

Complete Development Platforms for Secure IoT Systems

NXP IoT & SECURITY SOLUTIONS

JUNE 2017



SECURE CONNECTIONS
FOR A SMARTER WORLD

PUBLIC

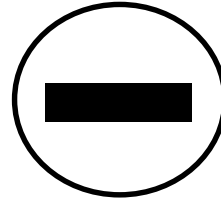


AGENDA

- IoT System Challenges
- NXP Modular IoT Framework
- NXP Integrated Development Experience
- Walk through our IoT System kit

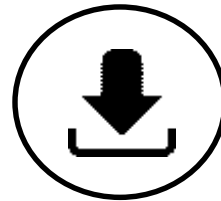


IoT Systems Challenges Today



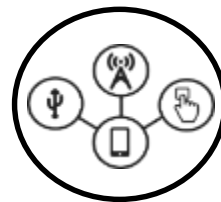
Stand alone IoT components do not function as full IoT systems

IoT application prototyping involves connecting multiple components/modules, that don't always work together



Complex software integration

Substantial effort required to integrate connectivity and security software for each board

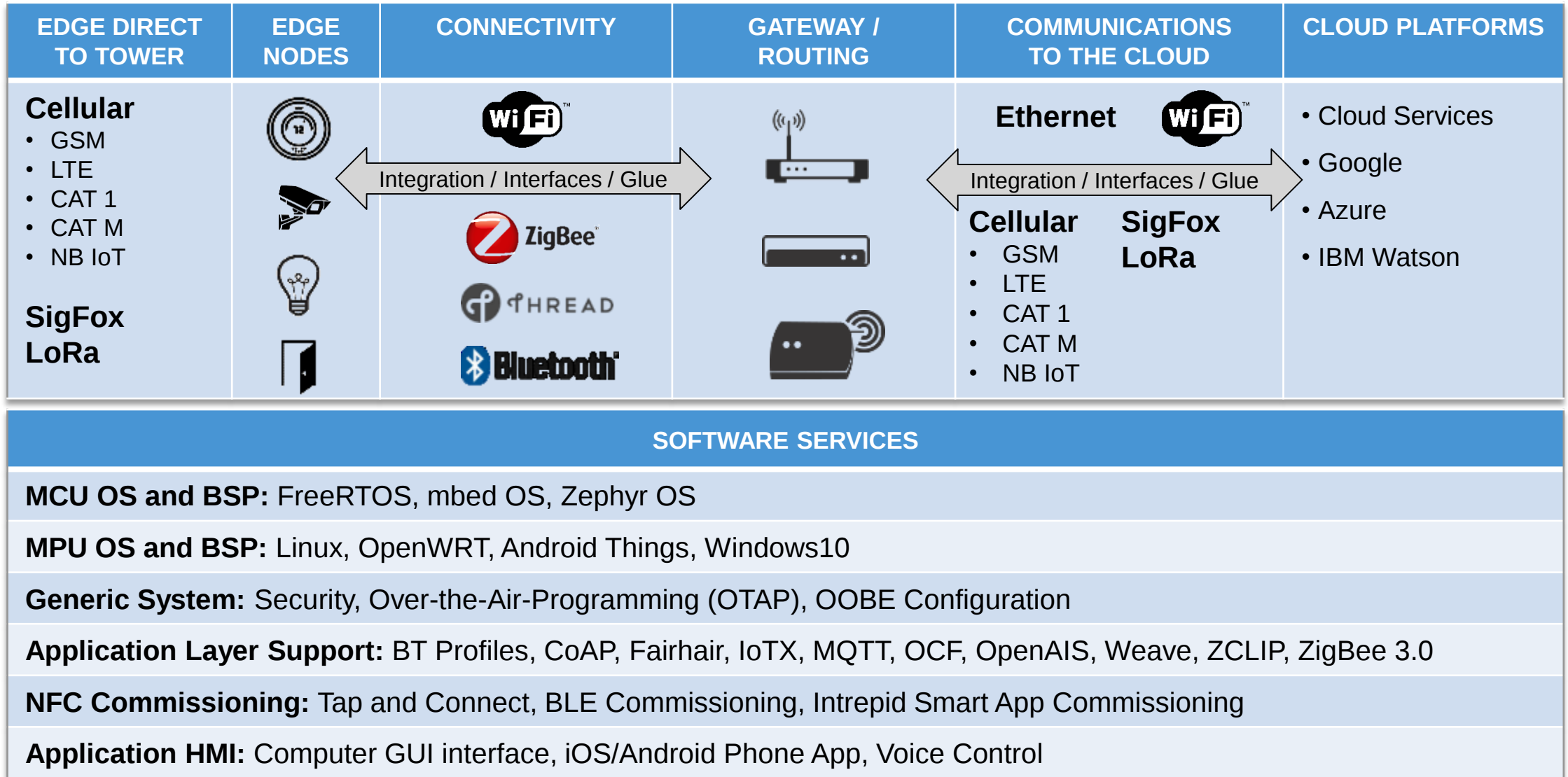


Interoperability not guaranteed across individual components

Hardware, Software, Connectivity, Security, Web/Cloud infrastructure must be carefully selected

