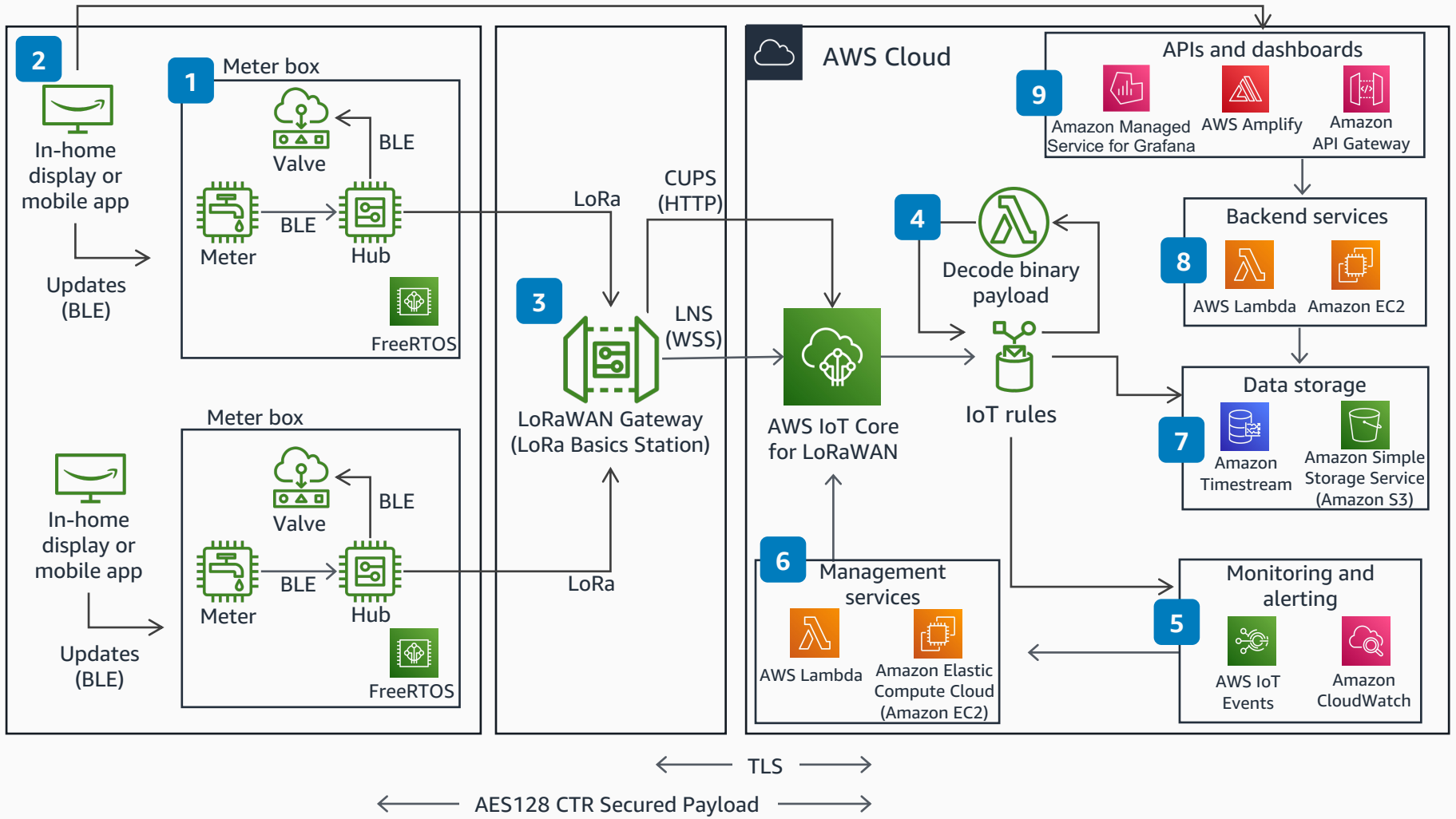
Smart Metering for Water Utilities

This architecture shows how to use AWS IoT Core for LoRaWAN to reliably collect water meter reads from multiple metering devices. Transfer the data to the cloud, detect water leakage in the grid, and gain deeper insights on water consumption, while monitoring and and managing the fleet of meters.



1. The purposes-built devices in the meter box use FreeRTOS as their operating system (OS). The *meter* collects water consumption, the *valve* interrupts water flow, both devices communicate via Bluetooth Low Energy (BLE) with the *hub,* which uses the LoRaWAN protocol to send telemetry to the cloud. The hub runs in Class A mode, which enables it to receive commands after the uplink transmission has been completed.
2. In-home displays or mobile apps are used to perform a local update process, connection is established via BLE.
3. The LoRaWAN gateway receives the meter data from the hub and forwards them to the **AWS IoT Core for LoRaWAN** service. The CUPS protocol is used to keep compatible gateways up-to-date.
4. **AWS IoT Core for LoRaWAN** sends the payload to the Rules Engine (through a LoRaWAN destination) where an **AWS Lambda** function decodes the binary device payload before data can get processed further.
5. **Amazon CloudWatch** is used for monitoring the state of your gateways and devices. **AWS IoT Events** tracks message deliveries to detect whether devices are still sending meter reads.
6. Management Services are a custom-built layer to manage devices and schedule downlink messages.
7. The data storage layer stores the meter reads on **Amazon S3** or in a purpose-built data store such as **Amazon Timestream**.
8. The backend services use the incoming meter reads to generate further insights.
9. **Amazon Managed Service for Grafana** is used for creating dashboards, while **AWS Amplify** and **Amazon API Gateway** enable access for third parties.

Reviewed for technical accuracy March 16, 2022

AWS Reference Architecture