
AWS
re:Invent

IOT313

Setting up a private LoRaWAN network with AWS IoT

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AWS

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Agenda

- LoRa and LoRaWAN concepts
- Bringing LoRaWAN connectivity to AWS IoT Core
- Setting up gateways and devices
- AWS IoT Core for LoRaWAN® components and data flow
- Demo
- Customers



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LoRa and LoRaWAN

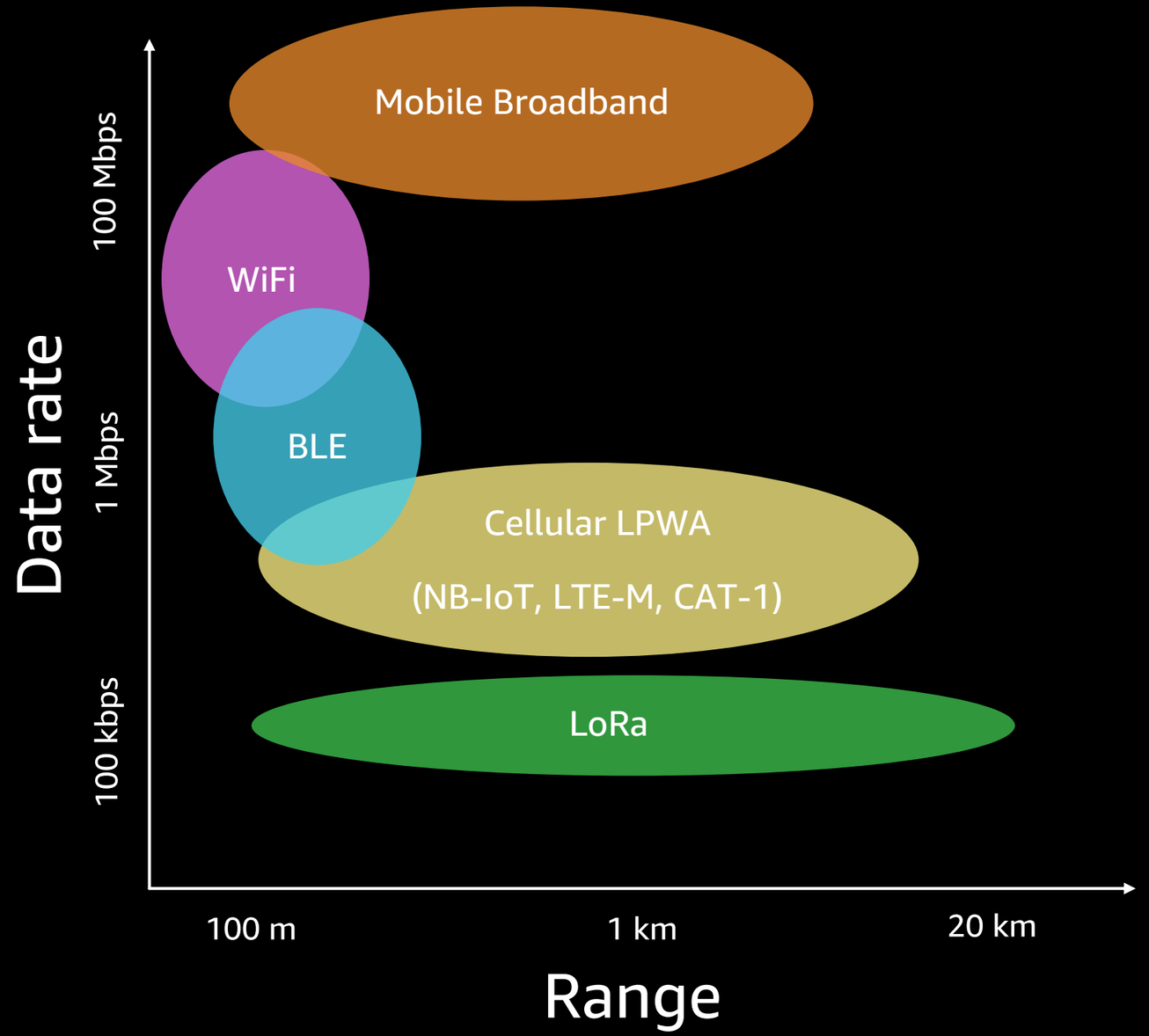


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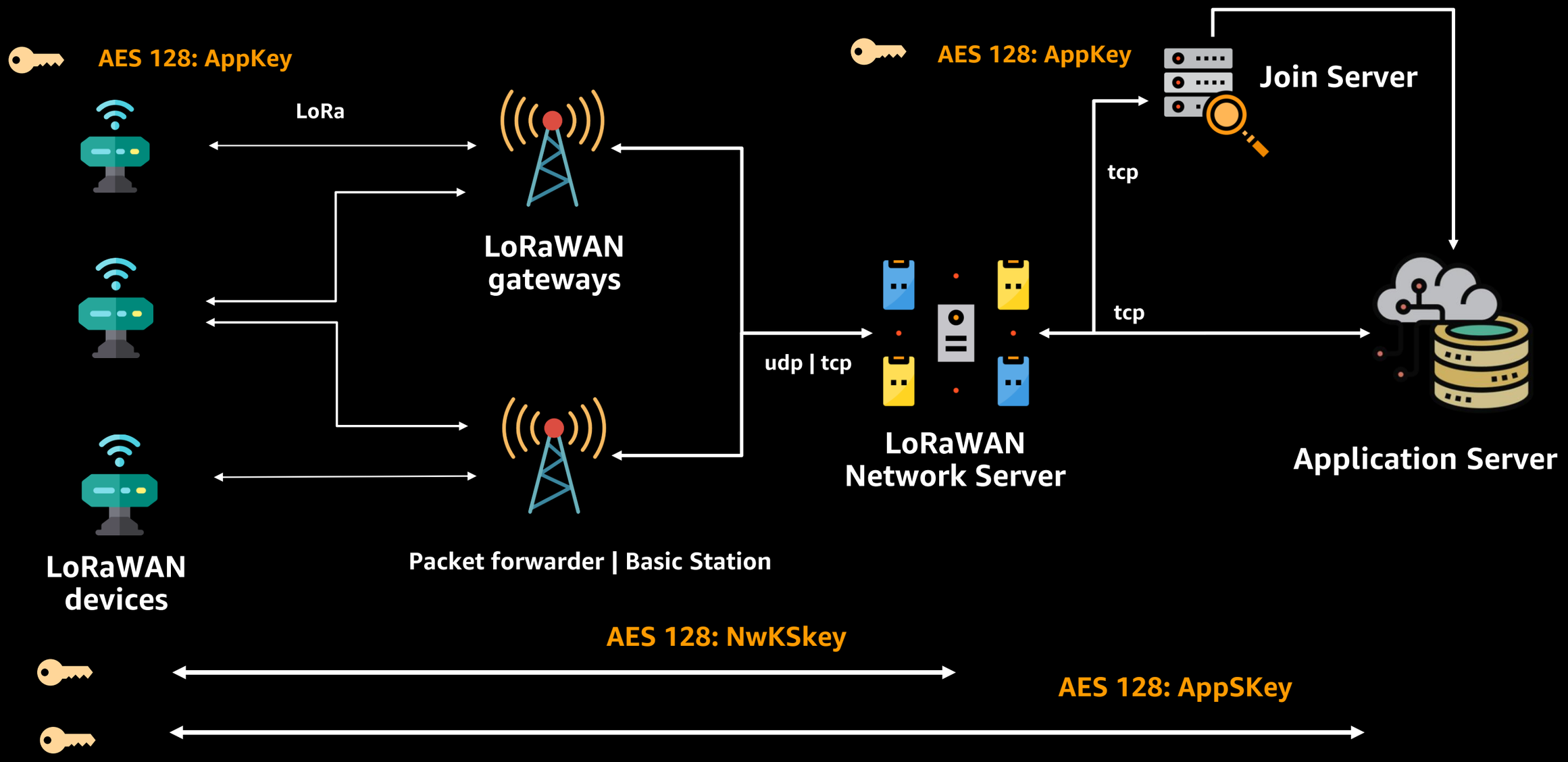
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Why LoRa?

