MTCA – The proven successor for VME and CPCI

Cover Story

Let Your Application benefit

Special Features:
- MicroTCA
- Tools & Software
- Embedded Computing
THE WORLD’S LARGEST SELECTION OF ELECTRONIC COMPONENTS
Available for Immediate Shipment!

FIND CONTACT AND ORDERING INFORMATION FOR YOUR REGION AT DIGIKEY.COM/EUROPE

1,000,000+ PRODUCTS IN STOCK | 650+ INDUSTRY-LEADING SUPPLIERS | 100% AUTHORIZED DISTRIBUTOR
Dear Readers,

In the embedded industry technical evolution and further developments often appear despite the fact that embedded systems feature longevity of many years up to several decades. Examples for these long lasting embedded technologies are the VMEbus – say the “grandfather” of embedded computer technology and Compact PCI. Both of these form factors dominated the embedded industry for more than a decade but now it seems that their successor arrives at the scene – MicroTCA (µTCA). Our cover story starting at page 6 implies that this form factor prevails as the most promising successor for the older form factors.

µTCA is based on AMCs (advanced mezzanine cards) originally derived for Advanced Telecom Computer Architecture (ATCA) but is a smaller, more cost effective and more scalable architecture. µTCA systems can scale from a single board to a 9U rack-mount application offering high performance capability in a small package size. The carrier functions and all other system infrastructure components of ATCA, for example Ethernet switch and system management boards, are all minimized as optional sub modules and serviced by one special slot known as the MCH. The main contributor to the success of MTCA is the Flexibility and scalability of AMCs. As an example an AMC can be designed using a simple 1GbE port backplane interface up to a complex backplane interface providing a variety of interfaces. From a performance and bandwidth perspective there should be little doubt that the AMC standard was designed with the future in mind. Surprisingly it is important to note that AMCs are also capable of targeting cost sensitive applications that require low to medium performance with a small package size. In fact there are various use cases where AMCs are used as an alternative to a commercial or custom mother board platform.

Due to the advantages our cover story determines that right now is the time to take the innovative step into the future and change to MTCA and claims that without a doubt MTCA is the replacement computing architecture for VME and CPCI. Time will tell whether this assumption will become true. Preconditions are good due to emerging new markets and technologies like the Internet of Things (IoT) which requires small, power efficient, and high performance embedded computer products.

Let’s just wait and see what will happen.

Yours Sincerely
Wolfgang Patelay
Editor
Now is the time to change your VME and CPCI computing platform to MTCA!  

For more than a decade VME and CPCI users have been waiting to see which open computing standard would prevail as the most promising successor. Now is the time to change: MTCA provides the necessary technology building blocks to provide a smooth migration path for your existing application. With a little basic planning, MTCA provides a straightforward migration path to address your application requirements now and for the future.

Securing IoT designs – from edge node to the cloud  

Along with integration, security is the top challenge in moving IoT faster into key growth areas such as critical infrastructure and the industrial market. Providing all the platforms for both installed base systems as well as new deployments, from the device level up to the cloud, security can be taken care of from a system point of view.

Touch, discover, and solve – demand more from your next scope!  

Modern oscilloscopes offer so much more beyond the traditional top four specifications. Touch technology has become an option with oscilloscope design as with all other devices, and helps trigger signals instantaneously. The Keysight InfiniiVision 3000T X-Series is one example of the latest scopes equipped with this and many other new features.

The ever-changing world of high speed digital design  

This article describes the development of modern electronics in the last decade, which has brought not only advantages but also some issues. To deal with these issues developers can attend a seminar which shows how to design the required high speed PCBs.

How to select the right modules in the embedded market?  

It has been decided to use a module - now comes the much more difficult part of the decision – the search for the best solution. The number of modules offered in the embedded market is nearly incalculable. So, how do I find the optimal module for my requirements?
For more than 30 years the world’s leading companies have trusted Green Hills Software’s secure and reliable high performance software for safety-critical applications.

