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February 01/15

Cover Story

## The connected car addresses congestion and safety challenges

SPECIAL ISSUE

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*Dear Readers,*



... and once again its time to meet at Embedded World Exhibition & Conference which will be held from 24th to 26th February 2015 at the Nuremberg Fairgrounds. The international Embedded Community can look forward to three interesting trade fair and congress days. The event – like the entire information offering of ICC Media – identifies the most topical issue in embedded system development in its basic theme “We are the Internet of Things (IoT)”. The basis of the IoT is formed by intelligently networked embedded systems. The

event will therefore present the latest state of research for the international embedded community and shows the direction of future trends to make this engineering revolution reality. The basic theme of “We are the Internet of Things” runs through the whole conference programme. The main topics under the keyword Engineering Focus at the 2015 conference are IoT and Security & Safety. Daily keynotes examine the topics from various perspectives and the themes are also reflected in the exhibition halls to accompany the conference.

This 1st issue of ECE & Boards & Solutions in 2015 is also dedicated to Embedded World, which developed itself in the last 13 years to the most important event world wide for the embedded community. Our cover story “The connected car addresses congestion and safety challenges” shows that linking vehicles to the Internet of Things will make journeys faster, cleaner, and cheaper. But this requires secure connections including secure communication, data, and IP protection as well as system integrity. Infineon realised this issue and offers a trusted platform module solution in its AURIX MCUs which is described in the article starting at page 14. If you think about IoT you’ll find also a huge need for effectively storing the acquired huge amount of data in Flash memory. Beside the traditional Flash memories there is now a new Flash architecture from Hyperstone available – called hyMap, which significantly improves write amplification, increase endurance and random write performance. For more information – see page 25.

But IoT does not only include the embedded word it combines it with the formerly separated IT world. Nowadays cloud computing is also used in industrial and embedded applications. The article “Managing SMARC Computer-on-Modules via the Cloud” starting on page 40 describes new SMARC COMs which comes complete with a connection to the SEMA Cloud making them a ready-to-use solution for a wide variety of IoT monitoring and maintenance services.

You’ll see there is a lot of innovation going on in the embedded industry. To keep you informed and updated you should visit Embedded World 2015.

*Look forward to seeing you there!*

Wolfgang Patelay  
Editor



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<b>Viewpoint</b>	<b>3</b>
<b>Safety &amp; Security</b>	
The connected car addresses congestion and safety challenges	6
Success story about a configurable system for air traffic controllers	12
Connected systems require hardware-based security	14
<b>Tools</b>	
Ethernet compliance testing with an oscilloscope	19
<b>Memories</b>	
New flash management architecture enables MLC for industrial storage	25
<b>Microcontrollers &amp; SoCs</b>	
SoC design enables easy and fast migration of platform solutions	28
Small Microcontroller devices for a big market	34
<b>Embedded Computing</b>	
How to get to the tailored industrial PC fast?	38
Managing SMARC Computer-on-Modules via the cloud	40
<b>Operating Systems</b>	
Mainline Linux goes real-time ... really?	42
<b>M2M Communication</b>	
Machine-to-Machine communication knows no limits	44
<b>Digital Signage</b>	
Turn a meeting room into a totally new surrounding	46

**Cover Story: The connected car addresses congestion and safety challenges 6**



This article shows how linking vehicles to the Internet of Things (IoT) will make journeys faster, cleaner and cheaper.

**Success story about a configurable system for air traffic controllers 12**

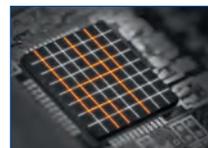
Security, availability and efficiency have emerged as the top requirements imposed on embedded computing projects. Applying a combination of advanced technology and iesy™ Project Management made a significant contribution to improving flight safety at Deutsche Flugsicherung (DFS).

**Ethernet compliance testing with an oscilloscope 19**



In industry and the private sector, it is difficult to imagine a world without Ethernet data exchange. Automated test solutions that support compliance tests on Ethernet interfaces are available for digital oscilloscopes. A test wizard on the R&S RTO from Rohde & Schwarz guides the user effortlessly through the measurements

**New flash management architecture enables MLC for industrial storage 25**



This article describes hyMap™ flash management architecture, a new sub-page-based mapping and flash translation layer approach which significantly improves write amplification, increases endurance and random write performance. A low random write WAF results in high random write IOPS, preventing stress on the flash and giving the flash device a longer life.

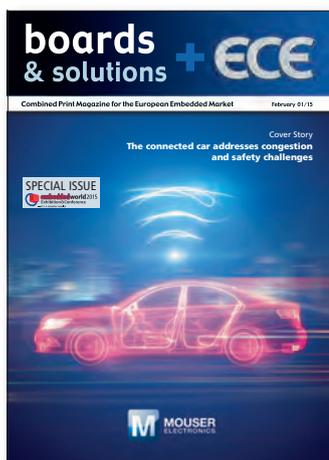
**SoC design enables easy and fast migration of platform solutions 28**



The Zynq-7000 All Programmable SoC is suited for implementing a platform strategy for most embedded applications. With its integration between ARM processing and FPGA logic and I/O programmability, it allows every level of an enterprise to harmonize their development efforts and bring highly differentiated product lines to market faster.

**How to get to the tailored industrial PC fast? 38**

On the basis of standardized building blocks, MSC Technologies has developed the first embedded system from the new NanoServer family under the brand DSM Computer. The flexible Box IPC is based on a fourth-generation Intel Core i3/i5/i7 processor and the Intel Q87 Express chipset from the desktop series.



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# The connected car addresses congestion and safety challenges

By Steven Keeping, Mouser Electronics

*This article shows how linking vehicles to the Internet of Things (IoT) will make journeys faster, cleaner and cheaper.*



■ We're devoting an increasing proportion of our lives to the road. The average American spends ten percent of their waking time (some 600 hours a year) behind the wheel. Worse yet, according to the Texas A&M Transportation Institute, U.S. commuters waste 38 hours per year stuck in traffic. In Washington D.C. and Los Angeles, the situation is even more serious with drivers squandering 67 and 61 hours, respectively, staring at the license plate of the stationary vehicle in front of them. The problems don't stop with lost man-hours. Traffic congestion burns fuel (2.9 billion gallons per year in the U.S.) and adds to atmospheric greenhouse gases (to the tune of 56 billion pounds of CO<sub>2</sub> each year.) Wasted fuel and lost work time cost the U.S. an estimated \$98 billion in 2011 according to a report prepared for the American Automobile Association (AAA).

Automotive makers work continuously to address these challenges. Cars have become comfortable cocoons due to sound insulation, supportive seats, and air conditioning; accidents are more survivable thanks to innovations such as anti-lock brakes, airbags, and crumple zones, and drivers are able to ease the tedium of congestion by accessing in-car entertainment ranging from digital-radio broadcasts to music from their smartphone and backseat video from in-seat DVD players. And in recent years, in-car systems have

been supplemented by internet connectivity. That connectivity has allowed drivers and passengers to remain "plugged in" to the business and social networks they take for granted when at home or in the office, turning hours stuck in traffic into productive time.

But what if internet connectivity could be taken a stage further? What if the most modest temperature sensor all the way up to the engine management unit and satellite navigation could send and receive information via the internet without the involvement of the driver or passengers? Such connectivity could further enhance the safety and comfort of vehicle occupants while addressing many of the congestion challenges of modern transportation. This vehicle of the future already has a name, the connected car. The IoT differs from the traditional internet by replacing the main source of data input (humans) with computers, machines and sensors. Such a development ensures the physical world is intimately interfaced to the internet without the need for human intervention.

The implications of this are huge, because unlike humans - who make mistakes and get bored - systems dedicated to the job of gathering data perform their designated role without error or fatigue. Kevin Ashton, the man credited with coining the phrase the "Internet of Things" back in 1999, noted: "If we had

computers that knew everything there was to know about things - using data they gathered without any help from us - we would be able to track and count everything, and greatly reduce waste, loss and cost." Networking company Cisco Systems, among others, describes the IoT as the convergence of Internet Protocol (IP) networks - millions of computers and billions of other IP devices in the home and office - with mobile networks - millions of voice communications and billions of data packets from internet-capable mobiles - to form a network of a trillion end points, using a common infrastructure, ranging from simple sensors to machines to more complex objects such as cars.

The phrase reduce waste, loss and cost, is something of a mantra to the automotive sector, so, together with silicon vendors that supply the industry, auto manufacturers are among the most enthusiastic proponents of the IoT. One key driver for this enthusiasm is the opportunity to introduce cost-saving measures such as performing over-the-air updates to the car software - particularly in key components such as the engine management unit (EMU). This could allow critical modifications to be made without the cost of recalling potentially millions of vehicles. But whatever the motivation for the automotive companies, the addition of IoT to the car will also be a boon for consumers.



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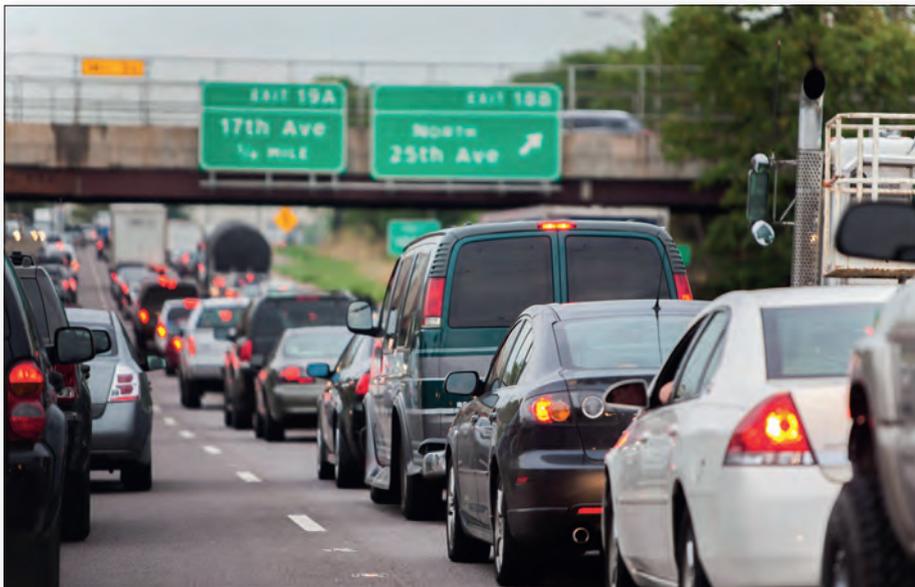


Figure 1. Traffic congestion cost the U.S. nearly \$98 billion in wasted fuel and lost work hours during 2011. (IstockPhoto #21416015)

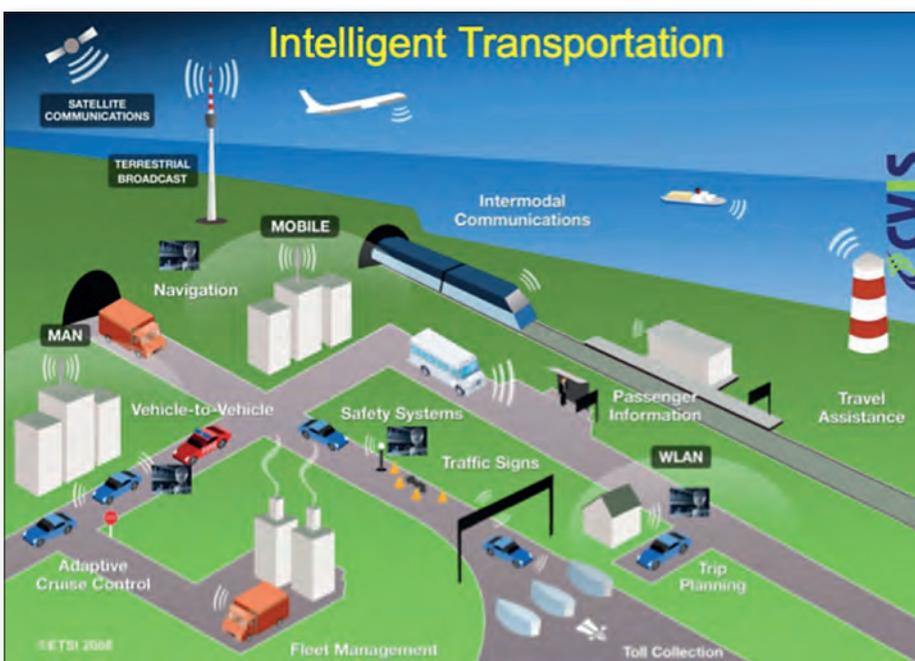


Figure 2. The connected car will benefit from intelligent transport systems. (source: ETSI)

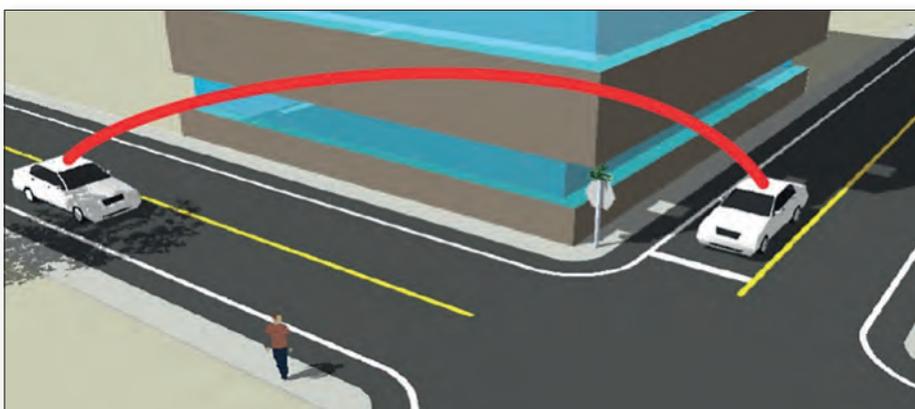


Figure 3. Cohda Wireless ITS warns drivers of potential hazards that are out of sight. (source: Cohda Wireless.)

Application of the IoT will extend to all aspects of the car, for example, the mechanics of the vehicle, external infrastructure supporting traffic flow, and the comfort and entertainment of the occupants. The connected car will be able to benefit from intelligent transport systems (ITS) combining inter- and intra-vehicular communication, smart traffic control, electronic toll collection, vehicle control, as well as safety and road assistance, among many others.

Cars connected to the IoT will be able to supply information about location, speed and direction, allowing powerful servers to analyze traffic flow, and predict bottlenecks and manage congestion when jams do occur. Inside the car, drivers will be warned about impending problems and advised of alternative clear routes. Outside the vehicle, congestion-easing techniques directed by these computers will include variable speed limits, smart traffic lights and signage, tidal road flow, and variable toll pricing. Some of these systems already exist by measuring traffic flow using roadside monitoring or buried-inductive loops, but information coming directly from connected cars will offer more precise information, in real time, across a wider catchment. The system will also enable direct communication with the driver, offering advice on how to avoid the areas of congestion. And in the future, the worst cases of congestion could be managed by allowing remote computers to take control of a vehicle and manage its progress through the traffic jam before handing control back over to the driver when things calm down.

But while solving congestion is undoubtedly beneficial to both driver sanity and the country economy, safety remains the number one priority for car makers and traffic authorities. So it is not surprising that these organizations are looking for ways to leverage the IoT to make driving safer. Avoiding accidents in the first place is the best way to eliminate injuries and fatalities, and engineers are working on systems that take the concept of congestion avoidance a step further by lowering the risk of collisions using real-time information about how well others on the road are driving. Drivers could be assigned a score and the system would then warn of poor performers and advise - via the car satellite navigation - revised routes to avoid them. Other IoT-enabled accident avoidance schemes will use ITS to analyze the data from connected cars to ensure that two vehicles don't end up on the same piece of highway at the same time. One example of this technology comes from Adelaide, Australia-based Cohda Wireless. The Cohda system uses an STMicroelectronics GPS platform to provide data about the vehicle's progress. The GPS platform is teamed

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Figure 4: Future vehicle network with Ethernet-based central-vehicle gateway and mini-hubs. (source: Cisco Systems.)

with an STA2062 multimedia processor that handles the telematics. If danger is identified, the driver is immediately warned to take steps to avoid an accident. Cohda Wireless says its technology extends driver awareness beyond buildings that block the driver's view, enabling drivers to be aware of all threats.

The European Union (EU) is taking a leading role in moving the connected car from concept to reality. Earlier this year the EU announced that the basic set of standards to make connected cars a reality has been fully completed. These standards ensure that vehicles made by different manufacturers will be able to communicate with each other. The EU says that connected cars will appear on the continent's roads in 2015. By then, all new cars are expected to have built-in technology that will allow them to automatically call emergency services if the worst happens. If the occupants are not conscious, the technology will provide the vehicle location to emergency services. The system will also convey vital information to the emergency services.

At first glance the inside of the future connected car won't appear too different from vehicles nowadays. A large human machine interface (HMI) will likely dominate the dash in a similar way to those in contemporary high-end vehicles. And because a modern car already contains a lot of networked electronics with proven reliability (and benefiting from commodity pricing beloved of a sector that looks to continually drive down costs), much of that technology will remain yet be adapted to suit connection to the IoT. However, the adaptation required could be considerable. Modern vehicles encompass sophisticated networks formed from wired and wireless elements. Electronic control units (ECUs) - that power everything from dashboard instruments to safety features and powertrain components to in-vehicle infotainment (IVI) systems - form a key part of

these networks. The number of these devices in the average car has doubled in the past ten years, and many vehicles now incorporate more than 125 separate ECUs. Today cars also boast a swarm of sensors monitoring everything from road condition, distance to the vehicle in front, vehicle speed and acceleration, and location (via GPS) to internal temperature, seatbelt tension and driver alertness.

Wireless connectivity such as Bluetooth technology or Wi-Fi is typically used to connect smartphones and tablets to the vehicle dashboard-mounted HMI. Most of the other sensors in the contemporary car, like those monitoring powertrain, chassis, body, control and safety use wired Controller Area Network (CAN) or Local Interconnect Network (LIN) buses. The instrument cluster is also connected via a CAN bus to the network. All network connections terminate at a central gateway that supervises functions and can be accessed from an external computer via an on-board diagnostics data link connector (OBD DLC). Changes to this conventional layout in an IoT-enabled vehicle are likely to include the use of Ethernet to link the various systems replacing CAN and LIN buses (particularly as Ethernet has recently been embraced by several automotive OEMs for vehicle infotainment buses) and the introduction of mini-hubs to aggregate groups of sensors or ECUs to simplify the network. Everything will still connect back to a central-vehicle gateway that will retain the OBD DLC, but vehicles will also incorporate a telemetry module to look after the wireless connectivity to the internet ("The Smart and Connected Vehicle and the Internet of Things," Flavio Bonomi, Cisco Systems, 2011).

While the car itself may form a thing on the internet, the various systems and subsystems will generate the information that will be of most value to the IoT. A good way to consider vehicle IoT connectivity is to consider the car as a large hub to which all the systems

and subsystems of the vehicle link in order to send and receive information to the wider network. Today, the computational power and intelligence required to take the raw data from systems in the car, send it in a form that's useful to external servers, and then receive and disseminate information coming back, resides in the central vehicle gateway. But in the near future automotive sensors could include technology that will allow communication directly to servers in the cloud using the gateway simply as a dumb forwarding device. Software such as Bluetooth v4.1 (which includes a low-power variant Bluetooth low energy suitable for wireless sensors) already includes foundation technology that will lead to wireless sensors with their own IP addresses communicating directly with remote devices on the internet. Companies such as STMicroelectronics, Texas Instruments and Nordic Semiconductor are pioneers in this field.

Electronics manufacturers have identified the automotive segment as a lucrative opportunity for their IoT products. But it is early days for the technology and automotive-grade components are thin on the ground. Nonetheless, Intel is encouraging automotive engineers to experiment with IoT with the introduction of its In-Vehicle Solutions Development Kit based on the CM1050 high-performance compute module. The company claims the kit simplifies in-vehicle system design. Intel has also formed an Internet of Things Solutions Alliance with companies such as Altera, Arbor and Greenliant in order to increase momentum. And Texas Instruments is working hard to exploit automotive IoT with its WiLink 8Q solutions. The company says the WiLink 8Q automotive wireless connectivity family offers scalability across multiple technologies to deliver features such as in-car multimedia streaming video in parallel with Bluetooth technology hands-free calling and navigation via GPS. Freescale Semiconductor is also backing automotive IoT, putting its focus on Linux and Android operating systems as the basis of future vehicle software and suggesting the i.MX family of automotive application processors are a good solution for vehicle network applications.

The IoT promises to improve the driving experience and save lives. However, in order to fully unlock this potential, a wide range of barriers need to be addressed, including security, safety, regulation, lack of cross-industry standards, widely varying industry dynamics and life cycles, and limited initial addressable market sizes. So while the future for the connected car is undoubtedly bright, the highway to its introduction is covered with speed bumps. ■

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# Success story about a configurable system for air traffic controllers

By Ansgar Hein, ies

*Security, availability and efficiency have emerged as the top requirements imposed on embedded computing projects. Applying a combination of advanced technology and ies™ Project Management made a significant contribution to improving flight safety at Deutsche Flugsicherung (DFS).*



Figure 1. Position Logging (PoLo) ensures safety through distinct authentication and seamless monitoring of all air traffic control activities. (source: ies)

■ Quality is one of the top aspects that customers require when it comes to product and service decisions, especially for solutions where matters of life and death are involved. In these cases a high demand on the quality turns into a quality requirement, which can be at best expressed in international standards, or perceived as part of the business culture of a company. Therefore, it is no surprise that the Chairman of the Board of DFS Deutsche Flugsicherung GmbH, Prof. Klaus-Dieter Scheurle clarifies its own demands accordingly: “Safety, punctuality and efficiency are a must for our company.” All people, systems, processes and suppliers must submit to this obligation.

The customer requirements were correspondingly high for the development of the next generation of the Position Logging system (PoLo), which is used throughout all air traffic controller workstations at DFS and without which no other system can be used. One of the main tasks of PoLo is to sign on and off employees at their workstations as well as to log and record their activities, monitor the strict rules on working hours and responsibilities and to ensure compliance. For example, it must be ensured that only users authenticated for a specific task are allowed to sign on at that working space and at the same time it must be ensured that an employee has not simultaneously logged on to another air traffic control workstation. Simply

put, PoLo is a freely configurable system for air traffic controllers to electronically log their activities where employees can easily sign on and off using their corporate ID cards. In the background, the permissions are automatically checked and all the activities are recorded. A supervisor may view all the information in real time just at a glance. All in all the Position Logging system contributes significantly to a particularly high degree of safety in air traffic and is an integral part of a modern and efficient air traffic control where intelligent systems minimize the workload of air traffic controllers and help ensure a smooth workflow in a complex environment.

For the new development of PoLo devices for DFS with prototyping and subsequent production, the project was put out to tender across Europe and tied to a three-year framework agreement. While the entire tendering process took about 12 months until the award of the contract, just six months were provided for the development and delivery of the new PoLo generation. A short period of time if you take into account the high requirements of security, availability, and efficiency that were required by DFS. As is the case with the technical requirements, the tendering was focussed on. Just the list of required hardware components and dimensions in conjunction with the software requirements posed a chal-

lenge. That’s the kind of tasks ies is looking for which triumphed ahead of numerous competitors in securing the contract. The company has the necessary expertise across all stages, ranging from planning through development to production and support, to inspire when it comes to safety, availability and efficiency.

The enthusiasm has rubbed off on the client, as ies knows from the personal feedback of the responsible project leader at DFS. But what is behind the success of the project? A glimpse behind the scenes of ies reveals that it is primarily optimum processes in conjunction with broad know-how and a consistent quality management, which ensure perfection down to the very detail. At ies this process is called ies™ Project Management and is a synonym for highest quality combined with short project duration. It has its start in the bidding phase, where all requests that derive from the specifications are being compressed and adequately specified. As a result, the bidding phase results not only in pure figures, but a tangible idea for the implementation process, including first 3D renderings of the electronic modules or the future solution. This also applies to technical solutions, such as the optical sensor to activate the RFID card reader, which elegantly integrates into the design of the housing. Due to the high level of detail in the proposal phase, tangible solutions can be



Figure 2. Air traffic controller workstations at DFS with PoLo devices (source: DFS Deutsche Flugsicherung GmbH)

persecuted and first BOMs can already be calculated, even if there will be changes throughout the project. With regard to the finished product, this provides a much higher planning reliability, especially compliance with standards for EMC and product safety may already be involved. Furthermore it offers a largely secured estimate in terms of the cost of production.

A dedicated time and task scheduling for hard- and software development could thus be derived already at the time of order. In particular, the RFID card reader posed a special challenge. In order not to disturb the other, highly sensitive devices that are installed in the immediate vicinity of PoLo, the RFID reader is activated only for a short period of time when the motion sensor detects activity in the vicinity. Therefore, a special fine tuning was necessary, to only trigger the sensor when a card is placed on the intended spot on the surface and not when a person moves in front of the device or uses other panels in the environment. A positive side effect of this solution is the reduced power consumption, which is clearly noticeable in the number of installed devices and the continuous operation of PoLo.

Considering the small size and the requirements for long-term availability and performance, every detail had to fit in the development of hard- and software – also because of the short duration of time up to the delivery of the devices. In order to achieve maximum performance in a compact design a standardized Qseven embedded computer module from congatec was chosen. The PoLo

supplier developed a base board that was tailored to meet the requirements of the overall device, as well as an orthogonally oriented interface board which leads out all interfaces from the device without the use of unreliable cable assemblies. This technically proven approach shortens the development time required compared to a complete custom development and also minimizes the development risks for the project considerably. More than 80 custom development projects in the area of embedded computing that have been implemented by the iesy™ approach in recent years prove how successful this approach is.