Pain Points at the System Level

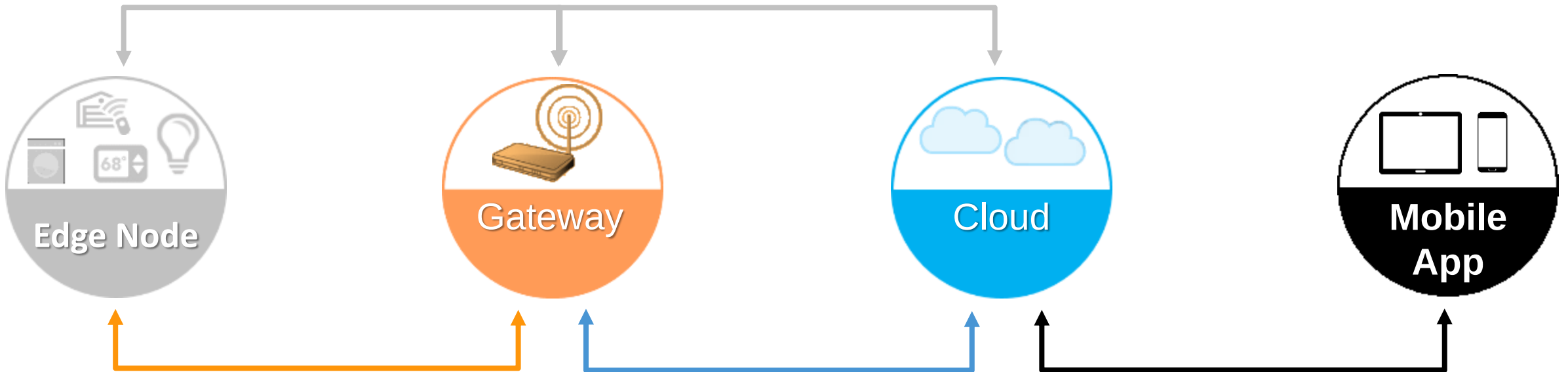
Complexity of IoT System Development



Fragmented market with thousands of use case combinations

IoT System Functionality Requirements

1 Easily pair Edge Nodes, Gateway & Cloud through secure commissioning



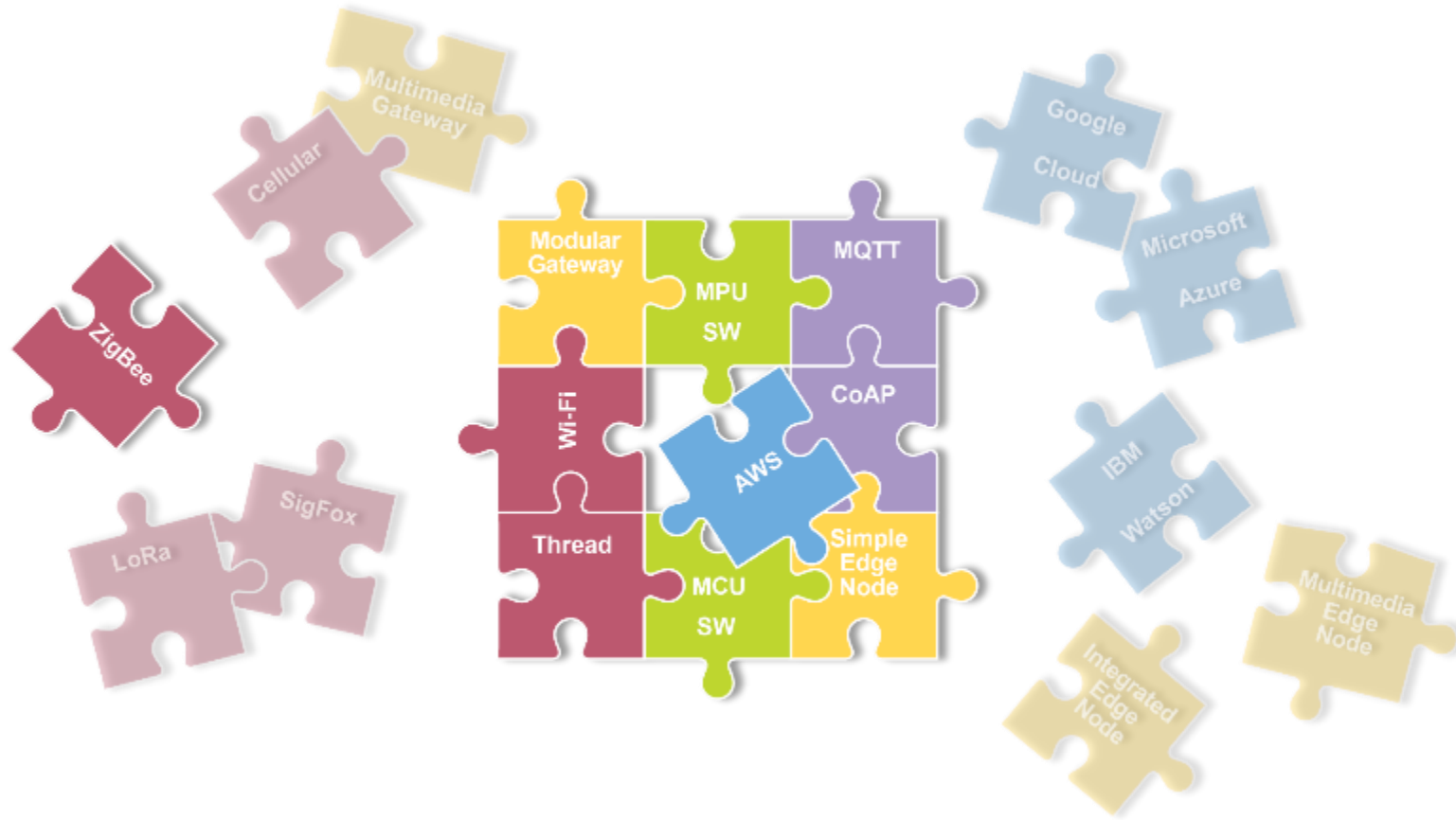
2 Exchange data between
Edge Nodes and Gateway
via secured connectivity

3 Exchange data between
Gateway and Cloud
with secure protocols

4 Monitor and Control
Edge Nodes via Cloud
using Application HMI

Introducing the NXP Modular IoT Framework

- Provides a selection of secure connectivity capabilities along with IoT edge services and a defined set of interfaces for building IoT Systems.
- Hardware and software components leverage the Framework to ensure system level compatibility and interoperability.
- Enables efficient development of IoT systems with pre-integrated security, wireless connectivity, and cloud services.



The First Complete Development Platform for Secure IoT Systems

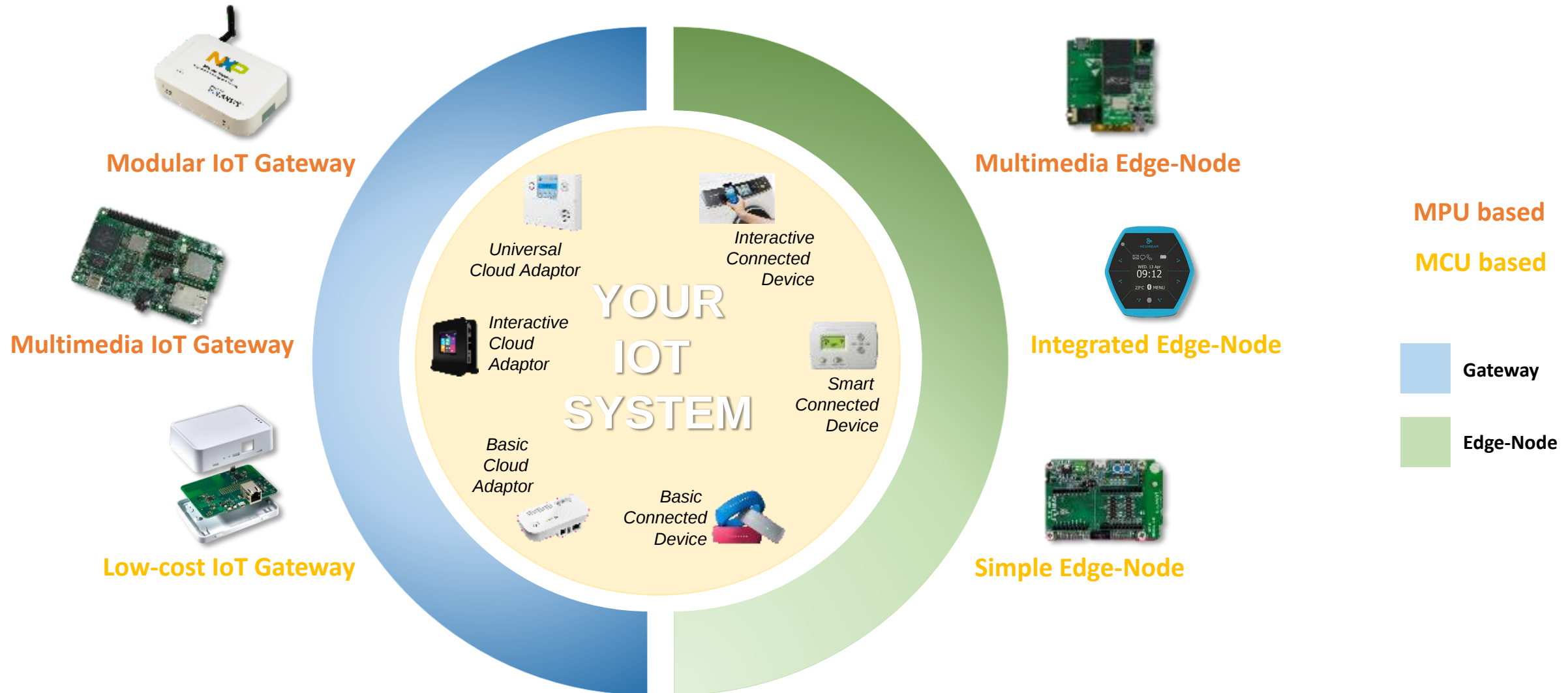
Modular IoT Framework: *Integrated Development Experience Kits*

