



RSU-351U

Information Sheet

C-V2X Roadside Unit,
C-V2X stack, V2Xcast®



Overview:

RSU-351U is a 3GPP C-V2X (LTE-V2X) PC5 roadside unit with waterproof IP67 enclosure designed to enable V2X in the Cooperative Intelligent Transport Systems (C-ITS) environment. RSU-351U provides secure data communication between vehicles and infrastructure, such as Advanced Traffic Controller or roadside sensor system, to enable cooperative ITS applications. Preloaded with C-V2X stack and V2Xcast® software, RSU-351U provides highest Vehicle-to-Infrastructure (V2I or I2V) application flexibility to fit the various deployment needs for different ITS and V2X system integrators.

Feature:

- ❖ A rich SDK containing facility-layer messages, APIs and example codes accelerates development of V2X applications.
- ❖ Seamlessly enable LTE-V2X PC5 on roadside Linux host via Ethernet connection and V2Xcast®.
- ❖ On-board mPCIe socket allows add-on module such as LTE modem.
- ❖ Surge protection on the antenna ports and PoE enhance immunity and robustness in voltage spike events.

Specifications:

Chipset	<ul style="list-style-type: none"> ❖ Autotalks® CRATON2 V2X communication processor <ul style="list-style-type: none"> ◆ dual 600MHz ARM Cortex-A7 32-bit CPU cores ◆ 1140 DMIPS processing power each Cortex-A7 core ◆ ARM Cortex M3 32-bit processor with memory protection unit (MPU) and ECC protected memory ❖ Autotalks® PLUTON2 V2X RF Transceiver ❖ Embedded Hardware Secure Module (eHSM) <ul style="list-style-type: none"> ◆ Dedicated ARM Cortex-M0 CPU ❖ Telit® SL869-V3 GNSS module
Operation System	Linux Yocto
System Service	<ul style="list-style-type: none"> ❖ RS-232 console through on-board interface ❖ Ethernet
System Memory	128MB NAND, 128MB DDR3
Preloaded Firmware	LTE-V2X PC5 C-V2X stack includes IEEE 1609.2/3/4, and SCMS client
Development Tool	V2Xcast® SDK, including APIs and facility-layer messages
Hardware Security	<ul style="list-style-type: none"> ❖ Dedicated ROM containing certified secure V2X signing firmware ❖ Secure encrypted off-chip storage of private keys ❖ Private material is inaccessible outside HSM ❖ Capable of >110 signatures / second, with <9ms signing latency for ECDSA NIST P256 or ECDSA Brainpool P256R1 ❖ Line-rate ECDSA verification engine (>2500 ECDSA NIST P256 verifications / second) ❖ FIPS 140-2 Level 3 certification ❖ Tamper detection* <p>(* . Support by project)</p>
C-V2X (LTE-V2X)	<ul style="list-style-type: none"> ❖ Frequency band: 5.895 ~ 5.925 GHz ❖ Radio mode: 3GPP LTE-V2X Rel. 14/15 PC5 sidelink ❖ Channel bandwidth: 10/20 MHz ❖ RF transmit power: max. +20dBm on antenna port, Class C RF spectrum mask compliant with margins ❖ RF receive power: typ. < -92dBm