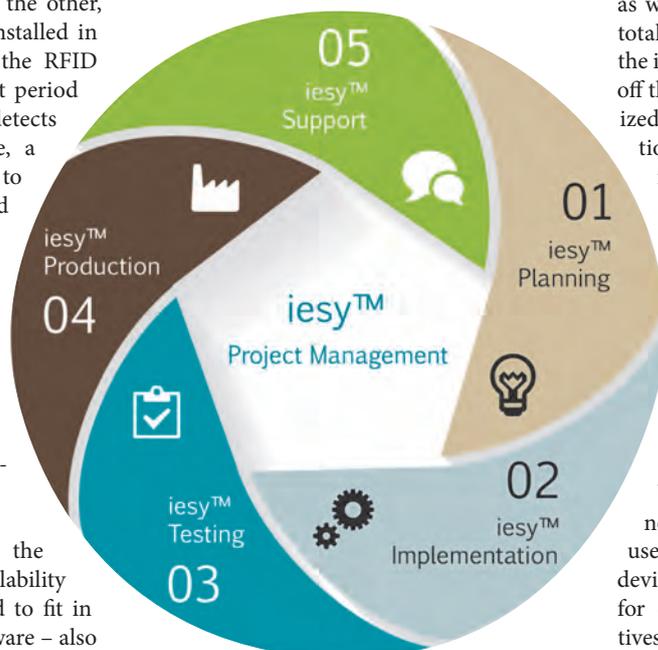


Figure 4. iesy™ Project Management cycle with five consecutive steps (source: ies)



Figure 3. Standardized i.MX6 Qseven embedded computer module (source: congatec)

All the hardware including the touchscreen is controlled by a customized embedded Linux for Freescale i.MX6. Drivers for the touch controller and the RFID reader have been specifically developed and optimized. The software development team put a particular emphasis on the software components and libraries that were required by the customer to achieve maximum performance and support for the overall system as well as reduced power consumption. All functionalities were already available throughout the prototyping phase and could thus be tested extensively. The final implementation of all components, as well as an extensive testing as part of the total quality management approach, on which the iesy™ Project Management is based, round off the project. The consistent use of standardized components and their individual adaptation to customer needs laid the foundation for the timely delivery of the new PoLo generation.

What made the project a success story was the fact that all processes were subjected to a strict quality management from beginning to end to meet both the safety requirements as well as the quality requirements of the customer. With the delivery of the finished products, however, the TQM approach behind iesy™ Project Management does not end. Rather, the support findings are used to gather new information for future device generations and make them available for other projects. This way, several objectives are achieved simultaneously, which are extremely important for customers and will become even more important in future: reduction of throughput times (faster time-to-market), reduction of cost (efficiency) and quality assurance. ■

# Connected systems require hardware-based security

By Juergen Spaenkuch, Infineon

*New connected technologies like IoT can only be implemented with strong safety and security technology to protect the infrastructure and components from manipulation, attacks and malfunctions. Secured hardware is essential since the maximum of security cannot be achieved with software-based concepts alone.*



*Figure 1. The Internet of Things and various other connected applications require secure communication, data and IP protection as well system integrity.*

■ Modern applications like connected industrial systems, smart grids, connected cars and autonomous driving, widely summarized under the term “Internet of Things” (IoT), have a high demand for reliable security. Typical use cases are authentication of components and their unique identity, monitoring and safeguarding of system integrity and protection of data and communication. To build trust in new services and technologies, IP protection is key and data security and system integrity are a prerequisite for the successful implementation of new services and applications. To establish new solutions we need integrated system solutions based on secured hardware which protects infrastructure and components from attacks, fraud and sabotage. In brief, hardware which enables to store, run and update software in a protected way.

Several attempts have been made in the past to apply purely software-based solutions for device authentication. Unfortunately, software – due to its nature – bears several significant weaknesses. Software is written code, and code can be read and analyzed. And once it is analyzed, it can be modified to the requirements of an attacker. And finally, once the device is re-programmed with the modified software, the authentication process and system integrity can be broken. Another severe weakness of software-based solutions can be the inap-

propriate storage of secret keys via all relevant process and production steps. Typically, in software-based protection systems, attackers can identify secret keys from software in a very simple way: keys usually behave like random numbers – in total contrast to the program code itself. So-called entropy analyzers are able to scan software and identify parts with high randomness – these parts typically contain the keys. Such a scan is done in seconds, and the keys found could directly be used to generate falsified products in masses.

Software-only solutions allow protection only in the case that none of the components used are physically accessible to an attacker. In real life, this exception would render such solutions unpractical. All in all, software is usually not seen as a valid alternative for product authentication, system integrity and IP protection today.

However, software can be protected by hardware: secured hardware protects the processing and storage of code using encryption, fault and manipulation detection, and secure code and data storage. Software becomes trustworthy by combining it with secured hardware. This has been proven by extensive experience from the areas of trusted computing and the use of secure elements in mobile phones and the protective functions of smart grids. A typical embedded control architecture with a stan-

dard microcontroller on which a real-time operating system and the applications are running can currently be found in the majority of installed systems. Usually the security functionality is implemented using software-based encryption mechanisms. What is missing is an efficient, secured trust anchor (Hardware Root of Trust, HRoT) with dedicated encryption functionality for increased security. This is why modern microcontrollers are an ideal solution to respond to increasing security demands. On the one hand, available stand-alone security controllers are usually implemented with microcontrollers. On the other hand there are application-optimized microcontrollers (MCUs) with integrated security functions.

The use of a stand-alone security element (security processor or co-processor) that acts as a HRoT has proven itself for years in other industries such as personal computers, servers, chip cards and identity documents. The concept is also recommended for industrial applications. For example, a trusted platform module (TPM) can be used as a HRoT in conjunction with other security elements in order to provide an industrial controller with comprehensive security functions such as integrated crypto-processors, encrypted storage, buses and peripheral functions as well as integrated error detection. Network end points

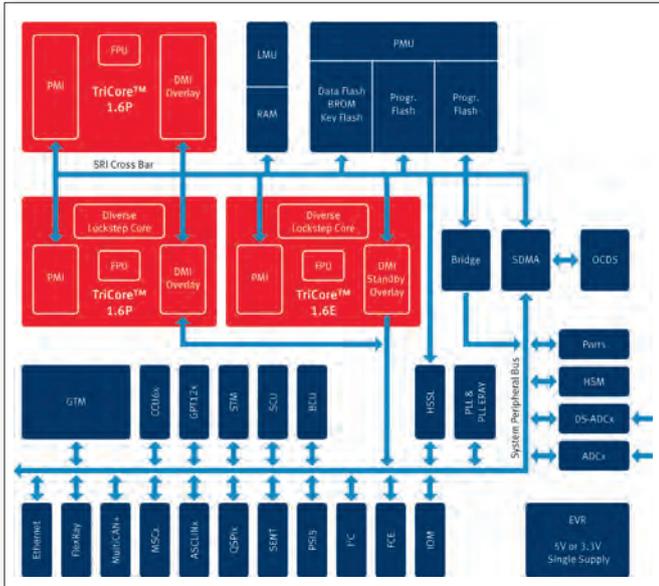


Figure 2. The microcontrollers of the AURIX family provide special function blocks such as security hardware extensions (SHE) or hardware security modules (HSM).

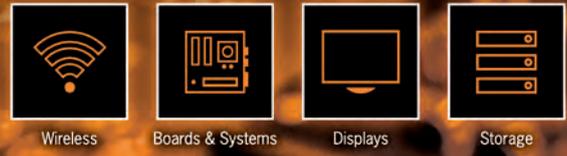
can be efficiently protected using this hardware-based approach. Coming back to the initial point of discussion - new business models and opportunities in the context of the Internet of Things - there are already numerous use cases and examples demonstrating how hardware-based security solutions add real value in terms of integrity and reliability of connected devices.

For example Infineon has been shipping TPMs for devices running Google's Chrome-based operating system since 2011. The Infineon TPM is an integral part of the security architecture of Google Chromebooks which were designed to provide a fast, simple and secured experience for people who use computing devices primarily to access the Internet and use web-based applications. One key part of their design is called defense in depth, which provides multiple levels of protection against malware.

Meanwhile the structure of the TPM standard was enhanced with some specific functions and interfaces added to support new applications. New profiles of the TPMs can address security relevant applications in the IT industry, but also in embedded systems, smartphones, communications equipment, industrial automation or automotive. In addition TPMs include a comprehensive software stack enabling a secure upgrade.

Automotive is also an arising field of application - as there are a lot of features and functions already widely based on hardware security, designed in response to the level of security required by the specific application. The microcontrollers of the AURIX family for example provide special function blocks such as security hardware extensions (SHE) or hardware security modules (HSM). The HSM takes care of secured communication with other microcontrollers by signing messages or even using full encryption.

Furthermore, the HSM can be used to securely boot the microcontroller in order to prevent attacks from viruses and Trojans, and to prevent unauthorized access. With regard to the fact that the car is becoming an increasingly connected computing device communicating with other vehicles and infrastructure, TPMs will become indispensable to protect the car's communication interfaces from hacker attackers or malware during software updates. ■



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## Hall-Stand 1-570

**ies: embedded NUC according to SGET standard**

Just in time for embedded world 2015, ies presents the first device which corresponds to the recently published SGET standard for embedded NUC. The advantages of this new industry standard for embedded computing are obvious: longterm availability, compact size with about 10 x 10 cm, PC power (x86 or ARM processors) and low power-consumption. In addition to the embedded NUC box, ies presents a broad variety of customized solutions with its partners Kontron and Congatec. Ranging from medical tablets to the compact solution PoLo (position logging) and beyond the company is the ideal outsourcing partner for the development, mass production and maintenance of customized electronics products. Following the motto „intelligent embedded systems“ ies creates innovative solutions made in Germany.

[News ID 2593](#)

## Hall-Stand 5-277

**Altera showcases its SoC solutions at embedded world**

Altera will showcase how it is further extending its leadership position in SoC solutions at embedded world 2015. Demonstrations show how Altera's SoCs are enabling advanced embedded systems featured in automotive and industrial applications. Altera will display its second generation SoC family, Arria 10 SoCs, the only 20nm SoC FPGA family, which provide embedded developers access to a high-performance applications-class ARM processor, integrated into a high-performance 20nm programmable fabric. Additional in-both demonstrations showcase the performance and flexibility Altera SoCs deliver to embedded automotive and industrial systems. Altera's SoCs are based on a world-class architecture that provide embedded developers several features, including IP security, error correction and encryption.

[News ID 2590](#)

## Hall-Stand 4-335

**LieberLieber: new extensions for Enterprise Architect**

LieberLieber will present four new extensions at embedded world 2015. LieberLieber Systems Engineer is intended for systems engineers and systems safety engineers. It is a suite of products to improve and expand the possibilities of system modeling with the Systems Modeling Language (SysML) for Enterprise Architect. The solution also provides elements for modeling the aspects of functional safety (FSM, IEC61508, ISO26262). Embedded Engineer combines two effective solutions: uml2code and UML debugger. The product was developed as part of the tool chain for embedded systems development,

because only with an integrated solution can the model-driven approaches in the development of embedded software can be efficiently implemented. LieberLieber AUTOSAR Engineer intended for the professional creation of AUTOSAR models. The package is based on a UML AUTOSAR profile that allows the creation of models according to the AUTOSAR Virtual Function Bus 4 standards directly with Enterprise Architect. LieberLieber Web Collaborator enables easy, web-based access to Enterprise Architect models. You even people who are not very familiar with Enterprise Architect can access information from the models developed in a format that is intuitive for them.

[News ID 2579](#)

## Hall-Stand 5-328

**ADI showcases innovative solutions supporting customer differentiation**

Analog Devices will showcase high performance, embedded solutions at Embedded World 2015.

Highlights at the show include:

- Analog in Instrumentation: Robust sensing and signal conditioning. Solutions for electrochemical gas detection; vibration sensing in extreme high temperatures; Wheatstone bridge sensing using Arduino shields.
- Analog in Industrial Internet of Things: Cloud-connected sensors for automation, energy and security. Includes wireless sensor networks; energy harvesting; image-based occupancy and behavior analysis.
- Analog in Wearable Electronics: Vital signs monitoring for health, wellness and fitness. Solutions for optical heart rate monitoring; MEMS inertial sensing motion and activity; bio-impedance sensing for BMI and stress.
- Analog in Motor Control: Efficiency in motor control systems. Embedded solutions integrating ARM Cortex-M4 processor core with high precision analog front end (AFE); model-based design methodologies; fieldbus and industrial real-time Ethernet protocols.

[News ID 2559](#)

## Hall-Stand 1-538

**ADLINK: innovation highlights at embedded world**

ADLINK announced to showcase amongst other products a wealth of innovative highlights at Embedded World 2015. With graphics support up to 4K resolution and high-efficiency processing, cExpress-BL provides performance per watt targeting latest industrial designs, ADLINK presents its first COM Express Compact Size Type 6 module, the cExpress-BL, based on the 5th generation Intel Core processors i7-5650U, i5-5350U and 5th generation Intel Core i3-5010U processor, with support for up to 16 GB dual channel DDR3L memory.

Cloud connectivity takes today's intelligent middleware a step further than previous generations of remote management technology. By employing a cloud server architecture and an M2M stack on top of the intelligent middleware, embedded devices can connect to the cloud without additional design requirements. Pushing data to the cloud enables operators to verify, monitor and manage system performance from a single, central location – improving reliability and reducing management costs. IMT-BT is an industrial mobile tablet, integrating the dual-core Intel Celeron processor N2807 for high performance computing power. Built-in WLAN or WWAN connectivity enables the IMT-BT to easily access information from a wide variety of industrial and commercial settings. IoT Gateway Platform, based on the Intel Atom SoC processor E3826 meets a wide variety of specific industrial needs. The MXE-200i series offers the most reliable Embedded IoT Gateway for use in harsh environments, compliant with industrial grade EMI/EMS protecting customer assets and reducing TCO. A rugged, fanless, IP65-rated outdoor edge server based on the powerful Intel Xeon processor, the HXC-1000 is designed for harsh environments, such as outdoor deployment and onboard vehicles. It is specifically engineered for caching networking and value-added applications at the network's outer edge, thus cutting down on communications back to central server rooms and reducing overall network load.

[News ID 2537](#)

## Hall-Stand 4A-130

**Avnet Memec demos IoT and Industrie expertise at Embedded world**

Avnet Memec will present the latest products and technologies at the Embedded World show. Avnet Memec will highlight its substantially expanded range of solutions and products for IoT, from wired and wireless connectivity, through power management and security, to front-end technologies in sensing and monitoring. Continuing its Embedded World tradition, Avnet Memec will also exclusively host the Maxim Integrated Tech Lounge. As well as an expanded Internet of Things zone, the Avnet Memec booth will host a specialist Industrie 4.0 area, multi-supplier technology-focused demonstrations, and the dedicated Maxim Integrated Tech Lounge. IoT demonstrations include the latest low-power wide-area wireless networks based on SIGFOX and LoRa-Technology; PowerHouse energy monitoring module, Plug'n Play, robust power line communication and SmartServer web connectivity from Avnet; seamless integration of different networks, nodes, sensors and actuators into single cloud services and web-based applications; cloud-on-chip solutions from Telecom Design; IzoT chips, stacks, interfaces, and management software from Echelon; IoT security solutions; Bluetooth 4.0 Low Energy modules and IEEE 802.11 a/b/

g/n/BT WLAN Modules. Also demonstrated are M2M solutions from Avnet Memec partners Quectel, Sierra Wireless and Wyless. Smart manufacturing products presented in the Industrie 4.0 area range from microcontrollers, through sensors and power devices, to advanced HMI and control technologies, data processing and communications devices. Featured suppliers include Microsemi, Renesas, Microchip, Finisar, Silicon Labs and Allegro Microsystems.

News ID 2572

Hall-Stand 2-110

**Fujitsu: industrial-grade ATX mainboard with Intel C612 chipset**

The industrial-grade ATX mainboard D3348-B is the main new product Fujitsu will focus on at the Embedded World fair in Nuremberg, Germany, from February 24 to 26, 2015 (hall 2, booth 110). The mainboard is available with Intel processors from the Xeon E5-2xx, Xeon E5-16xx, and Core i7 58xx/59xx series. Thanks to DDR4 memory technology, it offers significant performance increases compared to previous generations. Unlike most of the comparable mainboards in the market, it is not based on the X99 chipset, but the C612 chipset by Intel.

News ID 2549

Hall-Stand 4-218

**R&S presents growing oscilloscope portfolio at embedded world 2015**

Rohde & Schwarz is continuously enhancing its oscilloscope portfolio with new models, applications and accessories, and will present its entire portfolio of oscilloscopes at embedded world 2015. High definition oscilloscopes for signal analysis with 16 bit vertical resolution present a 256 fold improvement over the 8 bit resolution available in standard mode. To achieve this higher resolution, the signal is lowpass-filtered directly after the A/D converter. The digital filter reduces the noise, while increasing the signal-to-noise ratio. The higher resolution leads to sharper waveforms, showing signal details that would otherwise be masked by noise. Rohde & Schwarz has added a new model with 200 MHz bandwidth to its R&S RTM bench oscilloscope family. The history and segmented memory option, which expands the maximum memory depth to an unprecedented 460 Msample per channel, is available for all bandwidth models. This deep, segmented memory is especially beneficial for seamless analysis of data sequences with long rest periods such as pulsed signals and serial I2C bus data packets.

News ID 2505

Hall-Stand 4-206

**Altium to showcase Altium Designer 15 at embedded world**

At embedded world 2015, Altium will be showcasing Altium Designer 15, which includes powerful new enhancements for designing the next generation of high-speed printed circuit boards and supports the latest fabrication output standards. Modern designs require signal propagation at rates up to 100 gigabits per second. Designing to these specifications in previous generation design software is challenging. This process traditionally required manual rework and careful signal planning outside of the design tool, typically in a spreadsheet program - causing additional steps and introducing lots of room for errors. With Altium Designer 15 a new Pin Pairs feature has been added to enable accurate length and phase tuning across termination components; enable length, phase and delay tuning traversing an entire signal path. Designers will no longer require external software or have to maintain complex lists of signals and nets, but instead will be able to plan and route groups of high speed nets with much greater efficiency and accuracy.

News ID 2507

# ADVANTECH

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Hall-Stand 4A-128

**Silicon Labs to spotlight IoT solutions and vision at embedded world**

Silicon Labs announced that the company's CEO will deliver the opening-day keynote at Embedded World 2015. The company will also highlight its latest hardware and software solutions for the IoT at the Silicon Labs booth during the exhibition. Targeting connected device applications for the smart home, smart energy, wearables and industrial IoT markets, Silicon Labs will demonstrate next-generation, energy-friendly 8-bit and 32-bit microcontrollers, Thread and ZigBee mesh networking software, low-power Wireless M-Bus connectivity, environmental and biometric sensing solutions, and an expanded Simplicity Studio development ecosystem. Silicon Labs will showcase its latest hardware and software solutions for the IoT with hands-on demonstrations.

[News ID 2524](#)

Hall-Stand 1-209

**Xilinx: all programmable solutions for smarter systems on show**

Through a series of conference papers and in-booth demonstrations, Xilinx and its Alliance Members will showcase the latest All Programmable Solutions for Smarter Systems at Embedded World 2015. Come learn how Zynq All Programmable SoCs are enabling smarter systems in a broad set of applications including automotive, industrial, and vision-based systems.

All Programmable Solutions for Smarter Vision Applications

- Multi-camera Surround View Auto Calibration on logiADAK - This demo highlights Zynq's superior performance for Multi-Camera Advanced Driver Assistance Systems by combining multiple parallel video processing pipe-

lines with industry-leading automated stitching calibration of surround view display modes.

- Multiple Video Stream Recording using logiRecorder - logiRecorder adds valuable system development capabilities to the logiADAK platform by providing synchronous recording of up to 4 (or 6) video streams along with metadata that allows designers to fully recreate roadway scenarios in the lab for ADAS algorithm refinement.
- Simultaneous Localization and Mapping for Automotive - Presented jointly with Xilinx Alliance Member, Metaio, Simultaneous Localization and Mapping is a key algorithm for self-parking cars and other automotive applications. This demo shows a sparse 3D reconstruction of the environment used for vision based collision avoidance and trajectory All Programmable Solutions for Smarter Factory Applications
- Small Form-factor, Low EMI, Multi-level Inverter - Presented jointly with Xilinx Alliance Member QDESYS, this demonstration showcases a Zynq-7010 All Programmable SoC based on three level TNPC implementation with low THD (distortion), high ratio power/volume, three level modulation with very low EMI, low switching loss, and ultra-fast control loops.
- High Availability Gigabit Ethernet for Industrial Automation - Presented jointly with Xilinx Alliance Member SoC-e, Xilinx customer Delta Networks presents the first Quadbox for Gigabit Ethernet powered by the Zynq All Programmable SoC. The showcase demo is a network of products from both companies running high bandwidth traffic in a setting for high availability. SoC-e's IP Cores are exclusively for Xilinx and guarantee a plugfest proven solution for HSR/PRP according to IEC 62439-3.
- Anybus IP for Industrial Ethernet - Anybus

from HMS's CompactCom 40 series comes as IP Cores on the Zynq All Programmable SoC and provides a new platform for Industrial Ethernet on Xilinx devices.

[News ID 2528](#)

Hall-Stand 1-310

**Rutronik: networking machines and devices at embedded world**

Rutronik Elektronische Bauelemente is present at embedded world 2015 and will be presenting a bundle of RUTRONIK EMBEDDED products designed to link internet-capable machines with industrial devices as well as RUTRONIK SMART, which offers complete solutions for applications such as consumer/lifestyle, health care, home automation and security systems on the Internet of Things. The experts in wireless applications are giving live demonstrations to show how to manage SIM cards for industrial applications on the Cloud. The first Bluetooth 4.2 chip and module solutions, as well as super-fast LTE terminals show how devices and machines are getting connected to the Internet, and exhibits with 6LoWPAN demonstrate the possibilities of sensor connections. Traditional Bluetooth ensures excitement and fun with the racing car game of skill. In several live demonstrations, the RUTRONIK EMBEDDED team is showing the interplay between various component types: embedded boards, storage and displays as well as sensors - all of which can come together to create the most up-to-date HMI solutions. They are also using the latest storage solutions for the embedded market, such as high-capacity 3.5" hard discs, as well as fast SSDs with PCIe interface according to M.2 standard. Product and field application engineers from every technical area are on hand to provide exhibition visitors with expert technical advice.

[News ID 2469](#)

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# Ethernet compliance testing with an oscilloscope

by Dr. Ernst Flemming, Rohde & Schwarz

In industry and the private sector, it is difficult to imagine a world without Ethernet data exchange. Automated test solutions that support compliance tests on Ethernet interfaces are available for digital oscilloscopes. A test wizard on the R&S RTO from Rohde & Schwarz guides the user effortlessly through the measurements.



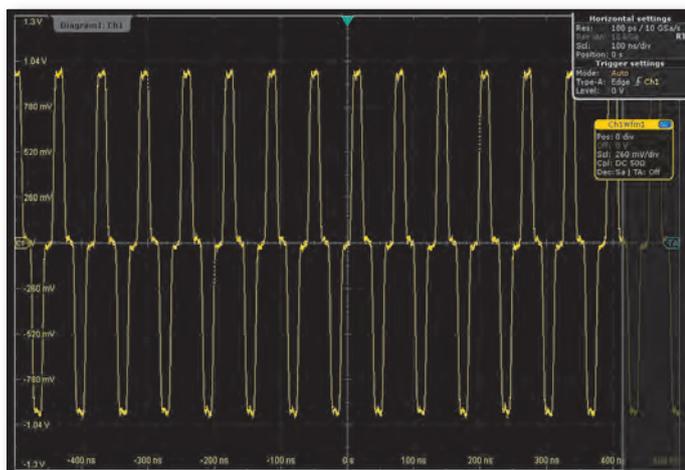


Figure 1. Signal acquired by an oscilloscope from an Ethernet chip in mode for 100Base-TX tests for peak-to-peak jitter measurements

■ Ethernet originated in the world of computer networking but is now well established as the communications interface for countless electronic devices and systems. For example, this standard is used in the automotive industry to control robots in production systems. Developers must ensure the interoperability of Ethernet interfaces. The necessary tests must be determined along with acceptance criteria and how to quickly detect any possible design flaws. Ethernet compliance tests allow comprehensive verification of interfaces based on standardized test sequences, thereby providing support to hardware developers as they work to debug and release their designs.

Ethernet was developed in the 1970s by Robert Metcalfe for use as a communications protocol. Beginning in 1980, Ethernet was standardized by the Institute of Electrical and Electronics Engineers (IEEE) 802 working group and then continually developed. 10Base-T, 100Base-TX and 1000Base-T are the most popular electrical Ethernet standards. For switches and servers, interfaces with 10GBase-T Ethernet are also being used to allow higher data throughput. All of these interfaces use two or four twisted pairs typically with RJ-45 connectors.

