Integrating CYPRESS ENVIROSYSTEMS products into a plug & play LORAWAN infrastructure: EDF requirements

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EDF requirements for integration of LORA devices

- In 2017, EDF has adopted an internal reference document related to IOT & cybersecurity. 80 requirements have been defined.

- Renewing and safe storage of the Network and Application Session keys on the LORAWAN devices is one of these requirements.

- The ABP (Activation By Personalization) key provisioning process defined in LORAWAN is not appropriate and the OTAA (Over the Air Activation) procedure is preferred.

- Today, only OTAA procedure is supported in our reference architecture for private LORAWAN networks.

Modifications carried out by CYPRESS ENVIROSYSTEMS on the WGR product

The WGR product from CYPRESS ENVIROSYSTEMS is of great interest for EDF. However, some important adaptations are required for EDF to deploy that kind of product. The following adaptations have been ordered:

- LORAWAN compliancy with operation over the European [868-870MHz] band: this is required since a global private LORAWAN infrastructure is currently investigated for our power plants. The proprietary LORA implementation from CYPRESS ENVIRONSYSTEMS is not appropriate.

- OTAA provisioning: in order to enable internal generation and periodic regeneration of the Network and Application session keys and fit with our reference architecture design.

- CODEC script file: this file describes the information fields that are included in the frames exchanged between the WGR and the LORAWAN Application Server (AS). It is essential for plug & play provisioning. This file is captured via a « CODEC importer » tool, a specific feature embedded into the KURA gateway and developped by EDF.

- Ability to operate the device on good links (SF7) or poor quality links (SF12). The device shall be at least configurable in a given SF so that it can join and transmit data over this given SF.

Note: KURA / KAPUA are source codes from the Eclipse Foundation

Reference architecture for plug & play LORAWAN integration: used for WGR validation tests (October 9th)
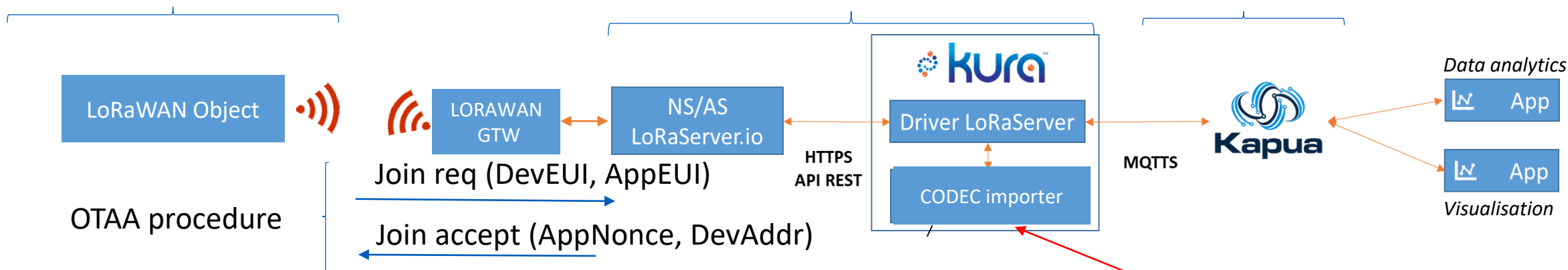
GTW Kerlink iFemtoCell

AAEON Industrial PC

Cypress Gauge Reader (WGR)

On-site server

Datacenter server

LoRaWAN Object

LORAWAN GTW

NS/AS LoRaServer.io

KURA

Driver LoRaServer

CODEC importer

Kapua

Data analytics

App

App

Visualisation

HTTPS API REST

MQTTS

Join req (DevEUI, AppEUI)

OTAA procedure

Join accept (AppNonce, DevAddr)

WGR script file is provisioned into the KURA Gateway

```
function Decode(fPort, bytes) {

    reading_extract = [0, 0]; // Initialization for 2 byte raw reading extraction
    battery_extract = 0; // Initialization for 1 byte raw battery level extraction
    errorCode_extract = 0; // Initialization for 1 byte error code extraction

    type = bytes[1]; // WGR payload type

    if (type == 18) { // 0x12, regular WGR reporting payload
        reading_extract = [bytes[3], bytes[4]]; // raw reading extraction
    }
    else if (type == 20) { // 0x14, extended WGR reporting payload
        reading_extract = [bytes[3], bytes[4]]; // raw reading extraction
        battery_extract = bytes[6]; // raw battery level extraction
    }
    else if (type == 21) { // 0x15, WGR diagnostic payload
        errorCode_extract = bytes[4]; // error code
        reading_extract = [bytes[5], bytes[6]]; // raw reading extraction
        battery_extract = bytes[7]; // raw battery level extraction
    }
}
```

The LoRaServer driver and the Codec Importer are features designed by EDF

KAPUA is the IOT platform for collecting flows from KURA gateways or other devices .

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Validating gauge data collection on the KAPUA interface

Gauge readings are collected every 5mn

Battery levels are transmitted every 30mn

EDF

Merci

Afterwork!