GNSS	<ul style="list-style-type: none"> ❖ Update Rate: 10Hz ❖ Sensitivity: <ul style="list-style-type: none"> ◆ Acquisition: -146dBm ◆ Navigation: -158dBm ◆ Tracking: -162dBm ❖ NMEA Standard: NMEA 0183 ❖ Accuracy: 1.5m (CEP50 with SBAS) ❖ Telit® SL869-V3 GNSS receiver supports GPS/Glonass/Galileo/QZSS constellations*. SBAS like EGNOS (EU), WAAS (US), and MSAS (JP) are also supported. <p>(* . GPS and Glonass are supported by default)</p>
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External Connector	<ul style="list-style-type: none"> ❖ one M25 waterproof Ethernet port with 802.3af PoE ❖ two Type-N RF port for LTE-V2X ❖ one Type-N RF port for GNSS
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On-Board Interface	<ul style="list-style-type: none"> ❖ Two MHF RF connector (LTE-V2X) ❖ One MMCX RF connector (GNSS) ❖ One Mini PCIe slot (for LTE module) * ❖ One SIM slot* ❖ One PoE Module slot ❖ LED headers <p>(* . Support by project)</p>
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LED	<ul style="list-style-type: none"> ❖ STATUS (USDOT RSU 4.1) <ul style="list-style-type: none"> ◆ Start-up: Blinking Green ◆ Operational: Solid Green ◆ FW upgrade: Amber (R+G) ◆ Fault: Red
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Antenna	<ul style="list-style-type: none"> ❖ two Type-N outdoor 7.6dBi LTE-V2X antennas (for diversity) ❖ one Type-N outdoor GNSS antenna
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Power Supply	802.3af PoE (12W)
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Operation Temperature Range	ambient: -40°C ~ +70°C
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Operating Humidity	10% ~ 95%, non-condensing
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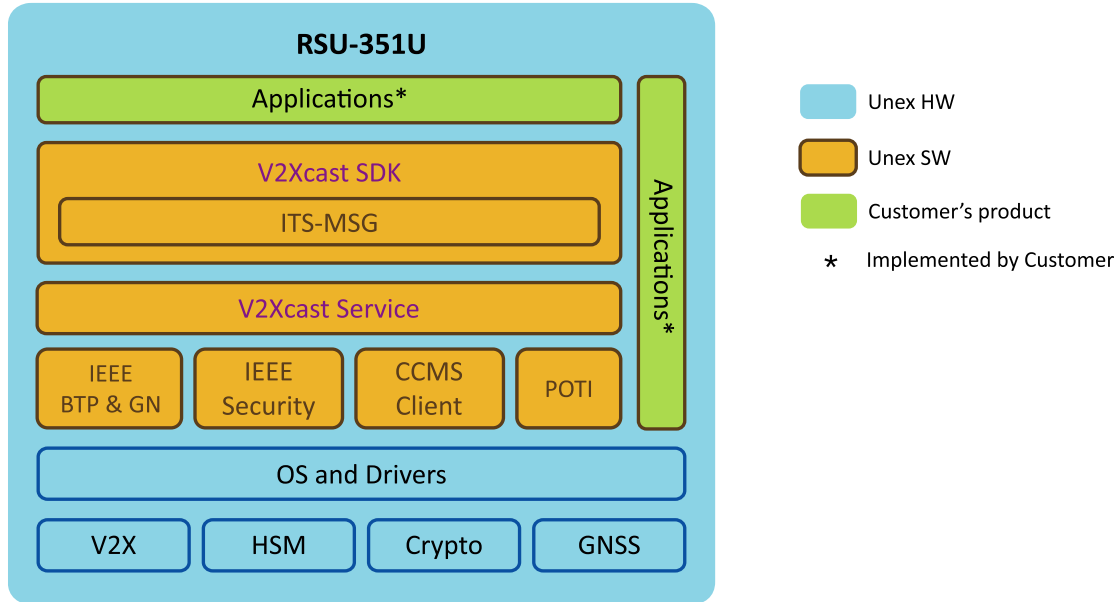
Storage Humidity	max. 95%, non-condensing
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Product Dimension	220.5mm (L) x 127.5mm (W) x 72.3mm (H) (excluding antennas)
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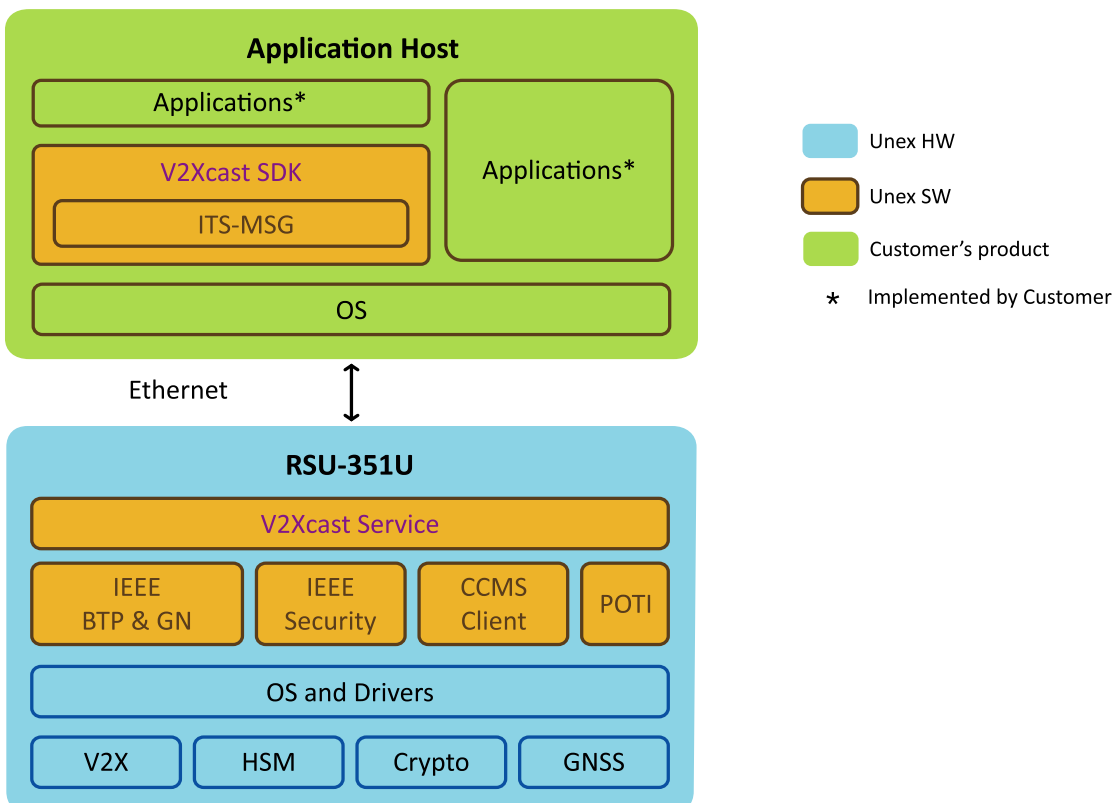
Software:

Featuring with V2Xcast[®], Unex’s innovative software technology, RSU-351U allows two modes of operation:

1. Hostless Mode: RSU works as a standalone full-featured V2X unit



2. Hosted Mode: RSU works as a V2X communication unit to the application host



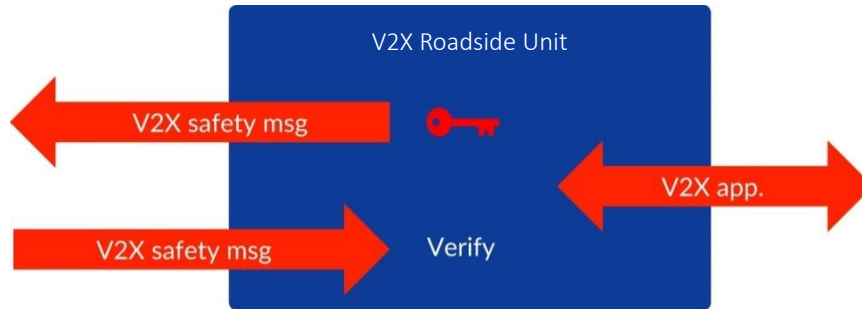
Unex RSU-351U enables ease of V2X software development through its V2Xcast® technology. Previously, V2X protocol software had to be built and verified complicated APIs, resulting in a duplicated effort, risk and cost. With Unex intuitive V2Xcast solution that provides ready-to-use V2X communication services for V2X applications, customers can significantly cut time-to-market with less development and testing cost.

V2Xcast is supported in RSU-351U to facilitate V2I/I2V application development. It includes two parts – V2Xcast Service and V2Xcast SDK.

V2Xcast SDK: Deploy V2Xcast SDK in either RSU-351U or external application host, it includes APIs to get the services from V2Xcast Service and the main functions of facility layer, such as message encoder/decoder and example code.

V2Xcast Service: V2Xcast Service image resides in RSU-351U, it combines C-V2X stack that includes IEEE 1609.2/3/4, and SCMS client. V2X communication protocols will be easily enabled via configuration input without any programming.

Security:



Security functions provided by V2Xcast[®] are designed based on a highly secure HSM (Hardware Security Module).

The highly secure HSM with FIPS 140-2 Level 3 certification is embedded in RSU-351U.

Cryptographic processor eliminates bottlenecks, maximizes application performance and offload CPU's computation. To protect your sensitive cryptographic keys in a high-assurance key vault, the design provides leverage a keys-in-hardware solution. With the keys-in-hardware solution, all the cryptographic operations are inside HSM and those keys never leave the HSM.