The Ethernet standard with the lowest data rate (10Base-T) is based on a signal with Manchester coding. The other standards considered here with higher data rates use more complex coding schemes for data transmission along with up to 16 electrical signal levels. IEEE has specified compliance tests for the electrical characteristics of Ethernet interfaces. The documentation describes comprehensive tests of transmitter

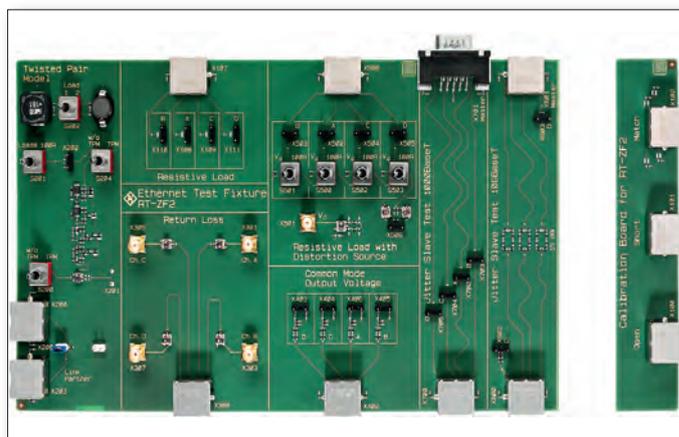


Figure 2. The R&S RT-ZF2 Ethernet test fixture offers all interfaces from 10Base-T to 10GBase-T for Ethernet compliance tests. It connects the oscilloscope probes to the various DUT signal lines.

signal quality and some tests of receiver signal quality. The specification defines test setups, test sequences and special test modes. The user is expected to manually activate the test modes when performing the compliance tests, e.g. by setting the appropriate register entries. Details can be found in the documentation for the Ethernet chip that is used. Figure 1 shows an example of test mode 1 for the 100Base-T transmitter test used to measure the quality of the 100Base-T signal (peak voltage, maximum droop, differential output template).

Developers need to perform Ethernet compliance tests on components or devices as part of basic R&D or when debugging their designs during integration. For analysis and verification applications, complete solutions are available based on digital oscilloscopes. Rohde & Schwarz offers the software options and test accessories for its R&S RTO oscilloscopes that are required for performing Ethernet compliance tests. The test accessories include a test fixture equipped with all interfaces from 10Base-T to 10GBase-T, making it simple to connect the oscilloscope probes to the DUT signal lines (figure 2).

Ethernet compliance tests are very demanding on the oscilloscope. It must provide a sufficiently high dynamic range while maintaining a low noise level. During transmitter distortion tests, for example, the transmitter signal distortion must not exceed a value of 10mV even with an unwanted signal of 5.4V (V<sub>pp</sub>) and 20.833 MHz. The oscilloscope should be designed with these requirements in mind, ensuring exact results in this critical test.

	10Base-T	100Base-TX	1000Base-T	10GBase-T
<b>Standard</b>	IEEE 802.3 clause 14	IEEE 802.3 clause 25	IEEE 802.3 clause 40	IEEE 802.3an
<b>Coding</b>	Manchester coding, unidirectional, 2 twisted pairs	4B5B, MLT-3, unidirectional, 2 twisted pairs	8B10B, PAM-5, bidirectional, 4 twisted pairs	128-DSQ, PAM-16, bidirectional, 4 twisted pairs
<b>Signal levels</b>	Manchester level change	3 levels	5 levels	16 levels
<b>Transmission bandwidth</b>	10 MHz	32.5 MHz	62.5 MHz	500 MHz

Table 1. Protocol characteristics of various Ethernet standards

Users should select a test solution that is certified for compliance testing by an internationally recognized, independent Ethernet validation lab. The University of New Hampshire InterOperability Laboratory (UNH-IOL) confirmed that “the R&S RTO oscilloscope and R&S ScopeSuite correlate with the time-tested techniques and methodologies of UNH-IOL.”

When putting new hardware designs into operation, developers tend to be under significant time pressure, making it important to perform the

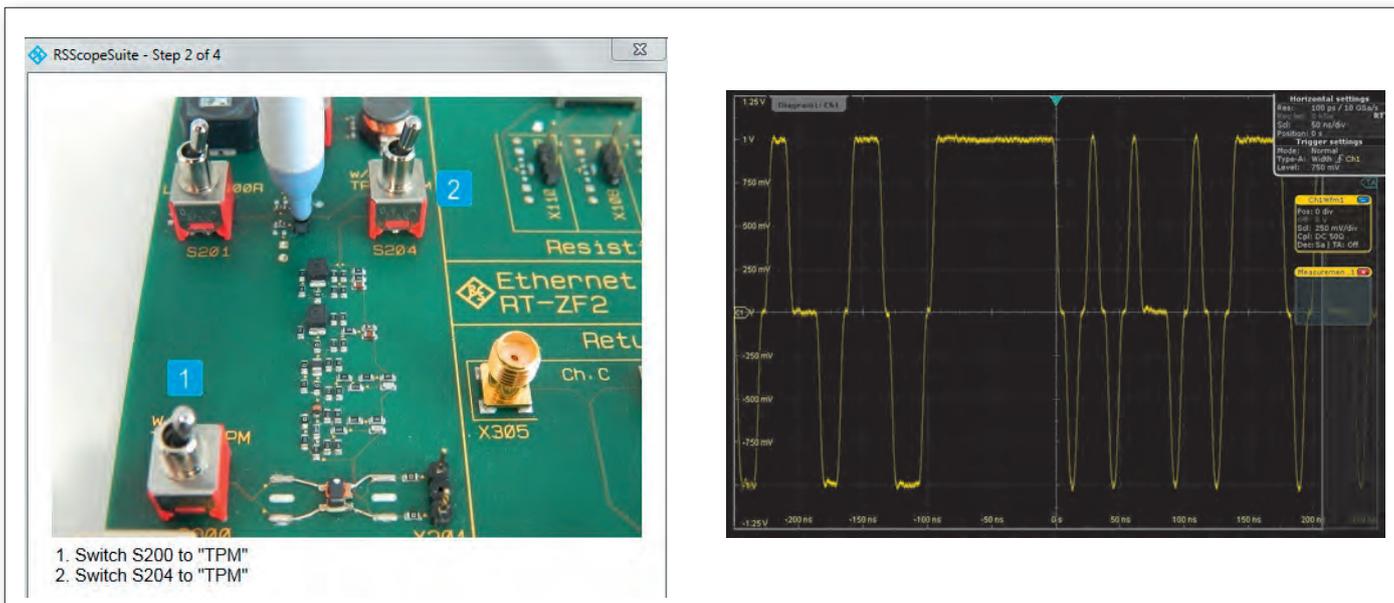


Figure 3 (3a left, 3b right). Instructions for an Ethernet compliance test case. The configuration on the test fixture is explained on the left while the signal acquired by the oscilloscope from the Ethernet chip in the configured test mode is visible on the right.

relevant tests as quickly as possible. Easy-to-operate test software such as R&S ScopeSuite with its high level of automation can make a huge difference. The integrated test wizard guides the user through the test setup, automatically configuring the oscilloscope as well as the connected signal generator and spectrum or network analyzer (figure 3).

This solution saves the user from time-consuming manual test configuration, performs the measurements automatically and quickly delivers accurate results. With just a few steps at the end of the measurement, the user compiles the generated logs and graphics into a comprehensive documentation set.

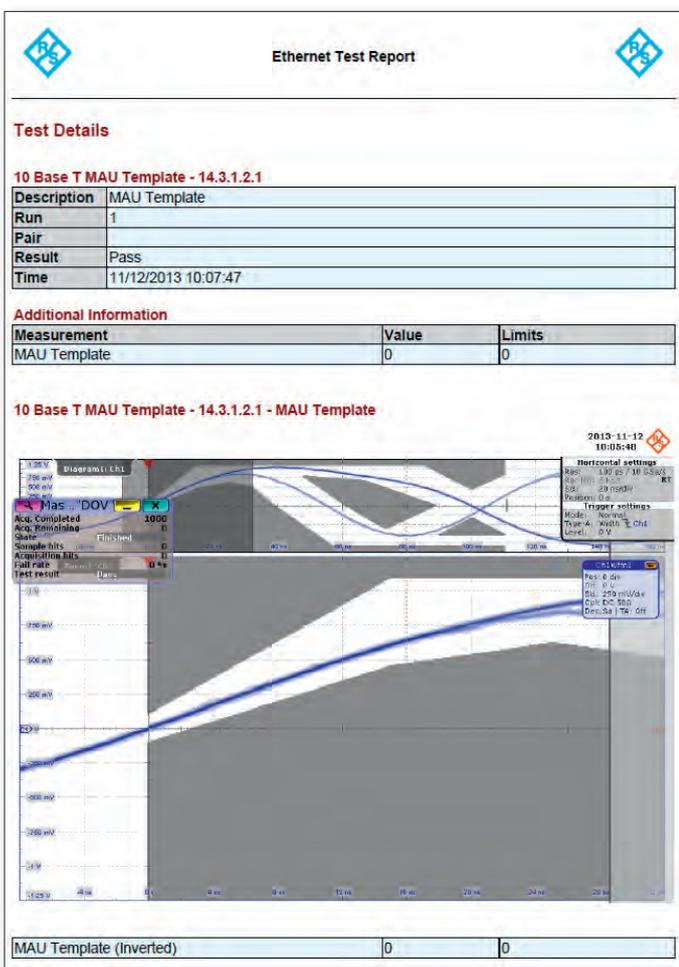


Figure 4. Excerpt from a detailed test report

Depending on the user preference, R&S ScopeSuite can be installed on a separate PC or on the oscilloscope itself. For operation on the oscilloscope, it is convenient to use an additional monitor where R&S ScopeSuite can be controlled with a mouse while the oscilloscope screen simultaneously displays waveforms and results.

The test software should provide the established test cases for the different Ethernet standards. Individual tests or complete test groups can be selected based on the specific task. A particularly convenient feature offered by the R&S ScopeSuite is automatic configuration after the test software is launched. The test wizard guides the user through the configuration in easy-to-follow, fully illustrated steps.

Once all the steps are complete, the measurements should be executed automatically and test results should be displayed clearly and accurately. The Rohde & Schwarz software, for example, shows the test results with a red, yellow and green traffic light display. Another practical feature: a test can be repeated at the push of a button if signal errors occur. Upon completion of the measurements, the user can compile the relevant results into a test report (figure 4) to obtain complete system documentation with figures and tables.

Users looking for an Ethernet compliance test solution should ensure that current Ethernet variants are supported and that the oscilloscope provides the required high dynamic range. The Rohde & Schwarz solution is based on the R&S RTO family of oscilloscopes. The outstanding dynamic range and the low-noise front-ends ensure accurate results even in critical transmitter distortion tests.

The complete solution also includes the two software options R&S RTO-K22 for 10Base-T to 1000Base-T and R&S RTO-K23 for 10GBase-T, along with the R&S RT-ZF2 test fixture. Testing of the Ethernet interfaces is extensively automated to deliver precise results that can be fully documented to meet the user requirements. ■

Hall-Stand 1-548

**ADL: 1.7 GHz PCIe/104 SBC features 3rd gen i7-3517UE processor**

ADL Embedded Solutions announces its ADLQM67PC-3517UE, a low-power processor extension to its ADLQM67PC PCIe/104 Single Board Computer platform. The ADLQM67PC-3517UE features a 17W 3rd generation Intel Core i7-3517UE processor coupled with Intel's QM67 PCH chipset. This 3rd generation Intel Core i7 processor integrates Intel's HD Graphics 4000 engine with AVX2 as well as the memory controller functions of a traditional GMCH. The 3rd generation Intel Core i7-3517UE processor has a 17W TDP and a higher performance/watt than any previous 2nd generation Intel Core embedded processor.

[News ID 2508](#)

Hall-Stand 4-578

**JTAG Technologies: product highlights at Embedded World**

JTAG Technologies will showcase JTAGLive products at Embedded World. JTAG Translator is an IP module from JTAG Technologies that provides a JTAG interface to the internal IP connection bus of an FPGA to which peripherals / peripheral controllers are connected. JTAG Translator is operated through a dedicated CoreCommander that can be used with JTAGLive and ProVision as well as with all our production packages. CoreCommander provides high-level functions to write data to and read data from memory and I/O addresses without software programming. CoreCommander functions are applied via the JTAG interface. The JTAG Translator IP module can be loaded in the FPGA for test configurations only, or it can be included as standard in functional designs.

[News ID 2502](#)

Hall-Stand 4-202

**iSYSTEM: new generation Embedded Software Analyzer**

iSYSTEM's Software and Blue Box Technology stand for fast and easy single and multi-core processor hardware access via any kind of debug interface. No matter whether one is developing, debugging or testing embedded software on a real hardware, iSYSTEM's solutions work for you. A major goal of the iC5500 development was the support of future processor hardware with the highest possible bandwidth for developing, analyzing and testing embedded software. Existing and future controllers do run at a higher trace port rate (>150MHz), single and multi-core applications request the measurement of more and more data via such interfaces in order to analyze the real-time behavior, and to get an in-depth view in OS handling and task switching as well as to optimize the overall software architecture.

[News ID 2500](#)

Hall-Stand 4-310

**PLS: UDE4.4 simplifies testing and debugging of multicore SoCs**

PLS Programmierbare Logik & Systeme is presenting its Universal Debug Engine (UDE) 4.4 for the first time at embedded world 2015. The UDE 4.4 features significantly enhanced debugging procedures for complex system-on-chips with heterogeneous controller cores, optimized data visualization in system-level debugging as well as dedicated support of a wide range of state-of-the-art 32-bit multicore SoCs of different manufacturers. Control of the respective multicore SoCs and their debugging is carried out with the UDE 4.4 within a specifically optimized user interface. Various colors determinable by the user and even definable groups of views for individual

function units ensure a fast overview and simple navigation, also in complex devices. Both separate and synchronized control of the active units is optionally possible.

[News ID 2487](#)

Hall-Stand 1-444

**AEON: Mini-ITX boards featuring Atom E3800 series**

AAEON announces a new power-to-performance standard with its release of EMB-BT2 and EMB-BT4. Both boards are powered by the Intel Atom E3800 series processors to offer premium performance and low power consumption. Fanless design is adopted to negate problems such as vibration and mechanical breakdown from moving or changing of parts while is dissipated entirely by heat sinks. Energy consumption is further reduced with the utilization of ATX power specifications, widely adopted for its stability and versatility, requiring only 12V.

[News ID 2426](#)

Hall-Stand 4-116

**Cadence: HARMAN Clari-Fi technology ported to Tensilica DSPs**

Cadence Design Systems announced that HARMAN's Clari-Fi music restoration technology has been ported to the Cadence Tensilica HiFi Audio/Voice digital signal processor family.

Designed to enhance music playback on devices including smartphones, home audio products, and OEM automotive audio systems, HARMAN's Clari-Fi music restoration technology automatically analyzes and improves the audio quality of all types of compressed, digitized music sources, reconstructing the information lost during the compression process.

[News ID 2489](#)

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Hall-Stand 1-538

**ADLINK: COM Express Compact Size**

**Type 6 module with 5th gen Intel Core**

ADLINK announced its first COM Express Compact Size Type 6 module, the cExpress-BL, based on the 5th generation Intel Core processors i7-5650U, i5-5350U and 5th generation Intel Core i3-5010U processor (codename Broadwell U), with support for up to 16 GB dual channel DDR3L memory. Featuring improved graphics and processing performance compared to the previous generation Intel processor, the cExpress-BL is suitable for fanless edge device solutions that demand intense graphics performance and multitasking capabilities in a space-constrained environment, such as digital signage for medical, transport and retail, or machine vision applications in factory automation.

[News ID 2586](#)

Hall-Stand 4-116

**Cadence at embedded world 2015**

The automotive Industry is working towards autonomous driving vehicles. As a consequence, future cars will be equipped with sensor clusters, more computing power, Car2X communication technology, high-bandwidth Ethernet networks, and more than 15 high-definition displays. Under the theme building the car of the future today, Cadence will demonstrate its solutions for ADAS, Infotainment, ECU design, Automotive Ethernet, early software development and verification of embedded systems. These complex systems require functional safety as defined in the ISO 26262 standard to be an integral part of the automotive product development phase ranging from the requirements specification to design, implementation, integration, verification, validation, and production

release. Visit Cadence and see demonstrations on how to improve the features, performance, efficiency, reliability, and safety of future cars. Get information on how new advanced semiconductor process technologies, in combination with dedicated design IP and the latest Allegro packaging technology, allow a new class of automotive System-on-Chip or System-in-Package. For system-level development Cadence will showcase tools for embedded software debugging, system verification and FPGA prototyping.

[News ID 2446](#)

Hall-Stand 1-548

**ADL: 1.7 GHz PCIe/104 Single Board Computer**

ADL Embedded Solutions announces its ADLQM67PC-3517UE, a low-power processor extension to its popular ADLQM67PC PCIe/104 Single Board Computer platform. The ADLQM67PC-3517UE features a 17W 3rd generation Intel Core i7-3517UE processor coupled with Intel's QM67 PCH chipset. This 3rd generation Intel Core i7 processor integrates Intel's HD Graphics 4000 engine with AVX2 (Advanced Vector Extensions) as well as the memory controller functions of a traditional GMCH.

[News ID 2454](#)

Hall-Stand 1-606

**PEAK-System: stamp module for CAN FD to USB**

For the simple implementation of a CAN connection in own circuits, PEAK-System introduces the stamp module PCAN-Chip USB at the Embedded World 2015 in Nuremberg, Germany. The communication with the CAN FD channel is done via the module's USB 2.0 interface. The actual used physical CAN transmission is determined by the transceiver to

be implemented by the developer. The stamp module has side lengths of 25 by 20 millimeters and is suitable for automatic insertion due to the single-sided component placement and the half-whole edge contacts. The separately available board PCAN-USB Chip Eval with example circuits provides an environment for testing purposes. PCAN-Chip USB will be available in the second quarter of 2015.

[News ID 2566](#)

Hall-Stand 4A-230

**Atmel: QTouch surface platform for capacitive touch-enabled user interfaces**

Atmel announced the new QTouch Surface platform for capacitive touch-enabled user interfaces. The new QTouch Surface platform builds on the QTouch capacitive touch button sensing technology supported by Atmel | SMART MCUs. The new solution includes an on-chip peripheral touch controller, the cornerstone technology that enables higher performance capacitive touch on Atmel MCUs. Consuming less than 4µA, the QTouch Surface technology is perfect for wearables and other battery-powered applications that require a capacitive touch user interface.

[News ID 2465](#)

Hall-Stand 4-316

**dSPACE now supports CAN FD**

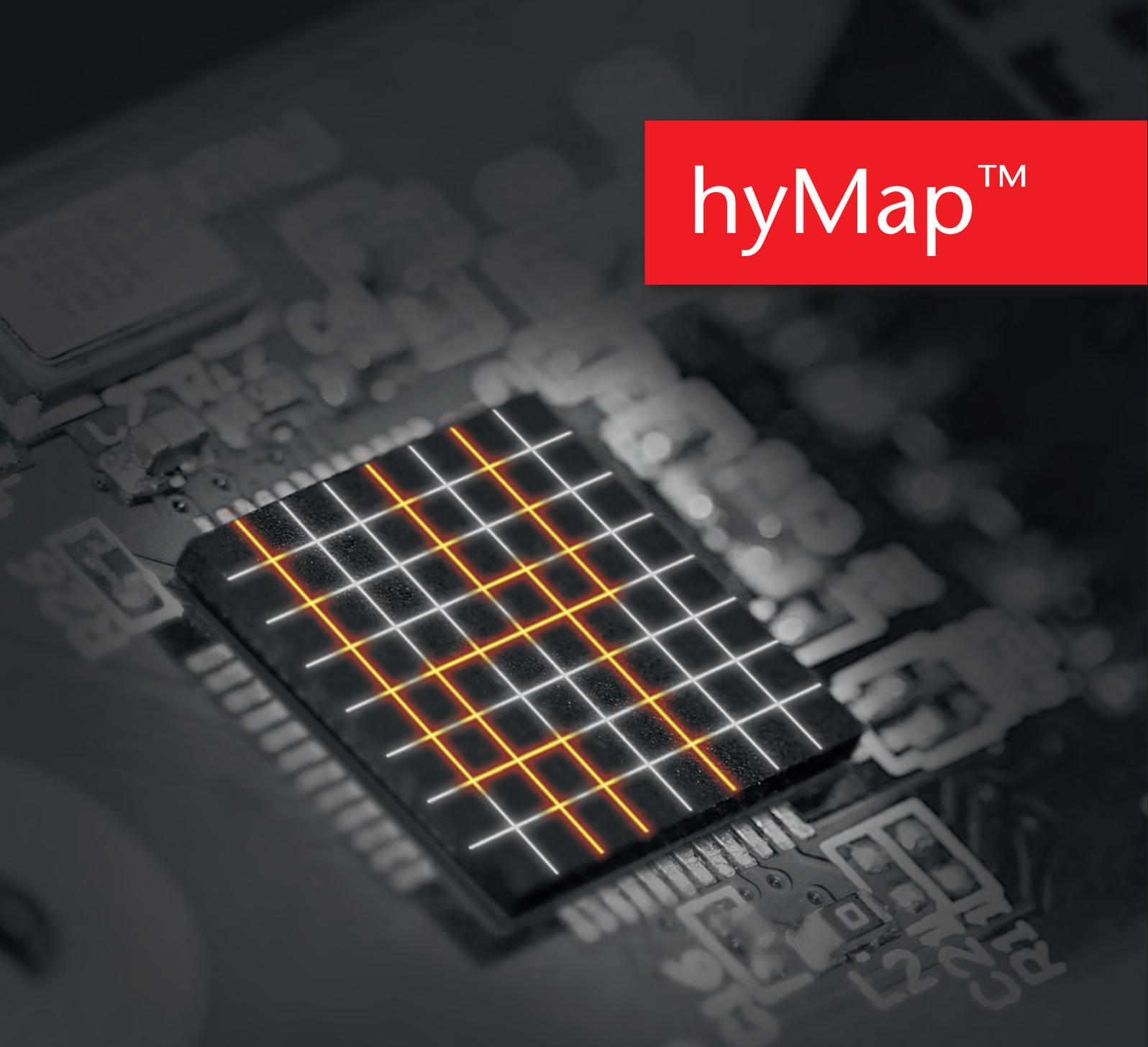
With its latest software release 2014-B, dSPACE is now offering a new plug-on device – the DS4342 CAN FD Interface Module. This module includes the new CAN FD communication standard, which can be used with existing systems for rapid control prototyping and hardware-in-the-loop applications. The DS4342 uses FPGA technology to support current CAN FD features and to easily address future requirements.

[News ID 2491](#)



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# hyMap™

## Reliable NAND Storage Controllers

- Significantly decreased Write Amplification Factor (WAF)
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- Intelligent Garbage Collection
- Adaptive Dynamic, Static and Global Wear Levelling
- Read Disturb Management
- Dynamic Data Refresh
- Reliable Write for MLC Flashes
- MLC aware Power Fail Management (PFM)
- Available for S8 and U8 Flash Memory controllers

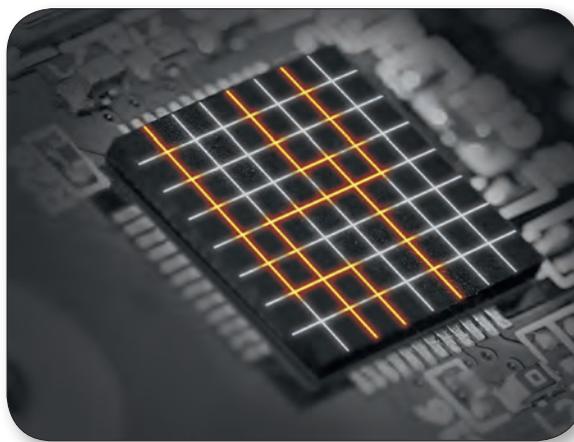
HALL 1 | BOOTH 301

*hyperston*®

# New flash management architecture enables MLC for industrial storage

By Susan Heidrich, Hyperstone

*This article describes hyMap™ flash management architecture, a new sub-page-based mapping and flash translation layer approach which significantly improves write amplification, increases endurance and random write performance. A low random write WAF results in high random write IOPS, preventing stress on the flash and giving the flash device a longer life.*



Flash memory is one of the most important storage technologies in terms of keeping and quickly accessing large data. This refers to the consumer market as well as to industrial applications. For storing and accessing data on a flash, a storage device controller is necessary. However, not only the controller hardware, but especially the dedicated firmware with complex algorithms enable safe flash handling and reliable data management and allow for market differentiation.

File systems use certain access patterns for writing to storage systems. The smallest access unit usually is a sector of 512 bytes. 4 Kbytes is a rather common unit, but it can be up to 256 Kbytes. There are several different protocol types such as ATA, USB, SD or MMC that pass read and write commands either directly or queued to a storage device controller. In all flash storage systems, a flash translations layer (FTL) including logical to physical mapping is applied that translates host-side logical to flash-side physical accesses. According to individual application requirements in terms of cost, performance and other desired features, different mapping approaches and granularities can be applied. The new hyMap™ technology is targeted to guarantee maximum reliability and endurance while improving random performance significantly.

## Finer mapping granularity

The smallest read access unit of a NAND flash can be a sector (512 bytes). The smallest write access unit is one page. Page sizes differ among flashes and can be between 2K to 8K for SLC and 8K to 16K for MLC today. Another flash-specific feature is the fact that a block must be erased before pages can be rewritten. Also block sizes differ depending on flash technology and capacity and can range from 128 KB to 8 MB.

