

C-V2X PC5 · ON-BOARD UNIT · DEVELOPMENT PLATFORM

AmbiOBU

5.9 GHz C-V2X PC5 on-board-unit development platform

AmbiOBU is a mature, production-ready V2X development platform from Ambimat Electronics, available to order: a complete on-board-unit development endpoint for direct 5.9 GHz C-V2X PC5 communication, supplied for algorithm development, integration, testing, research and demonstration.

DEVELOPMENT CONFIGURATION — NOT CERTIFIED, NOT HOMOLOGATED, NOT TYPE-APPROVED — NO ENVIRONMENTAL QUALIFICATION CLAIMED

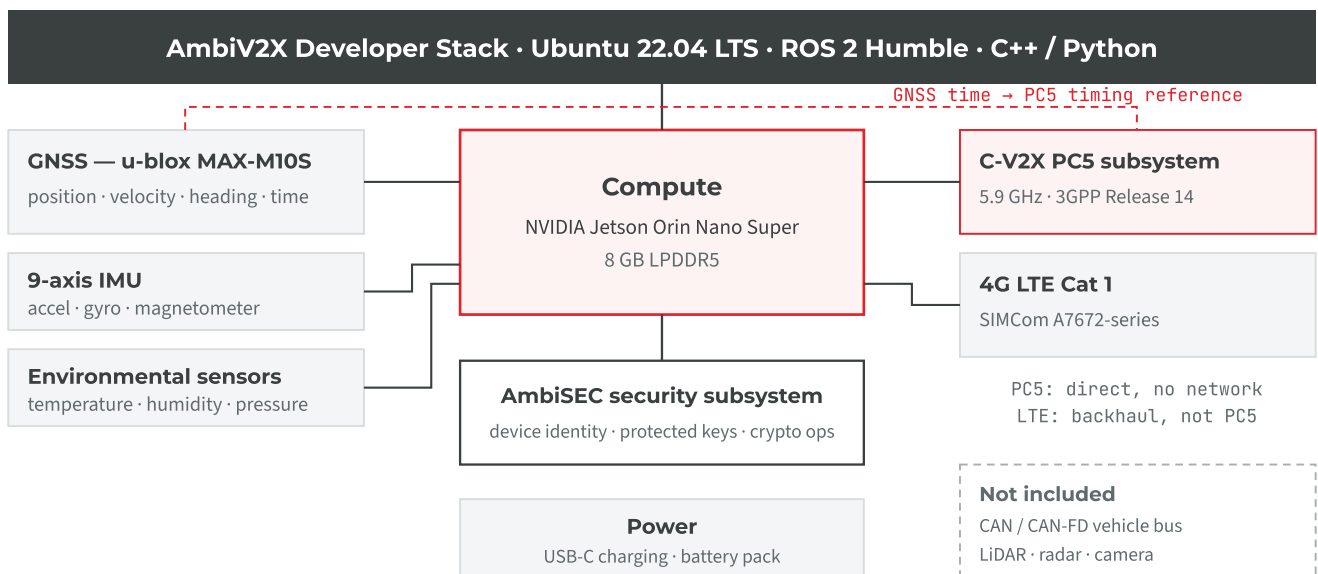


FIGURE 1 AmbiOBU in its development configuration. A self-contained node: its inputs are its own sensors, its outputs are the messages it broadcasts over PC5 and its cellular uplink. Functional diagram, not a board layout.

5.9 GHz C-V2X	4G LTE Cat 1	4-constellation GNSS	ROS 2 Humble	Available to order
PC5 direct, 3GPP Release 14	Backhaul, separate from PC5	u-blox MAX-M10S, L1	Ubuntu 22.04 LTS	From Ambimat Electronics

