Short range radio product overview

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Robust, secure, and versatile short range chips and modules

Short range radio technologies for all kinds of applications

u-blox short range radio modules target automotive, telematics, industrial automation, smart cities and buildings, fitness, healthcare, and consumer markets. Our offering includes Wi-Fi, Bluetooth®, and V2X communications, individually and in combination. Our components are compliant with industry standards and have national certifications around the world. Stand-alone modules and host-based modules are designed and developed to meet the requirements of industrial and automotive markets.

Key features and benefits

u-connect: Our u-connect software for stand-alone modules makes the integration of Bluetooth, Wi-Fi, and multiradio connectivity into new and existing products very efficient. Two variants are available: u-connectXpress, which is used together with a host, and u-connectScript, which enables embedding applications directly on the module. There is an upcoming version to take the hassle out of configuring and deploying a Bluetooth mesh network.

Form factor compatibility: Our modules focus on performance and ease of use, with footprint roadmaps that allow a single PCB to support multiple technology options and future revisions of technologies (e.g. Bluetooth 5 and 5.1 modules are pin compatible).

Security: To safeguard customer applications, protect data, and ensure secure data transmission, our products are designed to follow a set of security principles. Secure boot ensures that the module firmware is authentic and has not been modified. Secure firmware only lets authenticated and validated updates to be made.

Short range radio architectures

u-blox short range radio products are offered in two different architectures. Products with the stand-alone architecture include an embedded MCU, which runs the driver, stack and application. Products with the host-based architecture run the stack and applications on a Linux, Android or Windows host processor. Within the stand-alone achitecture three different configurations are available: u-connectXpress, u-connectScript or open CPU.

Stand-alone

u-connectXpress

- Stack runs on u-blox short range module
- Application runs on the external MCU

u-connectScript

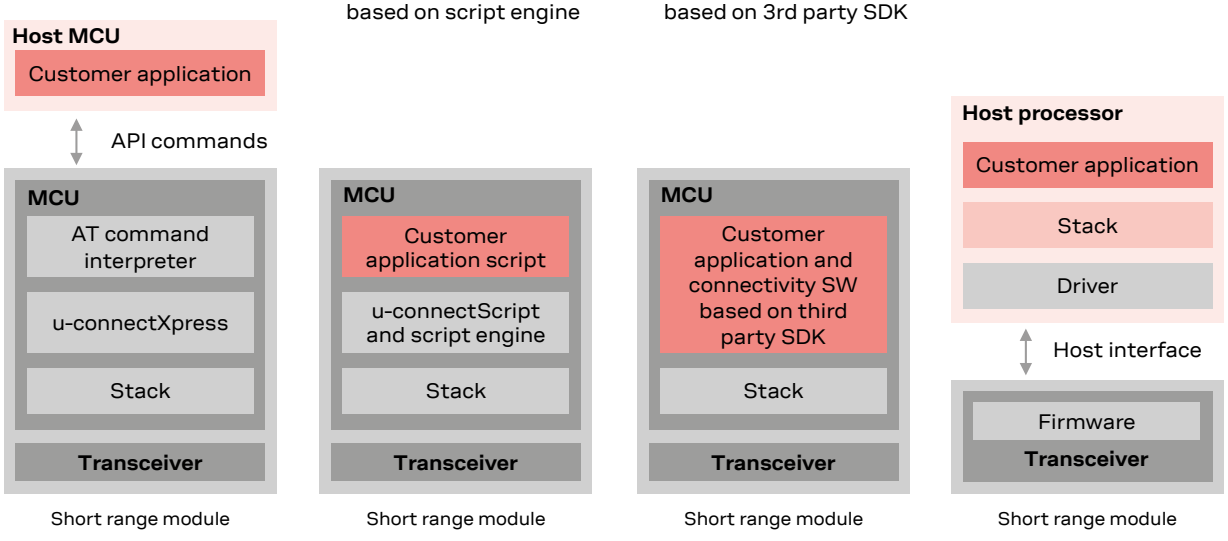
- Stack runs on u-blox short range module
- Application runs on the u-blox module, and is based on script engine

open CPU

- Stack runs on u-blox short range module
- Application runs on the u-blox module, and is based on 3rd party SDK

Host-based

- Third party stack runs on a host processor with open OS
- Application runs on the host processor



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Technology overview

	Bluetooth											Multiradio				Wi-Fi	V2X	
	ANNA-B1	NINA-B1	NINA-B2	NINA-B3	NINA-B4	BMD-360	BMD-34x	BMD-3xx	R41Z	NINA-W10, NINA-W15	ODIN-W2	JODY-W1	JODY-W2	EMMY-W1	NINA-W13	LILY-W1	VERA-P1	UBX-P3
Host-based												•	•	•		•	•	•
Stand-alone	•	•	•	•	•	•	•	•	•	•	•				•			
u-connect SW	•	•	•	•						•	•				•			
Open CPU	•	•		•	•	•	•	•	•	•	•							
Bluetooth version	5	5	4.2	5	5.1	5	5	5	4.2	4.2	4.0	4.2	5	4.2				
Bluetooth LE	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
Bluetooth mesh	♦	♦		♦	♦		♦	♦										
NFC	•	•		•			•	•										
Thread / Zigbee				•														
Wi-Fi 2.4 / 5 GHz										2.4	2.4/5	2.4/5	2.4/5	2.4/5	2.4	2.4		
Wi-Fi 802.11 standards										b/g/n	a/b/ g/n	a/b/g/ n/ac	a/b/g/ n/ac	a/b/g/ n/ac	b/g/n	b/g/n	p	p
Antenna options	P,C	P,M	P,M	P,B,M	B,U	B	B,U	B,C,U	B	P,M	M,U	P	P	P	P,M	P,M	P	P
Secure boot			•	♦	♦		♦			♦					•			

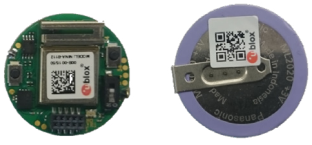
♦ = Feature enabled by HW. The actual support depends on the open CPU application SW.
Antenna notes: P = antenna pin, B= internal PCB, C = internal chip, M = internal metal PIFA, U = U.FL connector

Blueprints

u-blox blueprints provide a reference for integration of the products in real-world applications.

