Harman and NXP on Ethernet Adoption

We began writing about the auto industry’s interest in Ethernet in 2007, when BMW indicated that it would soon employ the high-speed networking technology to program embedded ECUs. Since then, as it does with every new automotive electronics standard, the industry has been moving very slowly but steadily toward adoption.

To find out how far along the industry’s embrace of Ethernet has come, we checked in with two people who should know. Tony Versluijs is vice president and general manager of in-vehicle networking at NXP. NXP is the world’s largest supplier of networking transceivers. With the exception of MOST, NXP covers all vehicle communications buses: LIN, CAN, FlexRay and Ethernet.

Arvin Baalu is vice president of platform software at the Connected Car Division of Harman, a leading infotainment system supplier. With others, Harman founded the AVnu Alliance to develop and specify Ethernet Audio Video Bridging. Harman is also a key member of the OPEN Alliance special interest group that is standardizing the BroadR-Reach physical layer developed by Broadcom and closing any gaps necessary for its automotive use. The two alliances are working together.

Ethernet’s Automotive Prospects Solid

Despite its long gestation, the market for Ethernet devices is still in its infancy. Indeed, according to NXP’s Mr. Versluijs, the number of new CAN nodes shipped each year still outpaces the number of new Ethernet nodes, but the demand for Ethernet nodes is rising exponentially. He believes that by 2023 the number of Ethernet nodes in the fleet will rise to a few hundred million. “For comparison,” he noted, “there are seven billion CAN nodes in the fleet today.”

Lidar Sensors to Complement Radar and Camera

High Price Limits Market

Camera sensors work poorly in bad weather and at night; radar is troubled by reflected energy and pedestrians. To fill in the gaps a third sensor is needed. That sensor is lidar. With its own laser light source, lidar sees quite well through fog and snow, is more accurate than cameras at measuring distances to objects and, unlike cameras, sees in 3D. The problem: for autonomous driving anywhere but on well-marked highways, a 360-degree lidar view around the vehicle is required, which means four lidar sensors are needed—and lidar sensors are pricey.

The large, expensive, mechanical scanning lasers used in autonomous vehicle testing were never considered for production vehicles, but even solid-state sensors are cost prohibitive today. Quanergy would like to start selling its scanning lidar sensors to carmakers for $250 each in a year or two. Only high-end carmakers will be able to afford that bill. Given their price today, high-volume applications of scanning lidar sensors is at least a decade away.

Lidar has been going through the same maturing process radar went through. “When we first introduced radar in 1999, it had an electromechanical scanning antenna and initially cost over two thousand dollars,” said Glen DeVos, vice president of engineering at Delphi. “Now our radar sensors have no moving parts, cost less than one hundred dollars and are highly compact, about the size of a deck of cards.” In July 2015, Delphi took an equity position in Quanergy.

Quanergy’s scanning lidar sensor already has no moving parts. It uses an optical phased array as a transmitter, which can steer pulses of light by shifting the phase of the pulse as it is projected through the array. It is more compact than a point-and-shoot camera and weighs 11 ounces.

While Renault-Nissan, along with Mercedes-Benz and Hyundai-Kia, have been linked to Quanergy in the press, Kazuhiro Doi, head of research for the Renault-Nissan Alliance, told us that the carmaker has “not yet fixed on any supplier. ... Lidar is not affordable yet but is getting close to the automotive range.”

In early March 2016, Quanergy and Sensata announced their plan to jointly develop, manufacture and sell lidar sensors in the transportation market. Sensata, the world’s leading independent automotive sensor supplier, also took an equity stake in Quanergy, gaining a board seat.

Leddar Tech’s Low Cost, Fixed-Beam Alternative

By 2019 a number of carmakers intend to offer vehicles that can operate autonomously on highways without driver attention. These limited autonomous driving applications can be implemented without four scanning lidar sensors. Those won’t be essential until cars are equipped to drive autonomously under all roadway conditions or park themselves without a driver present.

In the interim, however, carmakers may well be interested in applying low-cost, fixed-beam lidar sensors to support certain ADAS features and to complement radar and camera sensors in limited autonomous-driving applications. Michael Poulin, director of product management at Leddar Tech, said his company already has a solution that is automotive ready, both in cost and industrialization. “By 2018 or 2019 we will be able to supply a very cost effective, high range but moderate resolution solution that addresses today’s mass market needs.” Working through tier-one suppliers, Leddar Tech plans to offer its sensors to carmakers “at prices comparable to radar today. ... We are talking less than $100,” he said.