Based on the Modular IoT Framework, NXP provides optimized, Integrated Development Experience (IDEx) Kits to accelerate system development for specific IoT use cases, out-of-the-box.

- **Each kit is pre-integrated, comprehensive and fully documented**
- **Optimized for quick evaluation, rapid prototyping, demonstration, iteration and IoT field trial deployments**
- **Kits include production-ready connectivity software and hardware**
 - Decreases amount of work and lowers risk for development teams
 - Fills skill gaps in wireless mesh connectivity and security
- **Cloud reference design examples with source code**

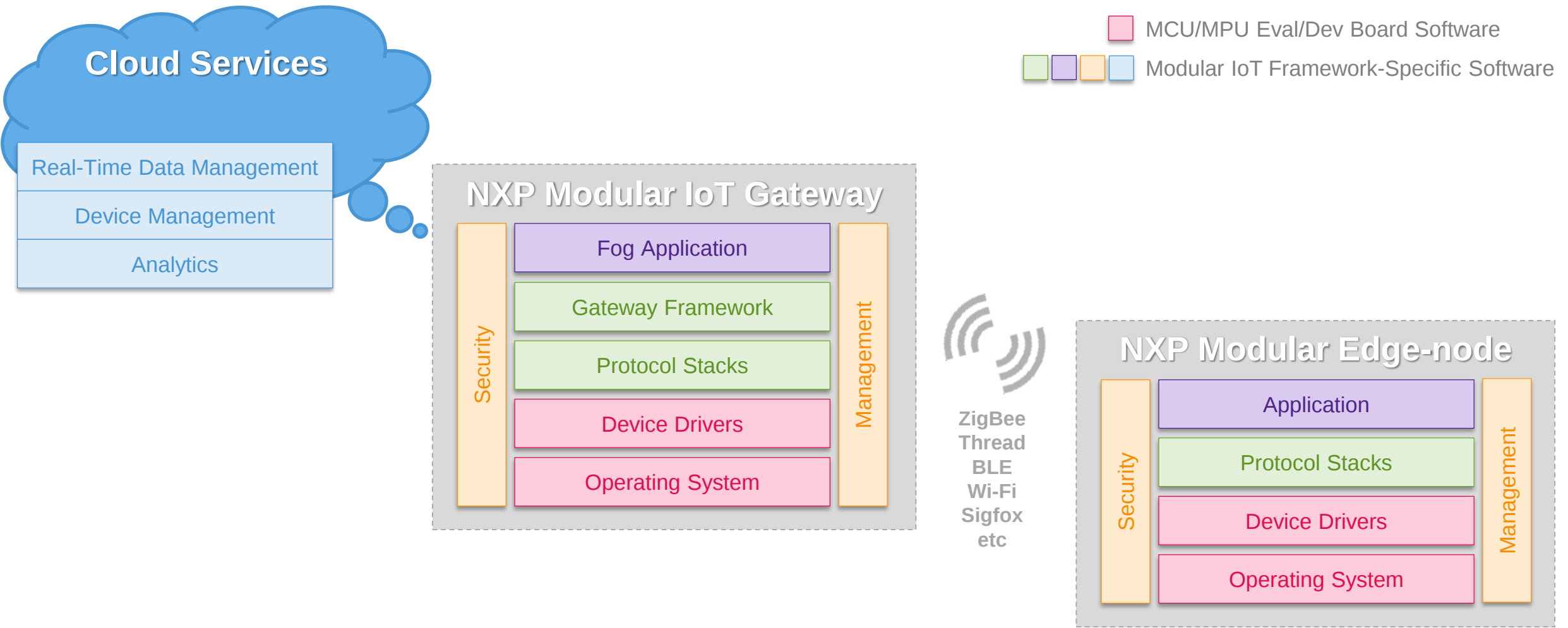
ALL IDEx Kit components are TESTED and VERIFIED to work together

Modular IoT Framework: *Hardware Platforms*



Rich selection of hardware platforms that enable
faster development of IoT Systems

Modular IoT Framework: *Software Architecture*



Complete Security, Connectivity, Management, Cloud and Application Software with compatibility and interoperability between IoT Gateway and Edge-nodes



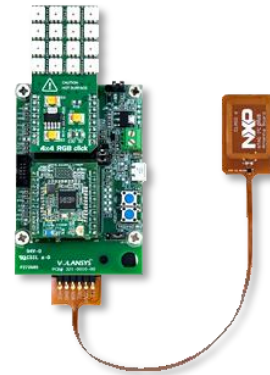
Integrated Development Experience (IDEx) for General Purpose IoT Systems

- Includes Pre-Configured Modular IoT Gateway and Modular Edge Node Platform



Modular IoT Gateway

- Modular IoT Gateway Base board
- i.MX6UL SOM
- Wi-Fi/BT/BLE 4.1
- Thread/BLE Radio
- ZigBee Radio
- NFC Reader
- A7x Secure Element



Modular Edge Node Platform (MENP)

- Simple Edge Node Base board
- ZigBee Radio
- Thread/BLE Radio
- NFC Tag
- RGB Click Module

