



## Case Study

StreetDeck

In-Vehicle Infotainment



# Demand for In-Vehicle Infotainment Picks up Speed

StreetDeck and Intel Drive Development of Pace-Setting New Solutions

## Case Summary

### Business Need

Consumers are increasingly demanding on-the-go access to multimedia content and productivity applications. And we're not just talking about portable devices. They want to integrate and use the devices they already have with the consoles and systems deployed in their cars. Automakers face the challenge of delivering innovative, integrated services for driver and passenger entertainment, driver assistance (such as navigation, emergency calling, etc.), productivity (like e-mail, web browsing and calendaring) and connectivity (including conferencing and calling).

### Problem

The car must be seamlessly integrated as if it was just another node on the home and/or office network. Reaching this level of integration in a mobile, rugged environment, accounting for the special needs of the driver and/or passengers, is no easy task. Solutions must be rugged like an embedded system to stand up to the conditions of the road, yet responsive to changing technologies and evolving consumer demands. A range of solutions is needed because different consumers want different features, even within the same vehicle. Hands-free capabilities are important to allow drivers to maintain safe control of their vehicles. In-vehicle systems must be interoperable with existing portable digital devices, open to communicating with devices of the future and flexible enough to add new features. Integration with the digital home and office is crucial to satisfying consumers as more and more of their content goes digital. All of these challenges add time and cost to the delivery of new vehicles, squeezing already tight margins.

### Solution

Automakers can maximize their development efforts, shorten time to market and keep costs down by adopting a standards-based hardware and software platform that can power all infotainment applications within the vehicle. Such a platform would be universally receptive to all kinds of existing devices, and easily upgraded to accommodate future technologies and applications. The standards-based architecture would allow for hardware and software reuse across product lines and generations of products, enabling automakers to scale their solution to meet different customer needs now and in the future.

**"In all of our testing and evaluations, we found that a platform built on Intel® Architecture Processors and Chipsets offers the optimum combination of performance and features needed for the rugged conditions of the motor vehicle."**

—Damien Stolarz  
Chief Technology Officer  
StreetDeck

## Introduction

Intel and StreetDeck are charting new territory in the development of in-vehicle infotainment systems. By collaborating on the design of a complete hardware and software system that integrates the functionality in most existing portable devices, the two companies are helping automakers understand how they can harness a standards-based computing platform to deliver the in-vehicle infotainment experience that consumers want, while keeping the costs of development under control.

This case study discusses the challenges facing automakers in their quest to add features, control costs, and meet burgeoning consumer demand for digitally integrated automobiles. It also explains how the standards-based approach used by StreetDeck and Intel may open up the entrance ramp to the express lane.

## What if You Had a Digital Docking Station in Your Car?

Portable computing and digital media devices have proliferated to the extent that on-the-go consumers now communicate, gather information and entertain themselves at every turn. Yet there is currently no way for those devices to be integrated with the in-vehicle systems that come in most automobiles today. Currently there are two devices that can integrate with vehicle systems via after-market integration kits—the Apple iPod\* and satellite radio. But most factory installed computing systems are so proprietary that it is difficult to add new applications. What you get is, well, what you get.

There is a great deal of anecdotal evidence that consumers want their on-the-go experience to be different. Just look at how consumers use digital devices in the car. It's not uncommon for a typical driver to have a navigation device mounted on the car's dash for driving directions, an MP3 player plugged into the head unit's audio input jack, and a cell phone to stay in touch. The problem with this discrete device approach is that the driver must interact with multiple gadgets.

What if there was a way to interact and control all of those devices from a single console? You could access the vehicle's built-in audio and video systems with portable digital entertainment libraries. Do e-mail, calendaring, navigation and other tasks while sitting in traffic. Keep everyone comfortable on long trips, providing multiple applications simultaneously, such as entertainment DVDs for kids riding in the back seat while parents listen to music or navigate to a destination from the front. In other words, it would be like consumers could take their living rooms and offices on the road with them.

## “The PC is the common denominator among all of the gadgets in use today.”

—Damien Stolarz  
Chief Technology Officer  
StreetDeck

Integration here is the key, whereby existing and future digital devices can plug into the vehicle for driver and passenger to interact with and control from a single console. The concept is similar to the common laptop docking station, but with more plug-ins, greater performance, and more ways to interact with those features, allowing for multiple kinds of devices and a wide variety of applications to be integrated and operated from the vehicle console.