Battery operated sensor board

B200 with NINA-B112



- On board sensor (accelerometer, gyro, thermometer)
- Two push buttons and an RGB LED
- Rechargeable coin cell battery with on/ off switch
- Debug pin header containing UART, SWD and power for charging

Tracking device

B201 with NINA-B112 and EVA-M8

- A Bluetooth Low Energy and GNSS technology solution
- Charging of integrated coin cell battery with USB and/or solar panel
- On board sensor (accelerometer, gyroscope)
- Three push buttons and two LEDs

USB dongle

B204 with NINA-B112

- USB connector integrated in PCB
- Powered by USB
- Access to UART over USB
- One button and one RGB LED

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Popular applications

Some of the industries that use u-blox short range modules along with a selection of applications are shown here, along with proposed u-blox modules well-suited to the applications.

Industrial automation	• Networked control systems • Handheld operator terminals • Networked tools & sensors • Gateways & hubs • Connected tools
Smart buildings	• HVAC, alarm panels, and security cameras • Access control, lighting, beacons • Gateways & hubs • Appliances & white goods
Medical & healthcare	• Enterprise patient monitoring • Connected home health devices • Fitness & rehabilitation equipment • Gateways & hubs
Retail & point of sales	• Payment terminals • Vending machines • Cash registers & receipt printers • Gateways & hubs
Automotive	• In-vehicle infotainment (IVI) • Advanced driver assistance systems (ADAS) • Automotive control units (ACU) • Telematics control units (TCU)
Telematics	• Fleet management systems • Vehicle trackers & e-loggers • Driver recorders & insurance boxes

Emerging use cases

Indoor positioning: Bluetooth's new direction finding feature, a key component of the Bluetooth v5.1 specification brings the benefits of high precision positioning to indoor applications. NINA-B4 is the first u-blox module designed to act as both a transmitter and a receiver in angle of arrival (AoA) and angle of departure (AoD) direction finding and indoor positioning applications.

V2X: Driven by demands for reducing traffic accidents and optimized traffic management, V2X technology leverages wireless communication for vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) communication, giving all vehicles on the road a shared real time perception of their surroundings. The u blox UBX P3 communicates via the IEEE 802.11p wireless standard, also referred to as Dedicated Short Range Communications (DSRC), a technology that is mature for the deployment of V2X systems.

Mesh support: Bluetooth mesh is a specification for forming mesh networks, developed to support a number of use cases for large scale networks. Nodes can communicate using one-to-one, one-to-many, and many-to-many communication. Bluetooth Mesh can be used with both u-connectXpress and u-connectScript software.

Wi-Fi for electric vehicle charging: Wireless charging stations promise to further increase the convenience of EV charging. In addition to shortening setup time (drivers simply have to park over the wireless charger), they do away with the need for charging cables, increase safety, and simplify maintenance. In both wired (AC/DC) and wireless charging setups, Wi-Fi is establishing itself as the most efficient solution to manage the charging process.

For a detailed view of our product offering, refer to our guided product selector:
www.u-blox.com/guided-product-selector

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S

Integrated antenna or antenna connector

To meet the divergent needs of the markets we serve, our products come with a broad range of antenna variants and connectors. Customers can choose the antenna solution they need, optimized for performance, robustness, versatility, size, and cost.

Module variants with integrated antennas may have the antenna included in the chip, internally within the module PCB or as part of the metal shield.

Available connectors for external antennas include U.FL connectors and antenna pins. Some modules include two or three antenna pins designed for Bluetooth and/or Wi-Fi.

U.FL connector

Antenna pin

PIFA antenna

PCB trace antenna

u-blox short range product naming

u-blox short range modules are available in different form factors and variants to provide flexibility for scaling different short range technologies to various application requirements.

NINA- B302

Form factor	Main technology/generation		Variant	
NINA, BMD, ODIN, LILY, JODY, VERA, ELLA, EMMY, R41Z	**B1, B2, B3, B4**	Bluetooth	**V V**	The last one or two digits, **V** or **VV**, are used to differentiate HW variants based on the same technology and generation. The difference is primarily related to the internal antenna or antenna connector.
	W1, W2	Wi-Fi		
	P1, P3	V2X (802.11p)		

u-blox values and promise

Competent technical support worldwide	• Over 20 years of R&D in GNSS and wireless technology • Lifetime support and maximum competence • Global leader in positioning and wireless communication
Quick time to market	• Short and reliable delivery times • Module form factor consistency
High quality	• Qualified for a long lifetime in the field (ISO 16750) • Indvidually tested, tuned and X-rayed modules • Zero defect policy
Broad spectrum of solutions	• Strong synergies between technologies - Wi-Fi, V2X, cellular, and positioning • Hardware, software, services, and solutions
Security	• Advanced spoofing and jamming detection • End-to-end trust of domain

Further information

For contact information, see www.u-blox.com/contact-us.

For more product details and ordering information, see the product data sheet.

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