- Includes Connectivity and Security Software

Modular IoT Gateway

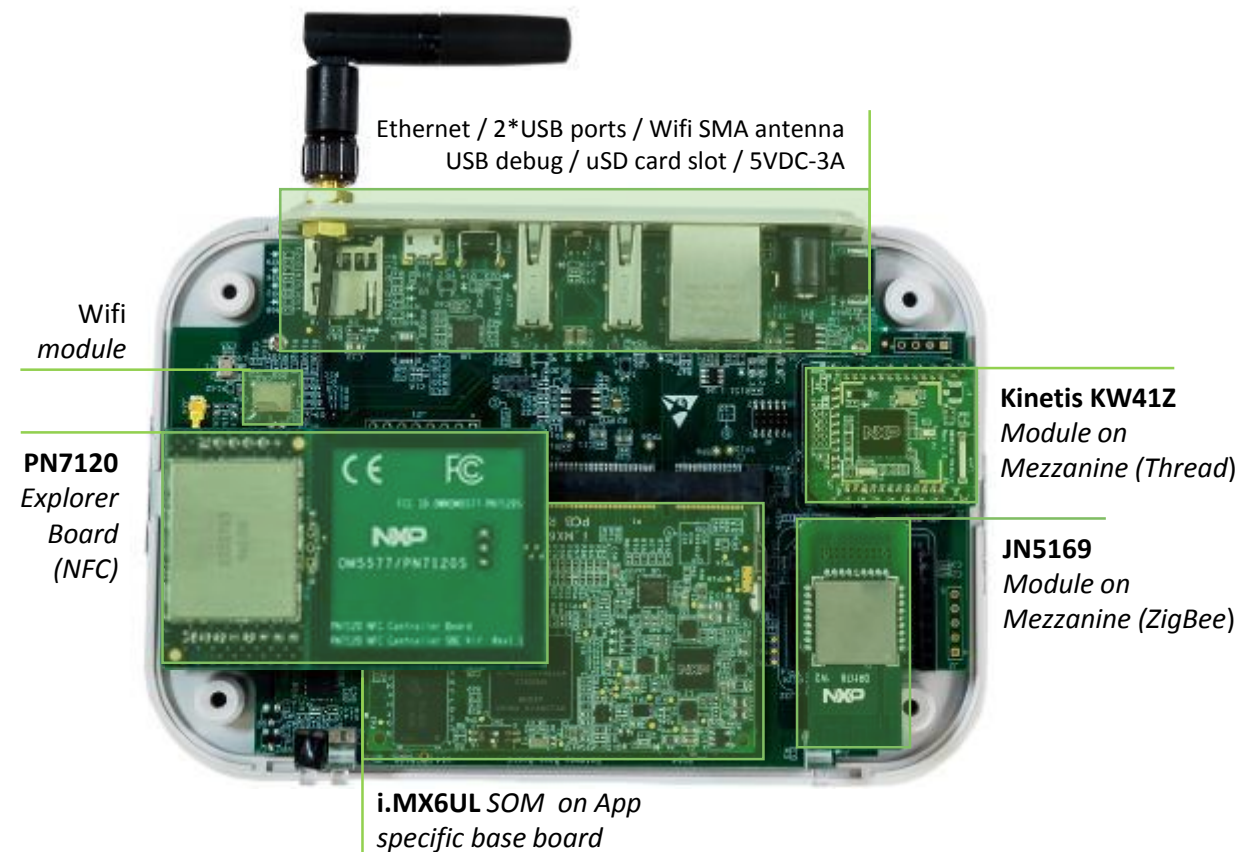
- Linux OS and component drivers (BSP)
- Connectivity and Cloud Protocols
- NFC Connectivity and Cloud commissioning
- Secure Over-The-Air Programming
- Application software

Modular Edge Node Platform (MENP)

- FreeRTOS with SDK peripheral drivers
- Connectivity Stacks (ZigBee, Thread)
- NFC Connectivity commissioning

Shipping TODAY as NXP Part-Number: SLN-IOT-GPI

Modular IoT Gateway: Overview



Hardware Modules

Radio Modules



KW2xD
Thread



KW41Z
Thread



JN5169
Zigbee



JN5179-001-M1x
Zigbee

Processor Module



i.MX6UL SOM

NFC Module



PN7120

Modular IoT Gateway: *Summary*

Fastest Time to Market

Modular solution reduces development time for Thread and ZigBee Gateway/Border Router applications

Path to Manufacturing

BOM, design files and software source code limit risks with wireless connectivity

Optimized Hardware Design

Includes best practices for IoT Gateway application design

Robust Software

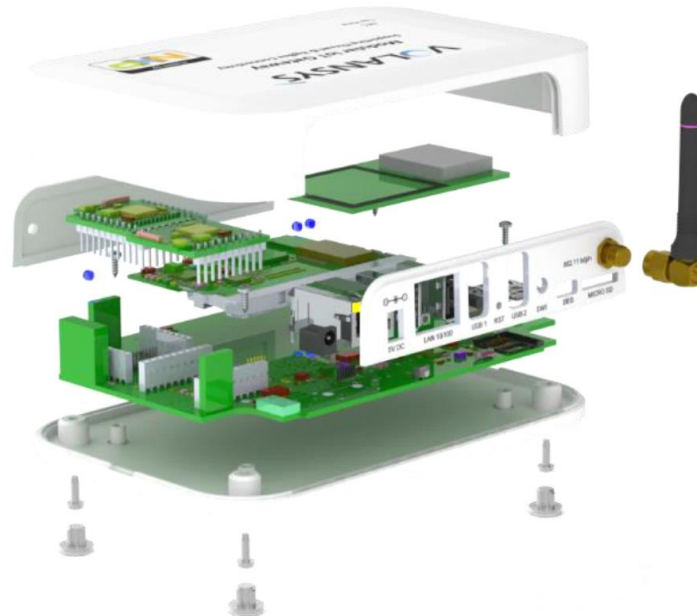
Includes everything from embedded drivers to cloud connectivity - optimized and easy to use

NXP Hardware, Software & Services

Drivers, protocol stacks, Linux BSP support

Target Segments/Applications

- Commercial Building/Lighting
- Smart Home
- Low Power WAN



Key Features

Performance: **ARM Cortex®-A7 @ 696MHz**

Local Connectivity in Large Networks 255+ nodes: **ZigBee, Thread**

Cloud Connectivity: **Wi-Fi and Ethernet**

Authentication: **Secure Element**

Set up: **NFC Commissioning w/Smart App**

Update: **Over the Air Programming via Multicast**

Certifications: **FCC/CE/IC**

Design Resources

Design files: Schematic, Layout, Bill of Material

Application program (Image + Source code)

Android Application (App + Source code)

