



Telematics

Where PC and Car Meet

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Director of Marketing

CES2004/Lunch@Piero's, January 9, 2004

Telematics – PC and Car Meet

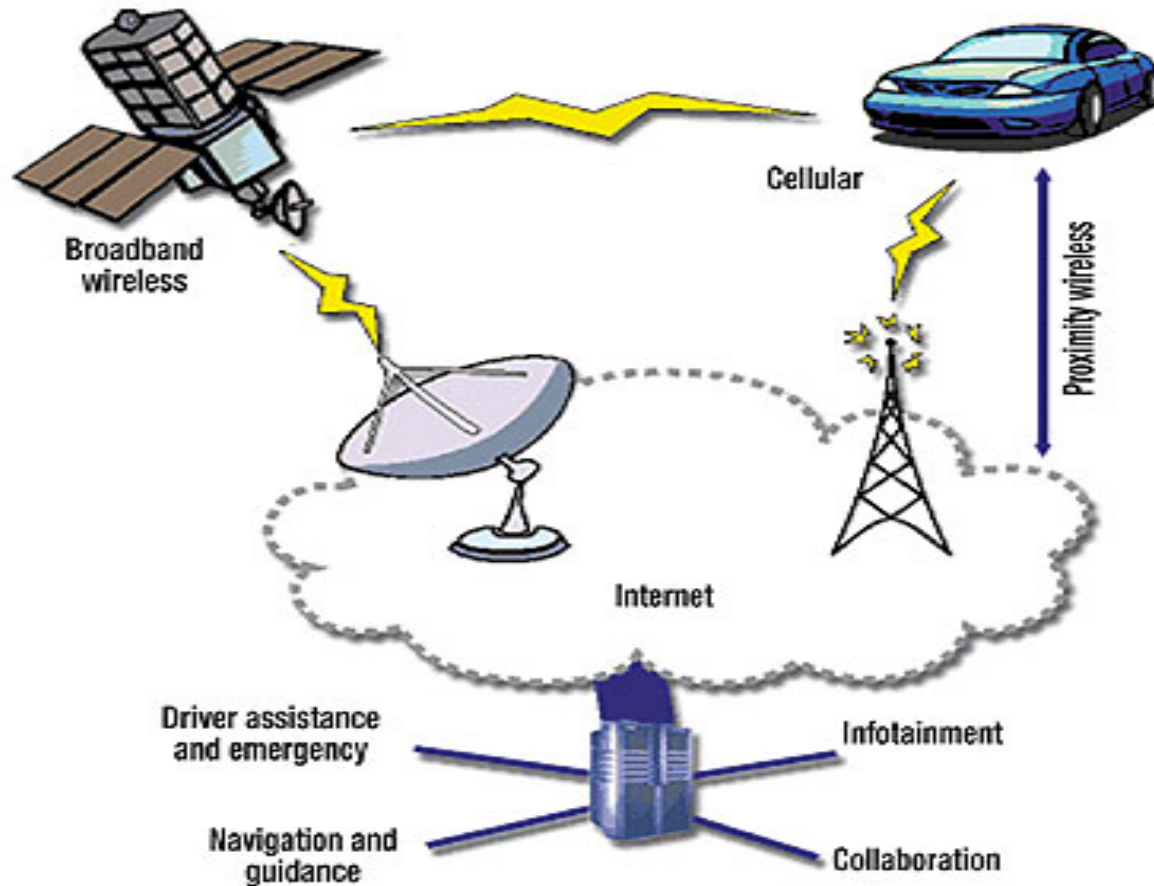
- Introduction
Alan Yuen
VIA Technologies
- Magic Telematics Vehicle System
Adel Tabsh
Premier GPS
- Mobile Entertainment in 21st Century
Jeremy Briggs
Neo Car Audio
- VIA Telematics, Miles Ahead
Andrei Bulucea
Ituner Networks
- Future of Mobile Technologies:
Familiar Challenges
Alex Huff
Truman Mobile
- Integrated Car/Home System
Ray Kucenas
CastleTek Systems
- Q & A