## The Automaker's Challenge

Automakers are well aware of rising consumer demand for more infotainment features to be integrated with the car. Some already offer such options as a way to compete for customers, and realize good profits in doing so. But these are proprietary designs closed to upgrades or new features. Automakers can't reuse those designs across generations of a solution. This means each option must be developed from scratch, adding to manufacturing cost and driving up the price to consumers.

The high cost of factory installed options is one reason that aftermarket in-vehicle infotainment (IVI) systems are quickly gaining popularity among consumers. But again, these systems are often proprietary, which means that different suppliers can't make use of other vendors' work. Because more of the development work for each solution rests solely with the vendor, development time and costs are increased.

Lightning-fast innovation in the consumer electronics industry only compounds these problems. Because the automakers' proprietary systems cannot easily be upgraded to add new features or integrate with new devices, these embedded IVI systems quickly become out-of-date and irrelevant to consumers' changing digital lifestyles, requiring large development investments whenever new consumer electronics devices come to market.

What automakers need is a way to quickly and cost-effectively integrate IVI systems into their options line-up, both before and after market. They need a simple way to scale their designs in features and price to accommodate the preferences of different consumers, and even different passengers riding in the same vehicle. And they need to be able to quickly and easily upgrade their systems post-sale in order to adapt to changes in the consumer electronics marketplace.

**“We use the Intel® platform because it’s the most device-integrated system available, with USB 2.0 ports, Bluetooth\* technology, Wi-Fi wireless networking, and the Windows\* XP operating system. This is key—because the Windows operating system and Intel® architecture are standards-based solutions that are compatible with every portable device that’s manufactured.”**

—Damien Stolarz  
Chief Technology Officer  
StreetDeck

### PCs on Wheels?

The good news is that automakers need not invent such a solution on their own. They must simply find a way to leverage the existing integration between the standards-based home and office PC and today’s most popular digital infotainment devices. “The PC is the common denominator among all of the gadgets in use today,” explains Damien Stolarz, Chief Technology Officer at StreetDeck. “Every consumer electronics device can, out of the box, communicate with a PC.”

But Stolarz is quick to point out that you can’t simply put a desktop PC in the car. What the industry needs, he says, “is a rugged, embedded hardware system that uses PC-type features to replace the conventional car stereo or navigation system. Something that combines all of the essential in-car services—like car-quality audio and FM receivers, satellite radio, and hands-free Bluetooth\* mobile phone integration—with all of the communication features typically available on a PC, like wireless networking, e-mail and calendaring.”

Also essential to the solution is a versatile, scalable hardware platform that can be upgraded in software. Using software to extend the features of the system, add new devices, or integrate new services is essential to keeping costs in line and extending the life of the vehicle’s infotainment system. Automakers also don’t need to invent all of the software on their own; companies like StreetDeck have already done a lot of this integration and development work.

### Characteristics of the Design

The ideal solution includes both hardware and software, optimized to meet the needs of the automotive industry. During their early development efforts, both Intel and StreetDeck

identified several important design criteria that will meet the needs described above. Although these two companies initially worked separately, they soon discovered that their mission overlapped. With Intel developing standards-based embedded platforms, and StreetDeck developing a standards-based application, the two companies ultimately identified the following design objectives for the ideal IVI system:

- Minimize the potential for driver distraction
- Meet the needs of all different types of users with a multi-modal interface; people who can process information by listening, others who must touch it to interact, and others who need visual feedback
- Develop one solution that can be scaled in features and price—both now and over time—to meet the needs of different consumers
- Provide a platform that readily integrates and communicates with existing and future digital media and DRM systems for audio and video assets
- Deliver cutting-edge features now, such as 3-D navigation, voice recognition, high-quality text-to-speech, multi-zone (front and rear seat) entertainment, hands-free/gesture-based interaction, Internet connected navigation, communication, and infotainment, and provide enough headroom to add other features in the future
- Maximize opportunities for design reuse to ensure fast time to profit and a greater ROI
- Enable the addition of new features and upgrades in software to minimize both development costs and easily satisfy consumer demand for the latest and greatest gadgets

### StreetDeck and Intel Deliver a Prototype

Intel and StreetDeck have collaborated to develop a prototype in-vehicle infotainment (IVI) peripheral (the “automotive enabler”) that provides car-specific functionality such as FM radio, satellite radio interface, car-quality audio, hands-free Bluetooth\* mobile phone integration and a USB hub to connect multiple consumer devices.