Still mostly used within consumer USB flash drives or SD cards, is “block-based mapping”. In this approach logical blocks are mapped to physical blocks. Pages within those blocks are directly 1:1 allocated between the host view and the flash view. This means logical page 1 within any block refers to physical page 1 in the associated physical block.

Another approach is the “page-based mapping” in which logical pages are mapped to physical pages. Block numbers are part of the page address therefore a logical page can be mapped to any page within any block.

An even finer mapping approach is “sub-page-based mapping” where logical units smaller than a page are mapped to physical units. However, as the smallest possible unit which can be written to a flash is still one page, those

units need to be consolidated to one page. When reading that smaller unit the controller does not need to transfer the whole page from the flash into the controller SRAM. The finer the granularity of the mapping, the better it can be tuned to different usage models. hyMap™ is sub-page-based by default and can be compiled to different granularities.

## Very low RAM requirements and inherent power fail safety

The finer the granularity of the mapping, the more complex is its algorithm. Apart from providing more computational power, more mapping information must be stored when updating, and retrieved when reading. Historically, most SSDs have stored all mapping information in an external DRAM. While this is convenient and fast, it is very difficult to ensure power-fail robustness. The average size of mapping data for a conventional page-based mapping FTL is in a range of 0.1% of the drive capacity e.g. 32 MB for 32 GB. For a sub-page-based mapping it is even higher. Every time a drive shuts down, this DRAM content needs to be stored in non-volatile memory (NVM). For stable operations, super caps need to be added to ensure power supply in case of a power loss. Apart from cost, this introduces another element that would need to be considered when assessing drive

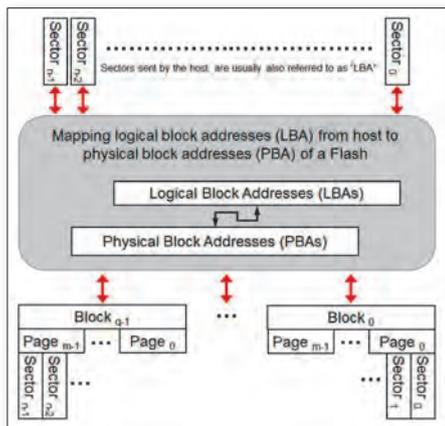


Figure 1. Basic block-based mapping

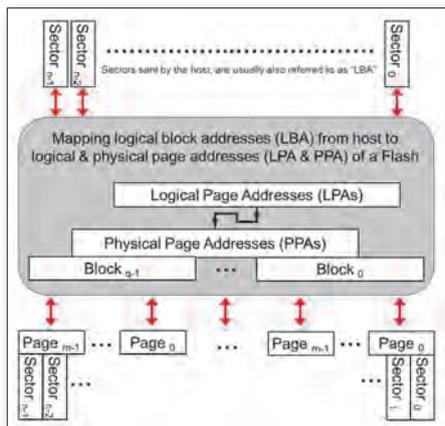


Figure 2. Basic page-based mapping

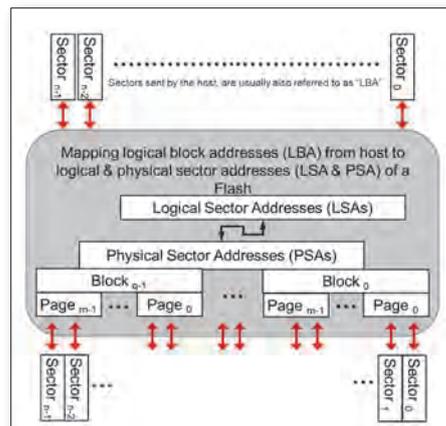


Figure 3. Basic sub-page-based mapping

reliability, life-time estimation, MTBF, and power on-off cycles. hyMap™ continuously updates necessary mapping information in the NVM by using a sophisticated algorithm and transaction-oriented logbook. Therefore, power-fail safety is ensured at all times.

Lower random-write WAF

The write amplification factor (WAF) refers to the amount of additional information that must be written to a flash when a certain amount of user data is written to the flash.

$$WAF = \frac{\text{Bytes written to the Flash}}{\text{Bytes written by the host}}$$

For instance, a WAF of 4 related to 4K random writes would mean, that for each 4 Kbytes of data in fact 16 KB are written to the flash, if blocks must be erased to free-up capacity and consolidate unused pages distributed over different blocks. This means that one 4 Kbytes write causes a block-erase and several page-writes to this block. Calculating the WAF is complex and depends on many different factors including: mapping granularity, efficiency of mapping and garbage collection, flash

technology (SLC/MLC, block size, page size), caching of data, storage location of mapping data (external DRAM or NVM), command queuing if protocol permits, data access/write patterns, free capacity on the drive and organization of that free user space (TRIM), over-provisioning, and data integrity requirements of the host or file system and possibility to use command queuing and write data caching to reduce WAF. For block-based mapping, write amplification can be significant, especially for small and random write accesses. A single-sector-write under worst case conditions might require that a whole block is erased and all original content is copied and stored together with the single updated sector within that block.

In such a scenario, the WAF would be as high as 2000, since for a 512 byte sector it would be necessary to write a whole block of 1 MB. For sub-page-based mapping such worst case write amplification is reduced significantly. A single-sector-write under worst case conditions might also require that a whole block is erased in case no unused block would be available but no old data would need to be copied. Only the old sector would become

invalid and the new sector in another block would become valid. In order to program a single sector under worst case conditions, it might be required to program the whole page. In that case the write amplification would be 16 (8 Kbyte / 512 byte).

Comparing both mapping approaches with respect to worst case WAF for write accesses smaller than page size it becomes clear that a finer mapping has significant merits and would boost drive endurance by a factor close to 100 times. In most use cases, accesses are not only single sector writes and also the controller can very often write more sectors at each time to the flash. Enterprise workloads are heavy on 4K random writes. This might not reflect a regular system usage model. So, for mainly sequential accesses or streaming applications, payload sizes would probably shift more towards larger sizes while for embedded OS, status updates, or communication protocol related tasks payload sizes might shift to smaller payload sizes. For usage models with a mix of payload sizes it is quite difficult to calculate exact WAF figures but as an order of magnitude WAF of the sub-page based mapping might be over 30 times better.

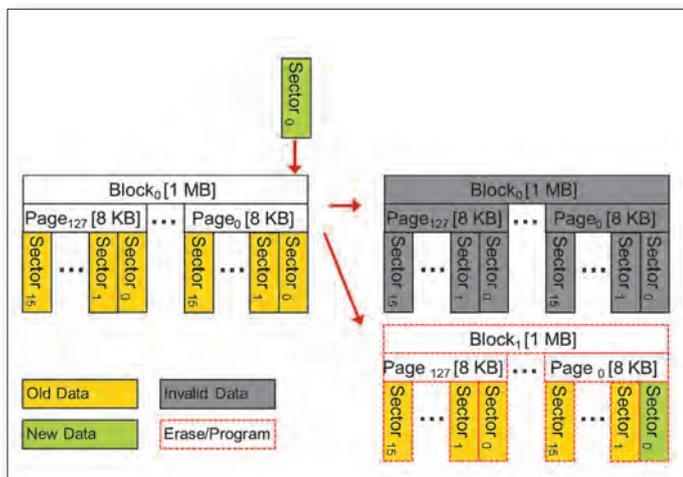


Figure 4. Worst case write amplification for an example access condition (random single sector write) for block-based mapping

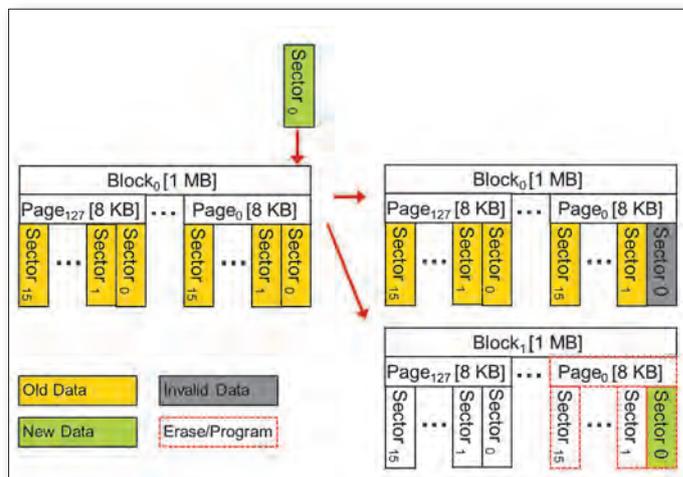


Figure 5. Worst case write amplification for an example access condition (random single sector write) for page-based mapping

		Block Based Mapping		Hyperstone hyMap™	
		Read (MB/s)	Write (MB/s)	Read (MB/s)	Write (MB/s)
SLC	Sequentiell	95	60	90	60
	4K Random	5.7	0.09 (20 IOPS)	3.1	4.0 (1000 IOPS)
MLC	Sequentiell	75	25	70	25
	4K Random	4.7	0.03 (7 IOPS)	3.3	3.9 (975 IOPS)

SLC: 2x nm, 8K page, 100 MHz DDR I/F, 2 CE DDP  
 MLC: 1x nm, 16K page, 100 MHz DDR I/F, 2 CE DDP

Table 1. Performance comparison for an SD card in SD3.0 UHS-I mode using S8 with block-based mapping and with hyMap™ firmware

**Enabling MLC for industrial / embedded applications**

Knowing the WAF associated with an individual usage model and drive pre-conditioning enables the calculation of the overall drive endurance expressed in Terabytes Written (TBW) and rate drives.

$$TBW = \frac{Capacity[GB]}{1000} \times \frac{P/E Cycles}{WAF}$$

Considering a scenario in which an individual usage model WAF would be in the range of 5 for hyMap™ and 200 for a block-based-mapping architecture, it can be affordable to replace an SLC flash with 100K write-erase cycles by an MLC, providing 3K write erase cycles and getting the same endurance in terms of TBW. That means, the better the mapping granularity is tuned to an individual system access pattern, the lower the WAF and the higher its drive endurance. hyMap™ can save money if it is found that now MLC can be used where SLC was required before.

**Performance optimization**

At some point physical blocks containing sectors or pages with obsolete data must be consolidated to free-up storage space. This process is called garbage collection (GC). An efficient GC algorithm selects those blocks first that contain most obsolete pages. The process is either performed in the background or during idle times. The availability of excess storage capacity compared to the net capacity of the logical data space is referred to as over-provisioning (OP). This is necessary to provide extra blocks so that GC can consolidate fragmented valid data stored in several used blocks. Also, depending on the amount of OP space, GC can work more efficiently as the share of valid data compared to invalid data of used blocks decreases, less data has to be copied to new locations and more free space can be provided per operation. hyMap™ can utilize available NVM resources to improve performance and reduce WAF by dynamically using unused capacity for over-provisioning.

The effects of hyMap™ in terms of performance are shown in table 1.

**Data reliability and device-life extending features**

hyMap™ uses a patented wear levelling (WL) algorithm that can be configured to the needs of different flash technologies as well as application requirements. WL is used to systematically utilize all flash blocks of the system equally in terms of consuming their individual write-erase-cycle endurance budget. It supports dynamic, static, and global wear levelling.

Dynamic WL requires no copy-overhead but alone would be limited to blocks not containing data. Static WL includes also those blocks containing data. Static data is relocated if needed. This WL activity is triggered at pre-defined threshold levels. Also these routines are executed in the background and interrupted in case of higher priority host commands.

**Power Fail Robustness without external DRAM**

As soon as a power-down is recognized, the controller is reset and the flash is write-protected. A log of all recent flash transactions is kept. Should the latest data be corrupt, the controller will recover the latest valid entry before that last failed write. All mapping information is reliably stored on the flash and therefore external DRAM is not needed.

The new firmware concept is targeted to making MLC flash as reliable as possible. As two logical MLC flash pages are physically correlated, it is possible to destroy data of an older page by writing another new one within the same block (paired pages). hyMap™ applies a Reliable Write feature to cope with this occurrence to make MLC power-fail safe. Moreover, it uses Safe Flash Handling in unstable power supply situations and especially when exposed to a sudden power-down in which the last programming of pages might not be reliable although a flash might have reported successful writing. ■

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# SoC design enables easy and fast migration of platform solutions

By Giles Peckham, Xilinx

*The Zynq-7000 All Programmable SoC is suited for implementing a platform strategy for most embedded applications. With its integration between ARM processing and FPGA logic and I/O programmability, it allows every level of an enterprise to harmonize their development efforts and bring highly differentiated product lines to market faster.*



■ Ever since Xilinx shipped the Zynq-7000 All Programmable SoC in late 2011, a bounty of products has been arriving. Today the Zynq SoC is at the heart of many of the newest and most innovative automotive, medical and security vision products, as well as advanced motor-control systems that make factories safer, greener and more efficient. The Zynq SoC has also won sockets in next-generation wired and wireless communications infrastructure equipment as well as a wealth of emerging Internet-of-Things applications. Having experienced firsthand the unmatched versatility of a device that integrates a dual-core ARM Cortex-A9 MPCore processor with programmable logic and key peripherals all on the same chip, a growing number of customers are expanding their use of the Zynq SoC from the processor of choice for one socket to the platform choice for entire product lines. By deploying a platform strategy leveraging the Zynq SoC and hardware/software reuse, they are able to quickly create many derivatives or variations of their products. The result is higher levels of design productivity and an improvement in the bottom line.

Let's look at what practices top platform-electronics companies employ to improve profitability; why the Zynq SoC is far superior to ASIC, standalone ASSP and even two-chip ASSP+FPGA platform implementations; and

how you can put this SoC to good use to drive prolific profitability at your company. To many, the word platform has become an overused marketing term. But in the electronics industry, many companies such as Apple, Intel and Cisco Systems have effectively executed platform business strategies to become highly profitable electronics leaders. In deploying platform strategies, companies make a relatively substantial upfront investment in creating and documenting the blocks they designed for the initial version of their electronics product platform. They then turn those design blocks into intellectual-property (IP) blocks, which they reuse to quickly and easily expand into derivative product lines and models along with next-generation products, delivering each of those derivative products faster and with less effort, less design cost and fewer resources.

Research firm International Business Strategies (IBS) in its 2013 report "Factors for Success in System IC Business" concludes that as the cost of producing an ASIC or ASSP device using the latest silicon processes continues to rise from the 28-nanometer manufacturing node to 20nm, 16nm and 10nm, companies producing their own chips will increasingly struggle to achieve the traditional end-product revenue goal: revenue 10 times larger than their initial R&D investment. Many make great

strides toward achieving this 10x goal by creating multiple derivative products on each node. "Derivative designs can cost 20 percent of the initial design cost, which means that if a commitment is made to a new product family that has very high development costs, then derivative designs can be implemented at a much lower cost. To optimize revenues and profits, it is advantageous for companies to implement multiple (derivative) designs in a technology node," the report said. "Implementing only one or two designs in a technology node can result in very high up-front costs and high risks associated with getting good financial returns. "New design concepts that reduce the cost of implementing new products have the potential to change the structure of the semiconductor industry dramatically," the report went on. "However, until a new design methodology emerges, semiconductor companies need to adapt their business models to the reality of the changing financial metrics in the semiconductor industry as feature dimensions are reduced" [source: International Business Strategies, Inc. (IBS) (2013/2014)]

In the study, IBS shows that the design cost of a 28-nm ASIC or ASSP (the first or initial product) is \$130 million (figure 1). Meanwhile, the design cost of a derivative is significantly lower: \$35.6 million. Thus, to achieve the 10x revenue goal for both types of devices

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Advanced connectivity is supported over Hi-Speed USB, 10/100 Ethernet and two CAN 2.0b modules as well as multiple UART, SPI/I<sup>2</sup>S, and I<sup>2</sup>C channels. The optional on-chip crypto engine ensures secure communication with a random number generator and high-throughput data encryption/decryption and authentication.

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- PIC32MZ2048EC Plug-in Module for Explorer 16



PIC32MZ Embedded Connectivity Starter Kit (DM320006 or DM320006-C with crypto engine)

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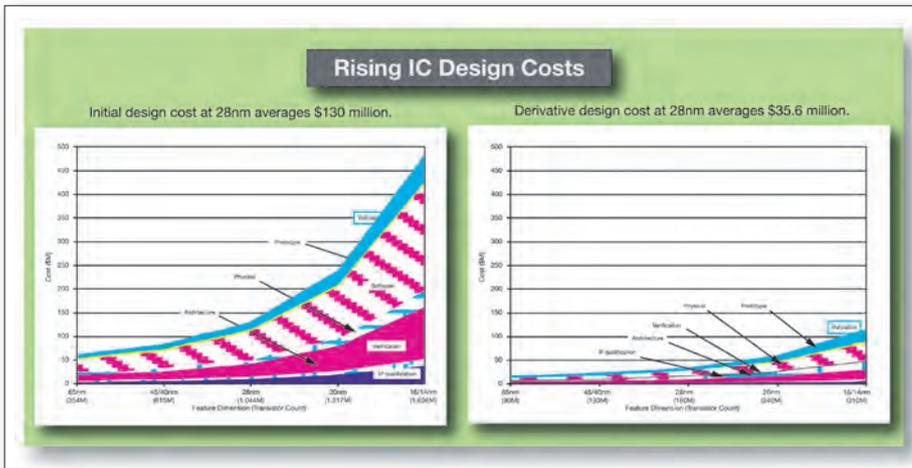


Figure 1. The initial cost of developing an IC rises with the introduction of each new silicon process technology.

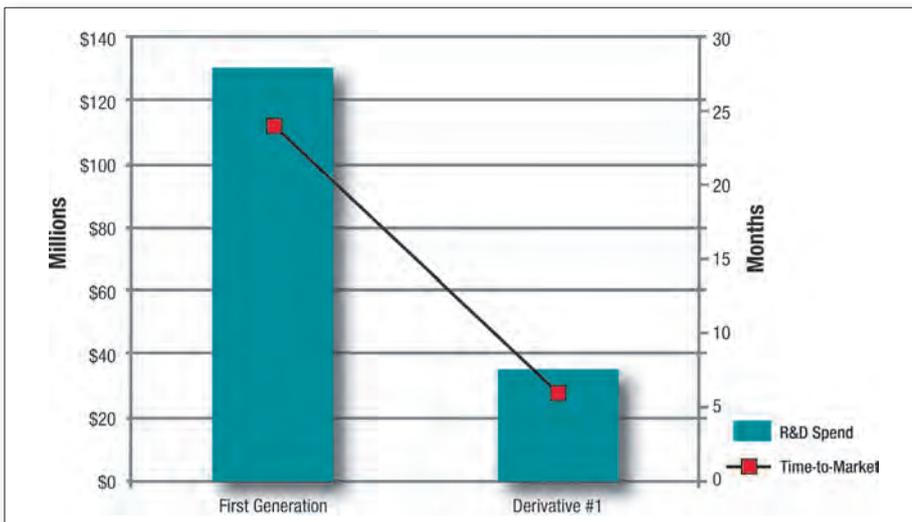


Figure 2. Derivative designs reduce time-to-market, development time and costs, making profitability goals easier to achieve.

requires an investment of \$1.3 billion for complex devices but only \$356 million for derivatives [source: International Business Strategies, Inc. (IBS) (2013/2014)]. The IBS study shows that companies must spend 650 engineering years to design a complex ASIC at 28nm. In comparison, a derivative 28-nm ASIC design requires only 169 engineering years to develop, a 3.8x reduction.

Assuming ASIC teams are developing new designs in step with Moore’s Law and are working on a two-year development cycle, it would take 325 engineers to complete a complex 28-nm ASIC in those two years. However, it would take only 85 engineers to complete a derivative 28-nm ASIC in two years. Or if a company were to use all 325 of engineers to develop the derivative as well, they could complete the job in six months (figure 2). Further, as illustrated in table 1, if we assume that the initial complex design achieved its 10x revenue payback of \$1.3 billion using 325 engineers, a derivative design with a smaller addressable

market that is only 80 percent (\$1.04 billion) the revenue size of the initial market of the ASIC would require just 85 engineers over two years to develop a product that would garner a net present value (NPV) that is much better than the NPV of the initial ASIC design. (NPV is defined as the difference between the present value of cash inflows and cash outflows.

The concept is used in capital budgeting to analyze the profitability of an investment or project). What’s more, the derivative would have a much more favorable profitability index or PI (NPV divided by R&D money spent) than the initial ASIC. Even if that derivative addressed a market half the size (\$650 million) of the initial design, it would have an NPV better than the initial ASIC, with essentially the same PI.

Increasingly semiconductor companies, as well as electronics system companies, are turning to platform strategies as a way to quickly create derivative products and maximize profitability in the face of rising R&D

costs, increased competition and customer demand for better everything. Platform strategies further reduce product development time, time-to-market and engineering-hour costs while simultaneously increasing the profitability of each derivative or next-gen product. As the IBS study shows, developing derivative designs is a way for companies to “optimize revenues and profits.” And developing multiple derivatives on the same node (in other words, derivatives of derivatives) using a platform approach allows companies to further optimize revenue and profit, as each subsequent design can benefit from lessons learned in the prior design, reuse and a more precise understanding of customer requirements.

Two of the biggest business decisions a company can make when deploying a platform strategy are actually vital technical decisions: which one of the many processing systems will be at the heart of your product platform? And which silicon implementation of that processing system is the best for improving profitability? In a platform strategy, a processing system must meet or exceed application software and system requirements. It must be scalable and easily extendable; must have a large, established and growing ecosystem; and must allow architects and engineers to leverage prior design work. Finally, it must come from an established, stable supplier with a road map and a track record of not deviating from that road map or of issuing endless errata. While there are candidates that fit some of these qualifications, the one that meets or exceeds all of them is the ARM microprocessor architecture.

ARM has become the de-facto-standard embedded processing architecture for just about anything that isn’t a PC. A vast majority of electronics systems today that use advanced embedded processing, from mobile phones to cars to medical equipment, employ ARM processor cores. In particular, ARM Cortex-A9 processor architecture is at the heart of many types of systems-on-chip (SoCs). It can be found in ASIC designs typically created for highest-volume value-added products like bleeding-edge smartphones and tablets, as well as in many ASSP designs for companies wishing to enter established low- to moderate-volume markets that typically compete on pricing for lack of feature differentiation.

To add differentiation to their products, many companies create product platforms that pair an FPGA with an off-the-shelf ASSP based on an ARM processing system. In this configuration, they can differentiate in hardware as well as in software, creating a broader feature set or a higher-performing end product that’s flexible and upgradable - one that helps them outshine competitors offering me-too soft-

	Lifetime Revenue* (\$M)	R&D Spend (\$M)	Lifetime Net Profit** (\$M)	NPV*** (\$M)	Profitability Index
Initial Complex ASIC	\$1300	\$130	\$260	\$12.85	0.1
Derivative #1 (80% size market)	\$1040	\$35	\$208	\$74.78	2.14
Derivative #2 (50% size market)	\$650	\$35	\$130	\$34.47	0.98

\* Assumes 7 years  
 \*\* Assumes profit margin 20%  
 \*\*\* Assumes 15% discount rate

Table 1. Creating derivative designs has an impressive net present value (NPV) but even more impressive profitability index.

	Total System Cost	Flexibility	Differentiation	Time-to-Market	Cost of Derivatives	Risk
Zynq SoC	Low + best value	Most flexible: HW and SW programmable + programmable I/O	Highest degree of programmability, HW/SW co-design	Fastest for integrated HW & SW differentiation	Lowest due to HW & SW programmability	Predictably low risk
ASSP + FPGA	Higher than Zynq SoC (system dependent)	Highly flexible but ASSP I/O limited compared to Zynq SoC	HW and SW programmable, ASSP-dependent	Fastest if ASSP requires HW differentiation	Low to high depending on FPGA vendor	Low to high depending on FPGA vendor
ASSP	Lowest if SW-only programmability is sufficient	Good but SW-programmable only	Limited to SW programmable only - easy cloning	Fastest if SW-only differentiation required	Lowest if SW-only derivatives needed	Can be Lowest if SW-only programmability is sufficient
ASIC	High to prohibitive	Once manufactured only limited SW flexibility	Best HW differentiation but limited SW differentiation	Lowest & riskiest	Highest	Terrible (respins)

■ Best platform attributes  
■ Good platform attributes  
■ Passable platform attributes  
■ Worst platform attributes

Table 2. The Zynq-7000 All Programmable SoC offers the right mix of attributes for customers looking to implement a platform strategy.

ware-programmable-only ASSP implementations. Adding Xilinx FPGAs to these ASSPs has helped a plethora of companies differentiate their products in the marketplace. With the Zynq-7000 All Programmable SoC, Xilinx is fielding a platform implementation of the stalwart ARM Cortex-A9 that suits the vast majority of embedded applications. As illustrated in table 2, the Zynq SoC offers many advantages over ASIC, ASSP and even ASSP+FPGA combos as a silicon platform. In comparison to other hardware implementations of the ARM processing system, the Zynq SoC has the best feature set in terms of NRE, flexibility, differentiation, productivity/time-to-market, lowest cost of derivatives and best overall risk mitigation. What's more, the Zynq SoC has vast cost advantages over other platform implementations. Let's look at the numbers.

