Modular IoT Gateway Solution

The SLN-NTW-GTWY modular IoT gateway solution is a pre-integrated IoT-based hardware and software solution platform that reduces time-to-market, reduces risks associated with wireless connectivity and saves development costs in demanding commercial installations using large-node networks (LNNs).

OVERVIEW

The modular IoT gateway combines advanced i.MX hardware capabilities, a pre-integrated production-ready Linux®-based BSP, out-of-the-box low-power wireless mesh connectivity, NFC-based commissioning and state-of-the-art security capabilities to provide a solutions platform that is ideal for connected applications which need to combine management and control of LNNs with cloud connectivity.

The robust modular IoT gateway does this by securely connecting LNNs via low-power wireless mesh networks such as Thread® and ZigBee® to an i.MX-based application logic and advanced capabilities solutions platform. That platform then connects northbound to the cloud through Wi-Fi® and Ethernet. The provided level of hardware and software modularity offers developers the flexibility required to quickly build and iterate a range of potential use-case-specific applications leveraging various configurations to provide the highest value to their customers.

ROBUST SECURITY FOR PROTECTED WIRELESS CONNECTITY TO IoT DEVICES

Addressing stringent network security requirements to protect user and system data, the modular IoT gateway solution uses encrypted wireless communications to prevent unauthorized access, interception, man-in-the-middle and replay attacks. Thread-based devices are authenticated to the network through the EC-JPAKE DTLS protocol which prevents passphrases from being leaked or reverse engineered. Thread and ZigBee messages use AES encryption for base level security at their respective mesh network layers, while offering flexible support for applications to add additional end-to-end security layers. The advanced security capabilities of the integrated i.MX application processor includes high assurance boot (HAB), secure key storage, secure JTAG, external tamper detection for passive and active events, and internal tamper detection for voltage, glitch and differential power analysis protection. Encryption software including OpenSSL is accelerated via the cryptographic acceleration and assurance module (CAAM). Trusted execution environment (TEE) support is available as an NXP Professional Services product.

SIMPLIFIED NFC COMMISSIONING FOR LARGE NODE NETWORKS

Commercial installations with thousands of nodes can leverage the built-in secure NFC tap-to-connect capabilities through the gateway. Using a smartphone phone application, end nodes can be quickly and securely commissioned to the network, even when the device that is being installed is not powered, which is common in smart buildings and industries, smart connected cities, oil and gas fields and agriculture installations.

A COMPLETE SOLUTION FOR QUICK DEPLOYMENT

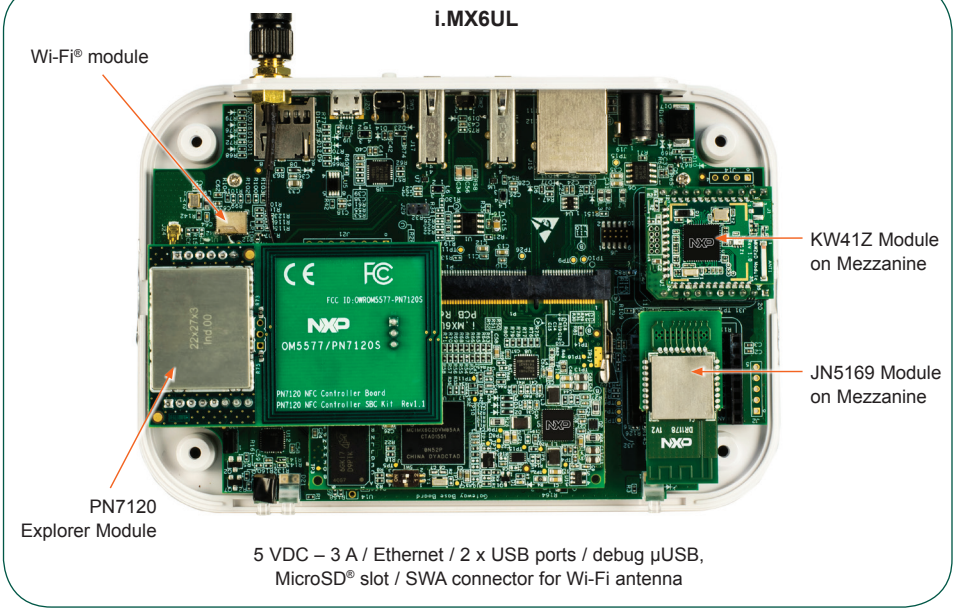
NXP's complete modular IoT gateway reference design provides a connected application solutions platform for quick customization and application deployment including production-ready hardware, schematics, bill of materials, protocol and connectivity stacks, Linux BSP support and fully documented software. Designers can evaluate, develop, prototype, iterate, field test, install and maintain LNNs for commercial settings starting with the modular IoT gateway solution platform.