This reference platform can be used in conjunction with an “off-the-shelf” mobile PC and Streetdeck software to create a full-featured infotainment platform. Automakers can also use the prototype platform and development model for a future factory delivered Infotainment system.

## StreetDeck's Software Solution

StreetDeck has delivered on all of these themes with a software application suite that has the potential to integrate any digital device on the market today. The StreetDeck software uses an innovative human-machine interface (HMI)—also known as a graphical user interface (or GUI)—that can be operated with gestures. Instead of conventional touch-screen operation, where you must look at the screen to press the right buttons, the driver can learn a couple of gestures they can draw on the screen which activate features in the software. Because they work anywhere on the screen, the driver does not have to look to control the application. This allows the driver to change songs, channels, pause the music, make a hands-free phone call, switch to navigation, and so forth—all with eyes focused on the road.

StreetDeck also provides text-to-voice and steering wheel controls to enable drivers who prefer other methods of interaction to make optimum use of their solution as well. "This type of multi-modal architecture is a bit more complicated to set up, but presents the most driver-friendly operation possible," says Stolarz.

What makes the StreetDeck solution unique in the marketplace is the use of an open architecture that relies on standards-based hardware and software for maximum flexibility. "This gives us the ability to support multiple applications without too much effort. We can also service multiple infotainment zones in the car simultaneously—DVDs for kids in the back, satellite radio or navigation for the parents riding up front," Stolarz explains. "Standards also give us the ability to upgrade and modify our software easily as new devices become available. We can also enable seamless network connectivity through common wireless interface standards."

Benefits of choosing the StreetDeck software suite to power an integrated IVI system are significant:

- StreetDeck's unique HMI, combined with appropriate hardware, gives drivers hands-free access to their cell phone, PDA and/or Ultra Mobile PC (UMPC). They stay connected regardless of where they are.
- Complete integration in a single platform allows the driver to control all devices from a single point in the car for a simplified user experience and enhanced safety. From this central console, occupants can choose the music, flip on the navigation system, make a phone call, or check e-mail, which is read to them using a text-to-speech application.
- Occupants can be as productive in the car as they are in the office. StreetDeck's IVI solution enables access to work-related data so the car becomes a genuine extension of the office.
- StreetDeck's platform flexibility accommodates the varying needs of different users. One user may want to access e-mail and the Internet-based information on their commute in a safe and hands-free way. Another may simply want to access their entire digital media collection in the car. A passenger may want to do the navigating on their laptop and then transfer the destination over to the car's navigation system. StreetDeck makes all of these options possible.

## Why Intel?

A key element in the StreetDeck solution is a hardware platform based on Intel® architecture. "We use the Intel® platform because it's the most device-integrated system available, with USB 2.0 ports, Bluetooth\* technology, Wi-Fi wireless networking, and the Windows\* XP operating system. This is key—because the Windows operating system and Intel® architecture are standards-



based solutions that are compatible with every portable device that's manufactured. This means the consumer can talk to it right out of the box," Stolarz explains. Connectivity to consumer devices and services through standard interfaces like USB, Bluetooth, Wi-Fi, 3G and WiMAX is important to enabling a fully integrated, highly versatile solution. Intel architecture provides connectivity for all of these technologies.

He further explains that the performance value of the Intel® platform is also significant. "In all of our testing and evaluations, we found that a platform built on Intel® Architecture Processors and Chipsets offers the optimum combination of performance and features needed for the rugged conditions of the motor vehicle. For example, the Ultra Low Voltage (ULV) Intel® Celeron® M processor provides the right combination of performance and power so that our application can even run in passively-cooled (fanless) configurations. That's a very big deal for the automobile manufacturer—and for the consumer who doesn't want their battery to run down just because they used the computer for awhile with the car parked. Intel really has some of the coolest platforms in the embedded segment, and these are especially optimum when you consider the performance we need for our software."