For the connected car, consumer and medical devices, industrial telemetry, smart grid, telecoms hubs and more, our software and services deliver proven secure, reliable underpinning technology for the Internet of Things.

To develop devices for the Internet of Things with the highest levels of security and reliability, visit www.ghs.com/secureIoT
Now is the time to change your VME and CPCI computing platform to MTCA!

By Vollrath Dirksen, Heiko Körte and Terry Manus, N.A.T.

For more than a decade VME and CPCI users have been waiting to see, which open computing standard would prevail as the most promising successor. Now is the time to change:

MTCA provides the necessary technology building blocks to provide a smooth migration path for your existing application. With a little basic planning, MTCA provides a straightforward migration path to address your application requirements now and for the future.

The recent obsolescence of a key semiconductor device used on VMEbus products is causing VME and CPCI users alike to rethink their future product strategies. For more than a decade these existing VME and CPCI users have waited to see, which open computing standard would prevail as the most promising successor. And now this recent announcement by IDT® and IBM to end-of-life (EOL) a key component for VME board designs is a clear sign that semiconductor manufacturers will not provide on-going support for products that do not meet their economic guidelines. Of course being left without a compatible replacement device will in turn force board vendors to extend product lead-times, increase minimum order quantities (MOQ) and ultimately EOL their own board products as well. So as OEMs and End Users of these board products focus on the short-term Band-Aid® to this EOL problem, the near term solution will ultimately be defined by the computing architecture they choose to move forward with. This article will attempt to put together a framework to rationalize what an OEM and End User should consider when making a change in their computing platform.

In today’s technical world it would appear that the only constant is change. Based on numerous examples in life we know that when new demands can no longer be satisfied with an existing solution they become the hard requirements that drive a new one. There are many academic theories and laws dealing with this position, but the most famous is Moore’s Law. Over time Moore’s Law has been proven time and time again, and it is fair to state that his basic assumptions and conclusions can be transferred to other industries or markets as well - the most obvious reason being that these industries and markets are massively impacted by the semiconductor industry as well. This position can be observed in the history of computing architectures which will undoubtedly continue into the future.

Although these standards all continued to provide additional years of success beyond its follow on replacement, there must be a good reason why another standard is created although an existing standard still continues to be used. This position then poses two distinct questions:

1) What makes a computing standard successful?
2) What are the forces that drive a new computing standard?

To properly address these questions requires at least a short historical review. After all, it is the historical record showing the test of time that ultimately defines a successful computing standard.

VME – From this perspective, even a short historical review must start with VME as it is the most successful computing standard used by the market thus far. Remarkably VME has provided more than 30 years of success. And the reason for its success is based on the fact that it has been able to provide multiple sources at the chip, board and system level. It used state-of-the-art technology at the time the standard was developed and in turn was accepted by multiple markets for various reasons including its modular design, open system standard, multiprocessor support and robust environmental capabilities. The architecture allowed users to combine high performance boards such as processors with low performance IO so a system could easily scale in terms of size and capability.

CPCI and PCI – Continuing with the historical record and as a consequence of PCs becoming a consumer product, industry started to look for ways to leverage this technology into industrial use cases. In fact VME provided sufficient proof that PCI was a suitable approach as PCI solutions were already being used in the form of PCI Mezzanine Cards (PMC). As a result of this commercial influence the open standard CompactPCI (CPCI) was released in 1999. Since its inception CPCI vendors have always looked at CPCI as being the successor to VME - mainly because CPCI was based on the commercial and technological advantages of PCI while
Maia
Wireless Sub-GHz Module with proven M-Bus and OMS Stack

Maia is a single embedded low cost wireless M-Bus RF Module developed specially for the AMR (Automatic Meter Reading) smart metering and smart grid infrastructure where the wireless M-Bus standard (EN13757-4) and OMS standards are used.