LoRa technology offers an **efficient**, **flexible,** and **economical** solution to real-world problems in **rural** and **indoor** use cases, where cellular and Wi-Fi/BLE-based networks are ineffective



LoRaWAN components



LoRaWAN meets AWS IoT Core

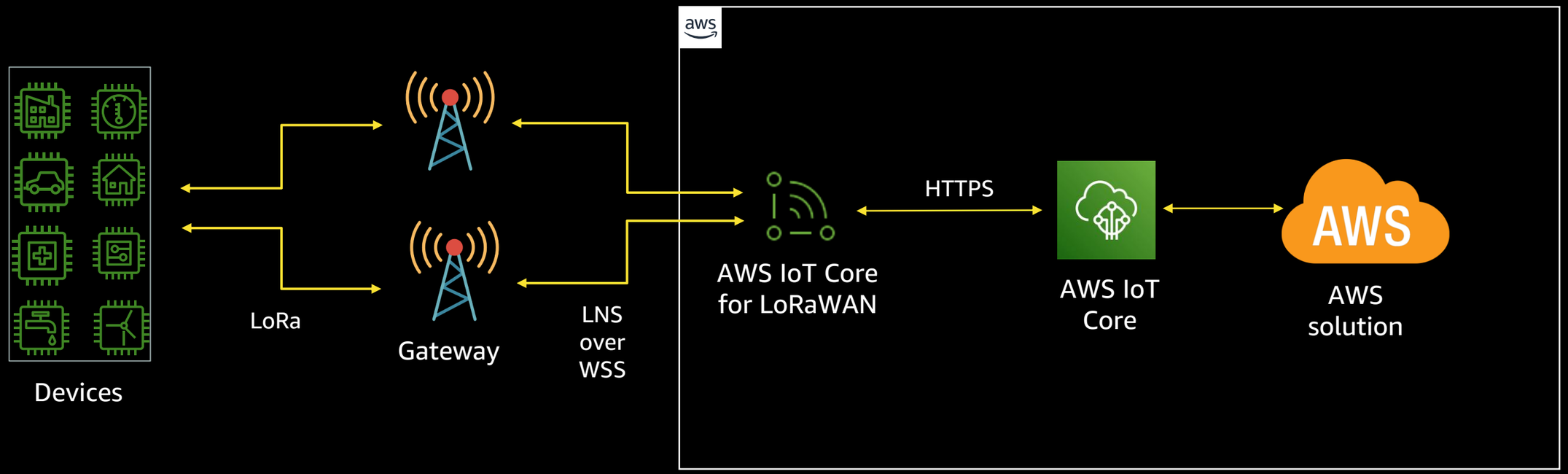


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How does it fit with AWS IoT?

AWS IoT Core for LoRaWAN enables enterprises to set up a private LoRaWAN network by connecting their own gateways and devices to the AWS cloud, without the need to develop or operate a LoRaWAN Network Server (LNS) themselves



Gateways

Software stack

Software Requirement:
LoRa Basic Station 2.0.4+ (open source version distributed by Semtech)

Support for CUPS:
Enables connection to AWS IoT Core for LoRaWAN endpoint

Security:
TLS v1.2 mutual authentication with x.509 certificates

Data Plane:
Websockets (LNS protocol)

Control and Management Plane:
HTTPS

Gateway final state



Unique digital identity



AWS IoT thing registry

Find AWS IoT Core for LoRaWAN Qualified SKUs in the AWS Partner Device Catalog
https://devices.amazonaws.com/

Gateways – Setup

```
aws iotwireless --endpoint-url="https://api.iotwireless.us-east-1.amazonaws.com"
        create-wireless-gateway
        --name="gateway_cli_example"
        --lo-ra-wan '{"GatewayEui": "a12345fff7cba9a6","RfRegion": "US915"}'
```

