**China and Auto Electronics a Good Match**

Report from Shanghai Auto Show

In contrast with most parts of the world, the automotive electrical and electronics industry in China is growing. That growth is powered by three multiplying forces that will continue to drive the industry for at least the next ten years. First, Chinese-made cars will have more electrical and electronics parts every year. Second, each year more and more new Chinese cars will be driven by electrical power, which requires even more E/E parts. Third, Chinese car production will accelerate as local carmakers respond not only to growing domestic demand, but as they learn how to make cars that the rest of the world wants.

According to Advanced Strategic Leadership, a Chinese strategy consulting company founded by Xiaozhi Liu, former director for vehicle electronics, controls and software integration at GM North America, E/E content in passenger vehicles will grow from 32% in 2009 to 38% in 2012, globally. But in China E/E content is just 11% of the cost of the vehicle now and will only grow to 15% by 2012.

When you walk around the Shanghai auto show, you see a lot of shiny new vehicles but you don't see much automotive electronics. Of course every car has a radio head unit, and a fair number of cars feature an LCD display and CD player. But the Chinese carmakers weren't promoting navigation, telematics, multimedia systems, portable device connectivity or active safety systems.

Not only is E/E penetration lower in China compared with Japan and Western markets, but retail prices for Chinese cars are also lower, averaging about 100,000 RMB ($14,706) per vehicle. As the incomes of Chinese consumers grow—per capita income has been growing at percentages in the teens—the prices Chinese consumers are able to pay for vehicles will also grow. As retail prices go up so will the penetration of E/E content.

As the Chinese auto industry converts to electric and hybrid vehicles, E/E content will increase even further, eventually to as much as 50% of the cost of the vehicle. A according to A dvanced Strategic Leadership, a Chinese strategy consulting company founded by Xiaozhi Liu, former director for vehicle electronics, controls and software integration at GM North America, E/E content in passenger vehicles will grow from 32% in 2009 to 38% in 2012, globally. But in China E/E content is just 11% of the cost of the vehicle now and will only grow to 15% by 2012.

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A t A uto Shanghai, BYD Company Ltd., the world’s second-largest rechargeable battery manufacturer, and since 2003 also a carmaker, featured its Dual M ode electric vehicle that can be recharged with household power. The vehicle will go on sale to Chinese consumers in mid-2009 with a retail price of just $26,000, nearly two years ahead of the G M Volt plug-in hybrid, which is to retail for $40,000. The Dual M ode, which operates both as an electric and a hybrid vehicle, will go on sale in the U.S. and Europe in 2011, according to a BYD press release. The Dual M ode, which operates both as an electric and a hybrid vehicle, will go on sale in the U.S. and Europe in 2011, according to a BYD press release.

The Fe battery, used in the Dual M ode, can receive a quick charge to 50% of capacity in ten minutes or a 100% charge in nine hours. In 2007, Warren Buffet purchased a 10% interest in BYD.

China’s Stimulus Package Boosts Sales

Passenger car sales in China have been growing at more than 22% annually for the last three years, from 2005 to 2008. In 2008, amidst the global economic meltdown, sales grew at just 9% over 2007, after disappointing third and fourth quarters, according to J.D. Power and Associates. In 2009 passenger car sales growth is expected to slow to less than 2%.

Concerned with the market slowdown, the Chinese government “halved retail taxes on small cars this year and plans to supply 54 billion RMB ($7.9 billion) for vehicle subsidies in rural areas to drive auto sales,” according to China Daily.

Those subsidies have had a positive effect on sales of small cars in the first quarter, and commercial vehicle sales are expected to recover later in the year. According to J.D. Power and Associates’ latest forecast for 2009, combined sales of passenger and commercial vehicles will reach 9.3 million units.

Later this year, according to the China Automotive Review, subsidies and tax breaks amounting to 10,000 RMB to 50,000 RMB ($1,465 to $7,325) per vehicle will be offered. The central Chinese government is already offering subsidies in 13 cities of from 50,000 RMB to 250,000 RMB ($7,325 to $36,625) for vehicles used for public transportation.