Its high quality, small form factor: 15mm x 14mm makes it ideal for SMD assembly. The module offers low power consumption which is achieved with STM’s ultra-low power microcontroller STM 32L05 and SPIRIT1, the low power Sub-GHz data rate transceiver. Also on board is an ultra-miniature balun, BALF-SPI-01D3 matching SPIRIT1 and supporting the connection to an external antenna, therefore saving space and cost. In addition, Maia includes an industry proven wireless M-Bus and OMS-layer to OMS 3.X and OMS 4.X specifications.

For application support and design know-how just contact your local EBV Elektronik partner, the leading EMEA semiconductor distributor or visit ebv.com/maia.
What makes a computing standard successful?

With the aforementioned computing standards in mind, the answer to the question posed earlier - What makes a computing standard successful? - becomes clear. A standard is successful in the respect of a broad adoption by different markets only if and when it provides:

- An open specification that necessarily allows anyone to have access to it.
- Architectural control by an independent organization as opposed to a single vendor.
- A healthy ecosystem offering a broad range of needed infrastructure and processing capability using devices such as processors, IO, chassis, power supplies, etc.
- Vertical market engagements that require longevity.
- A clear commitment of leading semiconductor companies to support these markets.
- A standard that allows the flexibility to adapt to further changes in technology.
- Market acceptance offering solid monetary support.

What are the forces that drive a new computing standard?

Based on the historical review presented earlier the forces that drive a new standard are typically disruptive in their nature. In this specific scenario the disruption would either be a technical or economic capability that was not previously available. And although a successful standard should allow for evolutionary changes to occur, there will be some point in time where a disruption is inevitable. The point being that these changes are ultimately necessary to meet the application requirements for tomorrow. An example of this might be moving from a parallel to serial data paths. Other examples could be referenced by Ethernet, PCle Express, storage (SATA, SAS), RapidIO and USB.

**ATCA and AMC** – In 2000 a few large customers in the communications market worked with board, chassis and system vendors to define a new computing standard that would meet the computing requirements for the next decades. Established as a PICMG standardization committee this group worked to develop a specification that initially targeted the telecom market and then with a bigger scope to replace an aged installed base of computing platforms running on VME and other proprietary form factors. The result of this work was the development of an open standard defined as the Advanced Telecom Computing Architecture (ATCA).

The target market ATCA was developed for made it a natural architecture to consider as the successor of existing VME industrial applications. This is underlined by the mezzanine concept that accompanies ATCA. The fact that PMC modules used with VME and CPCI did not offer hot-plug and hot-swap functionality and provided a limited data interface made an alternative mezzanine architecture necessary. With this being the case a new mezzanine card architecture for ATCA was developed – the Advance Mezzanine Card (AMC). AMCs use an enhanced architecture based on PCleExpress, SATA/SAS for storage, both 1/10 GBe, Serial RapidIO (the successor of Parallel RapidIO), IPMI for system management and diagnostics, and user IO to not only address today’s requirements, but tomorrow’s as well.

Today ATCA is being used in various high-end applications that include the core network, semiconductor fabrication and military/aerospace. The research and test markets have also used ATCA for applications involving experimentation as well. Generally speaking applications in the standard embedded computing market find ATCA as platform that exceeds their requirements for cost, power consumption and size.

**MTCA and AMCs** – In 2006 the rich set of possible interfaces and features of AMCs originally derived for ATCA paved the way for a smaller more cost effective and scalable ATCA architecture known as MTCA.

On its own, MTCA systems can scale from a single board to a 9U rack-mount application offering high performance capability in a small package size. The carrier functions and all other system infrastructure components of ATCA, for example Ethernet switch and system management boards, are all minimized as optional sub modules and served by one
Smart IoT Gateway Solutions
Stable, robust, and reliable connection to the cloud

- Connectivity
- Manageability
- Security

Powerful Yet Compact Embedded Platform

**MXE-200i**
- Intel® Atom™ processor E3826
- Support Intel® IoT Gateway
- 2x mPCIe for WiFi/Bluetooth
- Ultra-Compact 120 x 100 x 55 mm housing

Embedded IoT Gateway Platform

**MXE-100i**
- Intel® Quark™ SoC X1021
- Support Intel® IoT Gateway
- 2x mPCIe for WiFi/Bluetooth
- Ultra-Compact 120 x 100 x 55 mm housing

ADLINK Technology, Inc.
Tel: +49 621 43214-0  emea@adlinktech.com  www.adlinktech.eu
Today MTCA is used in a wide range of applications - from telecom infrastructure projects to test & measurement equipment for mobile networks - from real-time media processing, test and measurement equipment to large installations for high energy physics.