The average cost of designing a 28-nm ASIC is \$130 million, and thus the 10x revenue goal amounts to \$1.3 billion for ASIC designs. But typical design projects based on the Zynq SoC inherently have a much lower overall design cost and faster time-to-market than ASIC implementations. That's because they supply a pre-designed, tested, characterized, verified and manufactured SoC that provides software, hardware, I/O performance and flexibility for differentiation. What's more, the Zynq SoC

benefits from the fact that Xilinx hardware and software design tools are inexpensive and are highly integrated, whereas ASIC tool flows are complex, have significant interoperability and compatibility issues, and entail complex licensing with costs running in the millions. Xilinx design flow is especially streamlined when designers use the company recommended UltraFast methodology. In addition IP qualification costs are low because the Xilinx ecosystem IP is already designed and preverified, while Xilinx tools generate middleware.

As a result a typical Zynq SoC project runs \$23 million. Thus, to achieve the standard 10x revenue goal for design projects requires lifetime revenue of \$230 million - a 10x goal that is far more achievable and feasible than the \$1.3 billion required to achieve 10x for an ASIC implementation. Using the method described already while analyzing the IBS data, if we assume that an initial complex design implemented in a Zynq SoC was able to capture 100 percent of the same targeted \$1.3 billion market, it would require only a \$23 million investment using 57 engineers for two years to bring the product to completion. If we assume that the initial Zynq SoC design has the same 20 percent profit margin as the initial ASIC design, the initial Zynq SoC design would have an NPV of \$107.27 million, with a

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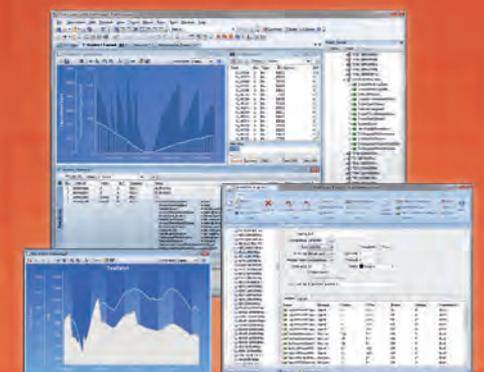
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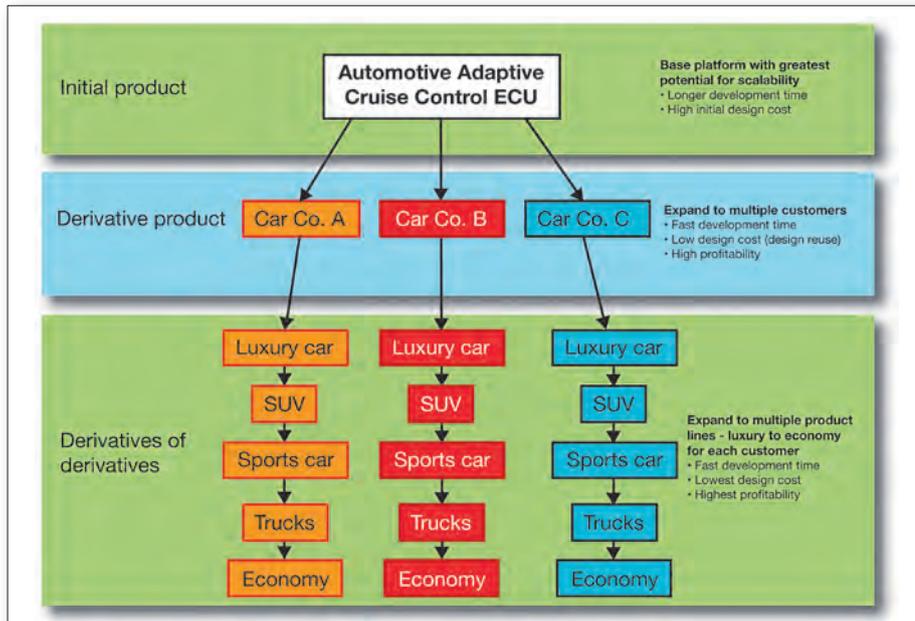


Figure 3. A customer has maximized its initial design investment by using a ZynqSoC platform to serve multiple carmakers and multiple lines and models for each manufacturer, improving profitability.

PI of 3.7, which is dramatically better than the initial ASIC NPV of \$12.85 million and its PI of 0.1. The NPV and PI for Zynq SoC derivatives at that same 20 percent profit margin are even more impressive. Xilinx customers have shown that the cost of a derivative in a Zynq SoC platform strategy is typically 60 percent less than their initial design.

Comparing the Zynq SoC platform derivative at the same 20 percent profit margin as the ASIC platform derivative addressing a market 80 percent the size of the initial design, the Zynq SoC platform NPV is \$96.66 million with a PI of 8.33. This is considerably better than the ASIC derivative, which has an NPV of \$74.78 and a PI of 2.14. Similarly, the NPV for the derivative Zynq SoC design addressing a market half the size of the targeted market of the initial Zynq SoC design would be \$56.34 million with a PI of 4.86. This is far superior to the ASIC platform derivative numbers. Even if we leave the ASIC platform profit margin at

20 percent and compare the results to a Zynq SoC platform assuming a lower, 15 percent profit margin (accounting for perhaps higher unit costs for the Zynq SoC), it presents a far superior path to maximizing profitability. The initial design at a 15 percent profit margin would have an NPV of \$73.67 million, yielding a PI of 2.45. This is a vast improvement over the initial ASIC NPV of \$12.85 million and its PI of 0.1 even when the ASIC has 20 percent profit margin.

For a Zynq SoC platform design that targets a market of 80 percent (\$1.04 billion), the revenue size of the initial Zynq SoC targeted market it would take 23 engineers two years to develop a derivative Zynq SoC-based product. In the end, the product would garner an NPV of \$69.78 million with a PI of 6.02. This compares with the ASIC derivative NPV of \$74.78 million, which is slightly better than the Zynq SoC derivative NPV. However, the PI for the Zynq SoC derivative at a 15 percent profit

margin is considerably better than the ASIC derivative PI of 2.14, even when the ASIC has a higher (20 percent) profit margin.

Further, a derivative Zynq SoC design (again at a 15 percent profit margin) addressing a market half the size of the initial Zynq SoC design targeted market would garner an NPV of \$39.55 million and a PI of 3.41. That is not only better than the ASIC derivative PI of 0.98 but also better than the PI of the initial Zynq SoC. It should be noted that while profit margins will vary depending on the volume needs of a given market, the data shows that the Zynq SoC is a superior platform choice even for high-volume applications. Even when comparing an ASIC platform at a higher profit margin of 20 percent to a Zynq SoC platform at a 15 percent profit margin, the Zynq SoC is a far better platform solution financially as well as technically. At lower volumes, the Zynq SoC platform is of course even more convincingly the best platform choice to maximize profitability

Today, a number of customers in a broad range of application areas are achieving dramatically greater scales of economy by leveraging the Zynq SoC as the heart of their platform strategies. A prime example is a world-renowned maker of high-end electronic control units (ECUs) for the automotive industry. This customer is standardizing on the Zynq SoC as a platform solution. Wielding the Zynq SoC and heavily leveraging the reuse of tightly coupled hardware and software IP, the company has created a highly flexible ECU platform that it can quickly customize for the specific needs of multiple automakers and their different lines, models/configurations and accessory bundles (figure 3). By using the ZynqSoC as a central platform, the company has achieved maximum economy of scale, reducing budgets while increasing the number of products it delivers to a growing number of customers. The upshot is delivering tailored ECUs to customers faster. ■

## Embedded World News

Hall-Stand 2-319

### ARBOR: industrial Panel PC for high-end applications

ARBOR Technology launched the LYNC-817, a new 17" fanless industrial Panel PC, power by Intel Celeron J1900, offering higher performance and lower power consumption compared to previous generations of Intel processors. In addition to its multitude of I/O ports and multiple integrated wireless communication module, the LYNC-817 also has the ability to accept power input from 9 to 36 volts, making the

LYNC-817 a high value product with excellent performance and cost-saving benefit, and ideal for high end industrial applications such as factory automation, process control and interactive media and communication.

[News ID 2431](#)

Hall-Stand 2-220/338

### Advantech: Computer-on-Module with ARM Cortex-A9 i.MX6 processor

Advantech announced a RISC RTX COM module, ROM-3420; powered by the Frees-

cale ARM Cortex-A9 i.MX6 Dual 1GHz high performance processor. Advantech introduced the RTX 2.0 (RISC Technology eXtended) specification which is a RISC standard platform form factor designed for demanding applications. Through its innovative mechanical and electrical design, ROM-3420 designed with RTX 2.0 can effortlessly perform complex and challenging tasks in demanding environments such as military, logistics, transportation/fleet management and many other fields.

[News ID 2420](#)



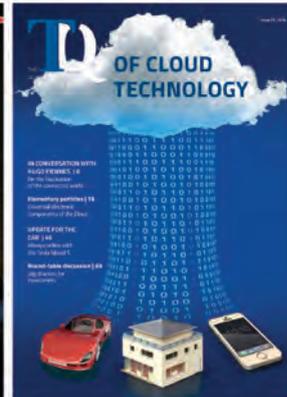
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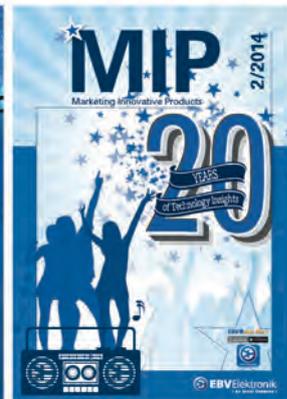
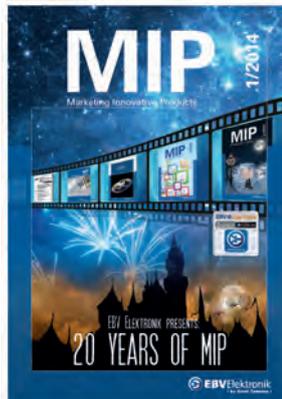
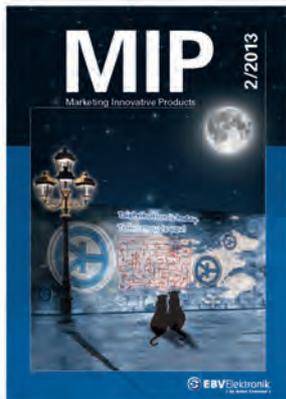
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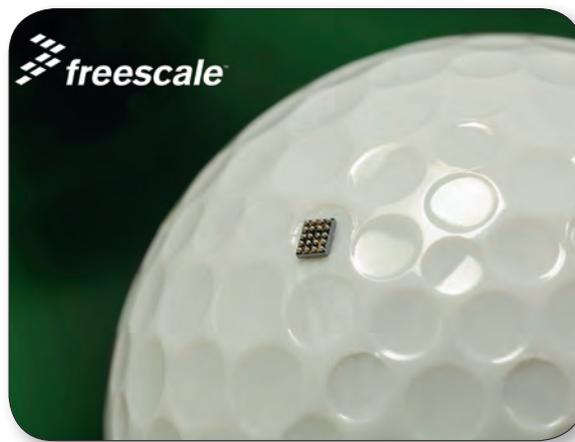
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# Small Microcontroller devices for a big market

By Kathleen Jachimiak, Freescale

*Kinetis mini MCUs from Freescale, such as the KL03 chip-scale package measuring just 1.6 mm by 2.0 mm with corresponding ultra-low power consumption, are well-suited to support next-generation IoT designs, including medical, monitoring, and other wearable applications.*



■ Huge volumes of data, billions of connections, boundless opportunities: these are terms often used to describe the Internet of Things (IoT). IoT is big, huge, and gigantic – we all understand that. In fact the only thing that is small in regard to IoT is the size of some of the devices that people will use to stay connected. Many designers focus their IoT design considerations around performance, sensing capability, and communication protocols. However, for many of the use cases within IoT, the implementation is not practical without a physically small – or mini – device. And as these devices grow in product requirements and technical complexity, so will the product size – unless companies take the opportunity to start designing for space optimization as well.

Semiconductors play a big role in enabling customers to reach their design goals of optimization by integrating more functionality into smaller chips. In fact, Moore's Law already tells us that the number of transistors on integrated circuits (IC) will double approximately every two years. So, it is only natural to assume that chips will grow in functionality and not size. However, we see that IC packaging innovation is becoming an important supplement to Moore's Law. We no longer are integrating more into the same sized package. Instead, we are integrating more into

smaller-sized packages. But again, it's not only about size. As smart portable devices are increasingly replacing traditional PCs and other electrical equipment, sophisticated packages are needed to deliver high-performance applications in a low-profile, low-cost, and low power design. Freescale is a technology innovator that is delivering the required high level of on-chip integration in industry-leading tiny packages with Kinetis mini MCUs based on wafer-level chip-scale packages (WLCSP). The most recently announced Kinetis mini MCU brings small to a whole new level. The Kinetis KL03 chip-scale package is the smallest ARM-based device at just 1.6 mm by 2.0 mm. That is 35% smaller than any other competing 32-bit ARM-based MCU, and smaller than a golf ball dimple. In fact, more than 20,000 of them would fit into a standard size golf ball.

But smaller chips do not necessarily equate to fewer features or less functionality – not by Freescale standards at least. Chips can be small and smart by offering optimal performance and key features on-chip to further save PCB board space for designers. More designers are choosing to start with a 32-bit MCU architecture in order to support complex algorithms, connectivity stacks, and HMIs. By adding on-chip memory, powerful timers, and a series of communications interfaces, the Kinetis

KL03 MCU, utilizing a 48 MHz ARM Cortex-M0+ core, adds more functionality and GPIO than competing solutions, and is the first Kinetis L device to offer an on-chip ROM bootloader for easy flash upgrade. So this chip is truly feature-rich and small.

Designers select small devices because they are building something small, and if you are building a small device, chances are it is small because it needs to be portable ... and if it is portable, it likely needs to run on a battery and for sure needs to be energy efficient to maximize product longevity between charges. Having a great throughput/mA number is only one of many considerations taken when designing a system to minimize power without sacrificing performance.

The Kinetis KL03 MCU redefines the “low” in low power, offering the most energy-efficient ARM-based MCU. Based on the ultra-low power ARM Cortex-M0+ core and smart low-power architecture, Kinetis KL03 devices achieve a run power consumption of less than 41  $\mu\text{A}/\text{MHz}$ . To further demonstrate the benefit of flexible low power, let's take the example of a wearable IoT application such as a fitness watch. A fitness watch has multiple operating modes, which benefits customers since they get loads of functionality in addition to just the basic watch – things like heart rate monitor,

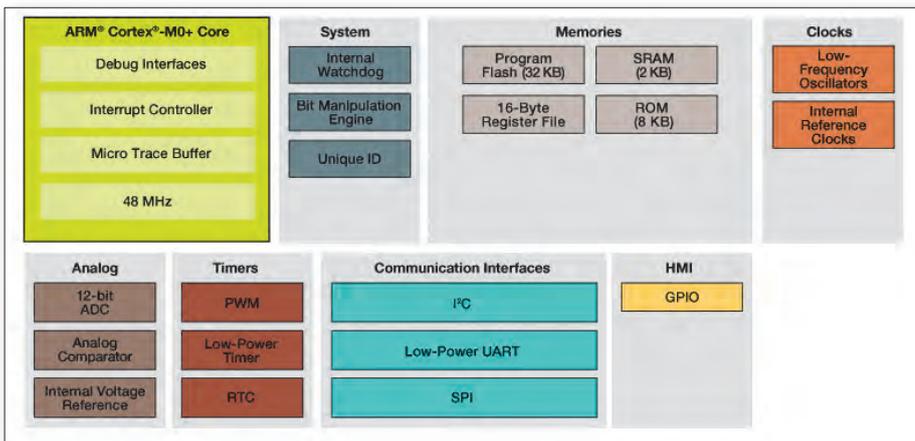


Figure 1. Block diagram of the Kinetis KL03 MCU

GPS navigation, and even tracking capabilities. To optimize the watch performance, the processor also needs to operate in multiple modes to match the requirement of the application. The Kinetis KL03 MCU offers flexible dynamic modes with fast response time through quick wake-ups and low-latency interrupts, as well as low power modes to use for monitoring purposes. It is not just about processing fast, it is about processing fast and efficiently, and if you compare the Kinetis KL03 device to competitive chips, you would see at least a 2x improvement in battery life while the application is running in a typical operation (or watch mode) throughout the day.

Developing for IoT applications can be overwhelming. How will my device connect to the cloud? What type of sensing solution is needed? How will I secure the data being transferred? While all these other considerations can be challenging, incorporating the MCU shouldn't have to be. The IoT space is growing - and it is growing fast. Time to market is becoming even more critical for designers, and the growing ecosystem of software and tools available for ARM products makes it a very logical architecture to begin with. In addition, Freescale supports Kinetis MCUs by providing a full complement of development resources including the new software development kit (SDK) for Kinetis MCUs - a comprehensive software framework that incorporates hardware abstraction layers, RTOS adapters, peripheral drivers, libraries, middleware, utilities and usage examples and cost-effective Freedom development platforms compatible with the broad Arduino hardware ecosystem.

Another tool is Freescale Processor Expert software, which helps to create, configure, and generate software and drivers for its microcontrollers. Bootloader software for Kinetis MCUs enables in-system flash programming over a serial connection and supports erase, program and verification capabilities. The broad ARM ecosystem of support with fea-

tured IDEs from Atollic, Green Hills Software, IAR Systems and ARM Keil tools, along with a new Kinetis Design Studio IDE from Freescale, is available as well. These expanded software and tool offerings build on the strong, longstanding Kinetis MCU enablement foundation of the MQX RTOS, the Tower System platform, and application-specific frameworks. Plus, designing with Kinetis MCUs means designing with one of the broadest ARM Powered MCU portfolio; designers preserve their engineering investment with more

than 900 Kinetis products to choose from, all of which offer some level of software or hardware compatibility.

In the market today, you already see small devices carrying decent battery life. Phones for example fit easily into pockets and usually run a whole day without needing to re-charge. So how much smaller and how much more energy efficient do we need to go? Is the desire to drive miniature devices simply a challenge that engineers want to take on or is there an actual market demand? Maybe we don't have the answers to those questions, but what we do know is that the wearable market is expected to grow >50% CAGR over the next few years and includes everything from smart watches to activity monitors (IHS Electronics and Media, September 2013). When you look at battery life for the wearable market, you don't talk about hours any more, but instead about days and even weeks.

We have already looked at one application in wearable devices for the fitness watch, and for most people, the current size of the watch is probably acceptable. But wouldn't it be more convenient if your fitness watch could do more? What if it could connect to online mapping tools in the event you got lost on

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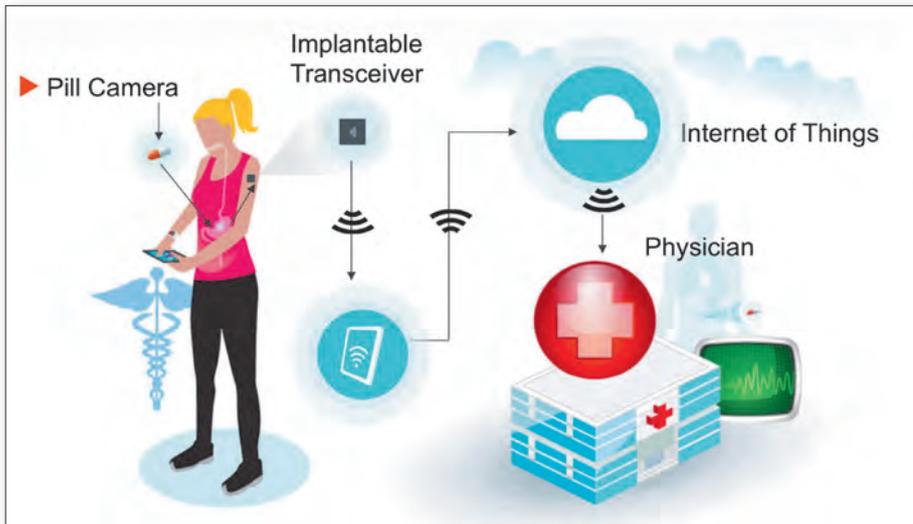


Figure 2. Remote patient monitoring is one example of a use case of IoT

the trail or give you real time warnings about dangerous weather moving in your area? Or even act as your car key? Eliminating that challenge of lugging your car keys around while on a run. The expectation is that consumers can have all of this and more and will be able to have it in the same form factor size that they have already become accustomed to. And activity tracking does not need to be limited to people. Miniature wearables will allow scientists to track plants and animals, even as small as insects. By collecting real-time data, scientists can better predict changes to the environment that will benefit all mankind.

We're already seeing some of these applications come to life. For example, during a recent vacation with my family, I observed how a band on my wrist could unlock my hotel door, check me in at amusement rides, and charge purchases. The idea of this versatile key will expand beyond just vacation spots as well. Imagine if your smart key fob for your car also controlled the outside lighting and locks in your home, so that as you pull up into your driveway at night, your home would be lit for entry. Just think from a safety perspective, you'll never have to worry about arriving to a dark home again.

The IoT plays a significant role in a broad range of healthcare applications as well. Specifically, a device like the Kinetis KL03 MCU brings new benefits to patient monitoring, where the device needs to be small and non-intrusive. Patient monitoring is about adding convenience and limiting costs for the patient. When a device is small enough to be inserted in a swallowable capsule for example or embedded into other portable products already available today (like the watch or key), portability, processing, and overall device capabilities grow exponentially!

Once upon a time IoT seemed like such a futuristic concept, but, the reality is that the IoT is here today – and luckily so are Kinetis solutions, with more than 10 million of these tiny Kinetis mini MCUs already shipped. While it can be overwhelming to think about the IoT in terms of interconnectivity of everything – connecting billions upon billions of devices – it becomes much more manageable if each of us focuses on our individual contributions that can provide value and benefit the average consumer.

The new Kinetis KL03 MCU does just this by enabling designers to launch the next generation of cost-sensitive, portable applications requiring long battery lifetime. At just 1.6 mm x 2 mm, it packs a powerful story in demonstrating how small things can have a really big impact on the IoT space. ■

## Embedded World News

### Hall-Stand 1-326

#### ● Axiomtek: 3.5-inch Embedded SBC offers broad scalability

Axiomtek has launched CAPA881, offering broad scalability from the latest 22nm 4th generation Intel Core i7/i5/i3 processors with Intel HM86 or Intel QM87 chipset (optional). The 3.5-inch single board computer comes with a DDR3L SO-DIMM socket up to 8 GB. The highly integrated 3.5-inch embedded board features high performance, graphics, power efficiency, security, and remote management capabilities, making it ideal for a broad range of intelligent systems such as embedded applications, gaming, DSA, DVR, IoT/M2M-related, network computing, and many more.

[News ID 2569](#)

### Hall-Stand 4-116

#### ● Cadence announces 4th gen Tensilica HiFi DSP architecture

Cadence Design Systems announced the Cadence Tensilica HiFi 4 audio/voice digital signal processor intellectual property core for system-on-chip designs, which offers the industry's highest performance licensable DSP core for 32-bit audio/voice processing. This fourth generation HiFi architecture

enables emerging multi-channel object-based audio standards and offers 2X the performance versus the HiFi 3 DSP, making it ideal for DSP intensive applications including digital TV, set-top box (STB), Blu-ray Disc and automotive infotainment.

[News ID 2488](#)

### Hall-Stand 1-408

#### ● Concurrent: Atom E3800 based processor board extends life of VME based equipment

Concurrent Technologies announces its latest 6U VME board featuring long-life cycle devices to extend the life of existing applications through to the next decade. VP E2x/msd is based on the Intel Atom E3800 processor series offering users a choice: a low power consumption single-core variant or a performance orientated quad-core processor. VP E2x/msd is available in a number of different operating temperature ranges from 0 to +70°C up to -40 to +85°C and will also be available in a rugged conduction cooled variant for extreme environments encountered in military and aerospace applications

[News ID 2551](#)

### Hall-Stand 4-116

#### ● Cadence: latest Xtensa processor delivers significant architectural enhancements

Cadence Design Systems announced the 11th generation of the Tensilica Xtensa processors. The new Xtensa LX6 and Xtensa 11 processors enable users to create innovative custom processor instruction sets with up to 25 percent less processor logic power consumption and up to 75 percent better local memory area and power efficiency.

[News ID 2512](#)

### Hall-Stand 4A-540

#### ● Elma: rugged COM Express-based computer includes a Cisco-certified routing engine

Elma Electronic now offers a modular, high performance embedded computer packaged for applications in demanding mobile environments. The modular COM Express-based computer includes a Cisco-certified routing engine complete with the full suite of mobile routing protocols essential for network attached equipment on the move. Elma is an approved Cisco Solutions Technology Partner.

[News ID 2534](#)

Hall-Stand 4A-129

**EKF: CompactPCI Serial CPU board with Haswell dual- or quadcore**

The SC2-PRESTO is a rich featured high performance 4HP/3U CompactPCI Serial CPU board, equipped with a 4th generation Intel Core mobile processor (Haswell dual- or quadcore). The SC2-PRESTO front panel is provided with two Gigabit Ethernet jacks, two USB 3.0 receptacles, and two mDP connectors, compliant with the DisplayPort 1.2 standard for Multi-Stream-Transport. Local expansion mezzanine cards are available for additional I/O. The SC2-PRESTO is equipped with up to 16GB Low Power RAM with ECC support.