One of the only negative factors at work in the Chinese automotive electronics market is the government’s recent tax increases on vehicles with larger engines, creating a disincentive for vehicles that would typically have more electronics content.

I spent two press days at Auto Shanghai, but went back for a third day mid-week, when the show opened to the public, to observe Chinese consumers’ response to the exhibits. I arrived at the huge Shanghai New International Expo Center about an hour after the doors opened and the car exhibit halls were already packed shoulder to shoulder with an enthusiastic and happy throng. Crowds of people had their cameras out, snapping pictures of the cars they were seeing. Clearly, Chinese consumers are in love with the automobile.

Consolidation Inevitable

Depending on whether or not you count some of the smallest companies, there are anywhere from 80 to 130 vehicle manufacturers in China. Among those, the 14 largest carmakers control 90% of the market. A part of the Automotive Industry Readjustment and Revitalization Plan mentioned above, the Chinese government, which owns most of the carmakers, now wants the industry to consolidate so it can be more competitive globally.

The consolidation among carmakers will lead to consolidation among suppliers, which will strengthen the industry. At Auto Shanghai there were 1,500 exhibitors, most of them very small, regionally based Chinese parts suppliers.

Western Suppliers

Thus far the biggest suppliers of automotive electronics in China are foreign companies acting independently. Continental, Bosch and Magneti Marelli were all at the show, each with relatively large exhibits.

Continental has been positioning itself to aggressively serve the Chinese and Indian markets by developing more affordable versions of the parts and systems it sells to carmakers in the West.

For example, on display at Auto Shanghai was a more affordable version of Continental’s Ford Sync portable device connectivity package. Designed for the Chinese market, Continental’s Wireless Media Gateway will cost the OEM half as much as Sync costs Ford. To save money it will use a Linux-based operating system rather than the Microsoft Auto software package used in the Ford Sync.

Delphi didn’t exhibit at the show but invited me out to see its busy Chinese headquarters and the engineering, test and validation facility in Shanghai, which employs 620 people and serves more than 30 Chinese carmakers. Shanghai also serves as world headquarters for Delphi’s Entertainment and Communications business, headed by Kenneth Erickson.

THE HANSEN REPORT ON AUTOMOTIVE ELECTRONICS

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Director of Marketing Michelle Long

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QNX FY 2009 Sales Likely Flat

OEMs will be even greater: the company expects a 27.2% decline in sales to other manufacturers. The biggest drop will be to Volkswagen and Suzuki: 26% and 27% respectively. Aisin's president, Yasuhide Yamauchi, urged employees to “... keep in mind that the current severity is not transient and that hard times will persist for some time.”

Aisin Seiki attributed its losses primarily to lower production volume at its largest customer, and to the effects of a stronger yen and ¥10 billion in extraordinary losses. Sales to Toyota declined 19% compared with FY 2008.

In fiscal 2009, North American customers accounted for 13.8% of Aisin’s sales; European customers accounted for 7.4%; customers in China and Thailand accounted for 10.7% of sales, a small increase over the prior year.

Aisin Seiki subsidiary Aisin AW, which produces automatic transmissions and navigation systems, reported a 21.9% drop in sales. A automatic transmission production was down 25.6%; navigation production remained relatively strong, falling just 5.5%.

In November 2008, Aisin AW announced a joint venture in Hangzhou, China, to develop control software for automotive transmissions.

**Denso Corporation**

Fiscal year 2009 ended March 31, 2009

**FY 2009 Consolidated Sales**: ¥3,142.7 billion ($32.8 billion)

**Change from FY 2008**: down 21.9%

**FY 2009 Net Loss**: ¥84.1 billion ($881 million), compared with a net profit of ¥244.4 billion ($2.6 billion) in FY 2008

**Outlook for FY 2010**: Denso expects sales to fall another 13.4%, to ¥2,720 billion ($28.4 billion), but the net loss will be reduced to ¥19 billion ($198 million).

