University of Cagliari, Italy

DIEE - Department of Electrical and Electronic Engineering

Self - Configurable IoT Satellite Gateway with QoS Traffic Management

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Introduction

Satellite Network

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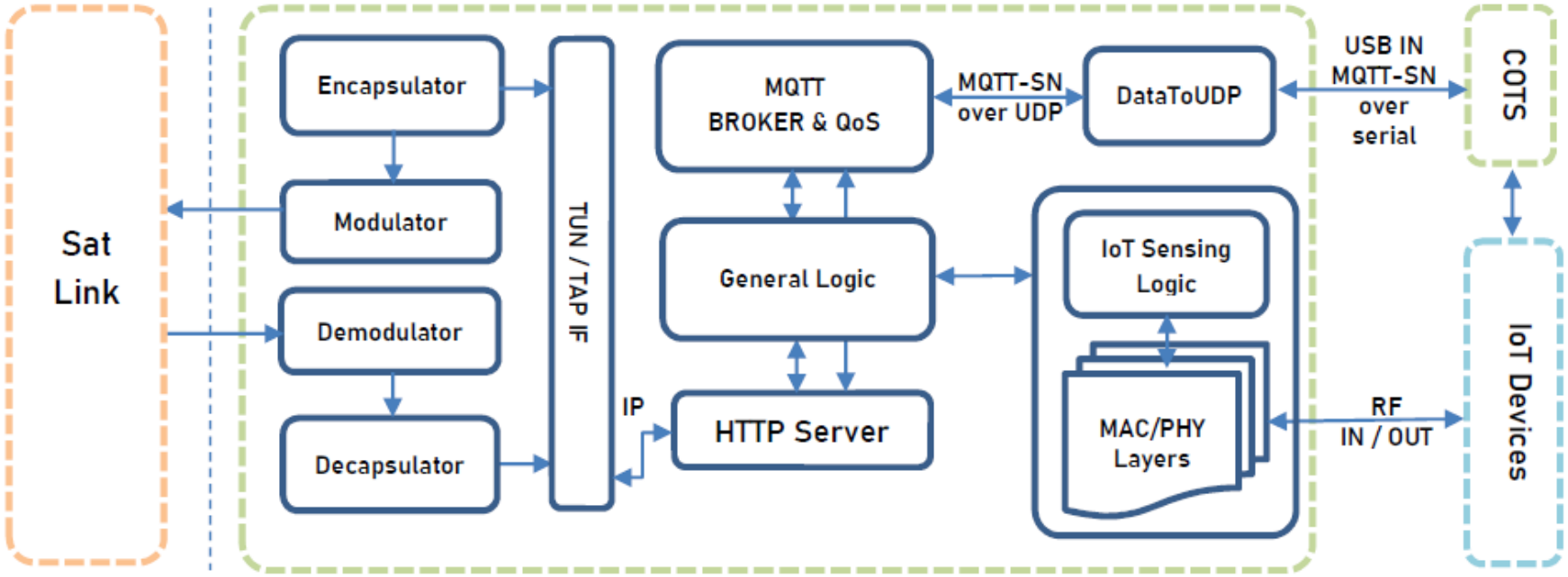
IoRT

Requirements

- From the Terrestrial side
  - Covering most of the presented protocols and standards.
- From the Satellite side
  - high aggregate throughput with very low transmission probability of packets;
  - effective support of small packages with very low transmission cycle;
  - minimum signaling overhead;