Telematics

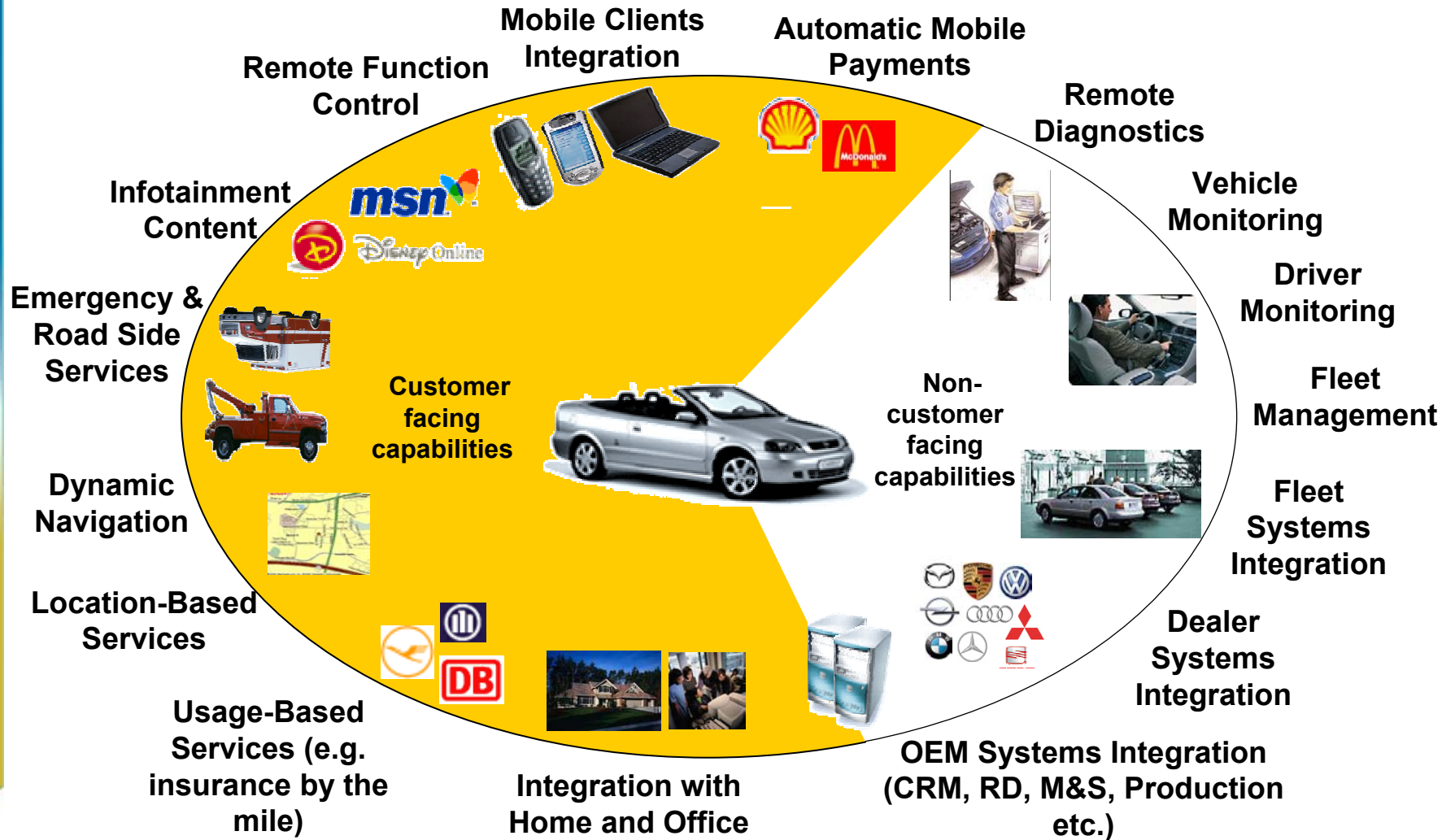
- **Telematics**
 - Automotive/Transportation as 3rd Internet space outside of office and home
- **Evolving definitions**
 - **Broad meaning**
 - Combination of telecommunications and computing
 - Largely non-automotive
 - Internet is an example of telematics
 - **Automotive telematics**
 - Use of computers and telecommunications to enhance the functionality of motor vehicles, for example, wireless data applications in cars, trucks, and buses – “Digital Car”
- **Diverse applications – no single killer apps**
 - Navigation
 - Entertainment
 - Diagnostics and maintenance
 - Communications
 - Safety and Security
 - Vehicle-status monitoring
 - Emerging
 - Wireless
 - Productivity
 - Pay-As-You-Drive insurance, etc.

Telematics Infrastructure



1. Converging systems within telematics technology open the door to many beneficial uses in automobiles (Source: Sun Microsystems).