[News ID 2445](#)

Hall-Stand 4-350

**Embedded Office extends range of its certification kits**

Embedded Office has extended the range of its Cert-Kits for a series of new microcontrollers. The range now also supports ARM 9, C166, C166SV2, Cortex A9, Cortex M3, Cortex M4F, Cortex R4F, PPC e200 and PPC e500. In addition to the certificate and the documentation for the certification, the Cert-Kits also comprise an executable system along with a complete validation software solution.

[News ID 2498](#)

Hall-Stand 1-511

**DFI: Mini-ITX Industrial motherboards consume only 15W TDP**

DFI unveils HU171 and HU173 in its 4th generation Intel Core U-Series product line. The new U-Series platform with BGA 1168 packaging technology features smart performance, immersive visuals, and low-power consumption at only 15W TDP. The enhanced Intel HD graphics GT series integrated in the processor not only supports the latest graphics APIs but also projects a 24% performance increase over its previous generation. Thanks to the latest architecture, HU171 and HU173 deliver huge improvements in CPU capability, graphics, security, and I/O flexibility.

[News ID 2518](#)

Hall-Stand 1-358

**congatec: COM Express and Thin Mini-ITX on 5th gen Intel Core processor**

congatec is expanding its successful product range with the 5th generation Intel Core processor platform up to Intel Core i7-5650U on COM Express Computer-On-Modules and thin Mini-ITX motherboards. The single-chip processors feature a low power consumption of just 15W TDP. Built on Intel's new 14nm process technology, the 5th generation Intel Core processor is designed to prove excellent graphics and performance, supporting the next generation of congatec's COM Express and Thin-Mini-ITX boards for Internet of Things solutions, while maintaining compatibility with previous generations.

[News ID 2484](#)

Hall-Stand 1-444

**AAEON: fanless PCs powered by i5 4100E/4400E running at 37W**

AAEON sets new standards of fanless PCs with the release of the AEC-6638 embedded fanless PC. Powered by Intel 4th generation i5 4100E/4400E processor running at 37W, this PC further improves upon its predecessor, the AEC-6637, in terms of display capabilities with the Intel HD Graphics 4600 engine as well as support for VGA, DVI-D and HDMI devices.

[News ID 2393](#)

Hall-Stand 1-306

**Toshiba: application processors with enhanced sound and image data-mining**

Toshiba Electronics Europe has launched three new application processors as the latest additions to its ApP Lite family's ARM Cortex-A9-based TZ2000 series. The new TZ2100 group devices are high performance application processors, which support enhanced sound and image data-mining, communications and security functions. Recent advances in big data are making it easier to sift through huge volumes of data and to develop services that provide users with greater value and convenience.

[News ID 2427](#)

Hall-Stand 2-140

**MEN: Ethernet switch with 29 GBit switch matrix and uplink**

The Gigabit Ethernet switch G101 comes with a 29 GBit Switch matrix and delivers high speed communication, with up to 25 Gigabit Ethernet ports and an uplink via a 2,5 Gb SFP. The managed switch conforms to EN 50155 and is therefore suitable for demanding railway applications. Specifically designed for rugged mobile communication in harsh environments, the new Ethernet switch conforms to the EN 50155 railway standard. The high bandwidth of the 29 GBit Switch matrix, robust design and wide operating temperature of -40 to +85°C make MEN's new G101 ideally suited for railway applications.

[News ID 2472](#)

Hall-Stand 1-350

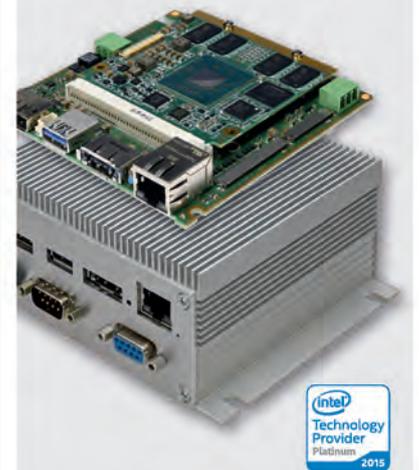
**Renesas: RX113 MCUs expand the use of touch key in healthcare**

Renesas Electronics is expanding the use of touch key in healthcare, building automation and home appliance applications with the new RX113 Group of microcontrollers. Part of the RX100 Series, the new MCUs offer a single-chip solution with unique touch sensor IP and leading-edge low-power technologies. This enables significantly reduced power, size, and development costs for entry-level devices in these markets, as well as for other cost-sensitive, capacitive touch-based applications for the growing Internet of Things market.

[News ID 2390](#)



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Technology in Quality

# How to get to the tailored industrial PC fast?

By Christian Lang, MSC Technologies

*On the basis of standardized building blocks, MSC Technologies has developed the first embedded system from the new NanoServer family under the brand DSM Computer. The flexible Box IPC is based on a fourth-generation Intel Core i3/i5/i7 processor and the Intel Q87 Express chipset from the desktop series.*



■ A modular design plays an ever more important role for compact industrial computers, to satisfy the current expectations that many OEM customers have for flexibility coupled with short development times. To comply with these requirements, MSC Technologies presents new NanoServer embedded systems under the label DSM Computer. The powerful N1-Q87 box industrial PC integrates the Intel Q87 Express desktop chipset and a fourth-generation (desktop series) Intel Core i3/i5/i7 processor.

Embedded solutions for the industrial market are characterized more than ever by their individual and flexible configurations. Even for small batch sizes, most OEM developers desire customer-specific computers on the same terms as standard systems, and are normally not prepared to pay high design costs. The price pressure, even for technically sophisticated products, and the requirement to market the system after ever shorter design times are increasing. Furthermore, many customers require the products to be delivered quickly even without existing blanket orders. The robust industrial systems must also operate reliably without service calls and remain available for more than five years.

How can the specific requests of the customers be fulfilled? Customer-specific embed-

ded systems can only be successfully realized through a wide dedicated range of standard products and a consistent platform concept. To achieve this, MSC Technologies focuses on predefined building blocks, which are scalable in their performance. The versatile building blocks were developed by MSC according to customer-specific requirements and quickly made available. The modular system includes standardized computer-on-modules (COMs), various baseboards, flexible industrial housings, sophisticated cooling solutions, memory modules, solid state disks (SSDs) and displays with or without touch technologies - everything from one source.

The system design includes, among other things, the integration of a mainboard or a computer-on-module with baseboard, the integration of HDDs/SSDs, the power supply and cabling. A cooling solution optimized for the application is of high importance for most of the projects. In many applications, the industrial PC with a display including touch is combined to a HMI terminal. 3D CAD systems and a temperature simulation are used during the design phase. The complete system goes through a functional test, compatibility verification and tests that simulate various harsh environments depending on the application. Approvals according to CE, FCC, UL, EN 60601, etc are routine. Manufacturing of

the complex industrial systems takes place at the MSC site in Freiburg, Germany. The production site is specialized in flexible, efficient and timely manufacturing of small and large series in lot sizes of several hundred pieces per week. The factory is certified according to ISO 9001:2008 and ISO 13485 (medical devices).

To integrate different CPU boards easily and flexibly in accordance with the building blocks concept, the new NanoServer family is equipped with an IO Shield. This allows identical housings to be used for all computer models of the same installation height, irrespective of the plug connector variants of the individually installed Mini ITX boards. The larger number of units allows the price of the industrial housing to be reduced significantly. Like the predecessor family, the NanoServer is offered in the three variants NN, N1 and N2 that differ in the number of free slots. In addition to the N1-Q87 with a PCI Express slot and an installation height of 79 mm, the slimline 58mm NanoServer NN without slots and N2 with two slots will be available soon.

Because all embedded systems are based on an industrial mainboard, thanks to their identical footprint and standard fastening solutions, they can be replaced with other models of the series if required. For example, to extend a system, the customer can insert a CAN bus card



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Figure 1. The NanoServer N1-Q87 integrates the Intel Q87 Express chipset and a fourth-generation Intel Core i3/i5/i7 processor.

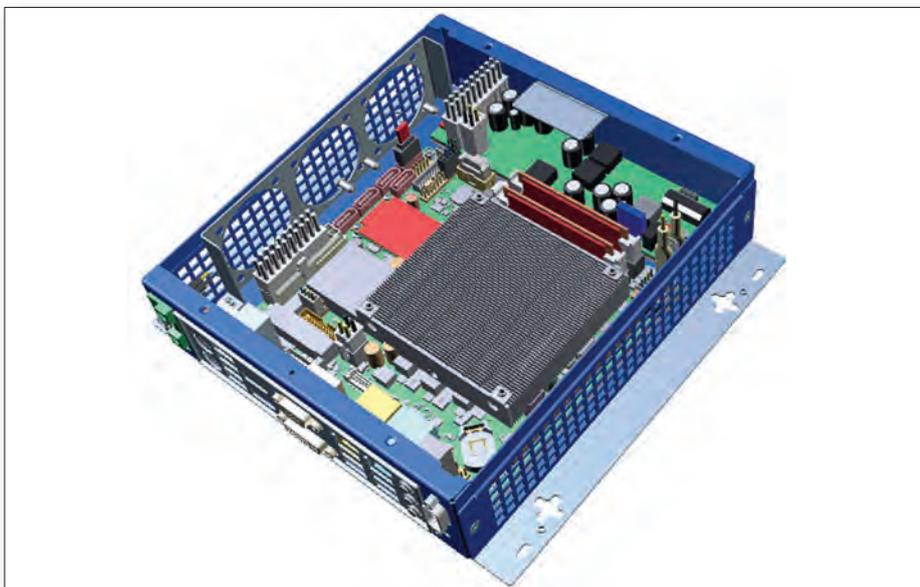


Figure 2. The future NanoServer NN-Q87

to convert to a more powerful model. The standard cover provided for the available installation heights NN, N1 and N2 can be opened from above with a single screw. To optimize the manufacturing process, all electronic components are fastened from the upper side. The modular product pallet allows all current board platforms to be made available.

The individual members of the NanoServer family differ in the processing performance of the integrated industrial Mini ITX mainboards. Products with a low-power Intel Atom processor (code named Bay Trail) are suitable for energy efficient applications. For demanding imaging applications, the high-performance NanoServer integrates a fourth-generation NanoServer (desktop series) Intel Core i3/i5/i7 processor with on-chip Intel HD Graphics (e.g. HD4600). The fast DDR3 1600 SDRAM memory can be expanded to 16 GBytes. The compact NanoServer N1-Q87 offers a number of popular industrial inter-

faces. In addition to the USB 3.0 and USB 2.0 interfaces, two GbE LAN interfaces, Serial ATA and HD Audio are present. The DVI-I and dual DisplayPort (DP) V1.2 graphic connections permit the connection of three independent, high-resolution displays. For system expansions, the high-end computer provides a free PCI Express x16 slot for short cards, e.g. a graphic card. In addition, two internal Mini PCI Express x1 slots are present, of which one is designed as mSATA (SATA III). The robust industrial housing provides space for two SSDs/HDDs or one SSD/HDD when the free slot is assigned. The SSDs do not have any moving parts and avoid the need for extensive wiring. The embedded system is supplied via a 12/24 VDC wide-range input or alternatively via an external 100 to 240 VAC power packs (120 W). The operating temperature range is specified from 0 to 50°C. On customer request, the modular NanoServer systems can be adapted quickly with optimized cost to special application requirements. ■



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# Managing SMARC Computer-on-Modules via the cloud

By Dirk Finstel, ADLINK

*This article describes new SMARC Computer-on-Modules which come complete with a connection to the SEMA Cloud making them a ready-to-use solution for a wide variety of IoT monitoring and maintenance services.*



Figure 1. The new SMARC Computer-on-Modules based on the Freescale ARM i.MX6 SoC processor are scalable, designed to withstand extreme temperatures of -40°C to +85°C and provide turnkey access to the SEMA Cloud.

■ In future, obtaining data from machines and equipment at any time or from any place will be seen as a standard by OEMs and factory operators for running automated analyses of their business data and streamlining their processes. However, this requires the embedded systems cloud connection to become a standard, too. With the launch of the SEMA Cloud, this connection has become a standard offering for the Adlink SMARC Computer-on-Modules. Application developers profit from receiving a turnkey solution for a range of monitoring and maintenance services from one single source – including a board management controller (BMC) right up to the cloud dashboard.

The new, credit card-sized SMARC standard LEC-iMX6 modules (82 mm x 50 mm) reap the benefits of these effective cloud functions. They are equipped with multi-core ARM Cortex-A9-based Freescale i.MX6 SoCs and are scalable over a wide performance range. The Solo-, DualLite-, Dual- or Quad-Core variants offer outstanding performance combined with low power consumption for small, quiet and economic systems used in industrial applications. Industry-standard robustness and reliability are also supported in the extreme temperature ranges of -40°C to +85°C and a sophisticated product testing using HALT/HASS methodology.

Powerful graphics for up to three displays plus the camera interfaces – which incidentally is a specification only in the SMARC Computer-on-Module standard – pave the way for realizing multiple new applications. Examples of application areas can be found in outdoor systems such as digital signage applications, vending machines or ticket and parking ticket systems, infotainment and management systems in trains, buses and utility vehicles, handheld and tablet systems for mobile tasks for in-field professionals as well as Smart Grid applications and a range of machines and equipment in

industrial automation, medical technology or test and measurement scenarios. All these application areas for the new SMARC modules can profit from being connected to the Adlink SEMA Cloud. It is often the case that machines are distributed on a widespread basis and OEMs and system operators need to be constantly informed of their status and interact with them from anywhere via secure cloud connections, serving to minimize or completely avoid downtimes or unplanned maintenance assignments. Additionally, OEMs can constantly measure the wear and tear or the service life of the machines, inven-



Figure 2. The three essential components for cloud-based monitoring, management and maintenance of the new SMARC modules with Freescale ARM SoC i.MX6 processors

tory status, centrally provide new functions when required or new updates and in doing so reduce service costs to a minimum.

On the field devices, the most important onboard component is the integrated SEMA Cloud Management Agent. It takes care of the bi-directional data exchange of the embedded system with the cloud via TLS-encrypted Ethernet, WiFi or 3G/4G cellular communication. Peripheral components can also be connected via freely definable inputs and outputs. For wireless peripherals, wireless interfaces such as Zigbee, NFC or Bluetooth can be supported, so that corresponding system configurations can be used as a data aggregator and an IoT gateway for locally distributed systems. The SEMA Cloud Management Agent can be run on a multitude of different operating systems such as Windows 7/8, WES 7/8, WEC 6/7 and most Linux distributions and can be used on ARM and x86 processor architectures. This makes it scalable for the whole range of SMARC modules right up to Intel Atom E3800 processor-based solutions.

The SEMA Cloud Management Agent for SMARC connects seamlessly to its own cloud infrastructure: the SEMA Cloud. It serves OEMs and operators as a central management platform for distributed devices. All the data is collated here and processed for the dashboards. From here all the configurable notifications and alarms are sent to the service personnel by means of email, SMS or even directly into the service module of a CRM.

Apart from being the operative core for monitoring the embedded devices, it is also a central control element for the administration of embedded devices and for parametrizing service notifications and user dashboards. Further to this, many necessary control measures can be automatically carried out via the cloud, for example to prevent damage or loss of control. In addition to the functions and information which SEMA provides via the BMCs, other user data, i.e. from sensors, can also be integrated. The SEMA Cloud Management Agent supports the widely accepted MQTT protocol. Further to the central cloud server infrastructure, matching client applications

are also available. Operators are supplied with dashboards which – according to their specific needs – inform them in the convenient push mode of the device condition via apps for tablets, smart phones or OEM-specific service devices. With these apps, employees get a secure remote access to their embedded devices. With these three basic components – the agent, the cloud servers and the user apps – SEMA Cloud for SMARC modules provides a comprehensive cloud-based service platform which OEMs and operators can deploy for innovative monitoring, management and maintenance services. OEMs should not base their decision for a SMARC

Computer-on-Module platform, like, for example, the new Freescale ARM SoC i.MX6 processor-based Adlink LEC-iMX6 module, solely on which development stage the supplier is at in terms of connecting platforms to the IoT, but on whether matching cloud solutions for its boards and systems are available. Only with these can OEMs develop the right service and maintenance concepts without any design effort on their own part and without having to develop the technological basis themselves. SEMA Cloud starter kits with Freescale ARM SoC i.MX6 processor-based Adlink LEC-iMX6 modules, local support and customer-specific trainings are now available. ■

Availability of the SEMA Cloud Management Systems			
	Freescale i.MX6	Intel Atom E3800	Intel Core-i3/5/7
SMARC	Yes	Yes	
QSeven		Yes	
COM Express		Yes	Yes
Mini-ITX		Yes	Yes

Table 1. Adlink is establishing the SEMA Cloud connection as a standard.

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# Mainline Linux goes real-time

## ... really?

By Dr. Carsten Emde, OSADL

*Only a few people know that about 90% of the code to make Linux a real-time operating system has already been merged into mainline Linux. The remaining 10% is maintained as off-tree patches requiring immense work. Mainline consolidation of these is the order of the day. All real-time Linux users are called on to contribute.*

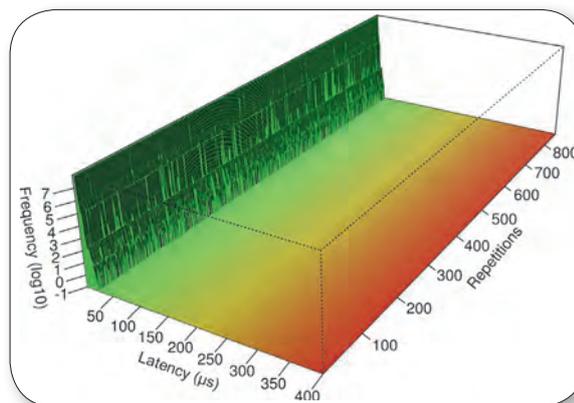


Figure 1. Sequential latency plots of 100 million test cycles

■ Since the end of the 90s, plans have existed to turn Linux into a real-time operating system. One of the reasons for this was the rapidly accelerating speed of innovation in information technology. At the time, the available dedicated RTOS kernels had to be individually retrofitted each time a new technology swept the market. The effort that this required was enormous, and the delay in availability of the new technologies for industrial systems was increasingly criticized by users. This led to the realization that it would make more sense over the long term to turn a general purpose operating system kernel into a real-time operating system kernel than to repeatedly equip all RTOS kernels with the technologies of general purpose operating systems.

However, this was no easy undertaking. Many respected operating system experts at the time felt that it was impossible to render an operating system real-time capable as an afterthought. However, the open structure and flexibility of well-coordinated open source development, as in the case of the Linux kernel development, made this feasible even though it was a daunting task. Among those who took up the challenge, were: Doug Niehaus, Professor at Kansas University, USA, Ingo Molnár

for Red Hat, Thomas Gleixner, CEO of Linutronix, for several clients, Paul McKenney for IBM, and Steven Rostedt for Red Hat.

After the basic components were developed from 2000 to 2006, they were gradually merged into the mainline Linux kernel, a task that is about 90% completed. The remaining 10% are available as the so-called PREEMPT\_RT patch which have been maintained and adapted by Thomas Gleixner and his coworker, Sebastian Siewior, at Linutronix. In addition, Steven Rostedt is taking care of the real-time capabilities of the long-term versions 3.2, 3.4, 3.10, 3.12 and 3.14. The PREEMPT\_RT patch supports more architectures and subsystems and is more closely linked with mainline development than any other method for achieving real-time for Linux.

Once the mainline Linux kernel has been equipped with real-time capabilities and is appropriately configured, a real-time operating system will be available that is largely capable of coping with established RTOS kernels in many ways. The two key benefits of a real-time mainline Linux kernel are guaranteed real-time features for the vast majority of industrial systems, and an API exclusively

based on the POSIX standard. The fact that the response behaviour of such a real-time Linux kernel is predictable and can actually be guaranteed has been confirmed by long-term measurements at the test center of the Open Source Automation Development Lab (OSADL) in which 100 million trigger pulses per test system are evaluated daily under different stress and load scenarios. The results were depicted in sequential latency plots (figure 1). The logarithmic scaling of the frequency values in the y-direction make it possible to visualize even a single outlier. As can be seen in an example measurement, not a single outlier arose in over 60 billion cycles. The maximum measured latency of the 2700-MHz Intel processor of around 20µs is about that which is achieved by dedicated RTOS kernels.

Despite the impressive success of the real-time Linux kernel, we should not lose sight of the fact that this software development requires a functioning ecosystem, as is the case with other components of the Linux kernel and open source software in general. Such an ecosystem works like a charm when the Linux kernel is used in servers, smartphones, and especially in telecommunications.

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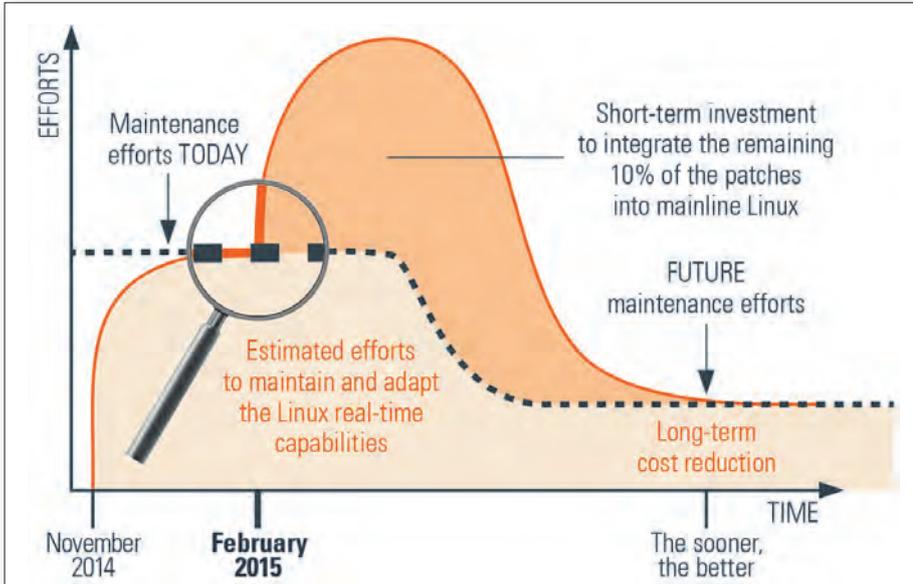


Figure 2. Time course of the efforts to provide and maintain Linux real-time and the positive effect of complete up-streaming

Companies that rely on specific Linux components in the relevant branches either provide their own personnel to work in the open source communities or become members in the relevant communities of interest such as the Linux Foundation in the USA. In this manner, the beneficiaries of the software participate in its development, and a classic balance of give and take is generated in the community, a process manifested in the implementation of real-time Linux kernel features.

In the beginning, companies such as IBM and Red Hat shouldered a major portion of the costs in a concerted effort because real-time Linux was sorely needed for customer projects. Their requirements have now largely been fulfilled. Nonetheless, the non-existing mainline consolidation of the remaining components

does not constitute a disadvantage since the systems can be individually addressed by a small specialist team using a separate business model. The corresponding product by Red Hat is called MRG (Messaging/Realtime/ Grid); it contains a real-time Linux kernel yet is only available for x86 systems (32- and 64-bit) and is only certified for a relatively small number of hardware platforms.

The use of Linux within industry is a different matter altogether: real-time features and other branch specific extensions are required in a variety of architectures and in hundreds of different systems. Reliable and sustainable development is only feasible if the missing components are incorporated into mainline Linux. Linus Torvalds has affirmed this repeatedly, with the proviso that additional com-

ponents must be incorporated by a team of appropriately qualified kernel developers. He especially pointed out that these developers must also be available later on when real-time components need to be adapted to new kernel features and maintained.

The Open Source Automation Development Lab (OSADL), founded at the end of 2005 for this purpose, has experienced consistent growth and functions as a nexus for a significant number of industrial companies. The available funds of OSADL have been used for a while in quality assurance of the real-time Linux kernel. When in summer 2014 it was decided to cease further work on the real-time patches because of lack of funding, OSADL started a campaign among its members and other interested parties to raise the required funds. Fortunately, these activities were successful, and a contract was signed to ensure development, maintenance and bug fixing of the real-time patches. The work resumed in January 2015 with Linux kernel patch level 3.18 and will – as before – continue with even-numbered patch levels.

This certainly is an important achievement that is very much applauded by industrial and other users of real-time Linux. It must, however, not obscure the fact that the second step, i.e. the complete mainline consolidation of the real-time patches remains the final goal. This is particularly important, since mainline consolidation is the only way, at least in the long run, to guarantee the continuous availability and industrial quality of real-time Linux (figure 2). It is easily conceivable that OSADL will be able to shoulder this remaining work without requiring external funding. Until then, however, OSADL is urgently appealing to all users of real-time Linux to join the common effort to make this final feat happen. ■

# Intelligent IoT Gateway

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# Machine-to-Machine communication knows no limits

By Alexander Bufalino, Telit and Rainer Rothmund, CEP

*Ten years ago, Machine-to-Machine (M2M) communication was still a niche topic. Today, it is regarded as the key technology of a networked, mobile future. Typical applications include real-time monitoring and control that takes into account a raft of different requirements.*



*Figure 1. The HT-910 terminal features a particularly fast upload speed and is suited for areas of application that require the sending of large volumes of data, such as video surveillance. (Source: CEP AG)*

■ M2M technology allows wireless, automatic communication between devices, between vehicles or systems and service centers, but also between individuals or vehicles and devices. When implementing an M2M solution, a wide variety of modules and services need to be taken into account, including hardware components and mobile radio networks, as well as system integration and consultancy services.