Key features

- 5.9 GHz C-V2X PC5 subsystem, 3GPP Release 14, including C-V2X power-saving modes
- Direct V2V and V2I exchange without a mobile network or subscription
- 4G LTE Cat 1 for backhaul, telemetry, diagnostics and experiment upload
- u-blox MAX-M10S GNSS: GPS/QZSS, Galileo, GLONASS and BeiDou concurrently
- 9-axis IMU and ambient temperature, humidity and pressure sensing
- NVIDIA Jetson Orin Nano Super compute, 8 GB LPDDR5
- Ubuntu 22.04 LTS with ROS 2 Humble; C++ and Python development
- AmbiSEC hardware-protected identity, key storage and cryptographic operations
- Same compute, GNSS, LTE, C-V2X and ROS 2 foundation as AmbiRSU
- Optional 1:10-scale movable development platform for in-motion testing

DEVELOPMENT CONFIGURATION

COMPONENT	SPECIFICATION
Direct V2X radio	5.9 GHz C-V2X PC5 subsystem, 3GPP Release 14, including C-V2X power-saving modes. PC5 is the direct path between nearby V2X participants; the local exchange does not go through a mobile network. The only radio direction Ambimat develops and supplies for V2X.
Cellular	SIMCom A7672-series 4G LTE Cat 1 module: backhaul, telemetry, remote diagnostics, backend and IP services, experiment data upload. Separate from the C-V2X radio; it does not provide PC5.
GNSS receiver	u-blox MAX-M10S, M10 standard-precision: GPS/QZSS L1C/A, Galileo E1-B/C, GLONASS L1OF, BeiDou B1I/B1C, all L1 band. Cellular plus GNSS dual-mode positioning for redundancy.
Compute	NVIDIA Jetson Orin Nano Super, 8 GB 128-bit LPDDR5. NVIDIA specifies Ampere architecture, 1024 CUDA cores, 32 third-generation Tensor cores, 6-core Arm Cortex-A78AE, 102 GB/s, up to 67 sparse INT8 TOPS — NVIDIA's platform figures, not measured AmbiV2X application performance.
Motion sensing	9-axis IMU: accelerometer, gyroscope, magnetometer; motion, orientation and hard-event logging.
Environmental sensing	Ambient temperature, relative humidity, barometric pressure.
Security	AmbiSEC hardware-protected security subsystem. See Security architecture , page 3.
Software	Ubuntu 22.04 LTS, ROS 2 Humble Hawksbill, AmbiV2X Developer Stack.
Power	USB-C charging, off-the-shelf battery pack, LED multi-function indicator.
Vehicle data bus	<i>Not included. No CAN or CAN-FD connection.</i>
Perception sensors	<i>Not included. No LiDAR, radar or camera hardware.</i>
Operating temperature	<i>Not published. No validated range and no extreme-temperature or high-humidity qualification is claimed.</i>
Enclosure / ingress	<i>Not published. No ingress rating is claimed.</i>

Rows describe the platform as configured for V2X development. They are not validated ratings. The AIS-230-aligned production specification is pending and will supersede this table.

INTERFACES & COMMUNICATION

- ❑ **PC5 sidelink** — direct vehicle-to-vehicle and vehicle-to-roadside messaging on 5.9 GHz.
- ❑ **LTE Uu** — IP backhaul to back-end services, telemetry and remote diagnostics.
- ❑ **Inputs** — the unit's own GNSS, IMU and environmental sensors. Everything the node says about itself, it derives from itself.
- ❑ **Outputs** — signed messages broadcast over PC5, plus the cellular uplink.
- ❑ A vehicle-bus interface (wheel speed, brake state, gear) is programme-specific engineering, not part of the kit.

GNSS & TIME

- ❑ Typical 1.5 m CEP in multi-constellation modes (u-blox conditions: CEP 50%, 24 h static, -130 dBm, >6 satellites per system). Standard precision; not lane-level.
- ❑ Navigation rate 3 Hz in the default GPS + Galileo + BeiDou B1I configuration; up to 20 Hz with GPS + Galileo.
- ❑ Velocity 0.05 m/s; dynamic heading 0.3° (single antenna, motion-derived).
- ❑ SBAS including GAGAN; AssistNow assisted GNSS. Jamming and spoofing detection, signed receiver messages.
- ❑ The C-V2X sidelink takes its timing reference from GNSS time.
- ❑ No GNSS/INS fusion engine is included; both streams are delivered separately to ROS 2.