OEM Vision



Telematics Applications

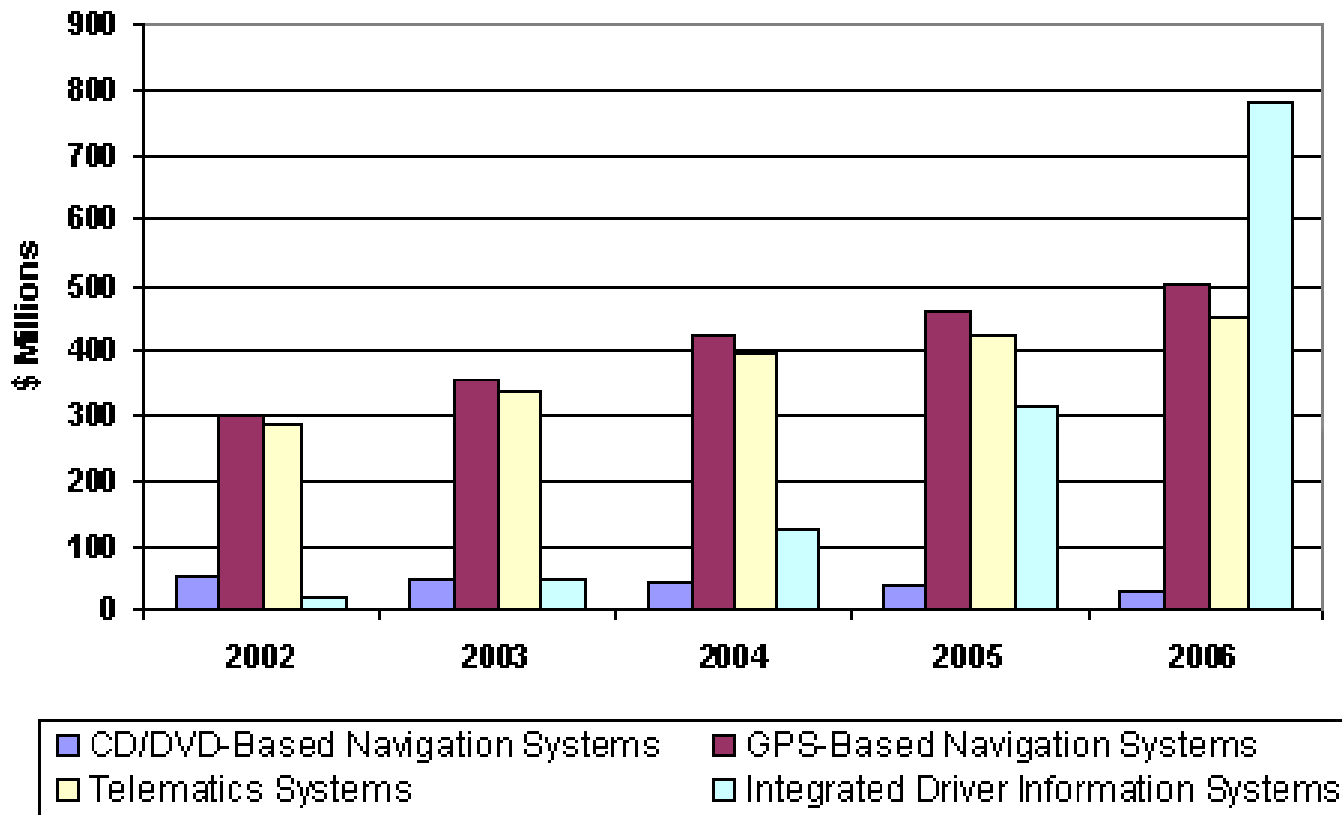
- **“Front-Seat”**
 - Navigation
 - Traffic routing
 - Communications – hands-free
 - Location services (restaurants, attractions, etc.)
- **“Back-Seat”**
 - A/V Entertainment
 - Gaming
 - Internet browsing, email, etc.
- **“Engine/Mechanical”**
 - Remote diagnostics and preventive care data collection
 - Safety and Security
 - Vehicle status/location monitoring