Essentially, M2M solutions build on three central components: at the heart of every M2M application is a communications module, and with it an embedded system which, as the central communications interface, also contains the sensors for recording measurement values. Added to this is a component that allows sensor values to be transmitted, via radio signal for example, to a central point. This evaluation system completes an M2M solution. It receives and checks the values for range violations, for instance in the context of an application logic, alerting any downstream systems and managing the terminal devices. These modules allow applications to be created for real-time monitoring and control that enable companies to increase their efficiency, reduce costs and offer better service. For the transfer of data via mobile radio, the communications modules are equipped with a SIM card. This card is used to identify

the device on the network, in a similar way to the SIM cards familiar from cell phones and smart phones and other mobile devices. The SIM chip used in M2M applications is specifically designed to deliver a long service life and be capable of operation even in harsh conditions and during extreme fluctuations in temperature. An important feature for companies that want to implement an M2M application: communications modules should support the entire bandwidth of mobile radio technologies, starting with GSM/GPRS via EDGE and UMTS/WEDGE/HSDPA/HSPA all the way through to CDMA and LTE. This gives users access to global and demand-specific deployment.

The demands on M2M solutions can be explained using specific products by way of example, such as those offered by CEP AG in Oberhaching, near Munich, a company that acts as a center of expertise for implementing M2M applications. One of these products is the HT910 UMTS terminal from CEP. In view of its technical design and interface options, it offers a highly flexible range of possible uses, can be used globally in the penta-band version (HT910 G), and is specifically targeted at systems integrators connecting the terminal to their system environment. During the upload, it supports HSPA+ upload data rates of up to 5.76 Mbps and a HSPA+ download

data rate of up to 21 Mbps. The fast uplink speed is ideal for areas of application that require large volumes of data to be sent, such as with digital signage applications. The terminal supports a voltage range from 5 to 32 volts DC and can be supplied with power in a USB host-powered version directly via the USB interface. This means that no separate power pack is needed, offering truly flexible possibilities for use. The HT910 supports also an ultra-low power mode, drawing ~11mA when no active data transmission is required. Applications for this feature include solar energy or battery-powered equipment with online payment transactions or road traffic panels.

The data terminal features both a USB 2.0 and a RS232 interface. Systems integrators are able to use USB drivers for popular operating systems such as Win CE, Linux and Windows (2000, XP, Vista, 7) so that the terminal can be integrated quickly and easily into existing application landscapes. It is also possible to custom-program the terminal using Python scripts. At the heart of the terminal is the small (28.2x28.2x2.2mm) and compact HT910 M2M module from Telit, one of the leading suppliers of M2M modules, in the land grid array (LGA) form factor. Compared to the previous ball grid array (BGA) form factor, the modules can now be integrated even more easily into an extensive range of solutions. As



Figure 2. Telic Picotrack is currently the smallest GSM/GPS location device for telematics projects. (Source: Telit)

with all Telit modules, the firmware of the HE910 can also be updated (FOTA, firmware over the air management). This is a particular advantage in the case of applications that are used globally. Neither an on-site update is required nor does the equipment have to be collected to update the firmware. The HE910 module is part of the Telit xE910 family, which supports the GSM/GPRS, UMTS/HSPA and CDMA/EV-DO technologies. All models are based on the same LGA form factor. Solutions providers can therefore use the most suitable module for their requirements with just one hardware design.

M2M modules have been in use for many years, in ticket machines, vehicles or electricity meters for example. A new application is their use to control truck parking management systems at freeway service stations. Traffic experts all agree that freeways in Germany lack many truck parking spaces. One of the reasons for this is that the transportation of goods on the freeway has again increased considerably in recent years, and not enough new truck parking facilities have been created to cope with the demand for them. At the same time, drivers are required by law to take a break after driving non-stop for 4.5 hours.

In a pilot project in the German-speaking region, one of the CEP partners is developing a solution to inform the truck driver in good time ahead of his departure how many free parking spaces are currently available. The communication in this solution is based on the HT910 terminal from CEP. In this project, the drive-in and drive-out area of the parking space is scanned by special sensors, which are connected to industrial PCs. The industry PC then transfers the data via the HT910 terminal to a central server.

The video cameras set up also transmit their images of the current parking lot situation via a HT910 terminal to the server. The determined number of free parking spaces is displayed on notice boards set up especially for truck drivers several kilometers before the

rest area. The system is therefore able to guide the parking space search completely automatically, without any manual intervention. Another possible application for HT910 terminals is in parking ticket machines, which are used to monitor parked traffic in city centers or on unrestricted parking lots. Numerous established suppliers of such machines are already testing and using the HT910 in their equipment. The terminal transfers information about faults and early warnings such as if there is no paper or the money hopper is full. Card payment transactions are also authorized online via the terminal.

In the latest generation of parking ticket machines, up-to-date information and advertising are also displayed in graphic displays. The content for this can be downloaded quickly from the Internet via the broadband connection using the HT910 terminal. Crucial for the use of the HT910 in parking ticket machines is the ultra-low current consumption, since the parking ticket machines are normally powered by solar energy or battery. As a result, the option of displaying advertising also provides an additional source of revenue for operators alongside boosting the machine efficiency through remote data transfer.

To finish, a short example from the world of telematics that is also suitable for small solutions from the domains of fleet management and vehicle location. At the heart of this application is Picotrack, a fully-functioning GSM/GPS location device weighing just 35 grams and measuring 57x38x15mm produced by Telic in Oberhaching, near Munich. The settings for event signals (depending on time, distance, change of direction) in Picotrack can be configured at will. The integrated accelerometer, which is used as motion sensor, can also be configured as an anti-theft device. The device also contains an integrated geo-fencing function. It generates a warning message as soon as the device enters or exist a pre-defined area.

In view of the low current consumption, Picotrack has a very long battery life. If data is retrieved every 15 seconds, for example, it can remain operational for around seven hours. At five-minute intervals, this operating time increases to around 12 hours, and at five-hour intervals it is around a month. In sleep mode with the wake-up option, it can operate for around six months. At the core of the Telic Picotrack is the Telit GE865 quad band GSM/GPRS module. Thanks to its compact size (22x22x3mm) and extended temperature range, it represents an excellent solution for M2M applications and mobile data devices. With BGA technology, product costs are reduced considerably, since no additional system connectors are needed. ■

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# Turn a meeting room into a totally new surrounding

By Christian B. Caldarone, VIA Technologies

*This article shows how modern Digital Signage technology provides all the goodies to turn a meeting room into a totally new surrounding that speaks for itself: the meeting room of tomorrow.*



Figure 1. Example of the meeting room of tomorrow

■ Meetings are held in low esteem, so attracting an audience can be quite a challenge. It does not matter if one sits in a meeting room with employees or with new customers. In either case the goal is not simply to sell information to the audience, but to create an inspiring dialogue and to exchange thoughts on a highly creative level. According to a popular saying, it does not matter so much what you say, as how you say it.

Many meeting rooms have a history of their own and some even stir emotions or feel like home. Maybe staff members used to sit there for hours: listening, talking, thinking, pondering, and wondering. This might have been good times, but sometimes it is time for a change. Due to new requirements these rooms often have to be completely reinvigorated, with their museum-like feel turned into an inspiring room full of energy, conducive to creative thinking and discussions. Now a process of creative destruction has to begin, so that something completely new can grow from it. The goal is a nice balance between design and functionality. The setup should be user friendly and help to clear away much of the cable clutter present in many meeting rooms. When planning the system architecture for the meeting room of tomorrow, different scenarios should be considered. For example it is important to know for which

purpose and which audience the room is to be used in order to learn about the necessary requirements. And of course the size of the room matters as well. Besides a central screen, where usually presentations will be given, most meeting rooms are equipped with posters, pictures and most likely even glass cabinets, where people can look at the latest products of the company. For the posters and pictures, the most obvious solution is to replace them best by video screens showing various content. However on second thoughts, e-posters could be more effective for this matter, as they do not distract too much attention from the central presentation screen. Most companies already have created adequate content, usually designed for trade-shows and targeted email marketing campaigns, which provides the type of concise messaging needed. So the strong colors of the company's visual identity will provide a pop of color in the meeting room of tomorrow, but they will not be too overwhelming.

The central presentation screen, being the focal point in the room, could be a 2x2 video wall as a good compromise. Depending on the size of the room and the height of the ceiling, a 3x3 or a 4x4 video wall could be a good choice too, but one should bear in mind that the video content has to be in a suitable resolution not to disturb the visual experience.

Most companies already have video content, used on a daily basis to be fed into the social media to attract new customers. This video content can be easily re-used. So a set of demo videos, customized for different segments and different target audiences, can be shown to customers, media and employees in the meeting room. In case no video shall be displayed, a custom background in form of an image or text can be shown.

For example VIA Technologies has chosen to equip its new meeting room with a total of eight screens, four 46" displays for the 2x2 video wall, three 42" digital signage screens and one 55" touchscreen panel. After much careful deliberation, it has been decided that a total of three systems is required to effectively manage all the screens. A video wall controller is used to power the central video wall and to act as a server to schedule the content to be played on the digital signage screens. Finally another mini size embedded PC is used as the player for the 55" touch panel screen. The fun part here is to figure out how to get all these systems working together effectively and without being seen.

The meeting room table is an important piece in the overall design, creating a focal point which ties the room together. Furthermore it can be used to hide the video wall controller



Figure 2. View into a traditional meeting room

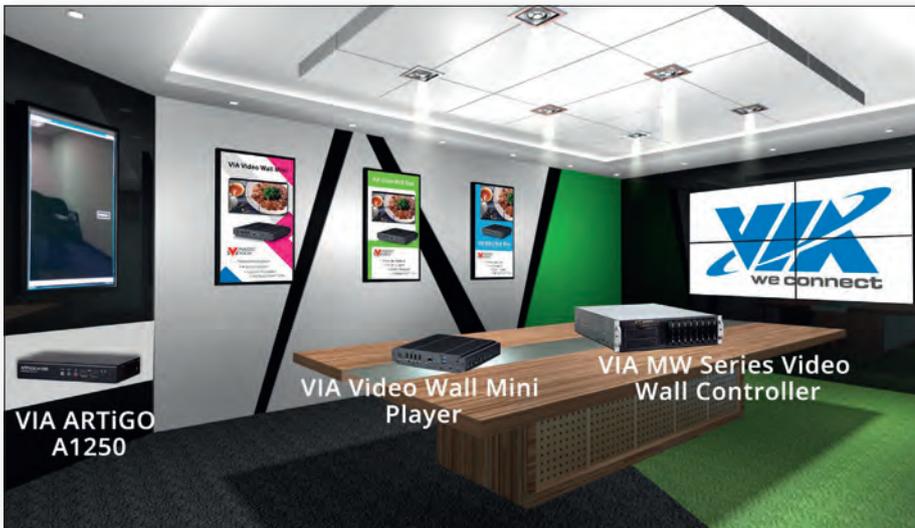


Figure 3. Examples for screens and controller products for the meeting room of tomorrow

and the video wall mini player inside, while maintaining easy access to the machines. Power buttons, a USB hub and a HDMI capture-in cable have been integrated into the table top to provide users with easy access points to turn the systems on, play files from USB thumb drives, or connect a laptop to the video wall - while a wireless mouse and keyboard allows anyone around the table to take control. The 55" touch screen acts as the stand-alone demo unit in the room, with a compact VIA embedded PC attached to the back of the panel through a VESA mount. While most of this may seem simple, if time is not taken to think beforehand how everything will fit in and be accessed, problems will arise.

Keeping in mind that meetings and presentations are the primary use of the room, it is now time to start looking at the software requirements for the video wall in order to configure the multiple panels as a single screen. One way of achieving this, is to install the VIA

MW series Video Wall controller. The solution comes together with the S3 Screen Toys utility which is included in the driver package for the VIA uH8 graphics card. It enables you to configure all panels connected to be operated as a single screen. The operating system which runs on the Video Wall controller is an ordinary Windows 7, so it is easy to add Microsoft Office to share Power Point presentations, Excel files and Word documents in the room - another essential requirement for a successful meeting. This setup works well as a stand-alone system, but what if someone wants to project a laptop-based presentation on the wall? For its own meeting room, VIA Technologies has chosen to install the SM@RT Vidi video conferencing platform, which includes the SM@RT Viewer application. This allows utilizing the capture-in capabilities of the Video Wall through either HDMI or VGA. Additionally users can install the app on their own device to wirelessly share content between their computer and the wall.

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Of course the primary function of a video conferencing solution like the SM@RT Vidi is to secure video conferencing between a company's headquarters and its branch offices. So this allows the video wall to be used to display the various video streams from each office as well as associated files in the virtual meeting. Now anyone attending the meeting is able to access the computer in the virtual and share content on the video walls across all locations. In order to simplify the management of the virtual meetings, it would be preferable to create an app, which can be used on a tablet or smartphone to provide a touch interface to quickly manage meeting setup, switch between various computers being shared, as well as scale the various windows on the video wall for maximum visibility.

One of the main goals of remodeling a meeting room to make it fit for tomorrow is to create a more immersive and engaging environment, which at the same time can be easily operated and will ensure that the content on the displays can be kept fresh and up-to-date. Therefore, best practice would be a server-client relationship between the video wall controller and the corresponding media-players attached to the displays in the room. Ideally, the video wall controller, acting as the server, is equipped with a Content Management Software (CMS) like the VIA MagicView, which is shipped together with the VIA MW Series

system. Using this kind of solution, it is quite comfortable to create a digital signage server with a user-friendly drag and drop interface to store content, quickly design layouts and schedule playback. The media-players should be ideally loaded with a software portion, able to make use of all functions the server provides. Experience has shown that this is most probably only the case, if the server software portion and the client software portion are from the same vendor. For example, in this case the media player of choice was the VIA Video Wall Mini media player, which is loaded with the VIA MagicView software for playback. One of the key benefits of this setup is that it allows to remotely managing the CMS from other computers on the network, keeping the room free for meetings.

How effective a digital signage system really is, comes down to the content it displays. Digital signage sites across the web preach the importance of dynamic content to drive audience engagement, but do not really get down on how to achieve this. With the incorporation of a new signage system in the meeting room of tomorrow, one is presented with a fantastic opportunity to take this challenge head-on. For example, when starting to remodel the room, one of the main goals is to update any museum-like feel by replacing the number of static demos in the room with a digital signage system to create a more engaging

environment. When tackling the challenge of actually creating the content to achieve this, the first question to be answered is: Where do I start from? So to begin with, it is a good advice to come up with a list of key questions to address, in order to help to focus the efforts: Who is the target audience? What are the key messages that need to be communicated? What is the most effective way to present these messages within the meeting room? How can one leverage existing materials to quickly create content?

As the meeting room is also the main site for customer meetings, media interviews and internal meetings or for the communication of core values and product offerings, it is a good place to start the content design around here, as it is relevant for all groups. In this context, it is very important to have a clear understanding of who to reach and what to convey to them. Once this is set, it is much easier to focus on maximizing the content for the screens in the meeting room. From the first attempt onwards, there are a lot of valuable lessons to be learned, on how to scale and balance content on the displays. The process also helps in generating many new ideas for future experimentation. Rather than trying to re-invent the wheel in the first attempt, there is always the possibility to successfully re-purpose existing content. There is nothing quite so valuable as learning by doing! ■

## Embedded World News

### Hall-Stand 1-511

#### DFI: 4-inch Embedded SBC supports ECC memory and 9~36V wide voltage

DFI unveils BT253, the most advanced 4" SBC in its Intel Atom E3800 SoC product line. The platform with BGA 1170 packaging technology features low-power consumption at only 5-10W TDP. By means of a significant improvement in onboard graphics, BT253 provides LVDS, HDMI, VGA (default) or DVI-I (optional) interfaces with dual-independent display capability. Apart from excellent graphics performance, BT253 takes advantage of Intel Atom SoC processor technologies that support ECC memory.

[News ID 2525](#)

### Hall-Stand 4-210

#### Lauterbach: µTrace supports new NXP LPC54100 series

Lauterbach has announced its support for the new NXP LPC54100 Series of microcontrollers. NXP recently introduced its LPC54100 Series of microcontroller, which achieves industry leading power efficiency and is ideally suited for "always-on" sensor-based products. Lauterbach have supported the

LPC54100 Series of microcontrollers since the beginning with µTrace, a proven and popular debug and trace tool for Cortex-M based processors. The tool uses USB 3.0 for connection to the host and connects to the LPC54100 via Serial Wire Debug interface. The developer can control the operation of the program and analyze the data in C and C++ by the use of simple and complex breakpoints.

[News ID 2535](#)

### Hall-Stand 4-206

#### Altium expands benefits to subscription customers

Altium announces extended benefits to Altium Subscription. With the release of Altium Designer 15, Altium commits to delivering Product Updates and Maintenance Updates to the current release and Maintenance Updates to previous releases. Starting with Altium Designer 14, Altium will deliver fixes and small enhancements as Maintenance Updates to two preceding releases in addition to updates and upgrades to the latest release. Altium Subscription customers will continue to receive Maintenance Updates for Altium Designer 14 and 15 through the release of

Altium Designer 16 at which time a 3-year moving window of maintenance support will be in place.

[News ID 2462](#)

### Hall-Stand 5-445

#### Telit and Tele2 announce M2M/IoT cooperation

TEL2 and Telit Communications PLC are entering into a Machine-to-Machine/Internet of Things cooperation to provide numerous new premium value added services and connectivity solutions. Since the launch of its worldwide M2M/IoT operations a year ago, Tele2 M2M Global Solutions has signed a number of agreements with customers and partners. Today, Tele2 announced a cooperation with Telit Wireless Solutions, the global leader in Internet of Things enablement. Telit, with its deep domain expertise and global footprint, and Tele2, with its proven credentials as the foremost provider of convergent communication services, together make it possible to provide comprehensive solutions and become a competitive player in the M2M/IoT market

[News ID 2403](#)

Hall-Stand 4-216

**IAR Systems reinforces development for MSP430 community**  
 IAR Systems releases a new version of its development toolchain Embedded Workbench for the MSP430 core from Texas Instruments. The new release adds new features as well as support for the latest MSP430 FRAM-based microcontrollers. Support for several new FRAM microcontrollers has been added, including the new RF430FRL15x sensor transponders that are a part of TI's Security + Communications series.

[News ID 2419](#)

Hall-Stand 4A-230

**Atmel: ARM Cortex-M7 based MCUs with exceptional memory and connectivity options**  
 Atmel launched four new series of devices to the Atmel | SMART ARM Cortex-M7-based MCUs. The new series deliver the highest performing Cortex-M7 based MCUs to the market with exceptional memory and connectivity options for design flexibility making them ideal for the automotive, IoT and industrial connectivity markets.

[News ID 2494](#)

Hall-Stand 1-538

**ADLINK: SMARC module with Freescale i.MX6**  
 ADLINK introduced a new SMARC form factor computer-on-module running a Freescale i.MX6 processor based on the ARM Cortex-A9 architecture. With a choice of dual or quad-core processors running at from 800 MHz to 1.2 GHz with soldered memory up to 2GB DDR3L-1066/1333. The ADLINK LEC-iMX6 delivers top-of-the-line performance with efficient power consumption that targets a new generation of mobile applications requiring industrial-grade stability and reliability and supports an extremely wide operating temperature range of -40 to +85°C thanks to ADLINK's proven Extreme Rugged technology.

[News ID 2477](#)

Hall-Stand 1-326

**Axiomtek: industrial-grade COM Express type 10 mini module**  
 Axiomtek has launched CEM840, its COM Express Type 10 mini module powered by Intel Atom E3800 processors. Measuring only 84 x 55 mm, the CEM840 comes with onboard 4 GB DDR3L memory, quad core, wide voltage, and up to three times more graphical power, and is designed for the extended temperature range from -40 to +85

[News ID 2415](#)

Hall-Stand 4-325

**Green Hills: powerful Embedded Linux C/C++ debugger**  
 Green Hills Software has announced a new MULTI software development environment for embedded Linux developers. MULTI enables developers to seamlessly control and debug all aspects of an embedded Linux system, including the Linux kernel, kernel threads, user mode threads and processes, and interrupt service routines, all from a single tool. Developers can simultaneously interact with these entities in a single window or in separate windows per instance.

[News ID 2456](#)

Hall-Stand 2-311

**IEI: motherboard and Embedded system with 5th gen Intel Core processors**  
 IEI announces the new product of WAFER-ULT2 motherboard and IVS-200 embedded system with support for the 5th generation Intel Core processor. The 5th generation Intel Core processor is designed to prove excellent graphics and performance, supporting the next generation of Internet of Things solutions, while maintaining compatibility with previous generations.

[News ID 2496](#)

Hall-Stand 5-360

**Infineon: security products protect online accounts with FIDO 1.0 spec**  
 Infineon Technologies supports the just released FIDO 1.0 specifications. FIDO defines an open standard for implementation of simple and powerful multi-factor authentication of computing devices that access Internet-based services, private networks and cloud applications. With FIDO authenticators, internet users now can more securely and easily log on to their online accounts using a password combined with a USB key or a local security token.

[News ID 2434](#)

Hall-Stand 4-432

**LDRA integrates tool suite with VxWorks 7 RTOS**  
 LDRA has fully integrated the LDRA tool suite with the next generation Wind River VxWorks 7 real-time operating system to achieve full compliance with industry safety- and security-critical standards. The reduced overhead and comprehensive support of the LDRA tool suite for a wide range of target architectures, regardless of their respective footprints, ensures that VxWorks-based systems can be built and verified faster and at lower cost.

[News ID 2441](#)

Hall-Stand 2-318

**IBASE: Mini-ITX motherboard adopts Intel Q87 chipset**  
 IBASE rolls out a new Mini-ITX motherboard adopting the Intel Q87 chipset and the new generation of Intel Core processors. The high-computing MI981 motherboard is designed to provide high performance and flexibility for functional expansions, and is ideal for applications in industrial control, factory automation, communications and gaming industries.

[News ID 2479](#)

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## Hall-Stand 1-511

### DFI: COM Express basic type 6 supports 3 display outputs

DFI launches a Type 6 COM Express Basic module, the HM960-QM87, in its mobile-based Intel QM87 product line. This COM Express Basic module is powered by the BGA 1364 packaging technology supporting the 4th generation Intel Core processor family. The enhancements in CPU performance, media and graphics capabilities, security and power efficiency in the 4th generation Intel Core processor family are driving innovation.

[News ID 2594](#)

## Hall-Stand 4-335

### LieberLieber: cooperation with PLS on UML test and target access

In the first week of December, at the Embedded Software Engineering Congress 2014 in Sindelfingen, Germany, LieberLieber Software and PLS Programmierbare Logik & Systeme will present their continuous tool chain for the testing and debugging of embedded software on the model level. Using this new comprehensive solution, developers using Enterprise Architect to develop model-based embedded software will also be able to test and debug their work directly in the model. Among other benefits, this saves a lot of time when generating C code. Another big advantage is that already-existing code is maintained.

[News ID 2405](#)

## Hall-Stand 4A-101

### Mouser launches new motor control application site

Mouser Electronics announced the introduction of their new Motor Control Applications site. Mouser's new applications site provides developers with the resources they need to learn about the latest advances in motor control, and the newest components available from Mouser Electronics for building motor control systems.

[News ID 2453](#)

## Hall-Stand 4-350

### Micrium and Embedded Office: prepackaged Cert-Kit for safety-critical applications

Micrium and Embedded Office announce the availability of prepackaged RTOS certification kits ("Cert-Kit") to reduce cost and accelerate development of safety-critical applications. Complete Cert-Kits are now available for industrial controls, medical applications, and transportation based on Micrium's industry-leading  $\mu$ C/OS-II kernel. The Cert-Kit forms the basis of all documents required for the certification of a safety-critical product using an RTOS. Upon request, the test environment can also be made available to customers.

[News ID 2408](#)

## Hall-Stand 4-170

### SYSGO: PikeOS provides safety and security for communication platform from X-ES

SYSGO is announcing the support of its pre-certified hypervisor PikeOS for the XPedite6101 Single Board Computer from Extreme Engineering Solutions. The XPedite6101 is based on a Freescale QorIQ architecture with T1042 processor, designed for high-performance networks. PikeOS adds key features like real-time, as well as safety and security, to a cost-effective and energy-efficient platform for critical networks and telecommunication applications in the Internet of Things.

[News ID 2455](#)

## Hall-Stand 1-328

### Wind River introduces cloud-based Internet of Things platform

Wind River unveiled Wind River Edge Management System, a cloud-based Internet of Things platform that enables devices to connect securely to a centralized console, providing device management and solution extensibility. The platform is an integral part of the newly launched Intel IoT Platform.

[News ID 2435](#)

## Hall-Stand 4-140

### Microsemi: outdoor lightning protection device for Ethernet solutions

Microsemi announced the availability of its new high reliability PD-OUT/SP11, an outdoor-rated lightning protection device supporting both Power-over-Ethernet and non-PoE enterprise installations. The new Microsemi PD-OUT/SP11 is a single-port device, protecting all eight wires of the Ethernet cable while enabling data streams of up to 10/100/1000mbps and PoE levels up to 95W. The device is optimized for outdoor devices such as security cameras and wireless LAN access points (AP) and features lightning protection up to 10KV. According to market research firm Infonetics, around 300,000 outdoor WLAN APs are expected to ship in 2014, growing to 650,000 in 2018.

