

C-V2X PC5 · ROADSIDE UNIT · DEVELOPMENT PLATFORM

AmbiRSU

5.9 GHz C-V2X PC5 roadside-unit development platform

AmbiRSU is a mature, production-ready V2X development platform from Ambimat Electronics, available to order: the static roadside endpoint for vehicle-to-infrastructure and infrastructure-to-vehicle research and integration over 5.9 GHz C-V2X PC5, built on the same foundation as AmbiOBU.

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

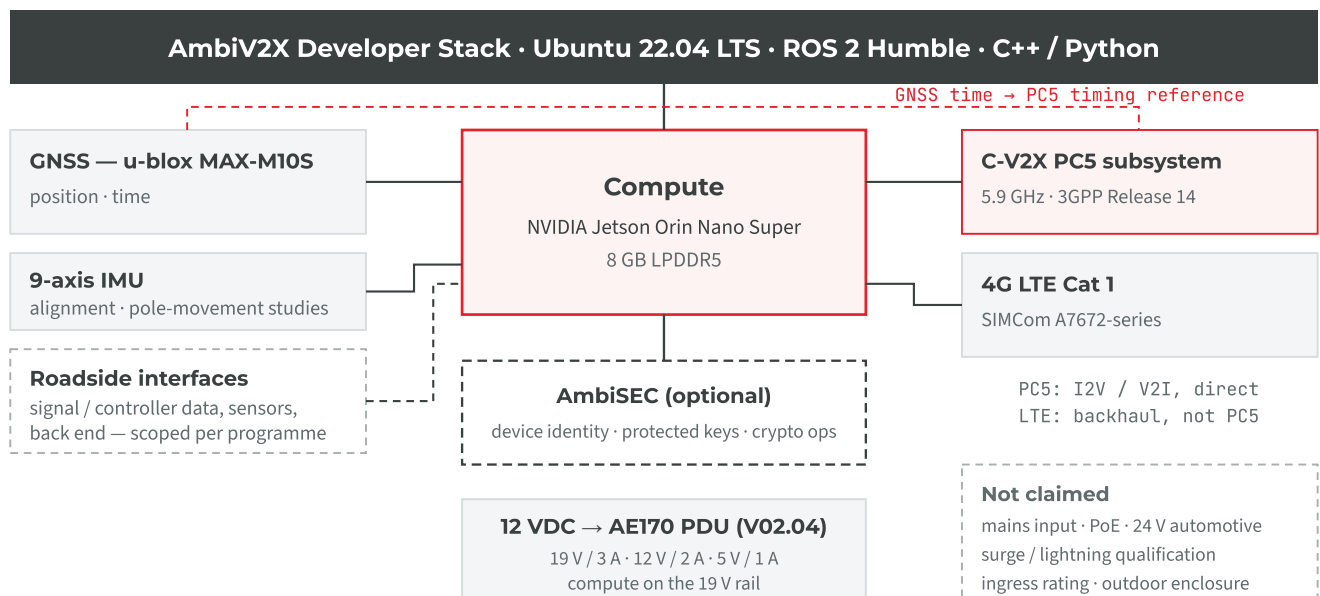


FIGURE 1 AmbiRSU in its development configuration. Dashed blocks are programme-scoped or optional. Functional diagram, not a board layout.

5.9 GHz C-V2X	4G LTE Cat 1	12 VDC input	ROS 2 Humble	Available to order
PC5 direct, 3GPP Release 14	Backhaul, separate from PC5	AE170 power distribution	Same stack as AmbiOBU	From Ambimat Electronics

Key features

- 5.9 GHz C-V2X PC5 subsystem, 3GPP Release 14 — the same radio baseline as AmbiOBU
- Static roadside endpoint for V2I and I2V research and integration
- 4G LTE Cat 1 backhaul, separate from the direct C-V2X radio
- u-blox MAX-M10S four-constellation GNSS for position and time
- NVIDIA Jetson Orin Nano Super compute, 8 GB LPDDR5
- Ubuntu 22.04 LTS, ROS 2 Humble, AmbiV2X Developer Stack
- Protocol development: IEEE 1609.3, IEEE 1609.2, SAE J2735 (BSM, SPaT, TIM, MAP)
- Optional AmbiSEC: device-bound identity, protected keys and cryptographic operations
- 12 VDC development input through the Ambimat AE170 power distribution unit
- Roadside interfaces scoped to the target programme