Telematics Market

- By Applications

U.S. Consumption of Navigation and Telematics Systems

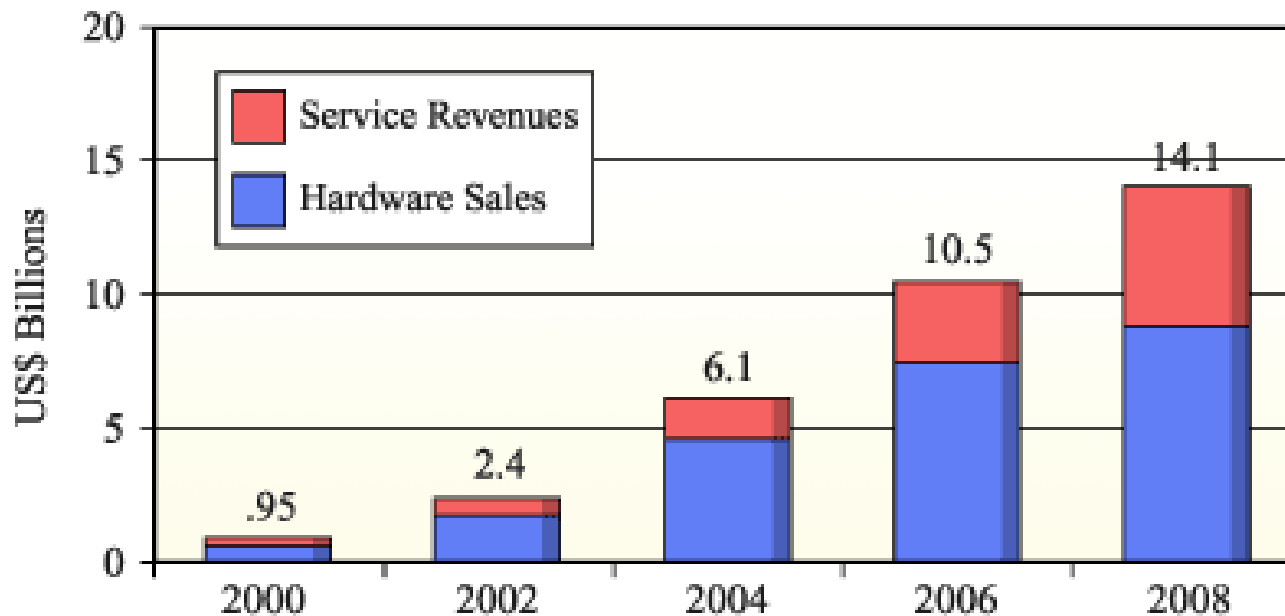


Telematics Market

- **By Service and Hardware Revenue**

Global OEM Telematics Market: 2000-2008

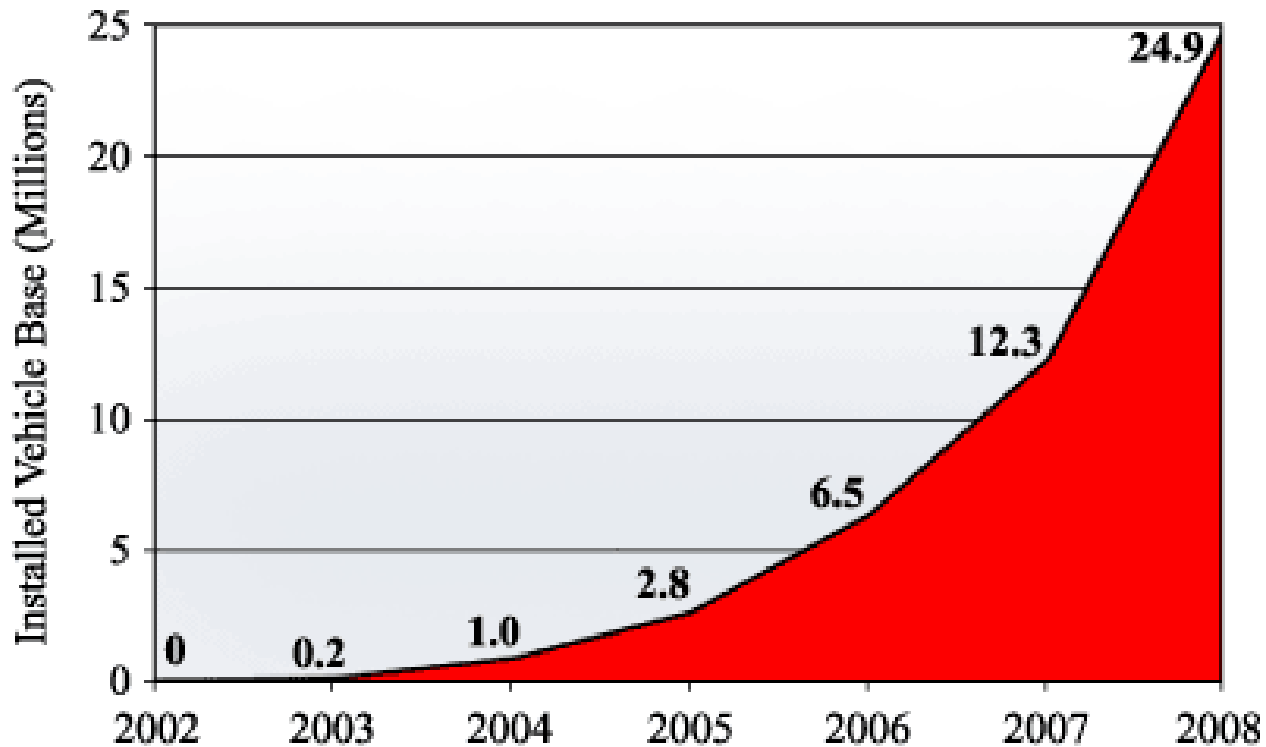
Source: Allied Business Intelligence Inc



Telematics Market

- **WLAN/PAN Wireless solutions**

Installed Base of Vehicles With Factory-Fitted Bluetooth
or 802.11 Hardware
World Market, 2002-2008
(Source: Allied Business Intelligence Inc.)



Telematics Hardware by Region

**Telematics Shipments Worldwide, By Region, By Type of Device
2001-2004 (in unit sales)**

	2001	2002	2003	2004
Western Europe				
Device integration	74,000	301,000	501,000	722,000
Embedded telematics	36,000	110,000	220,000	374,000
North America				
Device integration	13,000	44,000	97,000	164,000
Embedded telematics	1,593,000	1,945,000	2,107,000	2,358,000
Asia-Pacific				
Device integration	20,000	60,000	135,000	250,000
Embedded telematics	30,000	65,000	120,000	220,000

