



Blackfin[®] Car Telematics Platform Brings Low Cost Telematics to the Mass Market



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Analog Devices' Blackfin Car Telematics Platform (CTP) is a pivotal innovation for the automotive industry, integrating a powerful processor, key software elements, and an open expandable environment to enable the next generation of ubiquitous telematics.

Costs—A Barrier to High Volume Telematics

A 2002 "Automotive Feature Contenting Report" published by J.D. Power and Associates said that "over the past five years, consumer desire for navigation systems has shown the largest increase of all the emerging features" consumers want to see in their new vehicles. The report stated that "in the case of navigation systems, consumer desire has increased faster than its actual penetration into the market" and asserted that "this is due in large part to the gap between the actual price for navigation systems versus the price consumers are willing to pay."¹

Today, the market for such telematics systems is certainly well established at the higher end of the price spectrum. Luxury-car buyers are already accustomed to optional navigation-oriented front-seat applications (e.g., in-car GPS) and in-vehicle systems (e.g., Onstar). But high costs have remained a distinct and steady barrier to delivering pervasive, commodity-priced telematics systems to the broad, high-volume automotive market. Forrester Research expects nearly 80 percent of new vehicles to feature telematics by 2006, and this kind of penetration can only occur when market-disrupting technology advancements can drive costs down to bring telematics systems to commodity volumes.²

Separate Subsystems Conspire to Keep Telematics Costs High

Existing telematics systems have remained in the high-priced option category because discrete modules or subsystems are required to perform what can be a long list of specific functions, such as

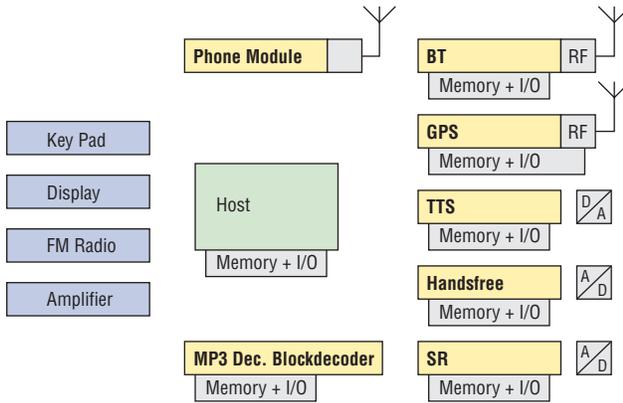
- User interface
- Mobile communications
- Vehicle diagnostics/prognostics
- Safety and security
- Electronic toll collection
- Cellphone integration
- Routing and navigation systems
- Dead reckoning
- Emergency services
- GPS
- Driver information systems
- Crash event data recorder
- Remote diagnostics
- Traffic data
- Auto-Office-Home-Device integration
- Intelligent vehicle systems
- E-mail access
- Customized news, sports, and financial information

¹ J.D. Power and Associates, "Consumers want to keep eyes on the road," CanadianDriver Communications Inc., October 30, 2002.

² Forrester Research, "Voice Drives Telematics Boom," June 2001.

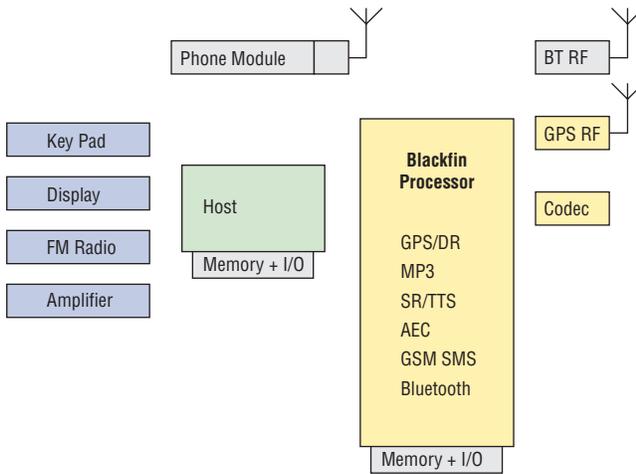
These functional subsystems are classically implemented as separate sub-units, driven by devices like DSPs, microprocessors, microcontrollers, FPGAs or ASICs. These devices are all typically sourced from separate vendors, each requiring their own memory and I/O components, development tools, and operating systems. The market-limiting result is a telematics system that is physically large, expensive, and time-consuming to develop.

Existing Car Telematics Systems



Using the Blackfin CTP, functions are integrated, resulting in a smaller, lower cost system.

Car Telematics Systems Based on Blackfin CTP



Blackfin CTP Drives Down Costs

In direct and very positive contrast, the Blackfin CTP capitalizes on the processing power of a single Blackfin Processor to reduce telematics system costs, size, and development time by integrating many telematics tasks onto a single processing platform. With processing performance of 500 MHz (1000 MMACs, > 500 Dhrystone 2.1 MIPS), the CTP's Blackfin Processor has the performance to replace a large number of separate processor subsystems, providing telematics systems developers with both the right kind and the right amount of processing power.