DEVELOPMENT CONFIGURATION

COMPONENT	SPECIFICATION
Direct V2X radio	5.9 GHz C-V2X PC5 subsystem, 3GPP Release 14, including C-V2X power-saving modes where applicable. The local exchange does not go through a mobile network.
Cellular	SIMCom A7672-series 4G LTE Cat 1: backhaul, telemetry, remote diagnostics, backend and IP services. Separate from the C-V2X radio; it does not provide PC5.
GNSS	u-blox MAX-M10S: GPS/QZSS L1C/A, Galileo E1-B/C, GLONASS L1OF, BeiDou B1I/B1C, all L1 band. Typical 1.5 m CEP under u-blox test conditions.
Compute	NVIDIA Jetson Orin Nano Super, 8 GB LPDDR5 — the same compute platform and memory configuration as AmbiOBU.
Motion sensing	9-axis IMU (accelerometer, gyroscope, magnetometer), for installation-alignment and pole-movement studies.
Software	Ubuntu 22.04 LTS; ROS 2 Humble Hawksbill; AmbiV2X Developer Stack, the same environment as AmbiOBU.
Protocol development	IEEE 1609.3-2020 including WSMP and WME, IEEE 1609.2-2016, SAE J2735-2022 — BSM, SPaT, TIM and MAP as candidate messages, profile selected per programme. Development and integration, not certified conformance.
Security	Optional AmbiSEC integration. See Security architecture , page 3.
Power input	12 VDC development supply through the Ambimat AE170 Power Distribution Unit (V02.04): regulated rails 19 V/3 A, 12 V/2 A, 5 V/1 A; compute supplied from the 19 V rail.
Roadside interfaces	Programme-configurable: signal and controller data, intersection state, road and environment sensors, back-end systems and instrumentation.
Enclosure & environment	<i>Defined per programme. No operating-temperature range, ingress rating, environmental qualification or roadside homologation is claimed.</i>
Mains / PoE / 24 V / surge	<i>Not claimed. No mains input, Power over Ethernet, automotive 24 V compatibility, or surge, lightning or roadside power-conditioning qualification.</i>

Rows describe the platform as configured for V2X development, not validated ratings. The roadside sensor stack and full specification are pending client requirements; no interface is listed merely because the compute module supports it.

NETWORKING & COMMUNICATION

- ❑ **PC5 sidelink** — direct I2V and V2I messaging with nearby vehicles on 5.9 GHz.
- ❑ **LTE Uu** — IP backhaul to back-end systems, telemetry and remote diagnostics.
- ❑ **Application permissions** — an RSU signs only the message types its certificate's PSID/SSP permissions authorise (for example SPaT, MAP), enforced cryptographically.
- ❑ A fixed site lets the antenna be aimed along the carriageway rather than radiating equally in every direction.

GNSS & TIME

- ❑ A static roadside node still needs GNSS: the C-V2X sidelink takes its timing reference from GNSS time, and message position claims come from it.
- ❑ Same MAX-M10S receiver as AmbiOBU: four constellations concurrently on L1.
- ❑ Typical 1.5 m CEP (u-blox: CEP 50%, 24 h static, -130 dBm, >6 satellites per system).
- ❑ Receiver jamming and spoofing detection and reporting.

SOFTWARE & INTEGRATION

AmbiRSU runs the same ROS 2 Humble environment on Ubuntu 22.04 LTS as AmbiOBU, with C++ and Python development against the documented interface packages of the AmbiV2X Developer Stack. Roadside interfaces, sensor payload and back-end integration are scoped to the target programme. A complete research setup normally pairs one or more moving AmbiOBUs with a fixed AmbiRSU.

SECURITY ARCHITECTURE

REQUIREMENT	AMBIRSU DESIGN ARCHITECTURE (WHERE AMBISEC IS INTEGRATED)
Hardware-backed credential storage	RSU identity keys and V2X certificates held in the hardware-isolated secure element
Device-bound identity	Unique identity key inside the secure element, non-extractable by hardware design
Signed messages	ECDSA signing and verification inside AmbiSEC implemented; the IEEE 1609.2 secured-message path is IN DEVELOPMENT
PKI certificate management	Issuance, renewal and revocation over the backhaul IN DEVELOPMENT ; the authority is EXTERNAL to Ambimat
Secure boot	Boot sequence cryptographically verified before the unit becomes operational
Secure OTA	Firmware authenticated by the secure element before installation; rollback on failed update
Tamper detection	Anti-tamper mesh on the PCB triggers alarm and credential wipe on physical breach
Application permissions	Message permissions scoped in the certificate (PSID/SSP)

The table is the architecture the platform is designed to, not a tested or certified implementation. Ambimat does not operate a Root CA, Enrolment Authority or Authorisation Authority.

INTENDED APPLICATIONS

Roadside application development

V2I and I2V applications against a real PC5 link and a fixed endpoint.

Infrastructure experiments

Candidate SPaT, MAP and TIM messaging, signal-data integration and back-end paths.

Research

University and lab test beds, with AmbiOBU as the moving participant.

Integration & testing

Message handling, credential handling and back-end integration before a site programme.

Demonstration

A static endpoint for a movable AmbiOBU to talk to on a test floor.

Production RSU baseline

Optional custom engineering: site enclosure, controller integration or a defined conformity regime.

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 outdoor roadside installation is not claimed, and no operating-temperature range or ingress rating is published. AmbiRSU is not in production deployment, and is not certified, homologated or type-approved. Homologation and certification for a permanent roadside installation remain specific to the final integrated product, the site and the target programme.

ORDERING & CONTACT

AmbiRSU 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/ambirsu/
Contact: v2x.ambimat.com/contact/

IMPORTANT LIMITATIONS

- ❑ A development platform, not a certified production roadside unit.
- ❑ The 12 VDC input is a development supply, not a field-grade roadside power system.
- ❑ Protocol work is development and integration, not certified conformance.
- ❑ Not part of the 1:10-scale movable platform, which belongs to AmbiOBU.

DOCUMENT REVISION

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

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