Jakob Hjelmåker, Business Manager, Bluetooth, Mecel AB.

Incisor interview:

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A pioneering Bluetooth concept

Swedish automotive connectivity experts lead the way

How are you getting on with the Bluetooth installation in your car? Surely you do have Bluetooth? And if you haven't, why not? Bluetooth has been around for ten years now, and with automotive applications cited from the beginning as being one of the 'golden' applications, it is surprising that penetration is not more extensive. To find out more about the state of the Bluetooth automotive art and challenges such as constant chase for new features, cost-efficient implementations and solving interoperability problems, Incisor has been talking to Jakob Hjelmåker, Business Manager - Bluetooth at Swedish company Mecel AB.

Screenshot from Mecel Betula Head Unit Concept showing the details of a phone book entry.

A Bluetooth pioneer

From its beginnings as an automotive industry specialist, Mecel developed expertise that allowed it to become one of the first players in the Bluetooth Special Interest Group (SIG) to be working on automotive applications. This was at a very early stage in Bluetooth's evolution. As far back as 1998, Mecel was introduced to the Bluetooth technology by Ericsson. The first product was an in-car hands-free system based around a head unit installed in a concept car. This was believed to be the world's first in-car Bluetooth hands-free system, and was shown at the IAA show in Frankfurt in September, 1999. Subsequently, Mecel worked on the development of the integrated Bluetooth system that was launched in Saab's 9-3 saloon in 2003.

Over the years that followed, Mecel participated in the Car and other working groups, contributed to the development of several profiles and features, and played a major role in the design of the Audio Video Remote Control profile (AVRCP1.3).

Mecel must be doing things correctly, because the Bluetooth SIG adopted the Mecel Bluetooth stack for use in the Profile Tuning Suite. Understandably, Mecel regards this as a great testimonial and confirmation that its stack is of the highest quality. The value that Mecel places on its close working relationship with the Bluetooth SIG will be demonstrated later this month, as Mecel has chosen to make a major product announcement at the Bluetooth SIG's annual All Hands member meeting (see below).

But Mecel was not only working on in-car systems. Since 2003 the company has supplied a Bluetooth stack to Motorola for use in its mobile phones, and today, non-auto industry clients make up a large part of Mecel's Bluetooth customer base.

The Nordic influence

Mecel now has a full portfolio of software products and has adopted an unusual naming system – all are based around the Latin names for Nordic trees. "We wanted to reflect the qualities of growth, sustainability and a general Nordic flavour," said Hjelmåker. "Mecel Betula Suite, for example, is Mecel's complete automotive Bluetooth platform including a global interoperability program, and is named after the Nordic birch tree. The birch is known to be a hard, durable wood, and these qualities reflect the robustness of Mecel's Bluetooth solution."

Continuing the product portfolio overview, the Mecel Populus (named after the Poplar tree) product suite is a complete tool chain for designing, developing and deploying user interfaces for distributed embedded systems, and the Mecel Picea Suite is

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Mecel's solution for efficient development of Autosar-compliant ECUs. Mecel chose the name Picea, which we know as the Spruce, as it is by far and away the most common and widespread tree in the Nordic region.

Auto system design in the PC

Expanding on Mecel Betula Suite, Hjelmåker explained that some years ago Mecel saw that more and more Bluetooth features would come, and that would mean more use cases and more and more potential interoperability issues. "The Bluetooth software behind all of this needs to be readily available and to be robust. There is no doubt that the installation is more cost-effective if it is fully and carefully integrated with the car's head unit, rather than made up of a collection of modules. This level of integration also makes for more flexibility of features," commented Hjelmåker. "Working with an advanced Bluetooth stack is tricky, and it is easy to negatively affect the performance of a system. So, we have created a high level API, which not only contains the necessary Bluetooth protocols and profiles, but also the complete application framework for automotive usage." Using the API of the Mecel Betula SDK, developers can design systems quicker, cheaper and better.

In order to maintain the effectiveness and appeal of the Mecel Betula Suite, Hjelmåker explained that Mecel is constantly updating it with new profiles and features that are expected to be popular in future applications.
But the API is not the only aspect of the Mecel Betula Suite that has been developed to make life easier. As part of the process of helping both the car companies and the phone companies exploit the potential of in-car wireless technology, Mecel has created an unusual marketing proposition. We asked Hjelmåker to explain the thinking. "We are very proud of our product line and wanted to have the best possible way of demonstrating the full range of capabilities. This is vital, as customers need to be able to understand and evaluate the Mecel Betula SDK and Mecel Populus Suite architecture before they commit. In response, Mecel has designed a PC-based head unit built upon the two Mecel products and named it the Mecel Betula Head Unit Concept. By simply installing a program on a PC, all the key features of Mecel Betula SDK and Mecel Populus Suite become available for evaluation – including making phone calls, browsing a call list or phone book and streaming music from a mobile phone.