[News ID 2386](#)

## Hall-Stand 2-519

### VadaTech: adapter/carrier cards for embedded open architectures

VadaTech offers a wide range of adapter cards that allow standard mezzanine cards of multiple formats to be utilized within the system. The adapter cards and carriers allow the re-use of legacy boards and the leveraging of existing technology to help solve an engineer's needs. VadaTech offers 17 adapter/carrier cards in the AdvancedTCA form factor. This includes blades that accept standard VME/VME64x, CompactPCI, PCIe/PCI-x, PMC/XMC, AMC, and COM Express modules.

[News ID 2432](#)

## Hall-Stand 4A-130

### Microchip: new Linux driver enables MOST technology for Linux Ecosystem

Microchip has joined The Linux Foundation and Automotive Grade Linux, a collaborative open source project developing a common, Linux-based software stack for the connected car. Additionally, Microchip has begun enabling designers to use the Linux operating system with its portfolio of MOST network interface controllers.

[News ID 2486](#)

## Hall-Stand 1-511

### DFI: COM Express Compact module with AMD Embedded G-Series SoC

DFI launches the SE967, a new Type 6 COM Express Compact module in its AMD Embedded G-Series SoC product line. This is DFI's first Compact module powered by AMD Embedded G-Series SoC which is improving boost residency and power & thermal management. This new module with the latest AMD embedded G-Series processor-based SoC platform that features power efficiency, high performance, and enhanced multimedia capabilities is well-suited for intelligent systems that display videos, graphics and interactive content such as gaming machines.

[News ID 2475](#)

## Hall-Stand 2-519

### VadaTech: rugged 1U MicroTCA chassis platform

VadaTech now offers a rugged 6-slot MicroTCA chassis in a 1U height. The chassis is designed to meet MIL-STD-901D and 810G for shock and vibration and MIL-STD-461F for EMI. The VT950 offers the highest performance density of any rugged 1U backplane-based embedded chassis in the marketplace. Competing rugged architectures are typically at least 3U high for comparable slots/performance. The VadaTech chassis utilizes a thicker aluminum construction than commercial enclosures, a reinforced cover, and several other ruggedization techniques.

[News ID 2450](#)

## Hall-Stand 1-306

### Toshiba: ARM Cortex-M4F equipped MCU reduces arithmetic processing times

Toshiba has expanded its TX04 series of microcontrollers with the launch of TMPM-440F10XBG. The ARM Cortex-M4F core-based microcontroller will find application in broad range of digital devices including precision equipment, portable devices and security cameras with motion sensors, single-lens reflex cameras, and amusement machines. Improving performance of digital equipment is driving demand for a reduction in microcontroller arithmetic processing times so that overall performance can be maintained and improved.

[News ID 2414](#)

Hall-Stand 4A-130

**Microchip: code configuration plug-in for MPLAB X IDE supports 16-bit PIC MCUs**

Microchip announces the expansion of its MPLAB Code Configurator Plug-In to support 16-bit PIC MCUs, in addition to the 8-bit devices already supported. This code development tool enables developers to enhance the design experience with faster application development. Based on the popularity of this tool for 8-bit products, Microchip has added support for more than 50 16-bit devices into the latest release of the MPLAB Code Configurator.

[News ID 2574](#)

Hall-Stand 1-350

**Renesas: RX700 series offers 240 MHz operation and 4 MB on-chip flash memory**

Renesas Electronics announced the availability of the RX71M Group as the new flagship product in the RX Family of 32-bit microcontrollers. Developed for use in industrial equipment, the new series doubles the CPU operating frequency to 240 MHz from the 120 MHz of previous products and is available with up to 4 MB of on-chip flash memory.

[News ID 2580](#)

Hall-Stand 2-240

**MSC: new SSDs from Samsung with high-write endurance**

MSC Technologies is offering Samsung's newly released SM843T and SV843 Solid-State Disks. The SM843T SSD utilizing selected MLC NAND Flash, the SV843T utilizing 3D-NAND Flash, which feature consistently low latency, high level of sustained writes, and high-write endurance coupled with power-loss protection all at capacities up to 960GB. The life of a drive is generally determined by such factors as the type of applications and workloads that are being used. The Samsung SM843T is optimized for random write workloads up to 1.8 full drive writes per day and up to 3.6 WPD with the SV843 SSD which represents a 12x improvement over competitive offerings.

[News ID 2570](#)

Hall-Stand 4-140

**Microsemi: FPGAs enhanced with physically unclonable function technology**

Microsemi announced the latest addition to its portfolio of Cyber Security capabilities for its flagship FPGAs, SmartFusion2 SoC FPGA and IGLOO2, with Physically Unclonable Function (PUF) technology licensed from Intrinsic-ID. With the hardened PUF technology as part of Microsemi's devices, system architects and designers now have an ultra-secure solution they can rely on when developing a wide range of applications for the Internet of Things.

[News ID 2499](#)

Hall-Stand 4A-101

**Mouser: 1GbE embedded IoT gateway by Advantech**

Mouser Electronics is now stocking the MIO 2263 Embedded IoT Gateway from Advantech. The MIO 2263 is a single-board computer equipped with either an Intel Celeron or Intel Atom CPU. These embedded Internet of Things gateway SBCs feature a 1GbE interface for Ethernet connectivity up to 1,000 Mbps, up to 8GBytes of RAM, multiple I/O and communication interfaces, high-definition audio, and a half-size Mini PCI Express expansion slot.

[News ID 2478](#)

Hall-Stand 5-445

**Telit to help build awareness of privacy and security across the IoT**

Telit Wireless Solutions announced, that, in response to the recent rise in consumer and enterprise concerns surrounding privacy and cyber security, the company will redouble its efforts to increase awareness about how its solutions can be properly applied to maximize security and privacy in handling personal information, such as health records and making online or mobile payments. With the effort, Telit hopes to help allay concerns by connected consumers and industry that it is not necessary to sacrifice privacy to enjoy all that the Internet of Things has to offer.

[News ID 2485](#)

Hall-Stand 2-140

**MEN: unmanaged 8-port Ethernet switch in rugged aluminum enclosure**

The NM10 is a robust unmanaged 8-port Ethernet switch in a compact box PC format and is available in four standard configurations. The flexible switch comes with either 100 Mb or 1 Gb Ethernet interfaces, as well as with a Class 2 wide range power supply. Conforming to EN 50155 and ISO 7637-2, the rugged Ethernet switch reliably operates in the extended temperature range of -40 to +70°C (+85°C for 10 minutes in accordance with Tx) in harsh road, railway and industrial applications.

[News ID 2584](#)

Hall-Stand 5-208

**TI: DLP Pico 1080p display chipset enables full high-definition projection**

Texas Instruments announced that the 0.47" TRP Full-HD 1080p chipset for video and data display applications is sampling to its third-party developer network. Based on the proven DLP Cinema technology used in more than eight out of ten digital theatres worldwide, the 0.47" TRP Full-HD 1080p chipset is the smallest TI chipset capable of generating brighter, more efficient full high-definition projection displays from small form-factor electronics.

[News ID 2402](#)

Hall-Stand 4-325

**Green Hills support TI's TDA2x ADAS processor family**

Green Hills Software has made available its automotive safety and security products, including the INTEGRITY real-time operating system and INTEGRITY Multivisor virtualization solution, for the Texas Instruments TDA2x processor product family and TI's Vision SDK, targeting Advanced Driver Assistance Systems (ADAS).

[News ID 2589](#)

Hall-Stand 1-340

**Silica: ArchiTech Louvre board combines NXP MCU and NFC tag**

SILICA has announced availability of the ArchiTech Louvre board, a platform to help engineers accelerate the implementation of Near Field Communications in electronic devices. The demonstration and development board is based around the NXP LPC11U37 ARM Cortex M0 microcontroller and the NXP NTAG I2C tag IC. It comes with firmware and sample Android applications, and source code is provided under GPL. The Louvre board is also equipped an Arduino connector interface to facilitate connection to an external platform for which thousands of applications are available and has an integral 2.7-inch, e-ink display.

[News ID 2439](#)

Hall-Stand 1-511

**DFI: 3.5" Embedded SBC features low-power consumption at only 15W TDP**

DFI unveils HU551, the most advanced 3.5" SBC in its 4th generation Intel Core product line. The new U-Series platform with BGA 1168 packaging technology features smart performance, immersive visuals, and low-power consumption at only 15W TDP. The enhanced Intel HD graphics GT series integrated in the processor projects a 24% performance increase over its previous generation. Improvements include rich media, multiple displays, as well as immersive visual experiences to a variety of industrial applications.

[News ID 2404](#)

Hall-Stand 4-520

**Rigol: MCPS test solution supports DAQ system M300**

a complete and easy to use Test-Solution for Data Acquisition and Data Logging. MCPS is a software package, which can be installed on standard Windows PCs (minimum WindowsXP SP3) within one minute. The basic concept of MCPS is to provide an easy and fast way to configure a measurement. MCPS is not a SCADA or development system, but was designed to be used by all users and not only by programmers or developers.

[News ID 2410](#)



## Hall-Stand 4-218

**R&S: oscilloscopes lead in analysis of high-speed CAN FD interface protocol**

Introduced in 2012, the CAN FD serial bus protocol with a maximum data rate of up to 15 Mbps boosts controller area network performance. This benefits, for example, the automotive industry in developing modern motor management solutions. The R&S RTx-K9 option now enables R&S RTE and R&S RTO oscilloscope users to analyze interfaces of this type and trigger to protocol details. Hardware-based decoding makes finding errors with the oscilloscopes especially fast, which accelerates the design verification and commissioning processes for chipsets with CAN FD interfaces.

[News ID 2440](#)

## Hall-Stand 4-218

**R&S: 200 MHz model of RTM oscilloscope for universities and education**

Rohde & Schwarz designed the new 200 MHz models of the R&S RTM oscilloscope especially for universities and educational institutions. The education mode was developed for test and measurement practica and makes it possible to disable all analysis tools (e.g. Autose and QuickMeas) and automatic measurements. This improves the learning effect as students and learners have to calculate measurement results on their own. The mode is password protected and available for the other bandwidth models of the R&S RTM family as well.

[News ID 2468](#)

## Hall-Stand 1-306

**Sierra Wireless: next-gen AirLink gateways for 4G LTE networks worldwide**

Sierra Wireless announced the launch of the company's next generation AirLink gateways. The AirLink GX450 4G mobile gateway and the AirLink ES450 4G enterprise gateway offer support for a broader array of LTE frequency bands, making them compatible with networks worldwide.

[News ID 2581](#)

## Hall-Stand 4-218

**Rohde & Schwarz partners with Conrad to offer measurement instruments**

Conrad Business Supplies has become a stockist of Rohde & Schwarz measurement instruments as a result of the decision by the manufacturer to market products from its subsidiary HAMEG Instruments under the Rohde & Schwarz name. Munich based Rohde & Schwarz acquired HAMEG in 2005 and in 2011 integrated the entire product range through its own well-established European distribution network. Amongst the key Rohde & Schwarz products now offered by Conrad is

the new R&S HMO1002 series of entry level oscilloscopes that offer reliable fanless operation and features including 1 MPTs of memory depth and a 1 Gsa/s real-time sampling rate. Another popular product range is the new R&S HMC804x power supply series that includes unique features such as data logging and an integrated energy meter that are not usually part of the specification of equipment in the entry level price bracket.

[News ID 2389](#)

## Hall-Stand 1-408

**Concurrent: VMEbus 4th gen Intel Core i7/i5 processor board**

Concurrent Technologies announces VP B1x/msd, a 6U VME board based on a 4th generation Intel Core i7/i5 processor. The headline variant of VP B1x/msd uses the quad-core i7-4700EQ processor that features new instructions to enhance vector processing and security along with improved graphics capability. Variants are also offered based on i5-4410E and i5-4422E processors for dual core based performance and power optimised solutions. All processor variants include Intel HD Graphics 4600 which has 20 execution units and can support three simultaneous display outputs. A front or rear VGA port is provided for backwards compatibility with previous boards.

[News ID 2548](#)

## Hall-Stand 4A-101

**Mouser: now stocking Cypress' PSoC-4 Pioneer Kit**

Mouser Electronics is now stocking the PSoC-4 Pioneer Kit from Cypress Semiconductor. This easy-to-use platform allows developers to design and evaluate the Cypress CY8C4245AXI, a member of PSoC 4 family. The Cypress PSoC 4 product family is a combination of an ARM Cortex M0 microcontroller, reconfigurable analog blocks, and digital programmable logic. Peripherals include a 12 bit ADC, two DACs, two op amps, and standard communication and timing peripherals. The PSoC 4 also features a 20nA STOP mode.

[News ID 2413](#)

## Hall-Stand 4-335

**LieberLieber and Willert: real-time capable UML code generation**

LieberLieber strengthens its partnership with Willert Software Tools to develop a real-time solution for UML code generation. In view of continually growing requirements, especially in the area of embedded software development, this new solution can help developers to create more complex real-time-critical systems while adhering to appropriate standards. This jointly-developed solution package combines "LieberLieber Embedded Engineer" with Willert's "Embedded UML Framework RXE."

[News ID 2520](#)

## Hall-Stand 2-240

**MSC presents Booksize PC with a passive-cooled Intel Core processor**

MSC Technologies presents the 330 x 206 x 88 mm embedded system Booksize B1-Q87 under the label DSM Computer. The compact computer is designed for applications sized between desktop computers and industrial computers, and is ideal for applications such as database servers. Other target markets are digital signage, retail and gaming.

[News ID 2492](#)

## Hall-Stand 4-460

**NI: design suite helps engineers prototype 5G systems**

NI announced the LabVIEW Communications System Design Suite, which combines software defined radio hardware with a comprehensive software design flow to help engineers prototype 5G systems. The LabVIEW Communications environment enables the entire design team to map an idea from algorithm to FPGA using a single high-level representation. This approach empowers designers to focus on innovation instead of implementation, which increases the rate and quality of their prototyping.

[News ID 2443](#)

## Hall-Stand 1-606

**PEAK: PCI Express adapter for miniPCIe cards**

PEAK-System presents a new PCIe-miniPCIe adapter. With its help, PCI Express Mini and Half PCI Express Mini cards can be operated in a computer with low-profile housing. The adapter includes a Mini-USB socket, a Micro-SIM card holder, as well as a voltage supply of 1.5 V and 3.3 V for plugged PCI Express Mini cards. A possible field of application is the operation of USB solutions and add-in cards for wireless communication, like WWAN (e.g. UMTS, GSM), WLAN, and WPAN (e.g. via Bluetooth).

[News ID 2418](#)

## Hall-Stand 4A-220

**Freescal: 15 Watt Qi-compliant wireless charging solution**

Freescal extended its wireless charging portfolio by introducing the industry's first 15 W Qi-compliant wireless charging solution. The solution paves the way for ultra-fast wireless recharging for a variety of larger mobile devices including tablets, large-screen smart phones and portable industrial and medical equipment. Delivering 3x the power of common 5 W charging solutions, Freescal's 15 W wireless offering provides efficient charging of larger form factor devices with higher capacity batteries, while enabling faster charging of smaller form factor devices by delivering higher power.

[News ID 2422](#)

Hall-Stand 5-208

TI eliminates motor tuning with new 12-V motor driver family

Texas Instruments expanded its motor driver portfolio with a new 12-V motor driver family that reduces spin-up time to just seconds and makes tuning stepper and brushed DC motors easier than ever before. The DRV8846 incorporates a new, proprietary adaptive current control technology that automatically tunes motor performance for precise, smooth and quiet motion. The DRV8848 simplifies designs by using a simple pulse-width modulation control interface and minimal external components.

News ID 2424

Hall-Stand 1-606

PEAK-System: position and orientation data via CAN

The new PCAN-GPS from PEAK-System determines position and orientation data by means of various sensors. This data can be transmitted on a CAN bus and can be logged on the internal memory card. Available are a satellite receiver, a magnetic field sensor, an accelerometer, and a gyroscope. The satellite receiver can handle the systems GPS, Galileo, GLONASS, QZSS, and SBAS.

News ID 2459

Hall-Stand 4-438

Pico: USB 3.0 SuperSpeed oscilloscopes with 512 MS deep memory

PicoScope 3000D Series oscilloscopes are high-performance test and measurement instruments for mainstream electronics design engineers. With up to 200 MHz bandwidth, 2 or 4 analog channels plus 16 digital channels on the mixed-signal models, and deep memories from 64 to 512 MS the PicoScope 3000D Series are ideal for debugging the latest digital and mixed signal designs.

News ID 2567

Hall-Stand 4-310

PLS: UDE supports Infineon TLE986x and TLE987x Embedded Power ICs

PLS Programmierbare Logik & Systeme presents the latest version 4.3.4 of its Universal Debug Engine, an optimized test and debug tool for the new Infineon TLE986x and TLE987x Embedded Power IC series. The highly integrated Embedded Power family was specifically designed for intelligent motor control in a wide range of automotive applications. The devices come in a standard QFN package with a footprint of only 7 mm x 7 mm. In addition to an ARM Cortex-M3 core, the devices include flash memory of up to 128

kB, up to six NFETs, a current sensor, a successive approximation 10-bit ADC, a capture and compare unit for pulse width modulation (PWM) control and several 16-bit timers.

News ID 2438

Hall-Stand 4-270

Express Logic: X-Ware platform now supports Atmel, Renesas, ST and TI development systems

Express Logic has expanded its support for X-Ware Platform, the company's target-specific, integrated run-time software that combines all X-Ware components (ThreadX, NetX, USBX, FileX, GUIX, and TraceX) pre-ported and fully integrated for use on specific development boards. X-Ware Platform helps developers avoid the significant development and integration work normally associated with the use of generic software products on a specific board. First introduced with support for the Renesas RZ/A1-based RSK board, X-Ware Platform is now available for Atmel SAMA5D3x-EK, STMicro STM324xG-EVAL and TI AM335x Starter Kit.

News ID 2571

Hall-Stand 4A-326

FTDI: EVE platforms support development of HMI's with capacitive touch

FTDI Chip has further enlarged the portfolio of development modules accompanying its Embedded Video Engine technology - which has helped revolutionise how human machine interfaces are implemented thanks to its innovative object-oriented approach. These latest EVE platforms are targeted at the creation of intelligent display systems using capacitive touch and are based on the FT801 EVE chip released earlier this year.

News ID 2449

Hall-Stand 4-238

SEGGER: SSL/TLS solution targets embedded devices

SEGGER introduces emSSL, a ground-up implementation of secure sockets that are the backbone of secure communications on the Internet today. Written to run effortlessly on single-chip embedded devices, emSSL integrates seamlessly with embOS/IP or, alternatively, any IP stack that supports plain sockets, or any bidirectional communications channel. emSSL supports TLS version 1, 1.1, and 1.2 out of the box and provides modern cipher suites that offer robust authentication, confidentiality, message integrity, and forward secrecy. Whilst being compact, it is also highly efficient in terms of RAM, ROM, and processor load.

News ID 2490



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**■ Artesyn: Compact ATCA system for data intensive enterprise networking**

Artesyn Embedded Technologies announced the Centellis 2100, a two-slot 40G AdvancedTCA system platform designed to support the latest high performance payload blades. With power and cooling support for up to 400 W per slot and up to 500 W in a single slot configuration, the new Centellis 2100 enables systems integrators to increase performance and I/O bandwidth per slot, while preparing for future performance upgrades that will have increasing power and cooling requirements.

[News ID 2582](#)

**■ N.A.T.: new opportunities for wireless and fixed line applications**

Discover with N.A.T. the new opportunities for wireless and fixed line applications by building a communication solution based around the de facto standard MicroTCA at Mobile World Congress. You will find three application examples based on N.A.T. building blocks at the expo covering: Fixed Line Application, Mobile Communication Architecture and Network Application. N.A.T. satisfies requirements such as implementing standard and customized serial protocols, increasing performance but decreasing power by adding sophisticated multicore processing up to 8 cores per slot, increasing scalability through easy to use building blocks on I/O and processing at smallest foot print, fast and low latency switching. N.A.T. turn-key systems as well as special board level solutions help to generate, distribute and analyze very efficiently enormous data traffic by state-of-the-art technology.

[News ID 2576](#)

**■ DDC: ruggedized 28V, 200A, 8-channel SSPC power distribution unit**

Data Device Corporation now offers its 8-Channel, Solid-State Power Controller (SSPC) in a ruggedized military-grade form factor, offering advanced programmability and high-power density in a compact, highly reliable package. In addition to improved reliability and smart power control, the 8-Channel SSPC Power Distribution Unit (RP-20S19XXX) provides significant Size, Weight, Power and Cost savings.

[News ID 2493](#)

**■ Faulhaber partners with Trinamic to develop stepper motor board**

Searching the multitude of available programmable motion controllers for a controller that is ideally suited to miniaturised stepper motors with phase currents of sometimes less than 100 mA was once a real challenge. The MCST 3601 series has now emerged from the cooperation between FAULHABER and Trinamic, the motion controller specialist for stepper motors. This controller is compact and flexible and, above all, is perfectly suited to the whole range of FAULHABER micro stepper motors.

[News ID 2470](#)

**■ DDC: 100-Amp per channel, solid-state power controllers**

Data Device Corporation introduces new 2-Channel and 4-Channel SSPCs, featuring 100 amp per channel high current throughput capability, and extremely low power dissipation, in small form factor solutions that enable highly efficient and compact system design. These highly efficient Solid State Power Controllers enable significant SWaP-C savings compared with mechanical switches, breakers, and relays, saving space for other components and expanded functionality.

[News ID 2409](#)

**■ Aitech: rugged Compact PC in IP65 aluminum enclosure**

Aitech Defense Systems now offers the extremely rugged and compact A171 computing system that ensures high computing performance under highly adverse conditions. An environmentally-sealed (IP65) aluminum enclosure that withstands exceptional shock and vibration houses the A171's Intel Core i7 processor board along with a highly integrated power interface board. The two boards are hard-mounted to the interior of the front panel, which enables the front panel's integrated heat sink to provide high efficiency cooling of the system's higher power components for increased system reliability.

[News ID 2444](#)

**■ Acromag: 6U VME 4th gen Intel Core SBC**

Acromag's XVME-6410 is a high performance 6U VME single board computer based on the 4th Generation Intel Core i7 or i5 processor and utilizes the Intel 8-Series QM87 PCH chipset for extensive I/O support. Up to 16GB

	COMPANY	PAGE
Advertisers Index	ADLINK	9
	Advantech	17
	Apacer	18
	ARTILA	43
	Avalue	39
	Digi-Key	2
	EBV	7/33
	EKF	27
	ELMA	49
	Express Logic	11
	Green Hills	5
	Infineon	56
	Lauterbach	23
	LPKF Laser	22
	Mesago	55
	Microchip	29
Micro-Star Int'l	45	
MSC	3	
Peak System	31	
PLS	35	
RUTRONIK	15	
Commell	47	
TQ Group	37	
VadaTech	41	



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[News ID 2568](#)

■ **Avalue: fanless, rugged and expandable Panel PC**

Avalue Technology is unveiling a new rugged and expandable panel PC, ARC-1209. ARC series is a new product line which stands for advanced ruggedized and expandable panel PC. The ARC-1209 is an ideal solution for industrial automation, home automation and human machine interface applications. ARC-1209 is powered by Intel Atom E3845 1.91GHz with integrated chipset and supports one 204-pin DDR3L SODIMM system memory with up to 8GB capacity. In terms of the I/O, ARC-1209 deployment includes one USB 3.0, three USB 2.0, two COM, one SATA II, one WiFi, one Mini PCIe supporting mSATA, three knockouts for antenna mounting, speak out and two LAN ports supporting Intel I210IT for wide temperature. ARC-1209 supports optional dual display (HDMI + LVDS), three audio jack for 5.1CH, extra Mini PCIe slot with push-push SIM socket, and future expansion for GPIO & CAN Bus.

[News ID 2536](#)

■ **SGET releases addendum of new Qseven camera feature connector**

SGET, the Standardization Group for Embedded Technologies, has released an addendum to the 2.0 version of the Qseven standard. The standard, originally developed by the Qseven consortium in 2007 has been adopted by SGET in 2012. The addendum specifies how a MIPI-CSI2 compatible camera can be connected to a Qseven module via a standard feature connector to enable cost-optimized high-resolution camera systems.

[News ID 2458](#)

■ **ACCES I/O: 8 MHz, 16-bit, USB arbitrary waveform generator**

ACCES I/O Products has announced the release of a new USB high speed arbitrary waveform output board with flexible ranges and configurable digital I/O lines. Industry standard BNC connectors are used for the analog waveform output and the gate control input, while the utility digital I/O lines are accessed via a 16-pin shrouded connector. The USB-AO-ARB1 can be used in an assortment of embedded applications including stimulus-response, test, simulation, industrial equipment control, waveform/audio synthesis, advanced substance scanning and detection, medical imaging systems, military/mission-critical, cyber security systems, manufacturing test, and process monitoring.

[News ID 2554](#)

■ **Interface Concept: Virtex-7 MTCA.4 FPGA processing unit**

Interface Concept in partnership with DESY has released a new FPGA Xilinx Virtex-7 processing engine in a single MTCA.4 form factor. IC-FEP-TCAa board combines the best current FPGA technology with innovative design to provide high-performance for demanding digital signal processing applications. Its Virtex-7 FPGA features thirty six Serdes transceivers. Two FMC (VITA 57.1) mezzanine sites allow to plug ADC, DAC, general IOs, sFPDP or additional FMC modules, including a four channel 1300MSPS @ 12 bit ADC FMC developed by IC for RF sampling.

[News ID 2557](#)

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