In an April 28, 2009, press release, Denso president and CEO, Nobuki Katoh, bluntly attributes the company's lower sales to “the sharp decline in worldwide production in the second half of the fiscal year and substantial currency exchange loss.” Toyota Group, which owns 24.5% of Denso and is its largest customer, accounted for nearly half of Denso’s FY 2009 sales.

A nother negative factor affecting Denso’s profits was the shift in product mix away from larger vehicles with higher electrical/electronics content, toward smaller, entry-level vehicles. For example, Lexus sales in Japan were down 35% while sales of Daihatsu mini-vehicles increased 1%.

**QNX Automotive Customers**

List includes only the customers QNX is allowed to disclose.

<table>
<thead>
<tr>
<th>Brand</th>
<th>Market</th>
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<tbody>
<tr>
<td>Aisin</td>
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<td>Alpine</td>
<td>HCX</td>
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<tr>
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<td>Hyundai</td>
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<td>Celestica</td>
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<td>Flextronics</td>
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<td>Garmin (Navus)</td>
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Continued from page 1
The Milwaukee, Wisconsin-based Johnson Controls Inc. (JCI) was first established in 1885 as Johnson Electric Service Co., a supplier of temperature control systems for buildings. Johnson Controls branched out into the automotive market in 1978 with the purchase of an automotive battery maker, Globe-Union Inc. Today, JCI is the largest producer of private-label, lead-acid automotive batteries in North America.

The company expanded its automotive business when it acquired a manufacturer of automotive seating components called Hoover Universal. In the 1990s, headliners and other interior trim products were added to the portfolio, and the 1996 acquisition of Prince Automotive gave JCI the ability to integrate electronics with interiors.

JCI operates three business segments today: Building Efficiency, which includes HVAC, security controls and related technical services; Automotive Experience, which consists of automotive seating components; and Power Solutions, which includes lead-acid, absorbent glass mat, nickel-metal-hydride and lithium-ion batteries for the automotive, commercial and marine markets.

According to JCI, fiscal 2008 was the 62nd consecutive year of sales increases, the 18th consecutive year of earnings increases and the 33rd successive year of dividend increases. Dividends have been paid consecutively since 1887. The company’s stock is traded on the New York Stock Exchange under the symbol JCI.

JCI’s brilliant record of earnings increases may come to an end in the current year. The company had a net loss of $801 million in the first half of the fiscal year (as of March 31, 2009), due primarily to lower automotive production volumes. Automotive Experience accounted for $604 million in losses for the first two quarters. The company’s guidance for the third quarter is for Automotive Experience losses to shrink below $50 million. The segment will break even in the fourth quarter, and the profitable Building Efficiency and Power Solutions segments will carry the company to positive earnings for the remainder of the fiscal year, according to the company.

Significant restructuring plans were announced in September that included reducing the automotive workforce by more than 7,000 people and closing 18 Automotive Experience plants. In March 2009 the company announced further restructuring, expected to be completed in 2010, which involves closing seven more automotive plants and cutting an additional 5,700 Automotive Experience jobs.

The company’s reliance on R&D investments is down considerably from past years: 2.2% of sales in FY 2008 vs. 4.1% of sales in FY 2004. JCI expects North American vehicle production for its fiscal year ending September 2009 to be just 8.8 million units; European production, 14.3 million units. The company plans to apply for funds from the U.S. government’s Auto Supplier Support Program, which has $5 billion in funds available to assist suppliers with exposure to the failing Detroit carmakers.

A Automotive Experience

Forty-eight percent of JCI’s total sales are generated in the Automotive Experience business segment, which currently operates approximately 250 manufacturing and assembly facilities in 29 countries.