In fact, when StreetDeck compared the ULV Intel® Celeron® M processor to other currently available chips, there was no comparison. "One of them absolutely required a fan to sustain performance, while the other one simply didn't have enough graphics capabilities to support our 3-D navigation and other critical features," explains Stolarz. "Using the 3-D graphics capabilities of the Intel® chipset gave us a no-compromise solution for our 3-D navigation display engine. This ensures that our navigation system exceeds customer expectations for graphics, and allows for the smooth addition of topography, satellite, and other enhanced navigation features."

### About the Intel® Embedded and Communications Alliance

Intel enables the modular network with standards-based building blocks that deliver enhanced performance, greater scalability, and maximum flexibility. These benefits drive profitable new communications services and lower infrastructure costs. The Intel® Embedded and Communications Alliance is a community of communications and embedded developers and solutions providers committed to the development of modular, standards-based solutions on Intel® technologies.

Visit [www.intel.com/go/ecata](http://www.intel.com/go/ecata) to learn more.



Stolarz goes on to explain: "There's even enough headroom in the ULV Intel® Celeron® M processor to allow our software to run in multiple modes simultaneously. This was a major objective, and one that only the Intel® Architecture Processors could accomplish. CPU performance is essential for the features we intend to add down the road."

Stolarz lists several other reasons that automakers and car computing manufacturers should base their IVI designs on the Intel platform, including:

- Seamless connectivity via Wi-Fi, Bluetooth, cellular and WiMAX technologies, enabling drivers to connect to their applications almost everywhere they go
- Scalability and upgradeability of the platform made possible by Intel's adherence to industry standards and an extensible architecture
- State-of-the-art manufacturing processes and high levels of quality validation ensure product dependability
- Intel's extensive roadmap ensures that new products will always use the most stable, proven technology for superior I/O connectivity, networking, processor speed and performance per watt
- With a huge selection of products based on a single architecture, developers can look to a single vendor for the variety of platforms, price points and feature sets to meet a complete range of mainstream requirements
- The Intel® Embedded and Communications Alliance is a broad ecosystem of third-party vendors that stimulates innovative solutions of system integration—StreetDeck is a General Member of the Intel Embedded and Communications Alliance
- As one of the world's most trusted consumer brands, Intel's leadership in the IVI industry will help drive demand in multiple market segments with powerful brand equity and marketing programs
- Intel is a leader in industry standards organizations such as the Digital Living Network Alliance\* (DLNA\*) and the WiMAX Forum\*, helping fuel product innovation and new methods of communications and computing
- When StreetDeck asked for assistance in optimizing its software for Intel architecture, Intel responded on several fronts, including ready-to-go design tools and readily available technical engineering support

## Which Road Should You Take?

The trend toward on-the-go infotainment presents one of the most significant opportunities for automakers to distinguish themselves from competitors. Although there are many ways to approach this challenge, automakers and their vendors might reap the greatest rewards by using the standards-based platform as a starting point.

Using a standards-based, highly integrated platform made from Intel® processors and chipsets ensures seamless interoperability with all of the existing digital gadgets, as well as those yet to come. Add StreetDeck software for a complete IVI application, and you'll have a solution that puts you on the fast lane to consumer satisfaction and the digitizing of the automobile.

As you consider your options, which road will you take?

### For more information:

[www.streetdeck.com](http://www.streetdeck.com)

[www.intel.com/go/infotainment](http://www.intel.com/go/infotainment)

---

Visit the Intel case study library to read about other developers that have successfully used Intel® technologies and building blocks to deliver leading edge solutions. <http://developer.intel.com/design/network/solutions/search.htm>

---

Information in this document is provided in connection with Intel products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Intel's Terms and Conditions of Sale such products, Intel assumes no liability whatsoever, and Intel disclaims any express or implied warranty, relating to sale and/or use of Intel products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. Intel® products are not intended for use in medical, life saving, life sustaining, critical control or safety systems, or in nuclear facility applications. Intel may make changes to specifications and product descriptions at any time, without notice.

Information regarding third party products is provided solely for educational purposes. Intel is not responsible for the performance or support of third party products and does not make any representations or warranties whatsoever regarding quality, reliability, functionality, or compatibility of these devices or products.

Intel, the Intel logo, Intel. Leap ahead., the Intel. Leap ahead. logo, Pentium, and Celeron are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

\*Other names and brands may be claimed as the property of others.

Copyright © 2008, Intel Corporation. All rights reserved.