Professional Support and Services

Software Enablement

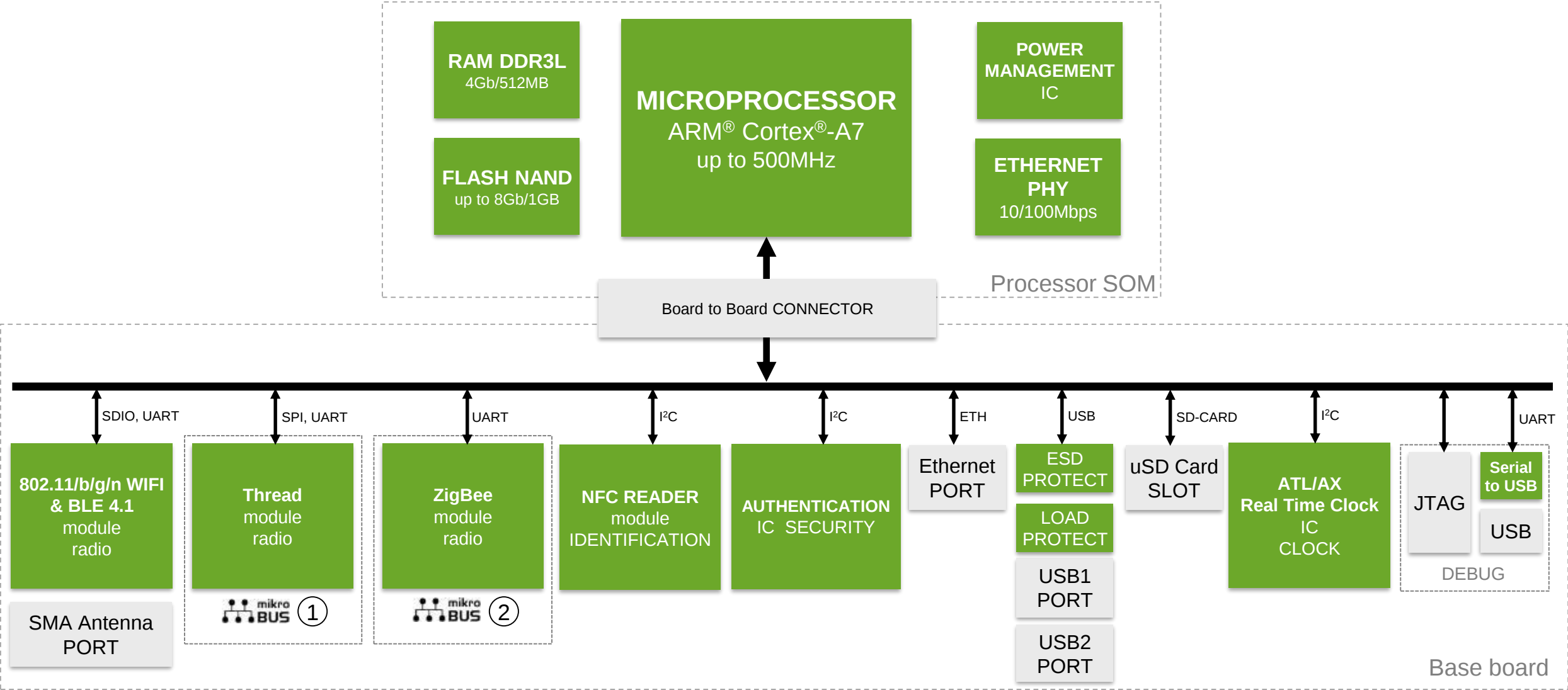
(Open source and free)