The Company Profile Continued

Automotive Experience Facilities

Research, Design & Development Locations
Cergy, France
Burscheid and Karlsruhe, Germany
Sofia, Bulgaria
Holland, MI, USA
Shanghai, China
Sao Paulo, Brazil
Ayase, Japan

Manufacturing Locations
La Ferté Bernand, France
Remchingen, Germany
Namestovo, Slovakia
Skopje, Macedonia
Gravalai, Brazil
Bir El Bay, Tunisia
Reynosa, Mexico
Shanghai, China

Electronics Business

In 2004 JCI shipped $1.4 billion worth of electronics. The company is unwilling to disclose any details about sales since then, except to say that some electronics businesses were sold and other businesses grew. In 2005 JCI sold the engine electronics business it acquired from Sagem. In 2007 it sold its diagnostics business to SPX.

Selected JCI Acquisitions

1996 JCI acquired Prince Automotive, with sales of $850 million, for $1.35 billion
2001 Sagem’s automotive electronics business was acquired for $435 million. Sagem at the time was shipping $522 million. Its products: body and engine controllers.
2003 Borg Instruments, with 2002 sales of approximately $70 million, was acquired for $150 million
2005 JCI purchased Delphi’s Battery Operations, with sales of $600 million, for $212.5 million

Selected JCI Alliances and JVs

◆ SJ CAE joint venture in China
◆ Marquardt partnership on PASS (Passive Access and Start System)
◆ Partnership with Shrader on Tire Pressure Monitoring Systems in Europe
◆ Johnson Controls-Saft Advanced Power Solutions

HMI Design Expertise

Driver Information
Instrument clusters
Displays
Compasses
Clocks
Parking distance warning displays

Infotainment and Connectivity
Mobile device gateways
BlueConnect handsfree system
Integrated display solutions

HomeLink® Wireless Control Systems

Body Electronics
Body control modules
Access control systems
Immobilizers/antitheft systems
Tire pressure monitoring systems

Energy Management
Battery management systems

In Holland, Michigan, and in Burscheid, Germany, where we have experts in industrial design, we have specialists on HMI and we have our electrical and mechanical engineers—a whole team of people working together with our customer. We are a service partner; we do not try to put a JCI look and feel into an OEM’s HMI,” he said.

The real challenge facing HMI designers is to present a great deal of fairly complex information in a manner that is clear and easy to understand and does not overload or distract the driver. High-end vehicles will increasingly be fitted with reconfigurable displays that have more powerful graphics capabilities to provide the driver with feedback from active safety and advanced driver assistance systems as well as the standard vehicle systems status.

Dr. Eppinger sees a continual evolution in instrument clusters underway, at least in luxury vehicles, toward a wider use of larger displays, reconfigurable displays and in some cases multiple displays. He noted BMW’s approach in the new 7 series, where the screen is physically separated from the multimedia system and functions as a central information display. Solid state clusters will certainly be technologically feasible, but the degree to which consumers will accept them remains un-
Johnson Controls Inc.

Dr. Eppinger believes the most important obligation for a supplier is to consistently provide very, very high quality levels. “If a body controller has an issue, you can have an immediate, significant problem in the vehicle,” he cautioned.

In addition to body control modules, JCI’s body electronics portfolio includes access control systems, immobilizers, anti-theft systems, tire pressure monitoring systems, and interior control modules such as seat and roof control modules.

**Connectivity**

JCI’s BlueConnect hands-free phone connection is currently used by Honda, Mazda and Mitsubishi to allow voice operation of Bluetooth phones through the vehicle audio system. A mobile device gateway adds some functions such as voice control for multimedia systems and connectivity for iPods, PDA’s or other portable devices.

The system uses a speech engine from IBM and currently runs on the QNX software platform, although other platforms could be used.

**HomeLink**

According to JCI, almost every OEM that sells vehicles in North America offers factory installed HomeLink. JCI’s RF garage-door opener. HomeLink, in production since 1995, also works with home automation systems to control lighting, door locks, security gates and alarm systems. HomeLink’s recently added QuickTrain technology makes training the device faster and easier.