Turn to Ethernet, page 3

Turn to Lidar, page 3
2015 Roundup: Autoliv, Bosch, Delphi, Valeo

Autoliv
2015 Sales: €9,169.6 million
Change from 2014: down 0.8%, due to 9.1% negative currency effects. Approximately 75% of sales are generated in currencies other than the U.S. dollar. Organic sales grew 8% over the prior year.
Operating Margin: 7.9%
Outlook for 2016: Autoliv expects 5% organic growth, offset 3% by currency effects. Adjusted operating margin is expected to be more than 9%.

Sales of seatbelts and passive safety electronics declined by 7.2% and 1%, respectively. Airbag sales, which account for 55% of the total, were nearly flat.

The company has been focused on the active safety market, especially radar and camera-based applications, for the last several years. Autoliv’s sales of active safety products, which in 2015 accounted for 7% of total sales, grew by nearly 25% over the prior year. According to the company, increased demand for radar-based products from Mercedes and increased demand for camera-based products from BMW contributed to active safety products growth.

Sales were well balanced regionally, with the Americas accounting for 35% of total sales, Europe, 31% and Asia, 34% (China, 17%, Japan, 7%, Rest of Asia, 10%). Sales of replacement inflators, a result of the Takata recalls, contributed to sales growth particularly in Japan and the Americas.

Bosch Mobility Solutions
Preliminary figures
2015 Sales: $41.7 billion
Change from 2014: up 12%
Outlook for 2016: Bosch is forecasting 2.8% growth for the entire Bosch Group.

The Mobility Solutions segment accounted for nearly 60% of Bosch’s total sales. According to Bosch, the major products driving sales growth in 2015 were gasoline- and diesel-injection systems, driver assistance systems and infotainment.

At CES 2016 Bosch received an innovation award for its new haptic feedback touchscreen that generates the sensation of real buttons with different textures.

Delphi Automotive
2015 Sales: $15,165 million
Change from 2014: down 2.2%
Operating Margin: 11.4%, about level with the prior year
Outlook for 2016: Assuming low single-digit vehicle production growth in the major global markets excluding South America, Delphi expects revenue between $16,600 million and $17,000 million, with adjusted operating margin in the range of 13.3% and 13.6%.

Segment Results
E/E Architecture
2015 Net Sales: $8,180 million, down 1% from 2014
Adjusted Operating Margin: 13.4%
Powertrain Systems
2015 Net Sales: $4,377 million, down 3% from 2014
Adjusted Operating Margin: 12.6%
Electronics and Safety
2015 Net Sales: $2,774 million, down 4%
Adjusted Operating Margin: 11.6%

According to Delphi, the decline in revenue reflects unfavorable currency impacts that offset its volume growth. The company completed the sale of its Thermal Systems business to Mahle GmbH in June 2015, for $660 million.

Delphi’s largest customer is General Motors, which accounted for 14% of 2015 sales. Volkswagen was the second largest at 8% of sales.

Delphi made several acquisitions during 2015 including HellermannTyton, a maker of cable management components. It strengthened its automated driving technology portfolio with the acquisition of Ottomatika, Inc., a Carnegie Mellon University spinoff that has developed autonomous driving software. On the hardware side, Delphi made a strategic investment in Quanergy Systems, a Silicon Valley start-up developing low-cost, solid-state lidar.

Delphi and GM both made strategic investments in Tula Technology, another startup. Tula developed Dynamic Skip Fire, a technology for individual cylinder deactivation with substantial fuel saving potential. Another 2015 acquisition, Control-Tec LLC, specializes in vehicle data collection and analysis.

Valeo
2015 Sales: €14,544 million
Change from 2014: up 14%, including a 7% boost from the depreciation of the euro against the U.S. dollar and the Chinese yuan
Operating Margin: 7.7% of sales
Outlook for 2016: Valeo expects to outperform the market in Europe, China and North America, assuming vehicle production rate increases in those regions of 2%, 5% and 2% respectively.

Sales to OEMs, which represent 87% of total sales, increased 16% over the prior year. OEM sales grew by 2% in North America and China but declined slightly in Western Europe and South America. OEM sales in the Comfort and Driving Assistance (CDA) Systems business group grew 13% and now account for 22% of total OEM sales. CDA products include displays, park assist, and vision and radar systems.