And based on its current position MTCA has proven its flexibility and capability from near PC based applications to full featured ATCA systems. The main contributor to the success of MTCA is the flexibility and scalability of AMCs. As an example an AMC can be designed using a simple 1GbE port backplane interface up to a complex backplane interface providing the following interfaces:

- Redundant GbE
- Redundant storage
- High-performance PCIeXpress
- And/or 10GbE or RapidIO interfaces
- Direct links to the neighbor slot
- Clock signals
- Clock synchronization (clock in/outputs)
-Management signals
- User-defined signals.

To provide even more flexibility and capability MTCA.4 can then compliment the interfaces listed above through the support of a Rear Transition Module that provides the following interfaces:

- Low and high-speed analogue signals
- Digital signals
- Clock signals
- User defined signals.

From a performance and bandwidth perspective there should be little doubt that the AMC standard was designed with the future in mind. Surprisingly it is important to note that AMCs are also capable of targeting cost sensitive applications that require low to medium performance with a small package size. In fact there are various use cases where AMCs are used as an alternative to a commercial or custom motherboard platform as illustrated by two recent examples from two different markets:

- Passive mother board platform equipped with Ethernet and RapidIO switches with four AMC sites for data center computing
- Small compact, cascadable and stackable MTCA chassis (260mm x 43mm x 302mm (WxHxD)) with support for two AMC modules used for network applications (demonstrated at International Super Computing Show ISC in 2014).

New product developments for application enabling AMCs used in both the MTCA and ATCA market will only continue to strengthen the ecosystem and in turn drive the MTCA adoption rate to higher levels. This position coupled with new Rear Transition Modules will only continue to drive new initiatives for MTCA.4 as well. In fact one such example is already in progress. In 2014 a PICMG initiative was launched to develop an optional extension to MTCA.4 that would provide a second backplane behind the standard MTCA backplane for the purpose of routing RF signals with support for differential power (+V,-V). The goal is to provide a higher level of integration and more tightly couple the interconnections between a digital and RF system. Yet another example of a flexible computing standard designed to be evolutionary and meet the market's requirements now and for the future.

Is it time to change your computing platform?

Yes, definitely! Now is the time to take the innovative step into the future and change to MTCA! The ecosystem is there to support the effort with additional backing by governmental and private institutions. The Helmholtz Validation Fund has invested more than 3 Million Euro to leverage MTCA.4, AMC and RTM technology to additional markets by providing training and technology transfers to industry (desy.mtca.de). Other examples are found around the globe and include the US and China. MTCA is a true global computing standard by many counts.

Without a doubt MTCA is the replacement computing architecture for VME and CPCI. It certainly hasn't been an easy road to introduce a new computing platform in the midst of a major economic recession, but since its birth in 2007 MTCA has generated many impressive success stories. Many of these successes are listed as part of this article, but perhaps the biggest reason for its ever growing success is the fact that it didn't have to be backwards compatible. The designers of MTCA were completely free to be evolutionary and use state-of-the-art technologies and then mix them with successful positions learned from VME and CPCI. The outcome of this is:

- Better signal quality than VME and CPCI
- Better flexibility and scalability than VME and CPCI, addressing low cost, mid-range
and high performance applications

- Support for Rear Transition Module
- Best mixture of state-of-the-art interfaces like PCIe, SRIO, GbE, XAUI
- Re-use of modules like IP (Industrial Pack”), PMC and others
- Carriers for XMC, FMC and other new
- Competitive with industrial PC technology and small form factors
- Definition of different levels of ruggedization
from “no” to “full”
- Redundancy built into the standard, no longer proprietary
- Built-in error detection, isolation and protection

Now is the time to change: With signals from the commercial supply chain indicating trouble lies ahead, it is simply not prudent to wait any longer. Now is the time to change: there are CPCI to AMC and VME to AMC adapters to allow a smooth migration path to MTCA.