Source: Telematics Research Group, September 2003

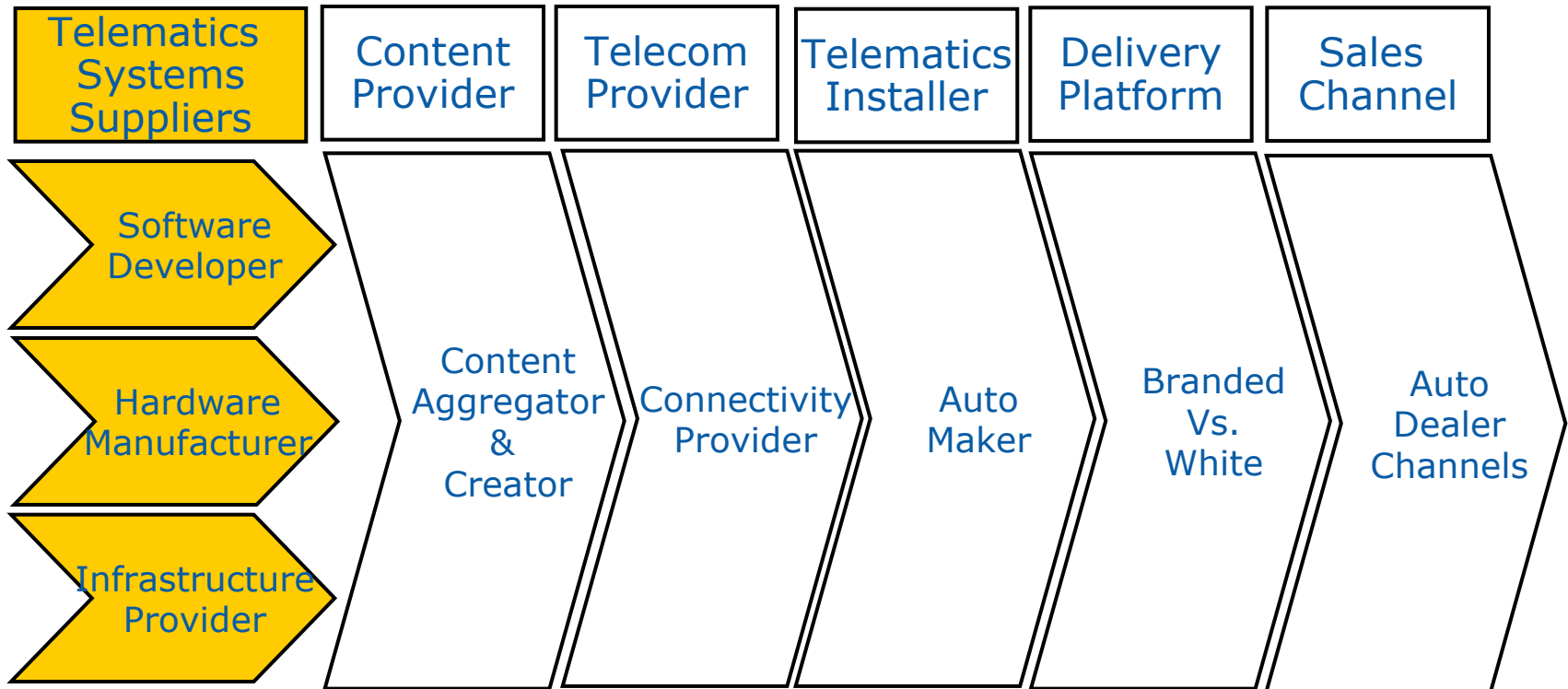
Device integration: primarily cell phone integration
 Embedded telematics: e.g. OnStar in North America

Telematics H/W and Service Costs

Availability of Telematics Hardware (as standard or optional equipment)			
	North America	W. Europe	Japan
# of Models with Telematics	103	66	68
# of Trim Levels with Telematics	606	874	402
# of Models with Standard Telematics	35(?)	18	0
Average Cost of Telematics Hardware	\$1,663	\$1,787	\$2,246
Average Cost of TSP (per year)	\$212	\$235	\$145

Source: Telematics Research Group, 8/02

Telematics Value Chain



Telematics Drivers

- **Car manufacturers invest heavily to differentiate product offerings and reduce maintenance costs**
- **Mobile networks well established**
- **Population becomes more mobile**
- **Technology costs significantly lowered**
 - Location technology becomes cheaper
 - GPS receiver for < \$15 cost adder
 - Standards-based technologies such as PC could offer significant cost savings
 - Wireless technologies maturing – Bluetooth, WiFi, etc.
- **Standards coming in play**
 - AMI-C (Automotive Multimedia Interface Collaboration) participated by global car makers
 - Java, OSGi, etc.

Telematics Obstacles

- **Technology push, not market pull**
 - End-user education on benefits
- **Complex technologies with multi-functional skills required**
 - In-vehicle expertise, communications networks, infotainment, etc.
 - Industry partnerships take time to build up and hence slow down adoption
- **Mostly proprietary designs**
 - Standards to proliferate
- **Right business models and product mixes**
 - Cost-Benefit analyses
 - Interface standards - integration vs. modular

Telematics Opportunities

- **Natural extensions of office and home capabilities and more**
 - Real time streaming, location based needs, home contents, PDA/smart phone interop, etc.
- **Modular “front-seat” and “rear-seat” designs to avoid obsolescence and distraction concerns**
 - Car makers and system vendors on open standards
- **PC technologies offer diverse and powerful capabilities**
 - Cost effectiveness
 - Rich feature set
 - Small form factor, thermal constraints and power management are key concerns

Telematics Business Models

- **How to Capture Revenues**
- **Telematics systems**
 - Ranging from \$800 (with 1 yr. OnStar from Audio) to \$2000+ (Japan)
 - Bundling 1-3 year subscription services at reduced rates
 - Integrated vs. mobile units?
 - Technology obsolescence
 - Car platform vs consumer electronics development cycles
- **Subscription-based services**
 - Around \$200 per year, e.g. OnStar for roadside assistance, airbag deployment notification, remote lock unlocking, etc.
 - Low take-rate (even on telematics-enabled vehicles)
 - No single killer apps that drives subscription
 - Different geographical needs
 - U.S. for safety and security, Europe for traffic avoidance and routing across multi-lingual cities, and Japan for traffic and entertainment
 - In general, users balk at paying perennial subscriptions
- **Cost-Benefit analyses**
 - Government, car manufacturers, telematics service providers, telecom operators, content aggregators, and end users
 - "Cell phone" subscription model + government mandate/subsidies?