In December 2015 Valeo strengthened its competence in connected car technologies with the announced acquisition of Peiker, a German maker of high-speed connectivity modules, with sales of approximately €310 million in 2015.
**Ethernet...**

“We assume that all carmakers will use Ethernet in their next generation networks,” wrote Harman’s Mr. Baalu in an email to the Hansen Report. Premium carmakers will likely be the first to market.

**What Is Driving Demand?**

In short, much more bandwidth is needed. “OEMs are planning multiple high-resolution displays in the car, and this, coupled with the need for more data throughput, is driving adoption,” wrote Mr. Baalu. “The use cases are increasing—connected safety, telematics, smart sensors, high-definition audio and video, and Ethernet-enabled boosters and amplifiers.” Over-the-air firmware updates will also necessitate high bandwidth networks.

Much more data will flow, not only data generated by onboard systems and components, but also data coming to the vehicle from the cloud. “Most cars are being equipped with a 4G or LTE connection to the Internet,” said Mr. Versluijs, “and a number of carmakers are moving toward architectures that will require an Ethernet backbone to link domain computers.”

**Looking Ahead**

Following its adoption by the IEEE, the BroadR-Reach 100 Mbit/s Ethernet over a single twisted pair for automotive solution is now called 100BASE-T1. No technical challenges remain to slow the roll-out of 100BASE-T1, but getting high-volume production vehicles on the road with Ethernet will prove out the technology and increase carmakers’ in-house competence in high-bandwidth networks.

“The tier ones can play a role in innovating at the subsystem level, but it’s on the OEM’s plate to implement the whole system, to tie all the ends together,” said Mr. Versluijs. “The OEMs are in different stages of maturity. Some are more competent with Ethernet than others. Many are taking their first steps on the Ethernet field.”

Mr. Versluijs also noted that wider availability of Ethernet chips will help speed adoption. Currently there are two supply sources, NXP and Microchip, which acquired Micrel.

Gigabit automotive Ethernet over twisted pair, the 1000Base-T1 standard, is in the works but some technical challenges still remain. That standard is due in 2017.

The demand for more onboard bandwidth is so great that “we are foreseeing that even GBit Ethernet might be a limitation in the future,” according to Mr. Baalu. “For example, we are looking at solutions for native video transports where GBit is not enough. Therefore we will evaluate HDBaseT, which could transport 6 GBit per second over unshielded twisted pair.”

**MOST and CAN**

Mr. Baalu noted: “Driven by the OEMs, the MOST steering committee decided not to develop the next generation of MOST. We are not seeing MOST as a requirement in the next-gen platforms we are developing. ... For 2020 and beyond, Ethernet is being considered for the entertainment bus because it can transport control data along with high-bandwidth audio/video data.”

Mr. Versluijs concurred with that view: “The expectation is that Ethernet will eliminate MOST. Not only is Ethernet infrastructure less expensive than MOST’s, but Ethernet can carry different types of data on the same channel, not only infotainment.”

Henry Muyshondt, executive director of the MOST Cooperation and senior manager at Microchip Technology, asserts that Ethernet and MOST will coexist since each has its own advantages. He writes: “Reports of MOST’s death are greatly exaggerated. MOST’s synchronous nature makes it much easier to use for audio and other streaming applications. Carmakers will stick with MOST, especially for simple infotainment applications.”

Some people have argued that since CAN was not designed with cybersecurity in mind, Ethernet networks might replace some CAN. Mr. Baalu and Mr. Versluijs disagree with this notion, suggesting that CAN will be around for decades, and that carmakers will figure out how to protect it from cyber threats.

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**Lidar...**

LeddarTech is a spinoff from the National Optics Institute (INO) in Quebec City, Canada.

LeddarTech already has one customer for its fixed-beam technology: Valeo, with whom it has been working since 2011. In January 2014, Valeo and LeddarTech signed an agreement giving Valeo a two-year license to exclusively develop active safety products based on the LeddarTech technology. Valeo will soon complete development of an ASIC based on the technology and has begun offering lidar sensors with the ASIC to carmakers for deployment in late 2017 or early 2018.

The Valeo/LeddarTech product detects the location of objects and their distance from the sensor.