In addition to its raw processing power, the CTP's Blackfin Processor is capable of achieving the right kind of concurrent functionality due to its unique architecture which combines signal processing attributes like dual-MACs (multiply-accumulate engines, commonly used for high-performance signal processing applications) and classic RISC characteristics like a memory management capability that facilitates simplified,

micro-processor-type programming modes and styles. The Blackfin Processor has signal processing features not found on any RISC microcontrollers and important microcontroller characteristics not found on typical DSPs. Because the Blackfin Processor performs signal processing and control functions equally well, it signifies the first time telematics applications, which require a mix of both, can be elegantly and cost-effectively implemented on a single kind of processor.

Overall, Analog Devices expects the Blackfin CTP to enable system cost reductions of at least 50 percent over current telematics system implementations when delivering a rich set of features like GPS, dead reckoning, text to speech, speech recognition, acoustic echo cancellation, noise reduction, Bluetooth™ connectivity, AM/FM decoding, and MP3 music decoding.

Open Platform

Processing superiority and architectural flexibility are both necessary, but not sufficient ingredients for creating a telematics market discontinuity. To drive down the cost of both deployment and development of telematics systems, Analog Devices has created a comprehensive, open-platform approach for telematics systems and software developers, making adoption of the Blackfin CTP fast and seamlessly easy. The platform includes documented APIs for application classes, documented host/processor communication protocols, a board support package, a full set of device drivers, a royalty-free RTOS, and a full-source license of the Blackfin CTP framework.

Analog Devices handles all aspects of the third-party infrastructure behind the Blackfin CTP, simplifying the financial and development relationships for the telematics systems developers. The combination of the power of the Blackfin CTP and the full support of the Blackfin CTP integration framework serves to alter the development time and cost dynamics of the telematics head-end market.

As an example, a single Blackfin Processor can concurrently perform the following application set, all of which is available for the Blackfin CTP in either Analog Devices' supplied software or preintegrated third-party offerings:

- GPS location management
- Dead reckoning
- MP3 playback from a CD drive/Flash Card/HDD
- Block decoding of CD drive data
- Noise and echo cancellation through single or array microphones
- Speech recognition
- Text to speech
- Bluetooth connectivity to a local phone

Beyond Raw Processing Power

At the same time it is trying to drive down system costs, the telematics market is experiencing increased system complexity, intensified market forces, and a demand for more feature-rich telematics applications. This all places added pressures on telematics systems designers, and the Blackfin CTP third-party platform is a direct response, helping to reduce time to market, lessen technological risk, minimize support requirements, and reduce development costs.

In creating such a comprehensive platform for car telematics, Analog Devices has taken the unusual step of going well beyond just providing developers with raw processing power. The Blackfin CTP includes a collection of telematics function modules that reduce code-development time and enable faster time-to-market. These third-party products offer a broad range of application and development software—products and tools that help telematics systems designers accelerate their development efforts and cut time to market through ease of development, reusability, and openness, as well as substantially reduced risk and cost.

Software Provisioning for Cars

The all-software approach of the Blackfin CTP is an advantage that telematics systems developers can pass on to automotive manufacturers. Because an all-software system is upgradable, and telematics systems are wirelessly accessible, Blackfin-based telematics systems allow over-the-air system upgrades. This kind of remote system provisioning enables an end-to-end software system that lets car manufacturers repair automotive and telematics system software as well as add new telematics application capabilities over the air (OTA). This helps to avoid recalls due to software issues, reduces customer-care call-center costs, increases customer satisfaction, and potentially increases revenue through application subscription fees.

Auto-component makers and automotive manufacturers are moving toward increasing software content in an attempt to deliver more value to their customers. Software content development will continue to be one of the fastest-growing segments in automotive electronics, and with this comes opportunity. Software-based telematics systems completely remove the limitations of fixed-function alternatives and allow car companies to regularly “upgrade” their customers with new, potentially revenue-generating functionality. This is especially crucial with the introduction of mobile communications capabilities and applications that exist in a world of constantly shifting standards.

JVM Yields Platform Independence

The automotive industry is keenly reviewing the telematics applicability of environments in which higher-level graphical user interfaces (GUIs) and applications can execute. Java®, already a well-established standard in the mobile communications industry, is also gathering momentum in car telematics. The biggest benefit of the Java platform for telematics systems development is that a single implementation of platform-independent portable code can be deployed across many vehicle platforms.

Coincident with the Blackfin CTP, Analog Devices provides a full Java 2 Micro Edition (J2ME™) Java Virtual Machine™ (JVM™) on the Blackfin Processor, including support for Connected Limited Device Configuration (CLDC 1.1) and the Mobile Information Device Profile (MIDP 2.0, the “profile” defined within the J2ME for mobile devices). Blackfin CTP’s comprehensive Java support provides telematics systems developers with added benefits, such as ease of programmability, interoperability, and compatibility across multiple platforms, all of which drive down development time and costs.

Blackfin—A Welcome Market Discontinuity

The Blackfin CTP combines a powerful processing engine, essential software elements, and an open, expandable environment to introduce a true market discontinuity in telematics price/performance levels. Cost barriers to mass deployment of telematics are effectively eliminated at this newly enabled price point, and the impact on the market is expected to be profound.

The flow of business to telematics systems developers will be dramatic as the telematics market dynamics change, from early adoption and innovation to commodity. Because it is a comprehensive approach that includes the right kind and amount of processing power with complete software and system-development considerations, the adoption of the Blackfin CTP will enable the introduction of commodity telematics systems to a broader range of vehicles than previously possible.

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