Devices

LoRa Alliance

LoRaWAN Certified Products

Enables you to select from a large array of certified products

Provisioning

Support for LoRa Specification 1.0.x and 1.1

Both OTAA and ABP Devices

Device final state



Unique digital identity

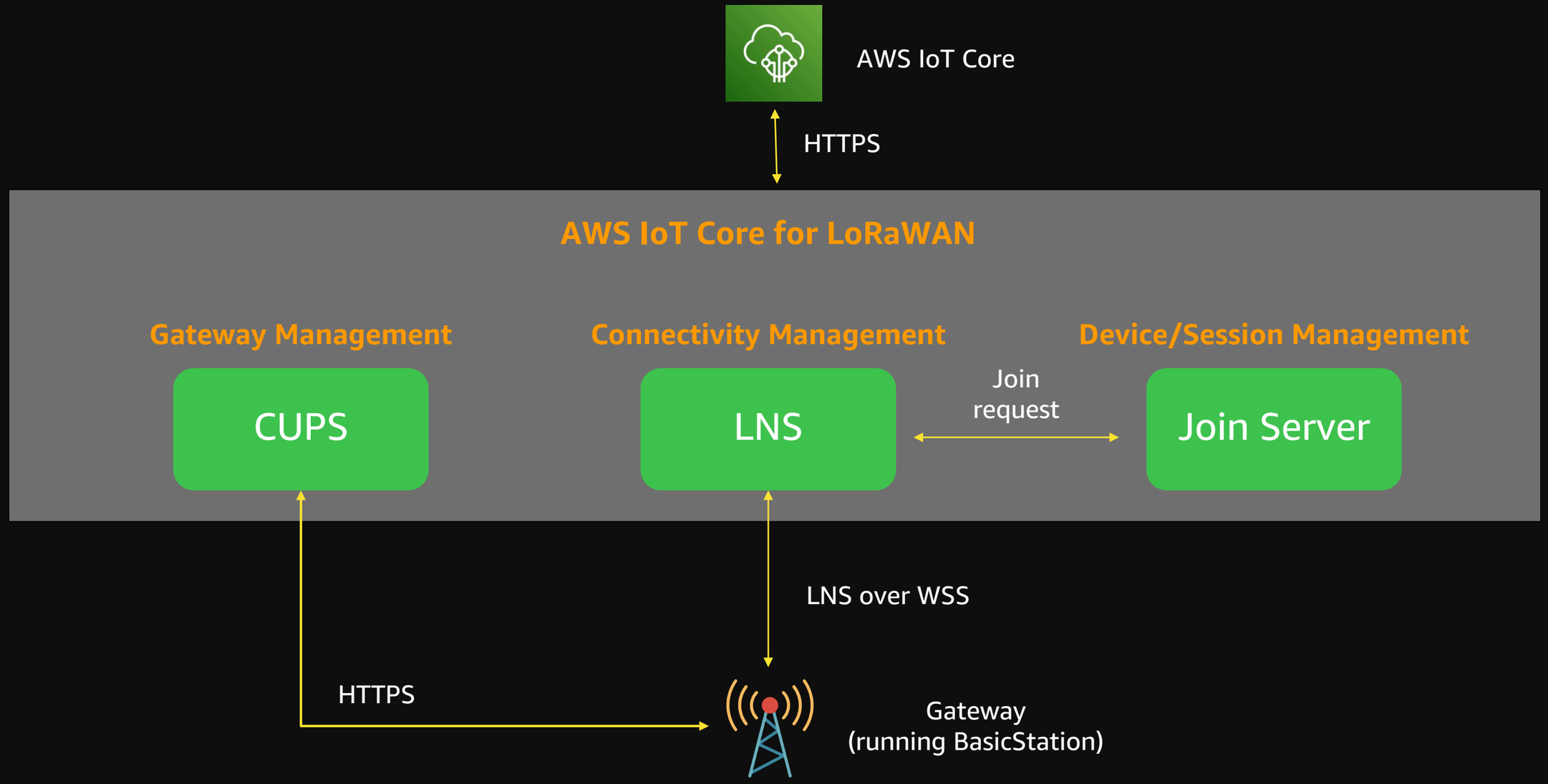


AWS IoT thing registry

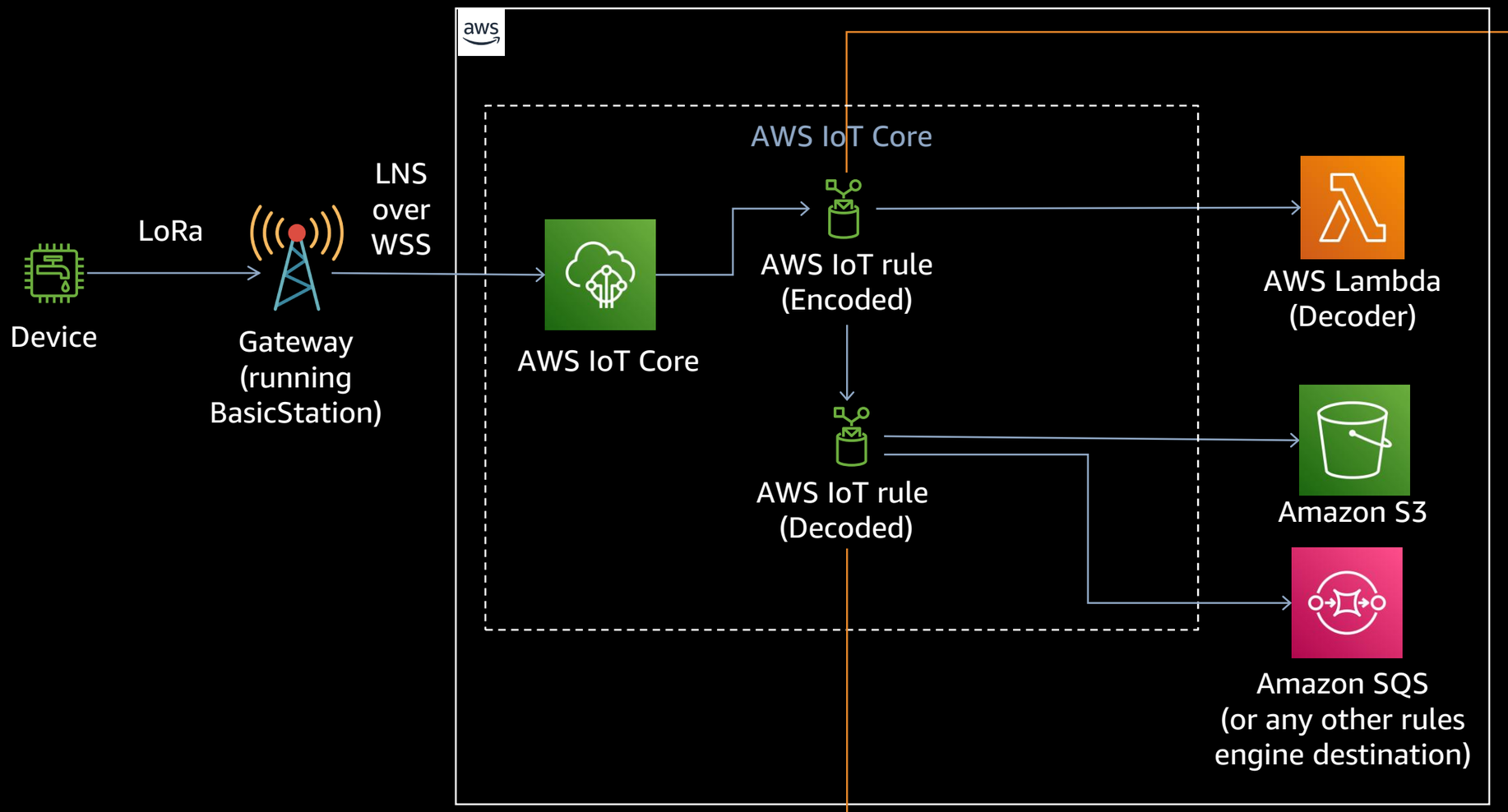
Devices – Setup

```
aws iotwireless --endpoint-url="https://api.iotwireless.us-east-1.amazonaws.com"
        create-wireless-device
        --type="LoRa"
        --name="device_cli_example"
        --destination-name="test_destination"
        --lo-ra-wan '{"DevEui": "01234567891234A6",
                      "DeviceProfileId": "…",
                      "ServiceProfileId": "…",
                      "OtaaV1_0_x": {
                              "AppKey" : "27abcdef123e11a123cd4ab123ab123b",
                              "AppEui" : "27abcdef123e11a4"
                      }
        }'
```

Under the surface - Components



Data flow - Uplink



Base64 encoded binary payload


```
{
  "DeviceId": "7078dea0-1fd4-4be8-bbc7-825022e698ec",
  "ApplicationId": 103,
  "PayloadData": "CAs8Y/////8=",
  "Metadata": {
    "LoRaWAN": {
      "DataRate": 5,
      "DevEUI": "58a0cb000010910e",
      "FPort": 103,
      "Frequency": 867100000,
      "Gateways": [
        {
          "GatewayEUI": "80029cfffe5cf249",
          "RSSI": -50,
          "SNR": 9
        }
      ],
      "Timestamp": "2020-10-09T14:53:51Z"
    }
  }
}
```


