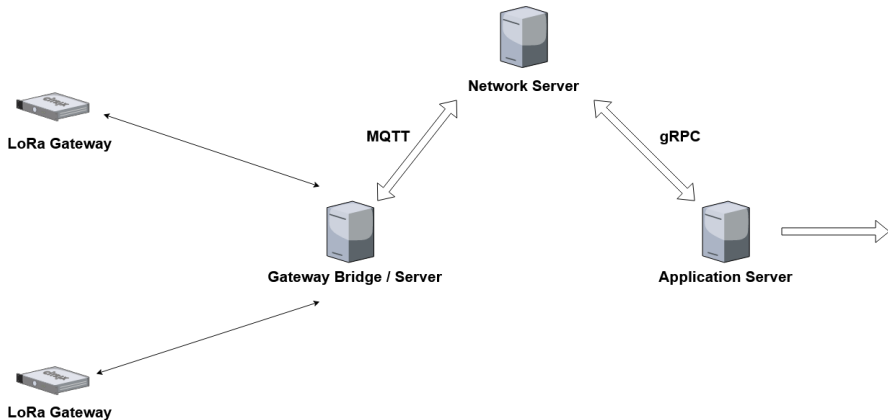
Note before starting

LoRa is not suited for:

- Real-time data
- Real-time control
- Critical applications
- Sending / Recieving big files
- Downlink-centric solutions

Backend Architecture

Architecture Overview



Role of the components

Gateway Bridge / Gateway Server:

- Maintains connections with gateways (rx and tx)

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Application Server:

- Handles LoRaWAN application layer, including uplink data decryption/decoding, downlink queuing and downlink data encoding/encryption.

Overview

What cannot be improved:

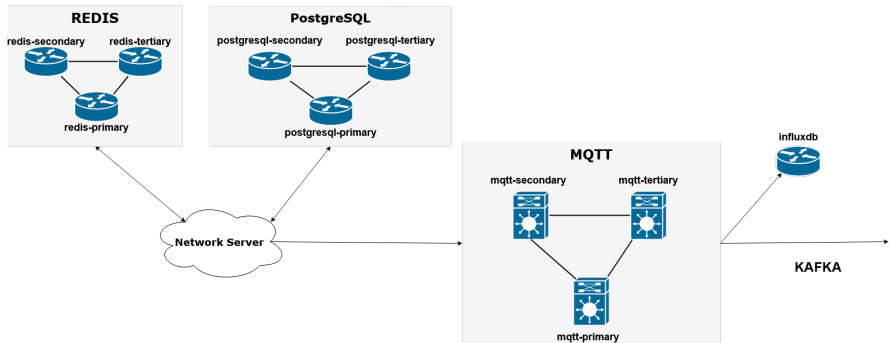
- Device → to gateway
- Gateway → Gateway Bridge / Server

What can be improved:

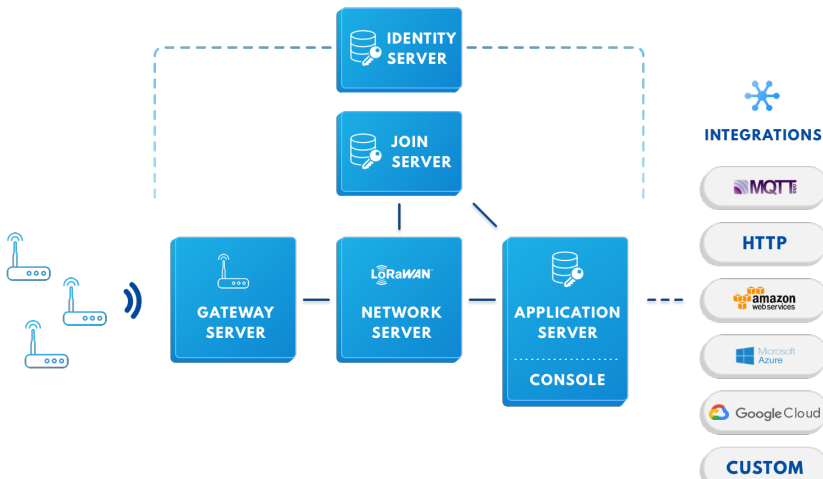
- Gateway Bridge / Server → Network Server
- Network Server → Application Server
- Application Server → Application

Setup

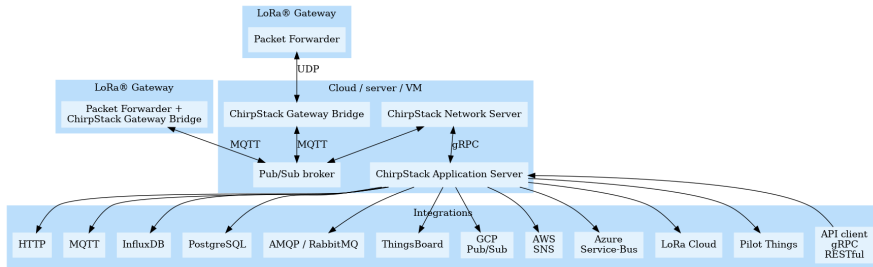
Architecture Overview



The Things Stack



Chirpstack



Conclusion

- 100% reliability cannot be reached
- The Things Network do not provide High Availability
- Load balancing and clustering necessary to make the network more reliable
- Storing meta information to continuously improve meta data
- Those are only first step towards a redundant, robust, secure and reliable IoT network