MODULAR IoT GATEWAY SOLUTION FEATURES

The modular IoT gateway includes hardware and software, drivers, protocol and connectivity stacks as well as Linux BSP support.

- FCC/CE/IC certified
- Multi-protocol support for Thread, ZigBee, Wi-Fi and Ethernet
- Supports large node networks (>= 250 nodes)
- Commissioning through NFC and Smart App
- Wi-Fi and Ethernet northbound to the cloud
- Over-the-air programming via Multicast
- Smartphone app support
- i.MX6UL SOM
- Kinetis® KW22D512 or KW41Z Thread microcontroller
- JN5169 ultra-low-power ZigBee wireless microcontroller
- PN7120 NFC controller
- A70CM secure element

FIGURE 1: MODULAR GATEWAY SOLUTION



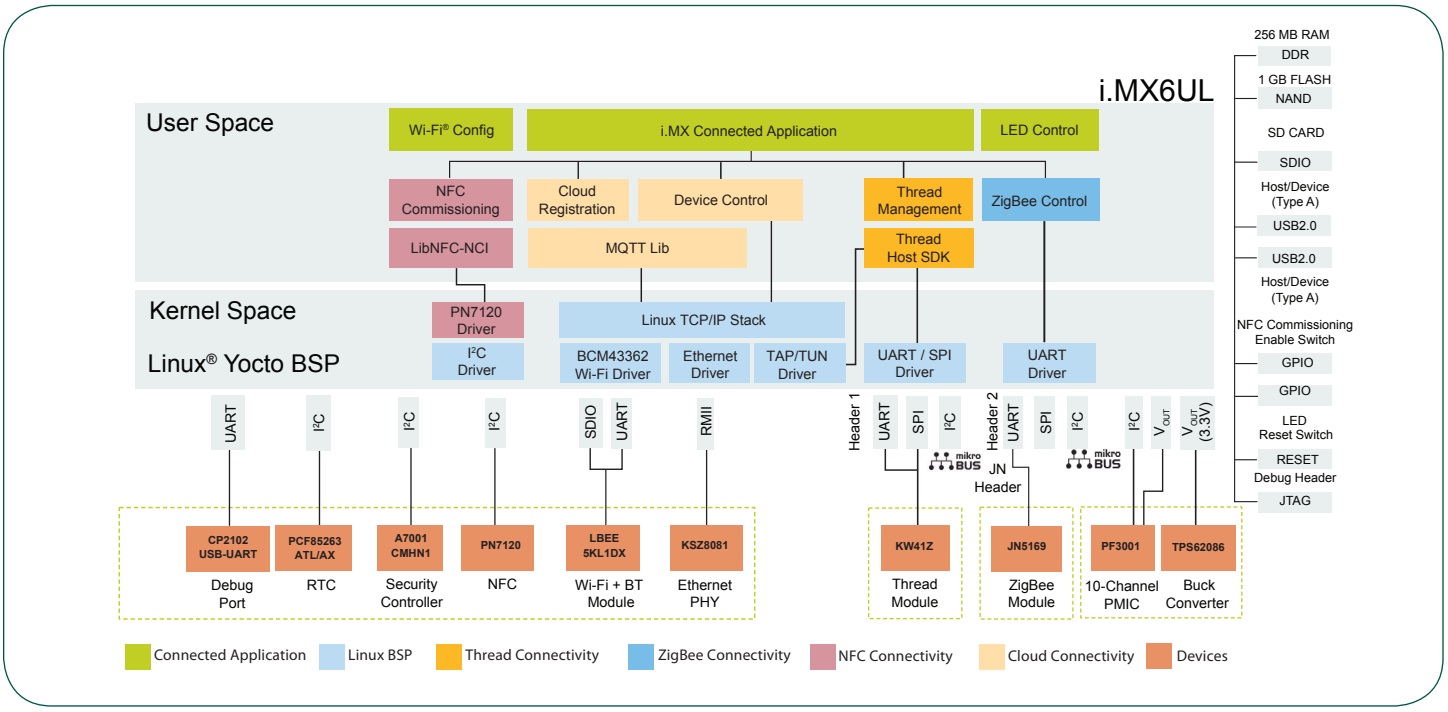
SOFTWARE AND TOOLS TABLE

MODULAR GATEWAY SOFTWARE	DEVICE
Yocto recipes for i.MX6UL Linux® BSP with full drivers and connectivity	i.MX6UL
Pre-built SD Card image for Gateway	i.MX6UL
Self extracting Yocto i.MX6UL Linux BSP and Drivers binary image	i.MX6UL
MQTT Client Library	i.MX6UL
Thread Linux Host Software SDK	i.MX6UL
Gateway & End device Registration with Cloud	i.MX6UL
Start up script for Wi-Fi client service	i.MX6UL
Control LED1/LED2 behavior	i.MX6UL
Commnication brige between cloud and end device	i.MX6UL
NFC Commissioning of gateway & end devices	i.MX6UL
Thread end device controller	i.MX6UL
Config File to load Wi-Fi Station firmware	i.MX6UL
ZigBee end device controller	i.MX6UL
Libnfc-nci for NXP NFC controller	i.MX6UL
JN5169 module Gateway Radio Firmware	JN5169
KW22D module Gateway Radio Host Firmware	KW22D
MKW41Z Module Gateway Radio firmware	KW41Z
Gateway NAND Manufacturing Tool	NAND

ANDROID™ SMARTPHONE APP SOFTWARE	ANDROID PHONE
Android mobile app to control and commission ZigBee/Thread end device	Android

EDGE DEVICE FIRMWARE	
Thread K64F+MCR20 end device application for use with GTWY OOB demo	K64F
Thread KW2x end device application for use with GTWY OOB demo	KW2X