Now that Valeo’s exclusive rights to the technology has ended, LeddarTech is free to offer its optical time of flight solutions to other tier-one suppliers. “Three things differentiate our technology from the competition,” said Mr. Poulin. “First, we have higher sensitivity. That means we can either offer greater range at a given illumination power, or lower power at a given range. That would reduce the cost and size of the sensor. Second, our technology offers higher immunity to noise, be it ambient light or climatic conditions such as rain, snow or fog, or environmental conditions such as dust or dirt on the optics. Third, we digitize and signal process the light that returns to our photo detectors and can therefore do more sophisticated processing of the return signal. That gives us a higher quality measurement over a wider range of conditions.”

LeddarTech is now developing its own ASIC to address the high-volume, low-resolution market in the 2018 to 2019 timeframe. A higher-resolution sensor...
The Company Profile...

Luxoft Holding Inc.

Thumbprint Sketch

Headquarters: Zug, Switzerland
FY 2015 Revenue: $645.5 million
Capital Expense: 4.1% of revenue
Interest Expense: (0.1%) of revenue
Net Margin: 12.2%
Operating Cash Flow: $75.4 million
Cash and Cash Equivalents: $82.6 million*
Working Capital: $189.7 million*
Shareholders’ Equity: $287.1 million*
Noncurrent Liabilities: $16.5 million*
Market Capitalization: $1.81 billion as of March 7, 2016
Products: IT solutions and services
Employees: 9,100 as of March 31, 2015
Revenue per Employee: $70,934
*As of December 31, 2015
Note: Fiscal year 2015 ended March 31, 2015.

Automotive Vertical
FY 2016 Automotive Revenue: $72 million (estimate)
Top Customer: Harman
Main Product: Software development services devoted to HMI and infotainment systems
Employees: Nearly 1,400 as of March 2016

Background
Luxoft was founded in April 2000 by the information technology services and products company, IBS Group Holding Ltd., of Moscow, to focus on the growing U.S. and European markets for offshore software services. Dmitry Loshchinin, vice president of IBS Group, has been president and CEO of Luxoft since its founding.

While Luxoft’s roots and management are very much Russian, the company operates far afield. Luxoft was incorporated in Tortola, the British Virgin Islands, in March 2006. Since June 2013, it has been listed on the New York Stock Exchange after an initial public offering of 4.1 million shares at $17 each. Shares were trading at $53 in March 2016.

Following pro-Russian unrest in Ukraine in 2014 and resulting European and U.S. sanctions, Luxoft’s headquarters, along with senior management and roughly 100 engineers, were moved from Russia and the Ukraine to Zug, Switzerland. To further decrease the company’s exposure to Ukraine and Russia, as of December 31, 2015, the company had relocated 515 employees to Romania, Poland and Bulgaria. That left 33% of its employees still in the Ukraine and 22% in Russia. The company recently opened up new delivery centers in Sofia, Bulgaria, and in Guadalajara, Mexico.

According to the company, Luxoft has not been targeted by the sanctions; its ability to deliver software products and services has not been negatively affected. The sanctions are aimed at Russia’s energy and arms sectors, not at software development and IT services outsourcing.

Luxoft provides software development services and IT solutions to a global client base consisting primarily of large multinational corporations. Its five largest customers, in order, are Deutsche Bank, UBS, Harman, Boeing and Citibank. The company develops and delivers solutions from 27 dedicated delivery centers worldwide. Its 10,000 employees (as of January 2016) operate from 30 offices in 16 countries in...
Given the size of its potential market, Luxoft’s automotive revenue is still quite small, although the company has grown at
29.1% per year from its 2013 fiscal year, reaching an estimated $72 million in fiscal 2016. Luxoft’s automotive market will likely continue to increase at double-digit rates for many years to come.

Luxoft believes its solutions match up very well with these automotive industry trends: the need for improved HMI, the rise in digital clusters, autonomous driving, ADAS and connected cars. And further, the company says it is “in the process of building out its under-the-hood expertise and its back-end cloud expertise.” (See Symantec acquisition, below.)

In automotive software development services, Luxoft competes with Elektrobit, a division of Continental, and with KPII Cummins, Tata Technologies, Mahindra Engineering, Mahindra Satyam, Wipro, HCL and Lochbridge.

Half of Luxoft’s automotive revenue comes from HMI development work based on its Populus and Teora tool suites, or based on third-party frameworks such as Qt Automotive or HTML5. Another 20% of revenue comes from the work Luxoft does in navigation including map compiling, routing and guidance, and updating.

