PRODUCT BRIEF

Vehicle Telematics Solution
Intel IoT

Intel®-based OBD-II Dongle for Advanced Vehicle Telematics

Offering exceptional connectivity and security at the edge, Intel®-based gateway technology brings robust data analytics to vehicles and fleets with an app-ready platform that speeds development.

Improving Driving with More Powerful Edge Data Analytics

The Internet of Things (IoT) is converging the physical and digital worlds, and rapidly changing how each of us operates day-to-day, including the way we drive and manage fleets of vehicles. Intel is speeding time to market for telematics solutions providers with a robust, application-ready On-Board Diagnostic II (OBD-II) dongle featuring the Intel® Atom™ x3-C3205RK system-on-a-chip (SoC) processor. It harnesses scalable cloud technology and Intel compute power and IoT expertise to enhance safety, security, productivity, and profitability.

A Purpose-Built Telematics Solution

The Intel®-based OBD-II dongle is a validated, highly refined platform specifically designed to collect data streams from an array of vehicle buses and sensors and more securely aggregate, analyze, filter, and report that information to drivers, fleet managers, insurance companies, and even private vehicle owners. This platform, built on an open Android* system, can reduce the costly and lengthy hardware and development and certification phases, and begin software development almost immediately. The analytics that the dongle makes possible will open new worlds of opportunity for software developers and service designers. With this reference design, they will be able to more quickly create robust solutions for fleet management businesses of all types and sizes and for the mass market.

Intel Atom x3 Processor

The heart of the Intel-based OBD-II dongle is the Intel Atom x3-C3205RK processor, which features a 1.2 GHz quad-core CPU running on 64-bit architecture. Its highly compact SoC design incorporates a host of connectivity and peripheral features. It offers efficient control of power-supply domains and power subdomains, and several system low-power (sleep) states. It also offers a digital microphone, stereo headset, and loudspeaker interfaces, and an array of I/O devices, including a mini USB 2.0 and SD card.

Integrated Connectivity

The OBD-II dongle features a highly-integrated dedicated modem hardware unit, which offers all of the necessary features to enable multimode, multiband mobile cellular devices. For communication with the cloud while en route, it offers 2G (GSM/GPRS/EDGE) and 3G (HSPA+/UMTS) connectivity that achieves high data rates in downlink (HSDPA 21 Mbit/s) and uplink (HSUPA 5.7 Mbit/s). Onboard GPS and GLONASS locate the vehicle,

while Bluetooth* technology (BT4.0) connectivity allows pairing to a smartphone so vehicle operators can access and leverage near-real-time OBD-II data. A 2.4 GHz spectrum Wi-FI connection allows for the transmission of larger amounts of data—such as engine or diagnostic data that can be used in predictive maintenance applications. What's more, integrated Wi-Fi hotspot technology transforms the vehicle into a mobile wireless local area network (WLAN), via the device's 3G connection.

Security and Stability Features
Whether the driver of a vehicle is a private owner or an employee of a major corporation, the data streams produced by the OBD-II connection and the sensors on board the Intel-based dongle will often be of a highly sensitive nature. The Intel-based OBD-II dongle builds security features into every level by first fusing the BootROM during production. Secure Boot then establishes a chain of trust by verifying the loaded software. To secure system memory, the security use cases and the modem execution and their memory are firewalled from the Linux*/Android layer. The platform is further protected from reverse engineering by disallowing tracing capabilities in production and requiring a specific certificate to enable debug capabilities. Crypto accelerators support several different encryption standards, while SecureVM* virtualizes the memory and processor core and encrypts all data that it stores.

Intel® Telematics Software Development Kit (SDK)
To support this OBD-II dongle, Intel offers an Android-based telematics SDK, which can allow developers and designers to quickly develop or port telematics applications out of the box. It provides reference APIs for accessing diagnostic and sensor data via OBD, CAN, ELM327, J1939, and sensors on board the dongle, including an accelerometer and 3-axis gyroscope. It manages functions like security, location, tagging, and network services. It also incorporates telematics algorithms to analyze driving style—such as hard braking and cornering—and fuel consumption. This powerful kit also makes the most of connectivity, using the Store-and-Forward Service for caching outbound messages in case of network unavailability and utility classes for managing device profiles to minimize battery power consumption.

End-to-End Telematics Architecture
As a fully enabled gateway, the Intel-based OBD-II dongle will be a key feature of Intel's developing end-to-end telematics architecture. This architecture will allow the ongoing connection between the sensors and capture devices aboard each fleet vehicle, the cloud, databases, and end-user interfaces. This architecture is going to move fleet and vehicle telematics away from a siloed model—one that requires original device manufacturers (ODMs) to develop every aspect of the architecture themselves—and toward a scalable, open model that creates more flexibility and opportunities for a broader array of products and solutions.