**Why JCI**

Why do customers buy from JCI rather than its competitors? In addition to consistently high quality, JCI cites its global engineering, development centers and support teams that can work with customers anywhere in the world. The company is structured around customer business units to serve each major customer. Another reason Dr. Eppinger suggested is that customers see JCI as financially stable and likely to weather the current turmoil in the automotive industry.

**Power Solutions**

The world’s number one maker of lead acid batteries, with a 36% market share, Johnson Controls’ Power Solutions group produces more than 120 million batteries per year. Sales to OEM’s account for approximately 25% of Power Solutions’ total sales. For the first half of JCI’s fiscal 2009, Power Solutions’ sales were down 35% compared to the first half of FY 2008.

In the early 2000s, JCI purchased two German battery producers, Hoppecke Automotive and Varta Automotive. In 2005, it added the battery operations of Delphi Corp., with annual sales of roughly $600 million, which included plants in 10 countries including Mexico, Brazil and France, plus joint ventures in China and South Korea.

In addition to making batteries, JCI Power Solutions produces complete “plug and play” battery systems for hybrids, plug-in hybrids (PH EVs) and electric vehicles. “We not only manufacture the cells, we also provide our OEM customers with complete thermal management and battery management systems—the software and electronics as well as the mechanical systems, the container, mounting interfaces and high power electrical wiring,” said Mike Andrew, Power Solutions’ director of government affairs and external communications for hybrid systems.

Despite the current upheaval in the automotive industry, the economic and political situation in the United States presents some real opportunities for JCI to invest in future growth. The American Recovery and Reinvestment Act (ARRA) makes about $1.5 billion in grant funding available for manufacturing facilities that produce advanced batteries including lithium-ion, other electro-chemistries and advanced lead acid, as long as the projects are in line with the Obama administration.
tion's goals of creating and retaining jobs in the U.S., reducing CO2 and increasing America's energy security. "I would call it an unprecedented opportunity. It's a chance for our domestic industry to really establish a capability right down the supply chain, a capability we presently don't have," Mr. A. Andrew asserted.

In April 2009, the company announced a $220 million project to revamp its Holland, Michigan, facility to produce lithium-ion batteries for hybrid and electric vehicles, specifically to service the production contracts with Ford and Azure Dynamics. The state of Michigan is supporting the project with $148.5 million in tax credits and JCI is in the process of applying for a ARRA grant money.

Johnson Controls is the world’s first company to mass-produce lithium-ion automotive batteries, which it does in Nersac, France, where the company is currently producing batteries for the Mercedes S-Class hybrid and for the BMW 7 Series ActiveHybrid.

Cost Effective Li-ion Batteries Needed

While the top-selling Prius hybrid and the new Honda Insight use nickel-metal hydride batteries, Toyota's joint venture with Panasonic, and Honda's joint venture with GS Yuasa Power Supply both plan to begin large scale production of lithium-ion automotive batteries soon. It is unlikely the carmakers for whom JCI supplies lithium-ion cells will soon match the Japanese OEMs in terms of volume, and it is equally unlikely that JCI will win battery business from Japanese carmakers.

The Company Profile Continued

Power Solutions Sales and Segment Margin

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<tbody>
<tr>
<td>Power Solutions Sales</td>
<td>$2,727</td>
<td>$2,928</td>
<td>$3,716</td>
<td>$4,335</td>
<td>$5,850</td>
</tr>
</tbody>
</table>

Power Solutions Sales by Region

- Asia, 3%
- Europe, 40%
- The Americas, 57%

Power Solutions Customers

Alphabetically

- Mazda
- Mitsubishi
- PSA
- Renault
- Subaru
- Toyota
- USABC
- Volkswagen

Distinctions Claimed by JCI

Power Solutions

- JCI is the leading supplier of lead acid batteries for every type of passenger car, light truck and utility vehicle.
- Johnson Controls-Saft is the world's leading independent supplier of lithium-ion batteries for hybrid electric vehicles. The company opened the world's first mass-production facility for lithium-ion batteries for hybrid and electric vehicles.