“While today, about 90% of our automotive revenue comes from services, my expectation is that in five years or so, 30% to 40% of revenue will come from licensing and royalties, with services providing the rest,” said Mikhail Bykov, managing director for automotive solutions.

To recruit automotive software engineers, Luxoft looks for people with a master’s degree and with C and C++ language expertise. “One of our main requirements is the ability to develop in an embedded environment, meaning systems that have memory and processor limitations and low-level operating systems,” said Mr. Bykov. “There are no big frameworks that do all the work for you, so you have to program a lot of things. What differentiates our engineers is their ability to read source code and understand the math of how algorithms and stacks work, how memory works, how to write efficient code.”

For the past three years Luxoft has participated with the Swiss boutique carmaker, Rinspeed, in the creation of a concept car for the Geneva Motor Show. Each year the HMI is designed and programmed by Luxoft. In 2016 Luxoft integrated SIX Payment Services’ platform into the vehicle’s infotainment system, a function that would allow drivers to make purchases directly from their cars. This year’s concept car also made an appearance at Harman’s exhibition in Las Vegas during the Consumer Electronics Show.

HMI

Luxoft believes that the human machine interface is especially fertile ground for development. “For the consumer, the vehicle’s HMI is clearly what differentiates one vehicle from the next,” said Mr. Bykov. “HMI is a key element of the overall user experience. If you drive cars from different OEMs you can really feel it. Some OEMs really fail at this stuff. Others are able to create such a nice experience that you are not even tempted to plug in your phone. In three or four years, most people will be making their choice of car not on their experience of the vehicle’s dynamics but on their experience of the infotainment system and the cluster.”

With roadmaps calling for the addition of autonomous driving features, demand for innovative HMI solutions will become even more pressing as carmakers look for ways to support riders with communica-
Adaptive Interfaces

In the past, when voice recognition technology was being developed for automotive applications, some people believed it would end up as the dominant interface technology for drivers. “It is now clear that voice is not the only answer,” said Mr. Bykov.

“There are too many errors. Even if the system understands you nine out of ten times, the time that it doesn’t makes you so angry that you don’t want to use the feature again.” Carmakers will increasingly offer multiple interface modalities: voice, the touch displays and panels, the haptics, the sensors, the buttons and so on, but they all must work together as a single, integrated user experience,” noted Mr. Bykov.

Populous

Populous, a tool chain for designing and developing user interfaces for distributed embedded systems, was acquired from Mecel AB, a subsidiary of Delphi, in July 2014. Only the intellectual property was acquired.

Populous minimizes the time and cost of producing full-featured human-machine interfaces. The tool suite is well suited to the design of the digital instrument cluster graphics. It is built on a database-driven HMI concept that doesn’t require coding. Populous works with a variety of semiconductor platforms, operating systems and graphics interfaces.

Luxoft’s relationship with tier-one supplier Delphi is based in part on Populous, which had been in Delphi’s solution portfolio. Delphi is one of Luxoft’s largest clients.

Teora

An embodiment of Luxoft’s user interface knowhow, Teora is the company’s framework for rapid development of automotive HMI. It includes a development environment consisting of applications for rapid prototyping, code generation and the design of screen layouts and displayed messages. It is applicable to Linux- and QNX-based systems. The platform enables a seamless integration of mixed 2D, 3D, Adobe Flash and HTML5 content.

ADAS

Luxoft’s software development expertise has been focused on the driver interface related to clusters. Luxoft is now expanding its HMI wherewithal into head-up displays. With HUDs, Luxoft can reasonably make the transition to advanced driving assistance systems and automated driving.

For the last three years Luxoft has been expanding its competencies with the aim of helping carmakers develop ADAS solutions. It developed what the company calls its Computer Vision and Augmented Reality (CVNAR) software framework with which it will provide engineering services.

CVNAR brings together a unique set of features that can be used to implement ADAS and autonomous driving features quickly and cost efficiently. For example, at the 2016 Consumer Electronics Show, Luxoft teamed up with QNX Software Systems to present an augmented reality head-up display demonstration in a Jeep Wrangler. The CVNAR framework ran algorithms that superimposed turn-by-turn navigation information, information and entertainment systems that either complement or provide appealing alternatives to brought-in devices.