Clear-text payload


```
{
  "output": {
    "device": "7078dea0-1fd4-4be8-bbc7-825022e698ec",
    "payload": {
      "voc": 65535,
      "voc_error": true,
      "co2": 65535,
      "co2_error": true,
      "iaq": 0,
      "rh": 90,
      "rh_error": false,
      "temp_board": 29,
      "temp_ambient": -32,
      "batt": 3.6
    }
  }
}
```

Network components management

Gateway lifecycle management

Remote firmware update

Remote configuration update

Device lifecycle management

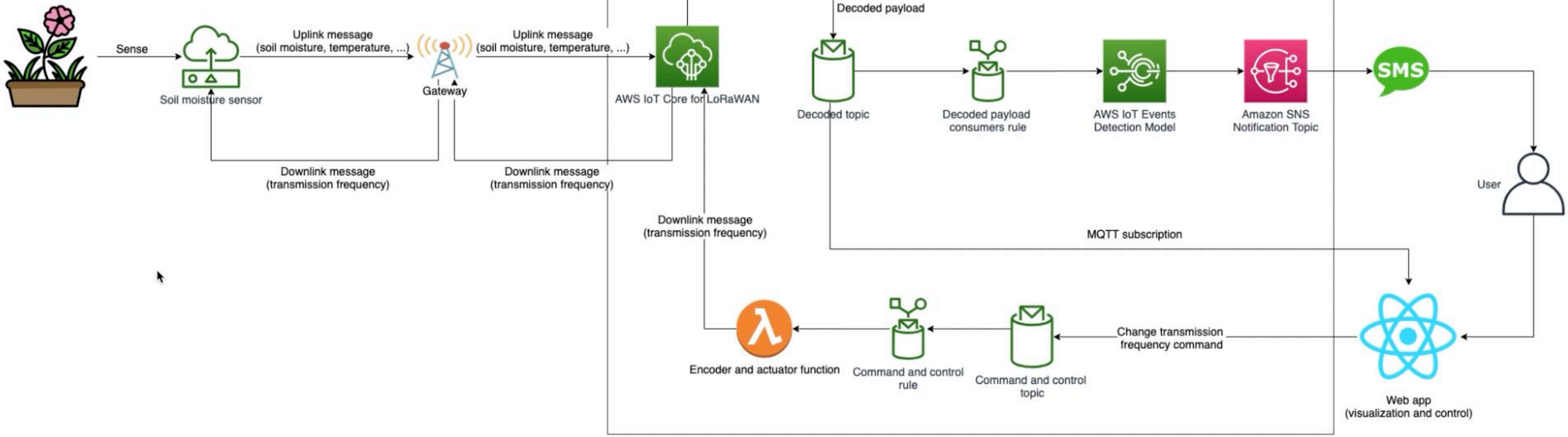
Send application messages to end-devices

Monitoring

Connection Status

Gateway Stats

Device traffic attributes


AWS Cloud
Encoded payload
Payload decoder rule
Payload decoder function
Decoded payload
Sense
Uplink message
(soil moisture, temperature, ...)
Uplink message
(soil moisture, temperature, ...)
Soil moisture sensor
Gateway
AWS IoT Core for LoRaWAN
Decoded topic
Decoded payload
consumers rule
AWS IoT Events
Detection Model
Amazon SNS
Notification Topic
SMS
User
Downlink message
(transmission frequency)
Downlink message
(transmission frequency)
Downlink message
(transmission frequency)
MQTT subscription
Encoder and actuator function
Command and control
rule
Command and control
topic
Change transmission
frequency command
Web app
(visualization and control)