SOFTWARE & INTEGRATION

Ubuntu 22.04 LTS with ROS 2 Humble Hawksbill. Applications are developed in C++ and Python against documented interface packages of the AmbiV2X Developer Stack, with SAE J2735 message development and IEEE 1609.x integration below the application layer. GNSS and IMU arrive as separate ROS 2 streams that an application can use, log, replay and compare. AmbiOBU and AmbiRSU share the same development environment, so work moves between the mobile and roadside sides of an experiment.

SECURITY ARCHITECTURE

LAYER	WHAT IT IS	STATUS
AmbiSEC hardware protection	Security boundary across which long-term secrets are never exposed to application firmware	IMPLEMENTED
Device-bound identity	Unique identity key inside the boundary, non-extractable by hardware design	IMPLEMENTED
Protected keys & crypto operations	On-chip key generation; signing, verification, encryption and decryption inside the boundary	IMPLEMENTED
Secure boot & authenticated update	Boot verified before the unit is operational; firmware authenticated before installation	IMPLEMENTED
V2X message signing & verification	IEEE 1609.2 secured-message encoding, signing of transmitted and verification of received messages	IN DEVELOPMENT
Certificate & credential lifecycle	Enrolment credentials, pseudonym certificate batches, rotation, revocation	IN DEVELOPMENT
Programme / national PKI	Enrolment and Authorisation Authorities, root and trust-list distribution	EXTERNAL
Trust-anchor operation	Operational RCA, SCMS or CCMS	NOT CLAIMED

AmbiSEC is engineered by Ambimat's AmbiSecure business unit. It is not the PC5 modem or the radio, and its presence is not evidence of certification, of national PKI integration, or of participation in any Root CA, SCMS or CCMS.

INTENDED APPLICATIONS

Algorithm development

V2V, V2I, moving-node and relative-motion experiments on a real PC5 link.

Integration & testing

Message handling, trust decisions and back-end integration before a vehicle programme commits.

Research

University and lab research in ROS 2, including state estimation built on the separate GNSS and IMU streams.

Demonstration

Run on the optional 1:10-scale movable platform, paired with an AmbiRSU on its mast.

Testing organisations

A configurable PC5 endpoint for test-bed work.

Production OBU baseline

Optional custom engineering: bus interface, enclosure, power input or a defined environmental envelope.

ENVIRONMENTAL & QUALIFICATION STATUS

Production-ready describes maturity, manufacturability and orderability – not environmental qualification. Environmental qualification of the standard configuration for extreme temperature, high humidity, ingress, vibration, shock or vehicle-specific installation is not claimed, and no operating-temperature range or ingress rating is published. AmbiOBU is not in production deployment, and is not certified, homologated or type-approved. AIS-230 approves vehicles, so no development platform is AIS-230 compliant. ISO 26262 and Automotive SPICE conformity for an integrated unit are targets, not claims.

Design references: C-V2X on 5.9 GHz, aligned to the TRAI spectrum proposal and the G.S.R. 466(E) licence exemption for 5875–5905 MHz; PKI-signed messaging, aligned to the Draft AIS-230 security requirements. These are design references, not certificates.

ORDERING & CONTACT

AmbiOBU is available to order from Ambimat Electronics. Configuration, lead time and pricing are quoted per enquiry; no price, stock position or delivery commitment is published.

Quotation: neel.shah@ambimat.com
Product page: v2x.ambimat.com/products/ambiobu/
Contact: v2x.ambimat.com/contact/

IMPORTANT LIMITATIONS

- ❑ A development platform, not a homologated vehicle unit.
- ❑ GNSS figures are u-blox specifications under u-blox test conditions (MAX-M10S data sheet UBX-20035208), not field guarantees.
- ❑ Compute figures are NVIDIA's, not measured application performance.
- ❑ Supplying AmbiSEC does not make Ambimat a Root CA or PKI operator.

DOCUMENT REVISION

REV	DATE	CHANGE
1.0	1 October 2026	First issue. Development configuration as published on v2x.ambimat.com/products/ambiobu/ .

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