UBOOT, Linux BSP

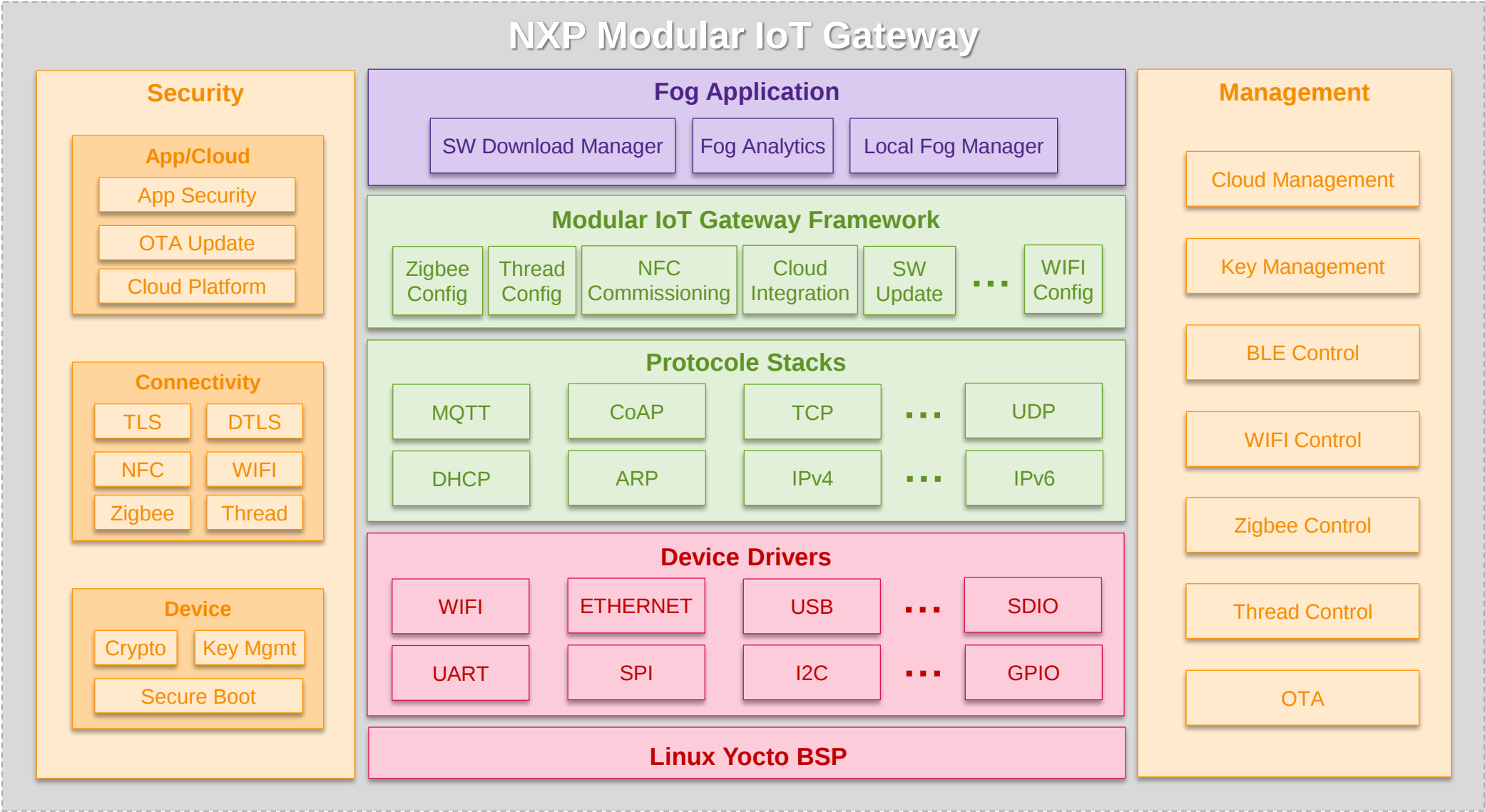
Board Component Drivers

Protocol Stack

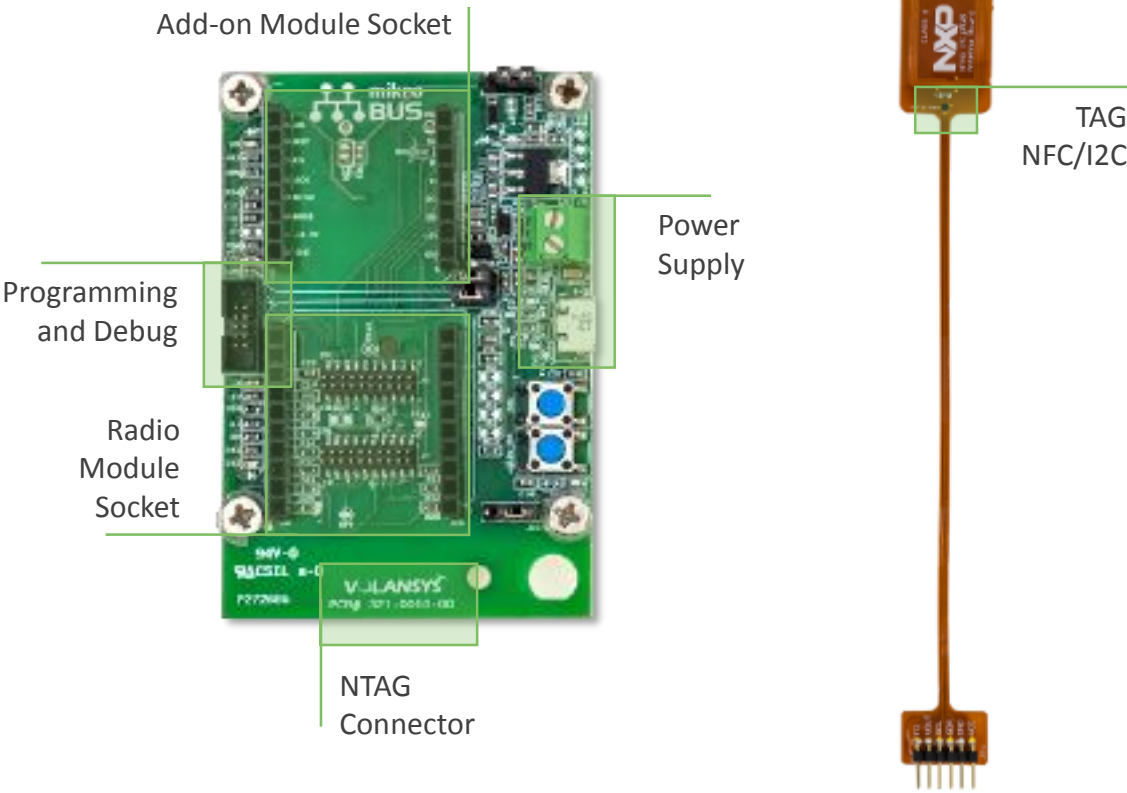
Modular IoT Gateway: *Hardware Block Diagram*



Modular IoT Gateway: *Software Architecture*



Modular Edge Node Platform and Modules: Overview



Hardware Modules

Radio Modules



**KW2xD
Thread**



**KW41Z
Thread**



**JN5169
ZigBee**



**JN5179-001-M1x
ZigBee**

Sensor/Actuator Add-on Modules



4x4 RGB click



RELAY click



**click
BOARDS**

Modular Edge Node Platform: *Summary*

Fastest Time to Market

Modular solution reduces development time for Thread and ZigBee Edge Node applications

Path to Manufacturing

BOM, design files, software source code – all accessible to limit risks wireless connectivity

Optimized Hardware Design

Optimized hardware design with best practices for designing Edge Node IoT applications

Robust Software

Includes everything from embedded drivers to connectivity stacks - all optimized & easy to use

NXP Hardware, Software, Services

Includes drivers, connectivity stacks & support

Target Segments / Applications

- Home Automation
- Healthcare / Wellness
- Utilities and Energy

Key Features:

Performance: **Wireless System On Chip** (MCU with memory and radio)

Local Connectivity for Large Networks over 255 nodes: **Zigbee, Thread**

Setup: **NFC Tag for Commissioning**

Update: **Over the Air Programming via SPI Flash**

Power: **5V USB and DC input**

Extension: **compatible with 200+ Click™ modules**



Design Resources

Design files: Schematic, Layout, Bill of Material

Application program (Image and Source code)

Professional Support and Services

Software Enablement

(Open-source and free)