Cost Effective Li-ion Batteries Needed

- GM: PHEV Saturn Vue using lithium-ion technology
- SAIC: PHEV fuel cell vehicle demonstration fleet
- Daimler: PHEV Sprinter delivery van fleet using Li-ion battery systems
- USABC: The United States Advanced Battery Consortium, with funding from the U.S. Department of Energy, has awarded Johnson Controls-Saft a contract valued at $8.2 million. The contract supports advanced technology development in the industry and will help JCI get up and running quickly with its U.S.-based Li-ion battery production.

The company is confident its Li-ion production capability will be on par with the Japanese battery makers' within the next decade. "Once we are in business, we intend to be a leader in that area. I would expect that within a five to ten year period we will be in a leadership position," Mr. Andrew asserted.

U.S. Lead Acid Rechargeable Battery Market Share (2007)

- JCI, 36.9%
- East Penn, 12.8%
- Exide, 20.4%

Source: Freedonia Group, Study #2448: Batteries to 2012; Visit freedoniagroup.com for further information or to purchase the study.

Power Solutions Battery Development Contracts

- Ford: partnership with Southern California Edison and Electric Power Research Institute (EPRI) for a fleet of demonstration plug-in hybrid electric vehicles (PHEVs)
- GM: PHEV Saturn Vue using lithium-ion technology
- SAIC: PHEV fuel cell vehicle demonstration fleet
- Daimler: PHEV Sprinter delivery van fleet using Li-ion battery systems
- USABC: The United States Advanced Battery Consortium, with funding from the U.S. Department of Energy, has awarded Johnson Controls-Saft a contract valued at $8.2 million. The contract focuses on the development of lithium-ion battery systems for PHEVs.

Power Solutions Battery Production Contracts

- Daimler Mild Hybrid: Mercedes S-Class with Li-ion technology, SOP* 2009
- BMW Mild Hybrid: 7-Series with Li-ion, SOP* 2010
- Chrysler Mild Hybrid: Small sedan with Ni-MH, SOP* 2009
- Azure Dynamics Balance Hybrid Electric Platform: Commercial delivery trucks
- Ford Plug-in Hybrid Escape: To be launched in 2012

* SOP (start of production)
More Reliable Traffic Data Still Needed

Navigation equipment that automatically routes users around traffic tie-ups and gives them an accurate arrival time is something carmakers and consumers have wanted for a long time. Numerous companies around the world have burned through hundreds of millions of dollars trying to come up with solutions to the problem. While many traffic data products have come and gone and many still remain, nobody has yet found a way to make serious money from traffic. So it's understandable that the product segment has its share of skeptics.

One well placed top executive with years of global experience in the field, who for obvious reasons didn't want to be quoted, had this to say about traffic information services: "We are all accustomed to it being free, so people aren't willing to pay unless it's a lot better than what you get for free. Traffic data is unreliable, and it only covers the major roads. If there's a traffic jam on the interstate, you don't know if you should get off."

People from Inrix, the Seattle, Washington-based traffic information provider, present a different picture. Inrix sees the number of automotive traffic subscriptions in North America climbing from one million at the end of 2008 to 3.1 million by the end of 2009, and growing quickly from there to 14.9 million by the end of 2012 as more carmakers make the service available to their customers. By 2012 Inrix expects there will be a total of 66 million traffic subscribers in North America, most of whom will get their traffic information not from carmaker-supplied equipment but from mobile phones and personal navigation devices.

This summer Inrix will launch a product called Total Fusion, which blends 160,000 miles of real-time traffic data with its predictive traffic data. Total Fusion will cover a total of 800,000 miles of road, taking it well beyond the 46,726 miles of U.S. interstate highways.