Thread KW41Z end device application for use with GTWY OOB demo	KW41Z
Thread KW41Z + MENP end device application for use with GTWY OOB demo	KW41Z
Thread KW22D + MENP end device application for use with GTWY OOB demo	KW22D
Zigbee JN5169 + MENP end device application for use with GTWY OOB demo	JN5169

MODULAR IoT GATEWAY SYSTEM BLOCK DIAGRAM



DOCUMENTATION AVAILABLE ON NXP.COM

- VT-SOM-6UL SOM Data Sheet
- KW22D Module Data Sheet
- KW41Z Module Data Sheet
- Modular Gateway Hardware User's Guide

DOCUMENTATION INCLUDED WITH INTEGRATED DEVELOPMENT EXPERIENCE

GATEWAY

- i.MX6UL Modular Gateway Firmware Flashing Guide
- Modular Gateway Out of Box Demo Setup Guide
- Modular Gateway Source Build Instruction Guide
- Modular Gateway OOB demo software architecture details

GATEWAY RADIO MODULES

- JN5169 Module Firmware Build Guide
- JN5169 Module Firmware Flashing Guide
- KW2xD Module Firmware Flashing Guide
- KW41Z Module Firmware Flashing Guide

EDGE DEVICES

- FRDM-K64+MCR20 Firmware Build Guide
- FRDM-KW24D Firmware Build Guide
- FRDM-KW41Z Firmware Build Guide
- KW22D512 + MENP Module Firmware Build Guide
- KW22D512 + MENP Module Firmware Flashing Guide
- KW41Z + MENP Module Firmware Build Guide
- KW41Z + MENP Module Firmware Flashing Guide
- JN5169 + MENP Module Firmware Build Guide
- JN5169 + MENP Module Firmware Flashing Guide

ANDROID SMARTPHONE APP

- Modular Gateway mobile application software architecture details

GATEWAY DESIGN DOCUMENTATION

i.MX6UL BASE BOARD

- i.MX6UL Base Board BOM
- i.MX6UL Base Board Schematic

i.MX6UL SOM

- i.MX6UL SOM BOM
- i.MX6UL SOM Schematic

KW22D512

- KW22D512 Module BOM
- KW22D512 Module Schematic

KW41Z

- KW41Z Module BOM-Rev
- KW41Z Module Schematic

NFC MODULE

- NFC PN7120 Module BOM
- NFC PN7120 Schematic

GATEWAY BOX DESIGN

- Enclosure
- Front Panel Design
- Rear Panel Design

VIDEOS

- Modular IoT Gateway Quick Start Video

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