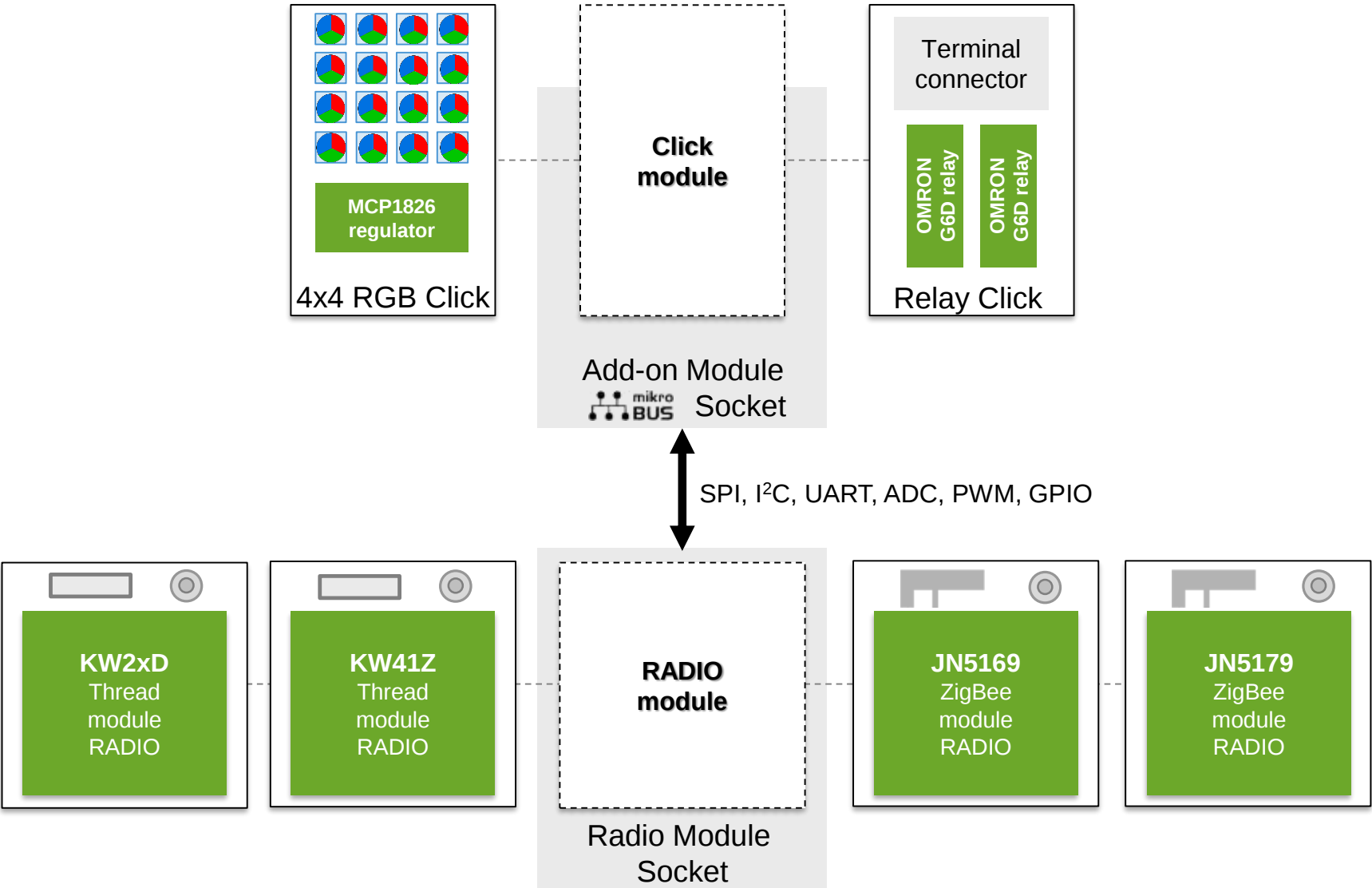
Kinetis Design Studio

Kinetis SDK

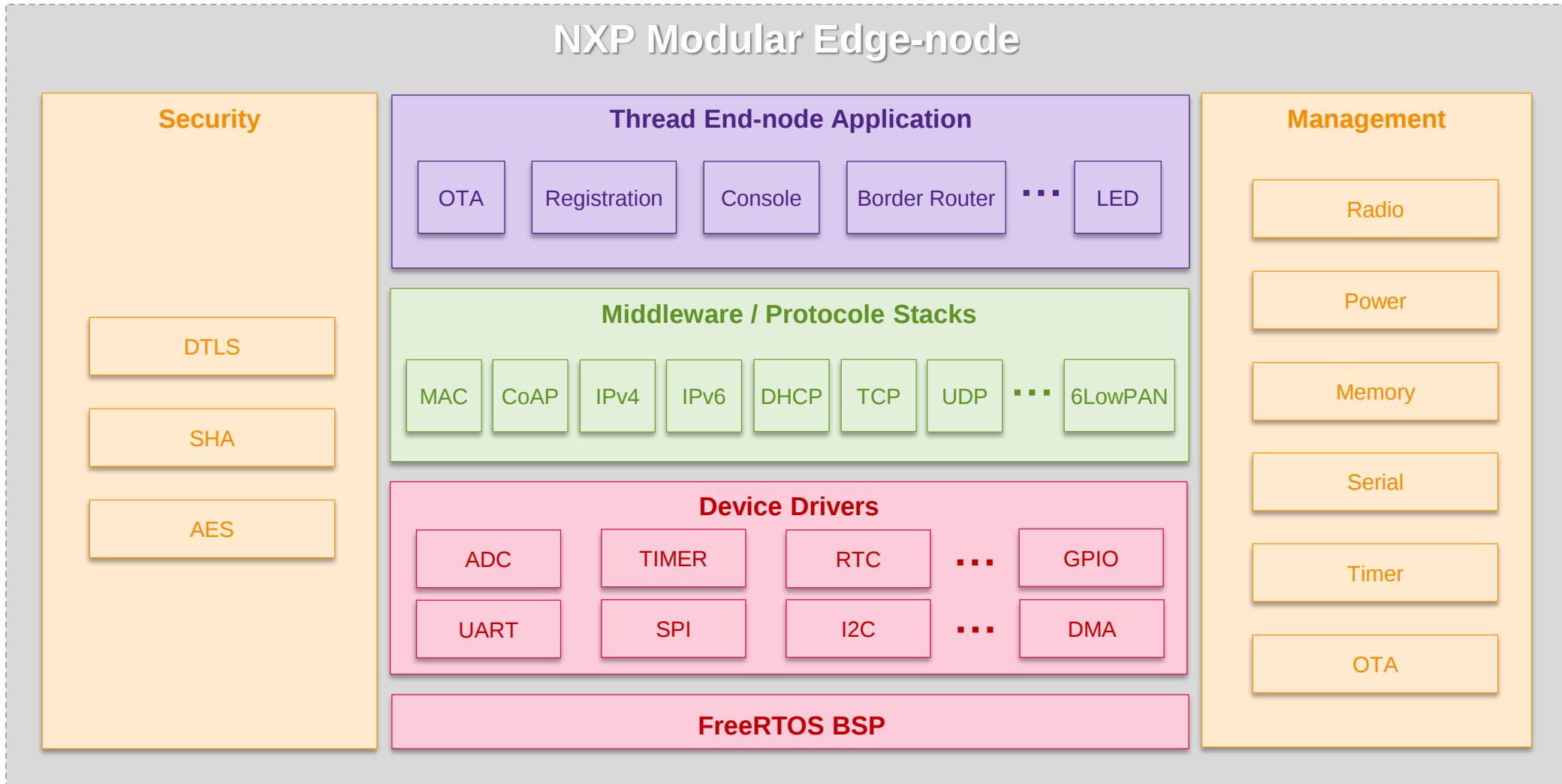
FreeRTOS

Protocol Stack

Modular Edge Node: *Hardware Block Diagram*



Modular Edge Node: *Software Architecture*



IoT Framework Radio: *Kinetis KW41Z Module*

Key Features

- 32-bit **ARM Cortex®-M0+** MCU core @ 48MHz
- 512KB Flash and **128KB SRAM** memory
- SPI Flash to support **Over-The-Air Programming (OTAP)**
- **AES 128** hardware accelerator
- **Thread** and **Bluetooth** Network Stack
- **Integrated chip antenna** and uFL antenna connector
- Easy integration to reduce time to market
- Industry standard **SWD programming** and debug connectivity
- Pads are side castellated for easy soldering & optical inspection
- RoHS Compliant
- **FCC and CE certification**
- **MikroBUS™ compatible** connector
- Ultra compact size: **21 x 16 mm**



IoT Framework Radio: *JN5169 Modules*

Key Features

JN5169 Modules are Hardware compatible with JN5168 Modules

All modules include JN5169 chip plus support components

- ✓ **Surface mountable** on motherboards

Standard power modules

- ✓ JN5169-001-M00-2: **Medium power** module (16 x 30mm)
 - ❖ **Printed antenna**
 - ❖ +10dBm
- ✓ JN5169-001-M03-2: **Medium power** module (16 x 21mm)
 - ❖ **uFL antenna connector**
 - ❖ +10dBm
- ✓ JN5169-001-M06-2: **High power** module (16 x 30mm)
 - ❖ **uFL antenna connector**
 - ❖ **+22dBm**

Module value proposition

- ✓ Fast time to market
- ✓ Reduced support burden
- ✓ **Meets FCC and EU regulations**
- ✓ No need for RF design resource for board and test design