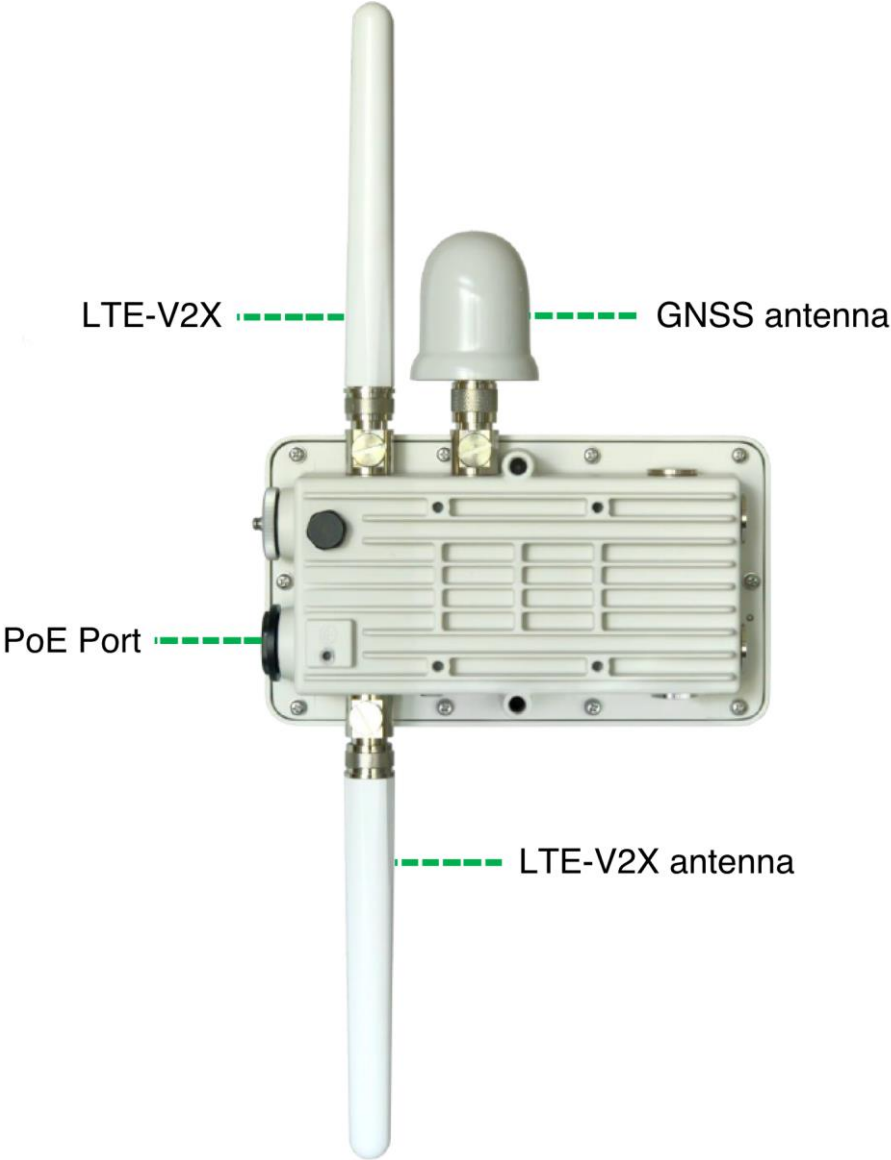
Typical Using Case:



OBU with communication stack

The Linux traffic controller unit acts as SPATEM/MAPEM generator to perform the relative encode/decode. Implement the required V2X stack on RSU-351U to co-operatively work with the Linux traffic controller unit and serves to receive and forward the SPATEM/MAPEM messages as a payload for communication between vehicles and traffic controller in co-operative ITS. V2I/I2V applications can be flexibly implemented on the Linux traffic controller unit or RSU-351U.

Connectivity:



Package Contents:

1. One RSU-351U
2. Two outdoor LTE-V2X antennas
3. One outdoor GNSS antenna
4. One PoE surge protector
5. One cable gland
6. Mounting Bracket and accessories
7. One earth wire
8. Hardware Guide and software development kit available on Unex server

Ordering Information:

RSU-351U	C-V2X Roadside Unit, C-V2X stack, V2Xcast [®]
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