Telematics Technologies

- **Migration to Standards-based Technologies**
 - Proprietary Telematics Services
 - GM OnStar, Wingcast, DaimlerChrysler's U-Connect, and AT&T Wireless telematics services
- **Java Telematics Technology for Telematics Service Providers**
 - Sun, IBM. OTI
 - Aggregate, deliver, update and manage online content and services
 - Decoupling applications and enabling future upgrade of underlying H/W and S/W
- **Middleware (speech recognition, echo cancellation, etc)**
- **OSGi (Open Gateway Initiative)**
- **Web services (SOAP, UDDI, WSDL)**
- **Wireless and mobile technologies**
- **OS for Automotive**
 - Microsoft's Windows Automotive (Windows CE)
 - Adopted by key automakers including BMW, Citroen, Mitsubishi, Subaru, Toyota, and Volvo
 - Speech partnerships with ScanSoft, Fonix, Elan, Asashi Kasei and Hitachi
 - Linux, VxWorks, etc.
- **AMI-C (Automotive Multimedia Interface Collaboration)**
 - GM, Ford, Toyota, Honda, Nissan, Renault, Peugeot, Citroen, Fiat, etc.
 - Defines common languages, physical interfaces, electrical interfaces to allow for interoperability among telematics devices and applications
 - Release x – Use Cases, System Requirements, architecture overview, etc.
 - Host devices use Java runtime environment to provide platform independence
 - Open Services Gateway Initiative (OSGi) as part of application environment
- **Key OEM initiatives – IBM Automotive Initiative, etc.**

In-Vehicle PC Technologies

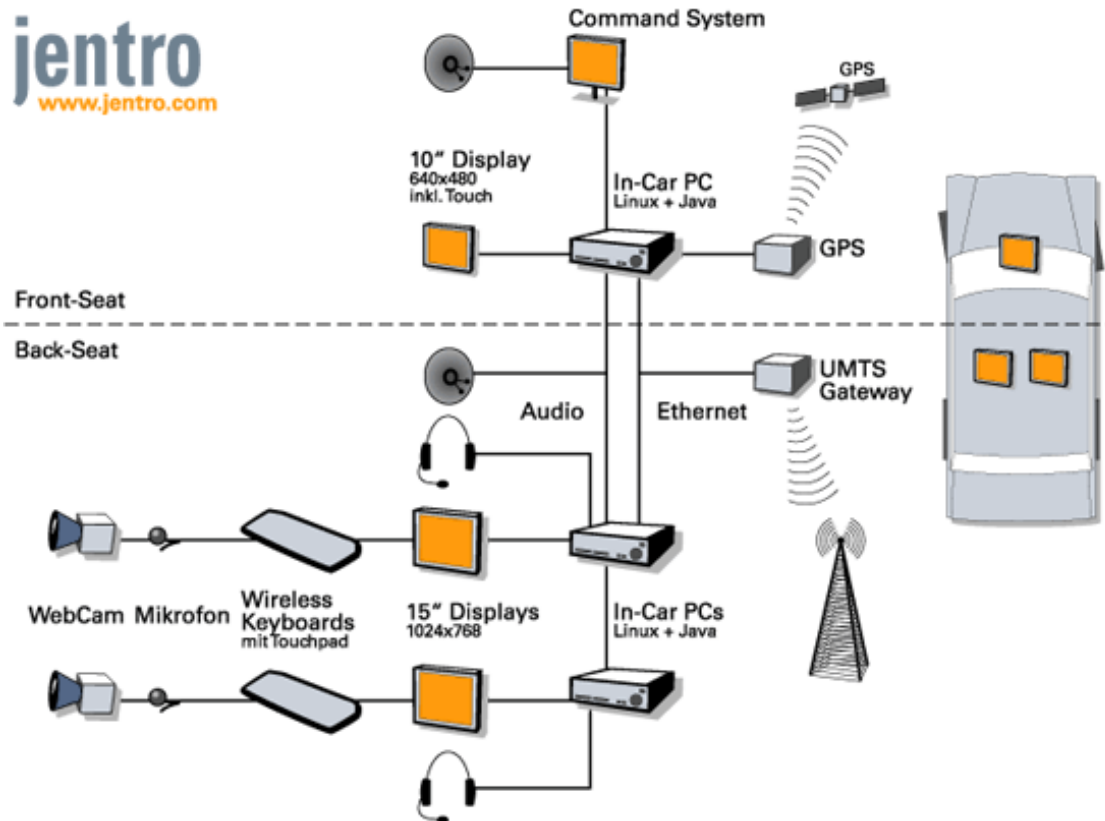
- **AutoPC - World's 1st in-dash computer**
 - Clarion/Microsoft/Citroen partnership
 - 1st generation – supplied to Citroen, 12/99
 - Integrates car audio, computer functions, navigation and wireless communications
 - X86 CPU at 166MHz with IRDA/CompactFlash/USB interfaces and 256x64x8 color screen
 - Windows Automotive (CE)
 - 2nd generation
 - Adds voice-activated email, internet browsing, DVD/CD/MP3 player in addition to GPS navigation
 - 2003 Citroen MPV with optional factory installed Xbox game console as rear-seat entertainment system