Architecture



Gateway Architecture

Implementation

MCLab

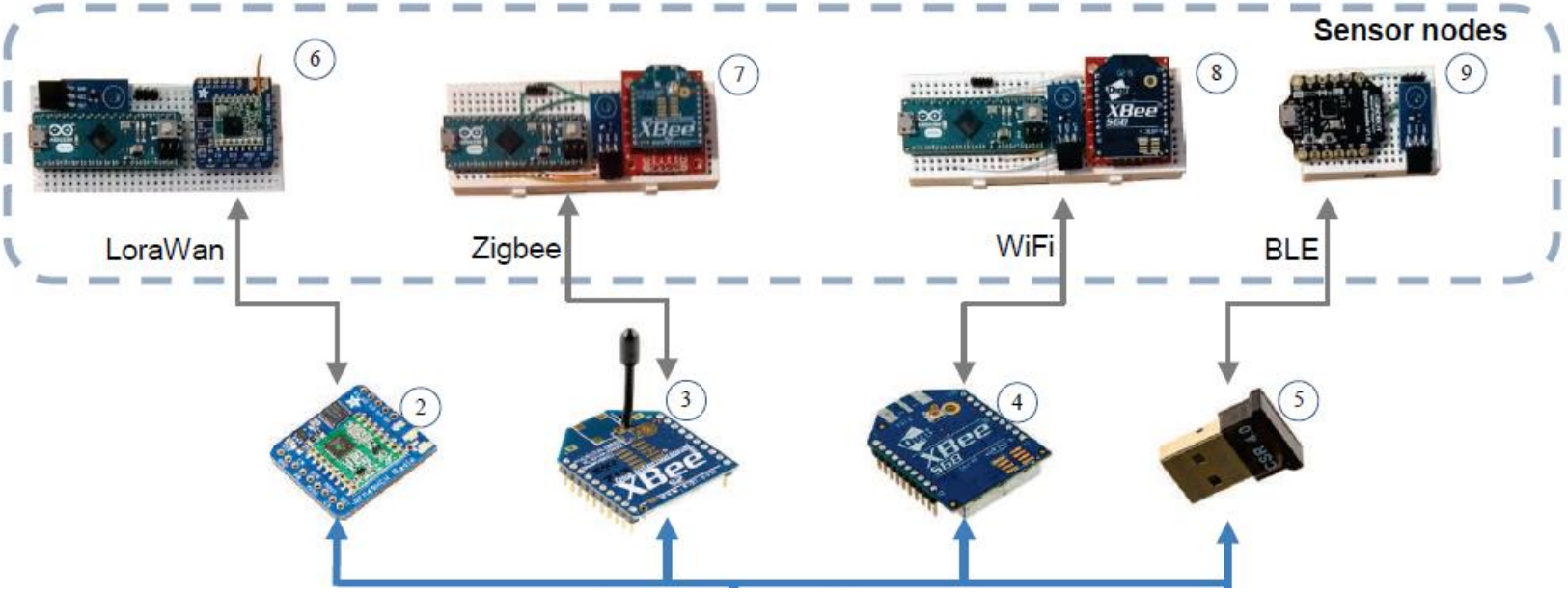
Computational platform

- USRP E320:
  - 2x2 MIMO transceiver (70 MHz to 6 GHz)
  - Xilinx Zynq 7045 SoC
  - Open Embedded Linux OS