JN5169-001-M00-2



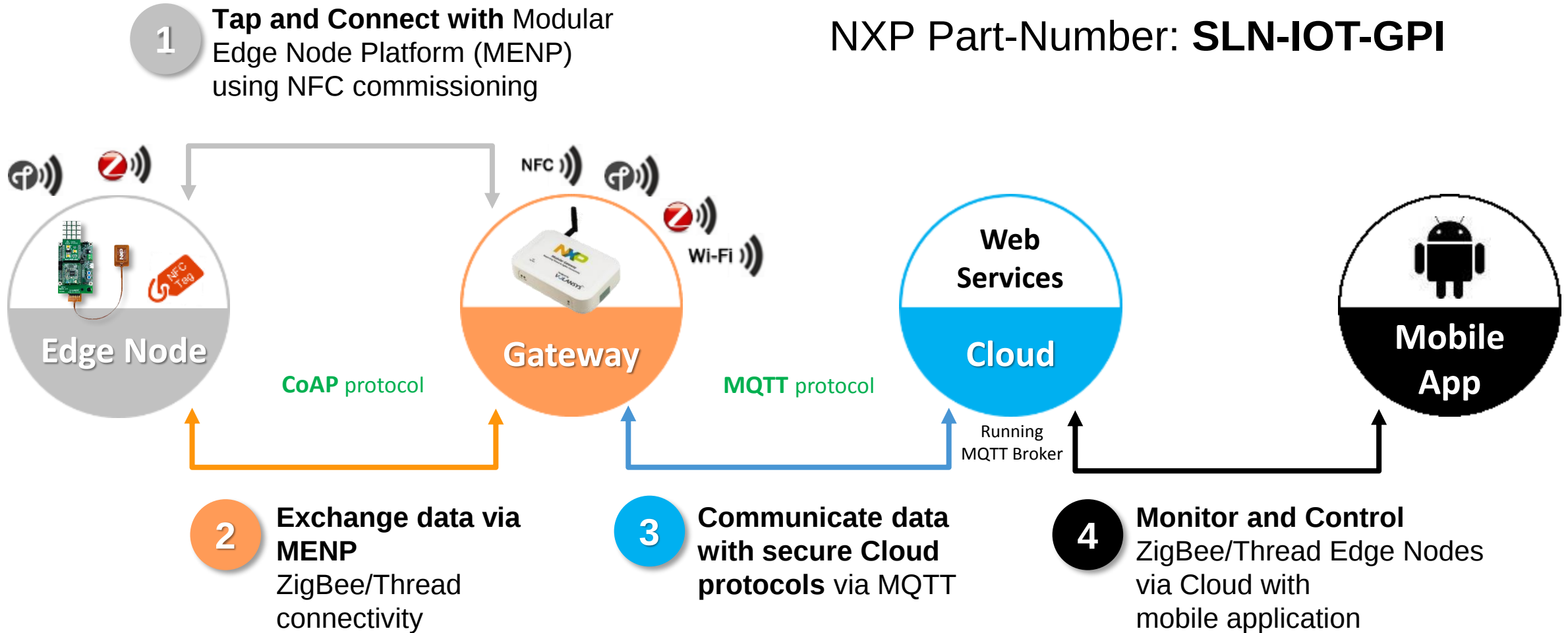
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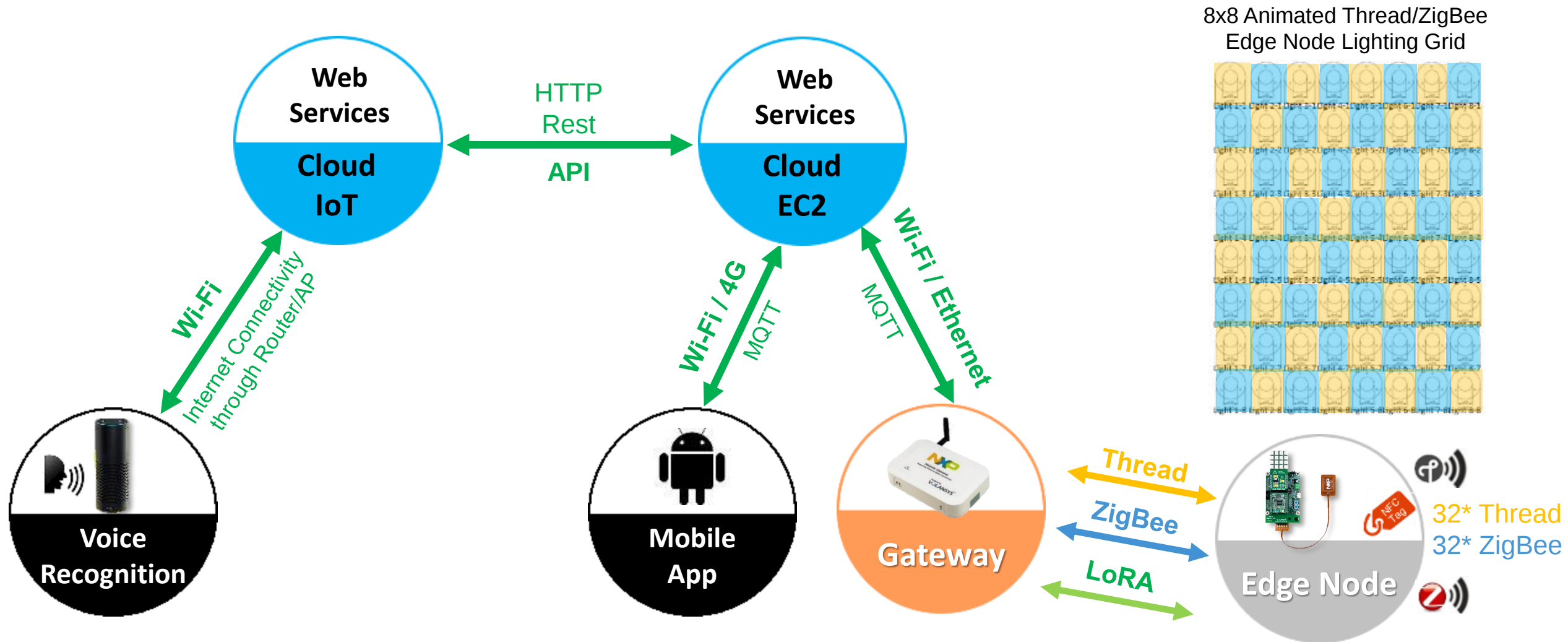
JN5169-001-M06-2

IDEx for General Purpose IoT Systems: *Functional Specifications*

NXP Part-Number: **SLN-IOT-GPI**



IDEx for General Purpose IoT System Use Case: *Lighting Control*



Summary

NXP's Modular IoT Framework & IoT Use Case Specific IDEX Kits:

- Reduce the complexity of building IoT Systems with an optimized platform for quick evaluation, rapid prototyping, demonstration, iteration and IoT field trial deployments.
- Eliminate the need for in-house expertise with built-in wireless connectivity and security capabilities.
- Complete, use case specific, out-of-the-box IoT solution, significantly reduces development time up to 12 months.



The widespread adoption of the Internet of Things will take time, but the time line is advancing thanks to improvements in underlying technologies..”

-McKinsey & Company

All you need to get your IoT system to market faster!



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