In-Vehicle PC Technologies

- Mercedes S-Class test vehicle - world's 1st in-vehicle 3G/UMTS (June'02)
 - Jentro's Java/OSGi/Linux based software
 - Equipped with in-car PCs
 - Up to 384 kbps with UMTS service



jentro
www.jentro.com



Video-Conferencing via UMTS



Mini-ITX Based Car PCs - Examples

- Small form factor (board at 6.7" x 6.7")
- Fanless or quiet CPU operations

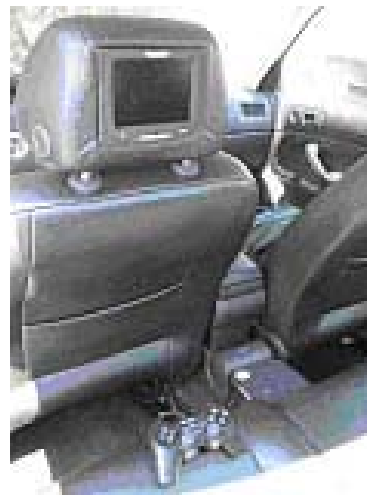


“Vauxhall Vectra CarPC Project”
VIA EPIA 800 board with Digitalww touch screen, a Opus intelligent ITX DC to DC PSU



“The Carputer Project”

In-car PC featuring MP3, DVD, DivX, VCD and SVCD player, Sat. Nav, games, a wireless network - AND Windows boots in under 10 seconds.



“The Dashboard PC”

VIA EPIA M9000. The Dashboard PC includes multimedia playback and GPS navigation capabilities. and extends beyond a dashboard interface to include a LCD monitor embedded in the driver seat

Mini-ITX Based Car PCs - Examples

“Integrated Dashboard”

VIA and Taiwan ITRI telematics program



“Cyber Car”

Why not be able to watch DVDs in my car? Why should I wait to arrive at home to switch on my PC?!! 100% in-dash design. (www.Divx-Car.com)

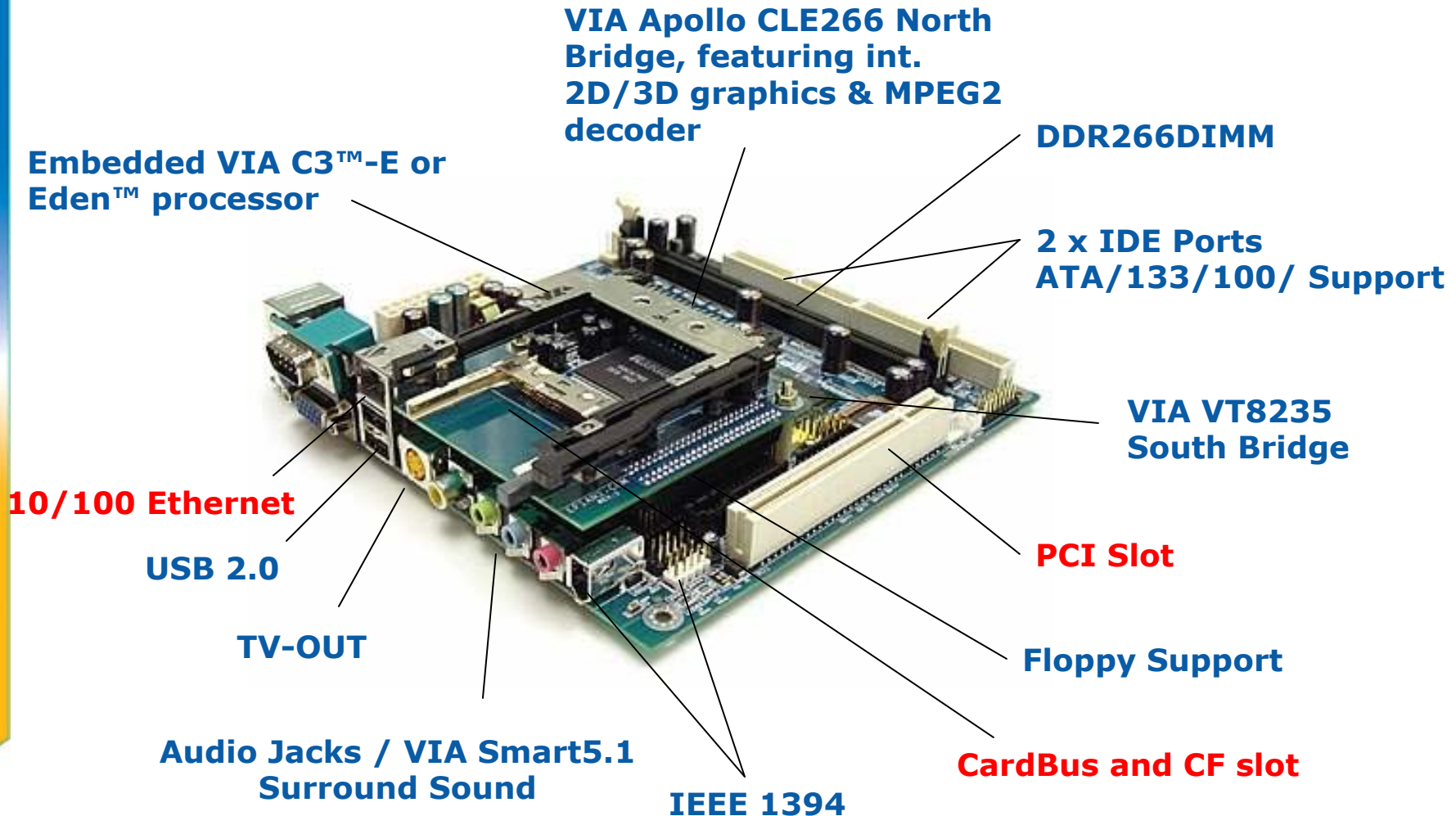
“VW Golf IV MultimediaCar”