Hjelmåker commented that this solution, which is supplied to Mecel's existing and potential customers, allows extensive testing of characteristics of the Mecel products, with the resulting final product free of nasty surprises – the customer gets exactly what he wanted and exactly what he had evaluated. Additionally, the phone companies are able to use the tool to test their products against a system that represents a high volume automotive solution. This way, many interoperability issues can be solved before the mobile phone hits the market. Following this, the next steps are to release the Mecel Betula Head Unit Concept for QNX and Linux. This will enable evaluations in production-intent embedded environments.

Bluetooth SIG members attending the annual All Hands Meeting in Tokyo later this month will be able to see Mecel demonstrating the Mecel Betula Head Unit Concept. "This is the first public demonstration of the Mecel Betula Head Unit Concept, and all of the most important players in the Bluetooth industry will be there. This makes it the right venue for our official launch."

Problems, or challenges?

What problems have the OEMs been facing, we asked, as they embrace Bluetooth technology and its role within the HMI and the vehicle implementation?
"There are two main areas to look at," suggested Hjelmåker. "First is interoperability. There are so many different phones, so many car companies and so many regions. It would be almost impossible for a car company to stay on top of this, even if it wanted to – and the car companies certainly don't. Therefore, Mecel has developed its own interoperability programme, helping the car companies to deal with this complex situation." A majority of the current and upcoming mobile phones are tested against the Mecel Betula SDK. "The mobile phones are verified against a thoroughly developed test specification, which meets several standards such as those from the Bluetooth SIG, the CTIA (Cellular Telecommunications & Internet Association – US) and CCAP (Car Communication Application Promotion – Asia)."

Hjelmåker explained that the second area to focus on has been the customer experience. The basic and fundamental requirement of successfully pairing Bluetooth devices has been a challenge for a lot of consumers. Just how should a set of Bluetooth features be presented to the user? "It is a complicated challenge. What you really need is a very flexible and easy to use HMI (Human Machine Interface). This will help the user understand not only how to get past the first challenge of pairing devices, but then will allow the user to access the full suite of features." This is another situation where the relentlessness of development means that flexibility is key. "Very often a situation develops, or a new feature is added, and we have to make changes very late in the development process. The Mecel Populus HMI suite has been designed so that it is very easy to make late changes or add features, including any necessary changes to the graphical features of the head-unit's display."

How to deliver quality sound in a metal box?

The car is a notoriously difficult acoustic environment. What techniques are used to ensure quality of sound and the ability to maintain a conversation, we wondered? Hjelmåker suggested that it is important to be working with the right partners. Mecel has paired with acoustics experts Ruwisch & Kollegen, and integrates its AEC – Acoustic Echo-Cancellation and NS – Noise Suppression proprietary technologies. Ruwisch & Kollegen also supplies effective dual-mic and beam-forming solutions, and, together with Mecel, is developing a tuning tool. "This allows us to go to the Tier 1 OEMs with a complete solution that quickly and cost-effectively delivers extremely high sound quality in the car," said Hjelmåker.

The settings menu in Mecel Betula Head Unit Concept. Once connected, the user can exploit the features of the concept such as audio streaming, phone book handling and other hands free activitie.

Bridging two colossal industries

The global automotive industry is dominated by a number of huge corporations, as is the cellphone industry. Yet now the two are being drawn together. How much interaction is there between the automotive companies and the handset manufacturers, we asked?

"The car and phone industries are very different. The contrast in the pace of development is enormous. Phone companies work to an extremely short development cycle, while car companies are at →

the opposite end of the scale," said Hjelmåker. "Mecel has over the years developed a network that creates the glue between the two industries. We manage interoperability between in-car systems and the ever-changing world of handsets. At the same time, we use our experience to help the car companies understand what technologies and applications are coming, and work with them to simplify the integration of those systems into future model ranges.

What is around the corner?

Incisor asked Hjelmåker to give his an overview of current take-up of wireless technology for infotainment and possibly 'systems' applications within the car, and to look into the future and tell us what type of applications OEMs are looking to implement.