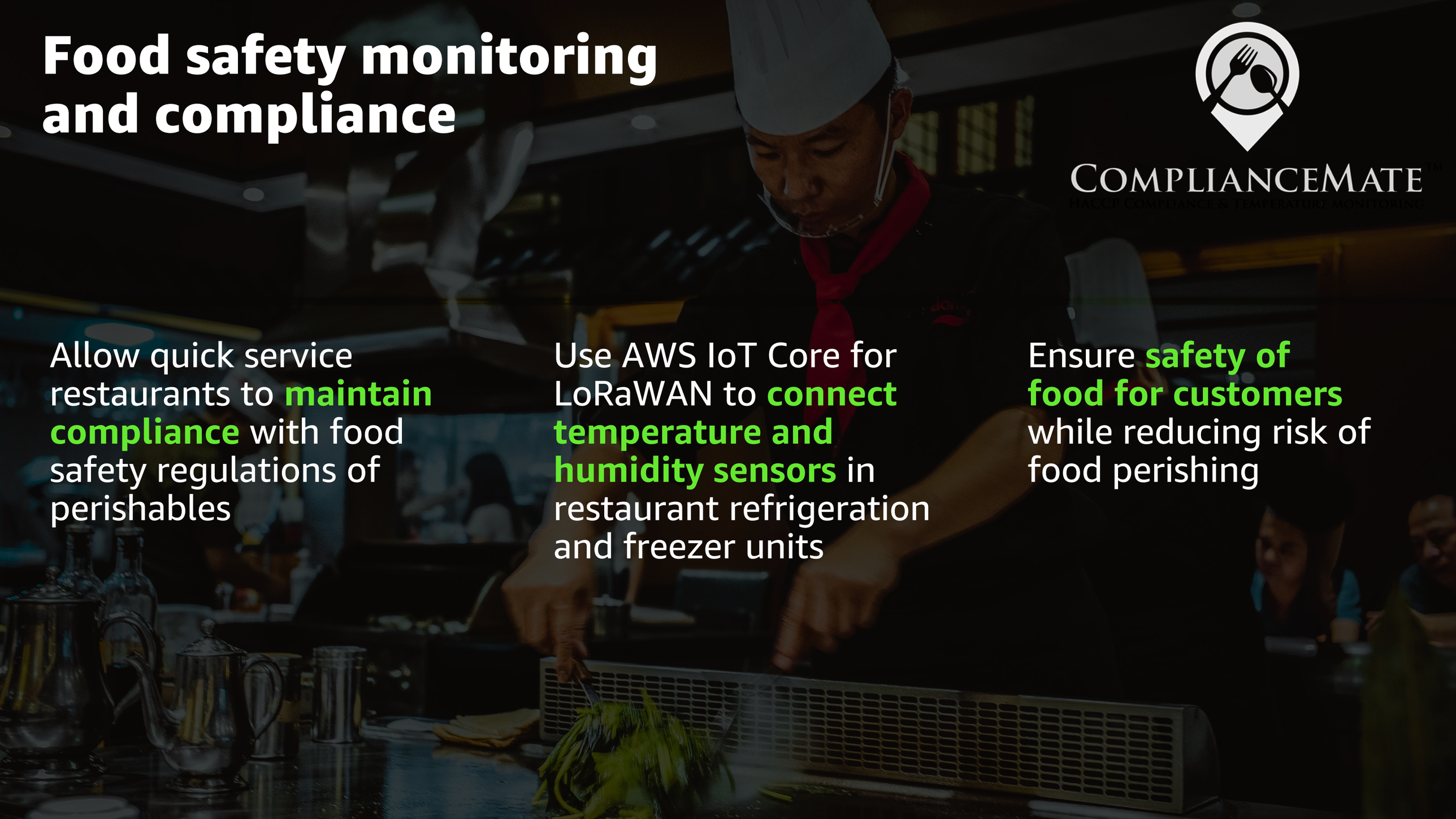
Customers



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Food safety monitoring and compliance



ComplianceMate™
HACCP Compliance & Temperature Monitoring

Allow quick service restaurants to **maintain compliance** with food safety regulations of perishables

Use AWS IoT Core for LoRaWAN to **connect temperature and humidity sensors** in restaurant refrigeration and freezer units

Ensure **safety of food for customers** while reducing risk of food perishing

Remote temperature and security control

quext



Allow property owners to offer smart home for tenants and increase building **security and efficiency**

Use AWS IoT Core for LoRaWAN to connect smart thermostats and door locks **without managing an LNS server**

Safer buildings for tenants and lower utility costs for owners

Summary

- Get started using AWS IoT Core for LoRaWAN today at https://console.aws.amazon.com/iotwireless
- Find AWS IoT Core for LoRaWAN qualified SKUs in the AWS Partner Device Catalog: https://devices.amazonaws.com/search?sv=iotclorawan
- Deploy LoRaWAN-based solutions using AWS at https://github.com/aws-samples



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