VIA EPIA 800 mini-ITX board delivers impressive sounds through my Blaupunkt Allicante and video to a 7" lcd widescreen monitor, Whole cd collection in the car, being able to watch divx movies and have a gps system. Powered from a 12V 300W Pure sinus converter.



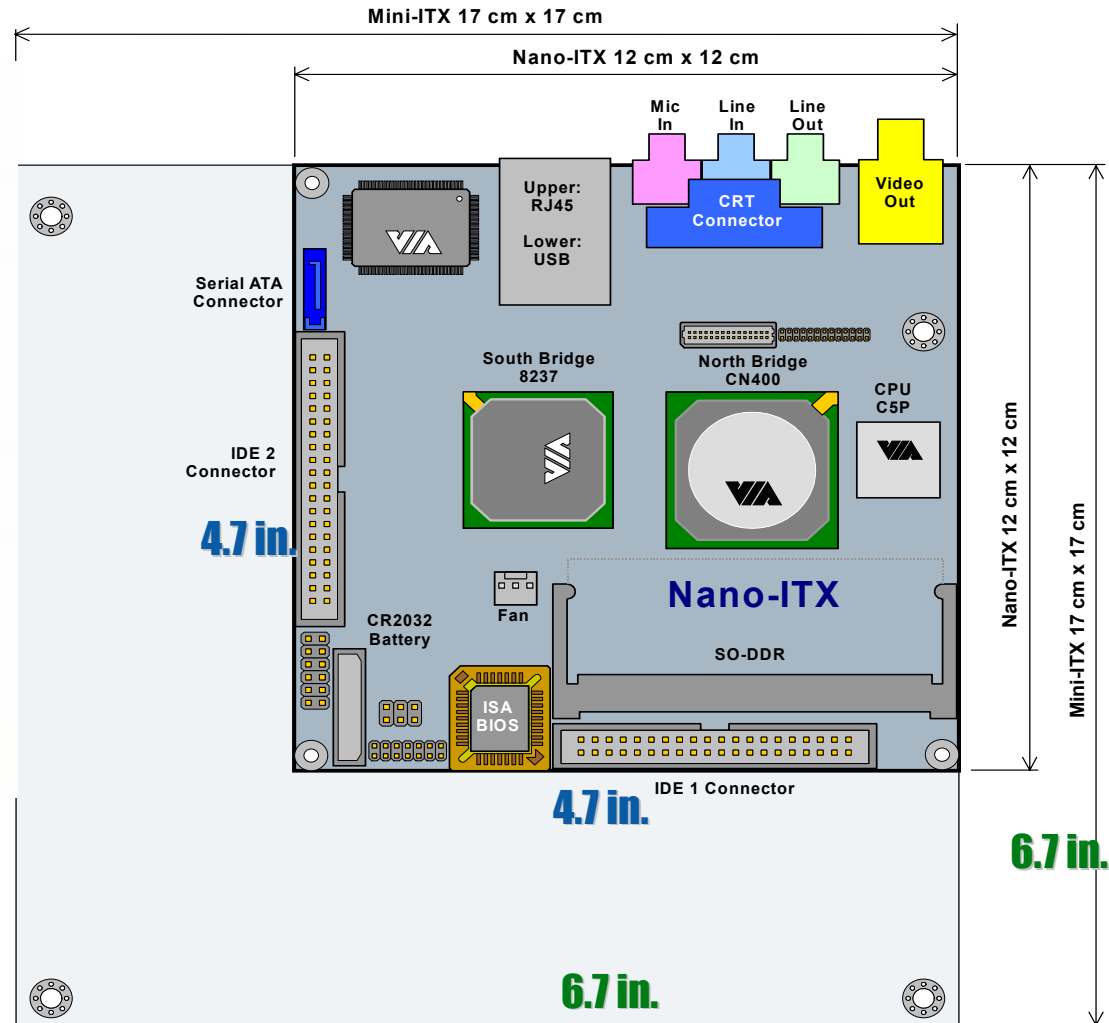
Open System Solutions

VIA Mini-ITX Board (MII)



Open System Solutions

Nano-ITX 50% reduction of mini-ITX board size





VIA Technologies, Inc.

Thank you