"Car companies were initially slow to warm to Bluetooth, mainly due to interoperability problems. However, according to the market research we are seeing now, the situation is improving, though interoperability is still key." Hjelmåker referenced a recent report from Strategy Analytics that predicts that by 2015, 73% of new cars and light vehicles will have on-board Bluetooth.

And are the car companies looking to go beyond simple, hands-free calling solutions? "In-car Internet will become increasingly common," said Hjelmåker. "But the roll-out of these systems will happen in phases, with applications based around the Hands Free, Phone Book Access and Audio streaming profiles already available. Car companies are welcoming the idea of using the A2DP profile to connect music phones and iPod/MP3 players to the head unit, replacing costly to install, hard-wired solutions that manufacturers have so far been forced to integrate." Hjelmåker went on to confirm an observation that will ring true for many of us. "A2DP also gets us away from the early batch of FM-transmit–based systems for MP3 players, which provided very poor sound quality. Streaming music using Bluetooth from the player to the head-unit removes this stage."

Hjelmåker suggested that applications based around the Message Access Profile (MAP) and Personal Navigation Profile (PNP) are next in line for deployment in the head-unit. "This will allow us to handle email and text messages via the car infotainment system and in a more organized way. Further ahead, High Speed Bluetooth (Bluetooth 3.0) will allow us to implement applications such as the wireless streaming of high quality video content to back of seat display units."

Hjelmåker believes that Bluetooth will remain the core distribution mechanism and will facilitate substantial expansion of in car content distribution. "It will embrace phone calls, music, messaging, Internet and live TV. The handset provides the bridge, bringing the content into the car. Interaction between the handset and the head-unit distributes it where it is needed, using the Bluetooth connection." Content providers are already working on ideas. Sport radio networks will allow you to go to the Internet and jump between football or rugby games while on the move. And if you are listening to a music track and you really like it, you will be able to use the technology to go to an online music store and buy the track, all via the in-car system.

The HMI of the Mecel Betula Head Unit Concept is developed visually in the user-friendly Mecel Populus Editor. The editor enables, amongst many things, easy verification of the HMI before deploying to target, which drastically reduces the number of errors commonly found in in-car infotainment systems. The HMI is in run-time deployed by the Mecel Populus Engine, which is available for several commonly used target platforms.

It is not only entertainment applications that will emerge. Mecel predicts that another highly useful application will be the delivery of live and location-based traffic information, which will be of particular value to professional drivers. Need to avoid a traffic jam? Want to buy fuel at the best price or to find a car park with available spaces? All of this is coming soon to the cars that we drive. Hjelmåker pointed out that the growth in 3G, flat-rate subscriptions means that all of these services are more affordable for the user.

Mecel will also bring Near Field Communication (NFC) into the equation. NFC is already known to be a handy solution for making the pairing of Bluetooth devices easier, but Hjelmåker explained that it has other uses for vehicle personalisation. "We are talking about micro-based location services. For example, if you are using a set of stereo headphones in the back of the car, NFC will allow you to select which side of the car – left or right – the music is streamed to. Existing and common profiles will be used to enable lots of user-friendly applications."

The route to success

Most of us wish to be able to use wireless technology in more and more convenient ways. When it comes to using Bluetooth and complimentary wireless systems in the car, it would seem that Swedish company Mecel will be leading developments that ultimately make time spent in our vehicles considerably more rewarding.

The first products based around the Mecel Betula SDK will ship in the Autumn of 2009, but Hjelmåker commented: "Within 2 years we should have more than 1 million Mecel Betula systems in the market, and once you have reached this level of critical mass, the phone companies take you very seriously."

About Mecel

Mecel, which is headquartered in Gothenburg and has a workforce of 120 employees, was founded in 1982, and since that time has become one of the world's leading centres of Bluetooth automotive expertise.

Mecel started its development by working on engine control systems and designing products for the automotive industry's popular CAN (Controller Area Network) bus systems. Mecel's talents were soon recognised and a successful track record in the automotive industry, which is notorious for demanding extremely high levels of quality and support, confirms that Mecel's products meet those tough standards.

Mecel's main customers today are Tier 1 global OEMs in the automotive sector, telecommunications and mobile systems. Mecel also offers consultancy services. Find out more about Mecel and how to get in contact with them on www.mecel.se

View Mecel Populus/Betula demo movie