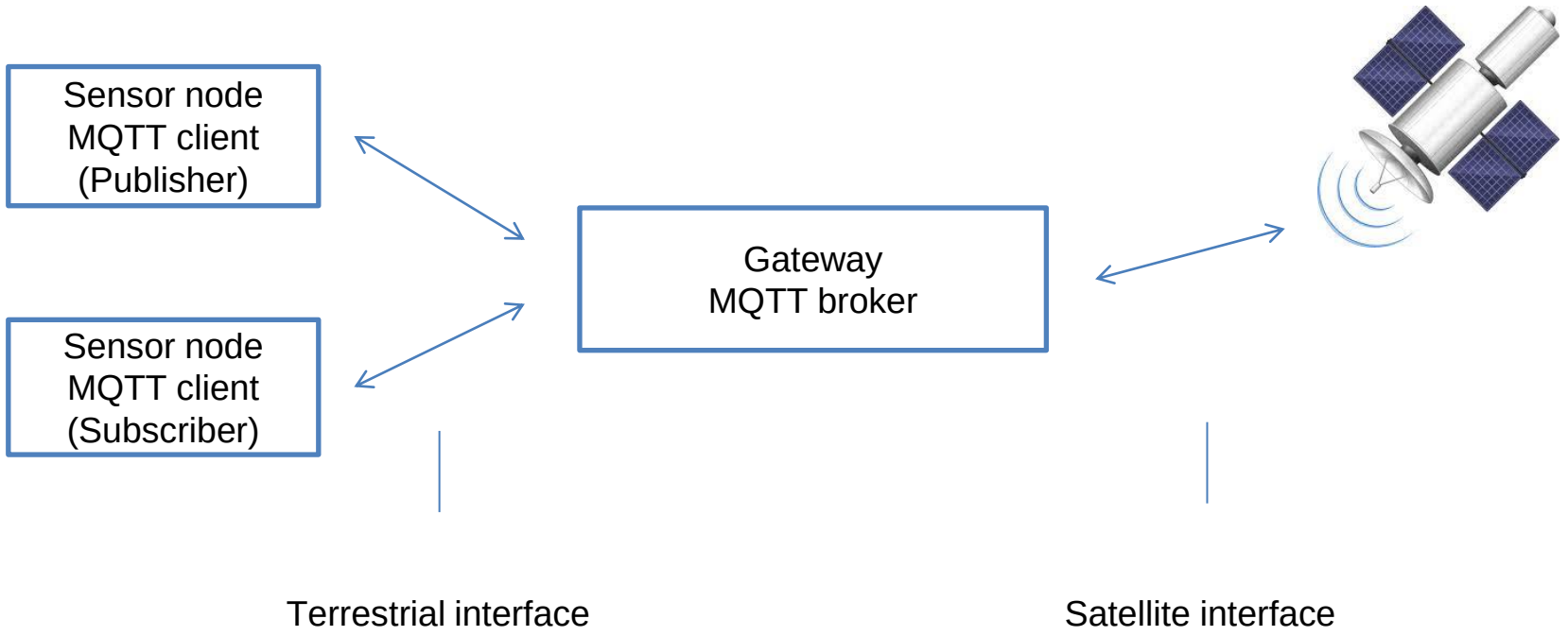
Implementation

Terrestrial-IoT interface:

- Adafruit RFM95W LoRaWan
- Xbee S2 Zigbee
- Xbee S6B Wi-Fi
- CSR 4.0 BLE



MQTT/MQTT SN

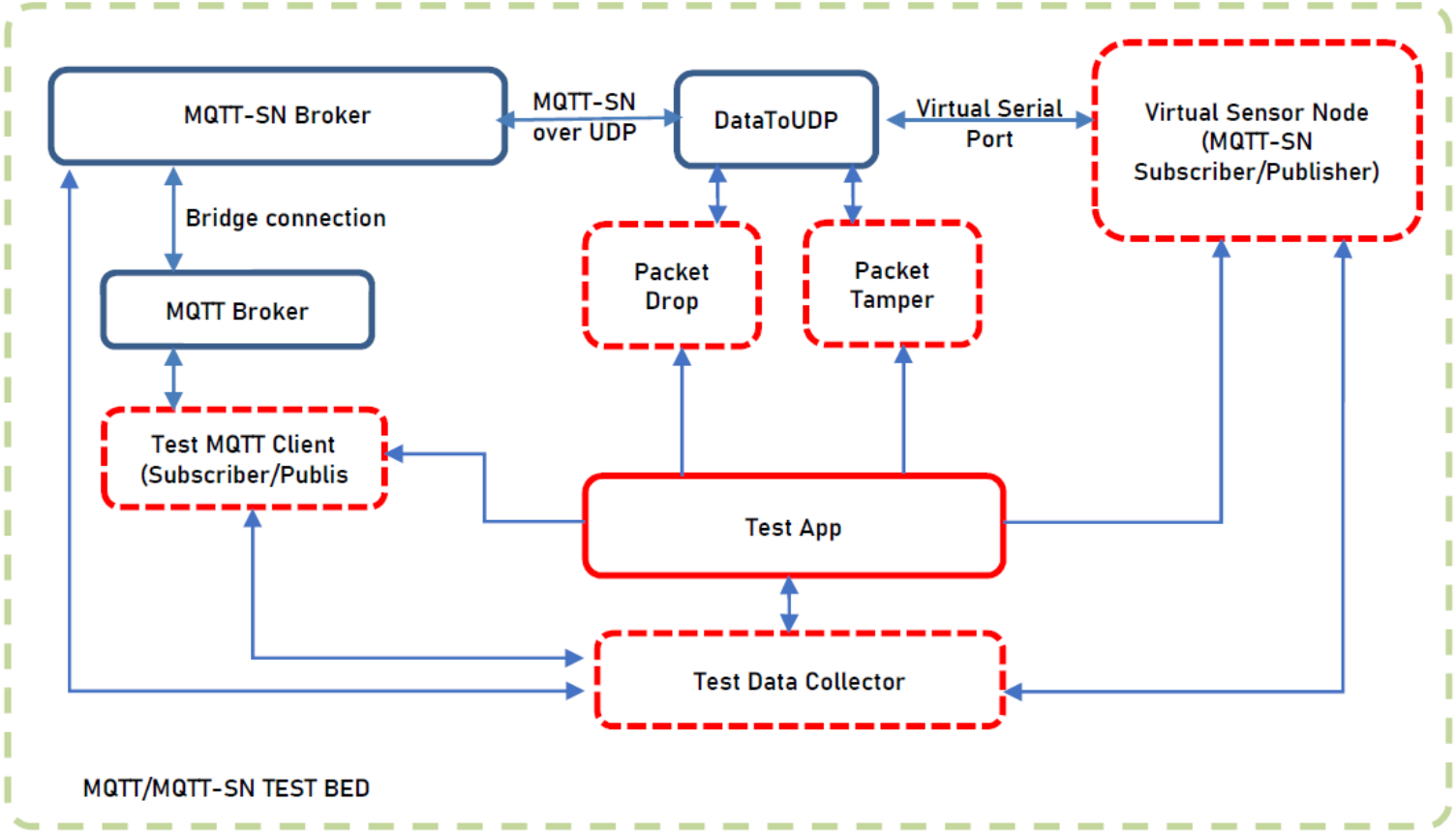

Sensor node
MQTT client
(Publisher)
Sensor node
MQTT client
(Subscriber)
Gateway
MQTT broker
Terrestrial interface
Satellite interface