In many CPCI applications no software change will be required as PCIeexpress is backwards compatible to PCI (CPCI). For VME there are data transfer solutions that provide a step-by-step move as well. Now is the time to change: users of PC solutions missing the advantages of CPCI and VME but with the need to have an innovative platform will also find MTCA a well-defined successor. Now is the time to be innovative, to save time, reduce cost and grow market share!

About the authors and the company:

Vollmuth Dirksen is Strategic Business Development Manager in Europe for N.A.T. since 2007. He knows the embedded market from the invention of VME, has deep knowledge of VME, CPCI and MTCA. Terry Manus is Business Development Manager in North America for N.A.T. since 2011. He has long experience in the semiconductor as well as the embedded markets with special focus on MTCA. Heiko Körte is Director Sales and Marketing for N.A.T. and with the company for more than 22 years. He has in-depth knowledge of the embedded communication market and the technology involved.

Following the credo “Innovation in Communication” N.A.T. have been a driving innovator and a leading edge supplier for modular board and platform computing solutions based on the open standards of VITA and PICMG since 1990.

Please visit the website www.nateurope.com for more information about the company and offered products.

2 http://defense.ge-ip.com/blog/end-vme/

Product News

- DDC: avionics interface computer simplifies test & development

Data Device Corporation introduces the Avionics Interface Computer, providing a scalable, programmable, and portable platform to develop and test MIL-STD-1553 and ARINC 429 system applications via an Ethernet network. The AIC features 2 PMC and 2 Mini-PCIe expansion sites, allowing users to select interface boards optimized for their specific application and connectivity needs.

News ID 2814

- Syslogic expands railway portfolio

Syslogic has gone one better by complementing its portfolio of EN50155 certified embedded computers. The Railway Computer RSL Compact 8 has a persuasive, sturdy construction and high performing Atom E3845 processors from Intel. It is also shock-resistant and can withstand vibration and extreme temperatures. As such, the newest railway computer is particularly well-suited for rolling stock applications.

News ID 2797

- EKF: 16 port USB 3.0 hostadapter

The SBX-DUB is a peripheral slot board for PICMG CompactPCI Serial systems, equipped with four individual quad port USB 3.0 controllers, providing a total of 16 USB xHCI SuperSpeed channels. Since any front panel connector is assigned to a separate SuperSpeed controller, a superior throughput can be achieved. Up to 16 USB 3.0 ports are available for rear I/O.

News ID 2719

- TQ: new generation of ARM Cortex modules

With the TQMa7x and TQMa5xxx, TQ is planning two Minimodules using the new processor families based on ARM Cortex-A7 and ARM Cortex-A15. By the specific selection of technology, TQ is creating a forward-looking basis so that it can continue to support its customers with innovative ARM products.

News ID 2740

- AAEON: new and improved BOXER-6614 embedded computer

Compared with its predecessor, the AEC-6613, the BOXER-6614 features a significantly more powerful processor, the Intel Celeron N2930 Quad-core Processor running at 1.83GHz, and enhanced memory support to DDR3L memory, up to 8GB, giving a performance boost in excess of 38%.

News ID 2807

- Toradex: SoC addition to Apalis computer module family

NVIDIA’s presentation of their latest generation Tegra TX1 system on chip and their live demo of the TX1 powered “Shield” at GDC 2015, has created a lot of excitement here at Toradex. Never before was it possible to perform such powerful multi-stream video, graphics and data processing by means of a fully integrated Cuda enabled GPU on a tiny ARM-based SoC.