The first Inrix Total Fusion customer is Ford, which will make traffic information available to users of its Ford Sync at no charge for the first three years. The Ford Sync system with Traffic, Destination and Information, will take account of actual driving times as it routes drivers to their destination.

When pressed to rate the value of traffic data on a scale of 1-10, with 10 being most valuable, Mr. Dance estimated: "When we launched BMW Real Time Traffic Information in 2006 we were maybe at 5. Now we are between 7 and 8. By 2011 we will be a 10."

Egil Juliussen, principal analyst and fellow at the market research firm iSuppli, agrees that the quality of traffic information is getting much better. He believes that the market for traffic information is a multibillion dollar business in five years, he predicted. iSuppli will soon publish a report which assesses the global market for traffic information.

North American Traffic Data Subscriptions

<table>
<thead>
<tr>
<th>Year</th>
<th>PND</th>
<th>Automotive</th>
<th>Mobile</th>
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<tbody>
<tr>
<td>2007</td>
<td>10</td>
<td>20</td>
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<tr>
<td>2012</td>
<td>60</td>
<td>120</td>
<td>180</td>
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Includes consumer subscriptions for "traffic only" and "navigation with traffic" for portable navigation devices (PND), automotive (delivered to the vehicle via consumer telematics, satellite, RDS-TMS, HD Radio, data over voice and GPRS) and mobile phones.

Data: Inrix

"Ford just reached one million Ford Sync users and expects another million users over the next 18 months. So we see very significant growth in traffic providers getting paid for this service," said Scott Sedlik, Inrix's vice president of marketing.

Questions about Quality

There are serious concerns in the industry about the quality of the traffic information carmakers and other customers are getting. Inrix, which claims a 52% share of the traffic data market in North America, says it delivers the broadest and most accurate information in North America, information it gets in part by monitoring transmissions from one million traffic probes. Its traffic probes are GPS-enabled commercial and consumer devices in taxis, service vehicles, airport shuttle services, cars and long haul trucks.

The company says that it has sufficient probes now to cover all limited access roads, and that it will eventually multiply the number of probes it monitors in North America to get more information about traffic on the arterials. "But it's not just the number of probes; it's also the science behind processing the data," said Kush Parikh, who handles business development for Inrix. "It seems trivial once you have the probe data to be able to report roadway speeds, but you have to think through how long each roadway link should be to best take account of stoplights and stop signs."

NAVTEQ, the number-two traffic data provider in North America, won't say how many probes it uses, but says it processes 40 million probe data points in a typical business day. Each piece of information from a probe is a data point.

Dave McNamara, formerly a top electrical engineer at Ford, leads the requirements subcommittee of the North American Traffic Working Group, part of ITS America. "We are trying to come up with a common data quality process. OEMs are paying for this traffic data and they really don't know for sure what they are paying for," suggested Mr. McNamara.

"Inrix is differentiating themselves by convincing Ford and others that their real-time traffic data using probes is very good. A lot of people think that might be more marketing hype than substance."

Fran Dance, telematics service manager at BMW North America and a spokesman for the ITS working group, noted, "We are finding there are certain metropolitan areas, Miami for example, where the quality of traffic data is unacceptable." BMW makes traffic information available for free to approximately 200,000 North American BMW customers who bought its $2,000 navigation option. BMW gets traffic data from Inrix, which supplements its probe data with incident reports from Clear Channel.

BMW has developed a method of checking the quality of traffic information using test cars that travel the covered routes. An SAE paper by Mr. Dance and others from BMW describing that methodology was published in 2008. (See SAE paper number 2008-01-0200.)

When pressed to rate the value of traffic data on a scale of 1-10, with 10 being most valuable, Mr. Dance estimated: "When we launched BMW Real Time Traffic Information in 2006 we were maybe at 5. Now we are between 7 and 8. By 2011 we will be a 10."

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