In addition, there is the formidable driver-interface challenge of finding HMI solutions to safely bring drivers in and out of the piloted driving loop. “This is a very dynamic area where carmakers are looking for new solutions and new platforms. It is developing quite fast and is a big part of the reason why our sales are growing at double digit rates,” said Mr. Bykov.

While the core of Luxoft’s HMI expertise is centered on the graphical user interface, its solutions must take into account all modalities. “We mostly work to support the graphical rendering, the graphical representation of the different types of controls such as voice, the touch displays and panels, the haptics, the sensors, the buttons and so on, but they all must work together as a single, integrated user experience,” noted Mr. Bykov.

Ford SDL

Three years ago Luxoft began working with Ford and others on the Genivi-hosted development of SmartDeviceLink, the open-source standard set of protocols and messages that connect applications on a smartphone to a vehicle head unit. SDL has its roots in Ford’s Sync AppLink. Luxoft contributed its open-source iviLink to the solution; other organizations also made code contributions. In January, Toyota announced its intention to soon install the smartphone connectivity platform in the Camry.

“Our role was helping to create the SDL specification,” explained Mr. Bykov. “Then we took it further in creating SDL profiles for different types of devices and connections. We are still doing some work in this area with Ford and their tier-one supplier Panasonic.”

Distinctions Claimed by Luxoft

◦ World’s first company to achieve CMM and CMMI Level 5 certifications simultaneously
◦ First company in Europe to attain CMMI Level 5 certification
◦ Introduced what it referred to as the world’s first Android-based OEM software platform for infotainment in 2010
◦ Introduced the world’s first Android platform for rear seat entertainment in 2011
The acquisition also brings Luxoft closer to customers served by Symtavision, such as the Volkswagen Group, who may now be more likely to consider taking advantage of Luxoft’s infotainment and HMI software development expertise.

Following the acquisition, Luxoft expects little revenue growth for Symtavision until 2017, after which a 10% to 15% annual rate of growth is anticipated. Revenue per Symtavision engineer is considerably higher than revenue per Luxoft engineer.

“With a lot of cash on our balance sheet we would consider other small, bolt-on acquisitions, but there aren’t a lot of service providers or software development organizations left that we could buy,” said Patrick Corcoran, director of analysts and advisor relations globally for Luxoft.

Luxoft’s HMI Services
At its HMI Competence Center, Stuttgart, Germany, Luxoft focuses on screen design, HMI concepts, product design, usability and psychology, covering the full range of human and machine factors in HMI design.

- Story, Design, Specification, and Software Development Services:
  - Create easy-to-use and highly attractive HMI concepts
  - Create products and solutions that meet safety requirements for OEM and aftermarket products
  - Conduct benchmarking and usability studies
  - Perform AAM (Alliance of Automobile Manufacturers) testing and develop driver distraction guidelines

- HMI Engineering Services:
  - Highly efficient implementation and integration of internally or externally created HMI specifications and style guides using Luxoft’s HMI platform tool chain and workflow

- R&D Services:
  - Head-up displays, distributed information on multiple displays
  - Gesture recognition
  - Augmented reality
  - Augmented navigation

Luxoft’s Competitive Strengths
- Employment stability: Low attrition rates among Luxoft employees, 12.9%, 9.9% and 10.5%, respectively, for each of the last three fiscal years.
- Experienced and well-educated engineers: 85% have five or more years of experience; 80% have master’s degrees.
- A key Luxoft strength is its ability to provide software development services at a low cost. Revenue per employee for Luxoft in its 2016 fiscal year was $70,934 and still the company delivered a net margin of 12.2%.

The acquisition was founded in 2005 and lately has not been growing as the company’s timing analysis technology is becoming less relevant with the advent of Ethernet networks.

Symtavision’s tools are used by automotive developers to model the interactions of vehicle functions. They help developers predict how much computing power is needed and how much communications bandwidth is needed while optimizing reliability and cost.

Given Symtavision’s experience with real-time vehicle control systems (chassis, powertrain, body electronics and in-vehicle networking) Luxoft expects that it will in the coming months be able to compete for software development engagements beyond the cockpit, its specialty up until now. Luxoft is especially interested in tackling advanced assistance system projects, said Mr. Bykov. “ADAS is a sweet spot. It is developing very fast and getting a lot of attention from OEMs. It is an area where you can apply a lot of complex and sophisticated solutions.”