QoS Management in MQTT:

- QoS 0 : At most once
- QoS 1 : At least once
- QoS 2 : Exactly once

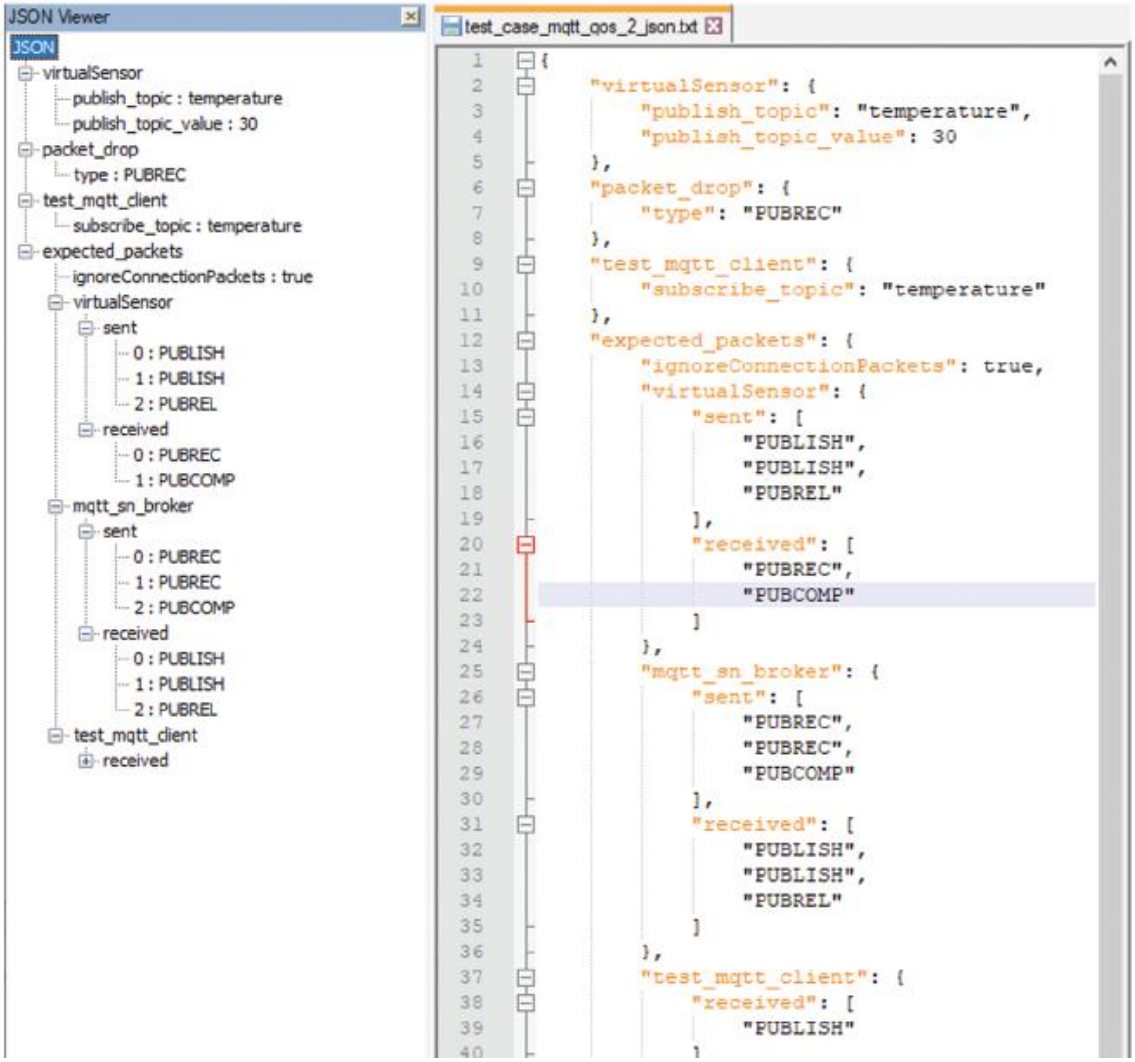
Test

- Self-Configuration Test
- MQTT (QoS) Test



Test

JSON file for QoS level 2 test



Conclusion and future work

- Our gateway represent an interesting starting point for study QoS in IoRT applications.

- Future works:

  - Open field testing
  - QoS improvement with ML

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Thank you for your attention