Integrated Module Available
For those seeking custom solutions for other telematics boxes, or dongle designs, an integrated module complete with the Intel Atom x3-C3205RK and Intel® A-GOLD 620, along with 8 Gb of LPDDR3 DRAM, and up to 8 GB of eMMC NAND flash memory, is also available on request.

GETTING YOU TO MARKET FASTER

This dongle is the key piece in Intel's expanding end-to-end telematics solution based on the Intel® IoT Platform, which can make creating solutions that deliver key insights easier, faster, and more reliable than it has ever been. As this technology and global connectivity continue to rapidly advance, speed to market with these solutions will be a key differentiator for OEMs, system integrators, and application developers. With this telematics platform, they won't have to also create middleware or design custom frameworks. What's more, the dongle is PTCRB- and GCF- certified, which speeds time to market while reducing risk during development. Intel is helping provide a fast, flexible, and scalable path to creating telematics and fleet management solutions.

Evaluate
Get started quickly with tools, libraries, and samples that Intel makes available.

Develop
The Intel®-based OBD-II dongle is a qualified, ready-to-use solution that incorporates cloud and device-to-device connectivity and has already received FCC certification, among others, saving significant time and money.

Deploy
Rapidly establish performance optimization of applications and analytics, and scale your application. Intel offers device management and security features not available with other solutions.

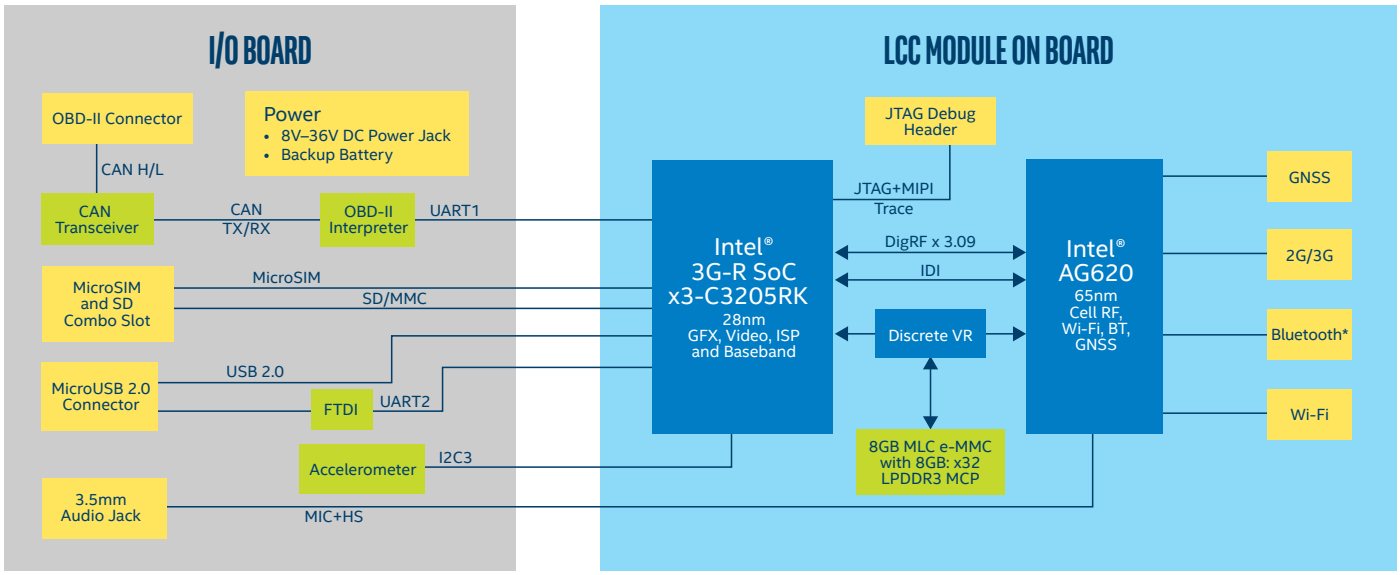

Figure 1. Vehicle Telematics Solution

KEY FEATURES

INTELLIGENCE AT THE EDGE

CPU: Intel Atom x3-C3205RK SoC is a highly compact 1.2 GHz quad-core CPU running on 64-bit architecture.

Memory: eMCP memory combines up to 8 Gb of LPDDR3 DRAM with up to 8 GB of eMMC NAND flash memory for fast performance in a small form factor and low power consumption.