Speaking about the acquisition during a conference call in late February, Symtavision’s CEO, Marek Jersak, said, “Now that we are part of Luxoft we will have access to much larger engineering teams. This creates the opportunity to grow revenue much faster because increasingly our customers are asking us to assume a larger share of responsibility which requires more headcount. … Projects can easily require hundreds of engineers.”

Syntavision GmbH Acquisition
In February 2016, Luxoft acquired Syntavision of Braunschweig, Germany, a provider of software tools and consulting services aimed at timing analysis solutions for processors, control units and buses in automotive, aerospace, automation and telecom systems. Syntavision is a spinoff from the Technical University of Braunschweig.

Among carmakers, Symtavision has served Volkswagen, Porsche, BMW, Toyota, GM and Audi. The company, with approximately 20 employees, produced some €5 million in revenue in 2015 from arrows, street names, pedestrian crossings, destinations, points of interest and forward collision alerts into the driver’s view. The application ran on the QNX Neutrino operating system.

Systems based on the CVNAR framework have not yet found production applications, but a number of R&D projects based on the framework are being worked. “So far, our ADAS experience has been in providing visual aids for the driver,” said Mr. Bykov. “Our acquisition of Syntavision will open some doors to companies that are working on ADAS systems.”

Luxoft Automotive Locations

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<tr>
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The acquisition also brings Luxoft closer to customers served by Symtavision, such as the Volkswagen Group, who may now be more likely to consider taking advantage of Luxoft’s infotainment and HMI software development expertise.

Following the acquisition, Luxoft expects little revenue growth for Symtavision until 2017, after which a 10% to 15% annual rate of growth is anticipated. Revenue per Symtavision engineer is considerably higher than revenue per Luxoft engineer.

“With a lot of cash on our balance sheet we would consider other small, bolt-on acquisitions, but there aren’t a lot of service providers or software development organizations left that we could buy,” said Patrick Corcoran, director of analysts and advisor relations globally for Luxoft.

Luxoft’s HMI Services
At its HMI Competence Center, Stuttgart, Germany, Luxoft focuses on screen design, HMI concepts, product design, usability and psychology, covering the full range of human and machine factors in HMI design.

- Story, Design, Specification, and Software Development Services:
  - Create easy-to-use and highly attractive HMI concepts
  - Create products and solutions that meet safety requirements for OEM and aftermarket products
  - Conduct benchmarking and usability studies
  - Perform AAM (Alliance of Automobile Manufacturers) testing and develop driver distraction guidelines

- HMI Engineering Services:
  - Highly efficient implementation and integration of internally or externally created HMI specifications and style guides using Luxoft’s HMI platform tool chain and workflow

- R&D Services:
  - Head-up displays, distributed information on multiple displays
  - Gesture recognition
  - Augmented reality
  - Augmented navigation
J.P. Morgan’s January 2016 report on the global xEV market (electric, hybrid electric, plugin hybrid electric and fuel cell vehicles) predicts annual growth in the range of 25% to 34% through 2020. Hybrid electric vehicles will dominate in all regions with the exception of China, where subsidies are not offered for HEVs. China will see a faster adoption of pure electric vehicles and plug-in hybrids.

The highest penetration of xEVs, more than 90% of them hybrids, is currently in Japan, where the Toyota Prius has been the top selling model for years. J.P. Morgan expects hybrid sales to remain strong in Japan: Penetration of xEVs should reach 36% in 2020, with hybrids accounting for 80% of xEV sales.

In the U.S., February 2016 sales of hybrids were down 10% compared with February 2015, according to HybridCars.com, likely due to falling gas prices. EV sales, however, showed their fourth consecutive month of growth in February. Tesla’s high-performance, fun-to-drive cars have no doubt burnished the image of EVs and broadened their appeal beyond merely making an environmental statement.

The report also looks at the broader trend of electrification of vehicle systems to increase fuel efficiency, including stop-start systems. In the United States, start-stop penetration could reach 60% by the end of the decade. According to J.P. Morgan, “Electrification will be a multi-year powerful trend in the auto industry as carmakers develop ... energy-saving cars ... and autonomous driving systems, including ADAS.”

The resulting demand for more advanced automotive electronics components will accelerate that market beginning in 2017.

J.P. Morgan believes suppliers Denso, Delphi, Mando and Nexteer are well positioned to benefit as electrification takes off. On the battery and component side, the analysts recommend LG Chem, Nidec, Mabuchi, Infineon and Maxim Integrated Products.