Integrated Connectivity: Integrated I/O board and AG620 modem support connections via Bluetooth* Technology, USB 2.0, GPS, 3G, Wi-Fi, and more.

On board Sensors: A built-in accelerometer and 3-axis gyroscope provide sensing capabilities that can detect driving style data, among other insights.

SPEEDING SOFTWARE DEVELOPMENT AND PRODUCT AVAILABILITY

OS: Supports Android M, and will soon support Linux.

Intel Telematics SDK: A fully validated, product-grade broad support package (BSP) that supports a wide range of APIs for fast app and service development. Includes APIs and porting for OBD, CAN, J1939 telematics applications, using key telematics ingredients out of the box. Also provides reference code for monitoring of driving style, such as acceleration and cornering, with the onboard accelerometer and gyroscope.

Certified: Includes a substantial list of regulatory, PTCRB, and GCF certifications for the US and EU, including FCC and operator approvals, to reduce time to market and investment cost.

SECURITY AT EVERY LEVEL

Root of Trust: The BootROM is fused during SoC production and serves as the root of trust to verify the software that is subsequently loaded.

Secure Boot: Hardens the chain of trust: the BootROM verifies the primary bootloader before it is loaded and the primary bootloader verifies the secondary bootloader, which in turn verifies the kernel.

Debug Protection: The platform is more protected from reverse engineering by disallowing tracing capabilities in production and requiring a specific security certificate to enable debugging.

Secure Communications: Supports standard SSL/TLS, and WPA and WPA2, for secure WiFi.

Trusted Execution Environment: Enables more secure use cases to be executed in insolation.

MobileVisor: Shares the physical CPU between multiple OS stacks; configures guest OSs independently; and manages boot parameters, memory partitioning, and devices.

Secure Storage: Ensures that eMMC areas are only accessible via secure VM.

Secure VM: Isolates memory from Android* and Linux to help prevent breaches.

INTEL®-BASED OBD-II DONGLE PRODUCT DETAILS

SECURITY FEATURES	DETAIL
Processor	Intel® Atom™ x3-C3205RK • Intel® Atom™ x3-C3200RK quad core processor 64-bit 1.2GHz CPU • A-GOLD 620
Memory	eMMC 4.51 (8 GB) + LPDDR3 (8 Gb; 1200MT/s)
Boot time	Cold boot power on (<1min); warm boot power on (<2s)
OS	Android* M, Linux* (coming soon)
USB	USB 2.0 host
Security	Secure boot, secure download, secure VM, signing/key handling, anti software rollback
Power	On/off by vehicle network through OBDII connection On/off switch for off lab use Input voltage (8V–36V) Standby current (in paging mode): <5mA Backup battery (Li-Ion cell 3.7V) Vehicle battery/device disconnection detection
Debug	JTAG Header
OP Temp	-20–~85C
Wireless	BT4.0 LE (HFP, GAT, SPP, etc.) Wi-Fi (802.11 b/g/n) support AP and stand-alone mode
Modem	HSPA+/UMTS band 1, 2, 5, 8 GSM/GPRS/EDGE Single micro SIM (no embedded SIM support)
Location	GPS/GLONASS A-GPS Satellite acquisition after power on in <20s
Accelerometer	Freescale MMA8653FC 3-axis, 10-bit digital accelerometer
OBDII	OBD-II interpreter (STN1170) SAE J1962 connection Fully compatible with ELM327 AT command set All legislated OBD-II protocols: • ISO 15765-4 (CAN), ISO 14230-4, ISO 9141-2, SAE J1850 VPW, SAE J1850 (PWM) Nonlegislated OBD protocols: • ISO 15765, ISO 118981 (raw), SW CAN (GMW3089), MS CAN SAE J1939 (for heavy-duty vehicle)

Advanced Technology for Smart and Connected Transportation

Smarter, connected fleets of vehicles are already providing powerful insights for trucking companies, insurance companies, and fleet managers. They are also helping control fuel emissions for a greener planet and keeping drivers safe. But we've only just begun to tap the opportunity. Powerful analytics like those enabled by the Intel-based OBD-II dongle can help get you to market faster with innovative products and applications to make roadways safer and more efficient.

For more information please contact your distributor, or visit intel.com/transportation.

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No computer system can provide absolute security under all conditions. Built-in security features available on select Intel® processors may require additional software, hardware, services, and/or an Internet connection. Results may vary depending upon configuration. Consult your system manufacturer for more details. For more information, see security-center.intel.com.

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