News ID 2805

- SECO: Cross Platform Development Kit 2.0 based on SGeT compliant carrier board

SECO launched the new Cross Platform Development Kit 2.0 based on the SGeT compliant carrier board, born from the SGeT Consortium specifications. The Cross Platform Development Kit 2.0 is a complete package that contains all the necessary materials to start developing with Qseven CPU modules, both x86 and ARM architectures, and most importantly to explore the possibilities offered by these two different worlds.

News ID 2800

- ARBOR launches ASLAN 16:9 widescreen industrial panel PCs

ARBOR Technology has launched a new product family, the ASLAN series of specialized industrial panel PCs. The ASLAN series is based on the quad-core Intel Celeron J1900 CPU for optimal efficiency and performance. The panels feature 16:9 ratio widescreen displays that provide a greater operational and viewing experience than traditional 4:3 displays.

News ID 2798

More information about each news is available on www.Embedded-Control-Europe.com/magazine
You just have to type in the “News ID”.
MicroTCA solves key needs in wide range of applications

By Justin Moll, VadaTech

The MicroTCA architecture is highly versatile, making it an exceptional fit for many applications. This includes solutions with mid-range performance criteria in many industrial, broadcast, and other markets, up to the most demanding signal processing, networking, and storage requirements in mil/aero, physics, and communications systems.

The MicroTCA architecture was formed in 2006 and originally geared for Telecom systems. The TCA in the name stands for Telecom Computing Architecture. Ironically, telecom is only a niche today for the open standard embedded computing architecture. MicroTCA serves the key needs of design engineers in applications from industrial control, broadcast, energy, medical, test and measurement, and transportation markets. Its largest success has been in mil/aero, high-energy physics, and communications. With perhaps the best performance density in the market, there are several design innovations in MicroTCA that are solving the most critical design challenges across a broad spectrum of industries.

MicroTCA fits the design needs of many applications because of its versatility. There is a broad swath of modules from several vendors from I/O, graphics, storage, network interface, switches, FPGAs, digitizers, etc. Some of the core features of the technology are that has provisions for up to 99.99999% uptime reliability, a highly scalable, compact, vast and proven ecosystem, and low cost. Its inherent system/health management and interoperability are the envy of other open architectures. As a truly COTS platform, there are economies of scale in serving multiple markets. As the architecture is very compact, it is attractive for many applications where SWaP-C (size, weight, power, and cost) is a consideration. Although the performance is potentially extremely high, the ecosystem also supports the lower to medium requirements for network communication, graphics, storage, etc. One of the key drivers for MicroTCA innovation is the communications/test market. Requiring bleeding edge performance, MicroTCA has introduced the industry first 100G line cards (out the front panel, 40GbE across the backplane) including a 100G Cavium 6880 processor and a 100G Stratix-V FPGA. The mil/aero and physics markets have introduced AMCs that are also at the bleeding edge in ADC and DAC.

But the architecture is perhaps surprisingly fitting for applications that don’t require the most cutting-edge performance. One example is for industrial applications - a system that uses an EtherCAT card in the AMC form factor, dual GbE networking modules, a dual-channel ATI graphics accelerator card for video processing, and a single-core IvyBridge processor packaged in a lightweight 1U chassis. The PCIe signaling, video processing and networking connection for high-speed sorting/scanning can be achieved in a small, low-cost 1U chassis. Similar industrial applications with mid-range performance requirements are motion control, lithography, power distribution systems, and more. With the versatile performance density of MicroTCA, a wide range of applications are discovering the advantages of a truly COTS architecture.

For transportation and energy applications, the voice, data, and video communications requirements make MicroTCA the ideal fit. These types of industries need a robust architecture in as small a form factor as possible. For railway communications/monitoring and energy power distribution systems, having high system reliability is additionally critical.

For transportation and energy applications, the voice, data, and video communications requirements make MicroTCA the ideal fit. These types of industries need a robust architecture in as small a form factor as possible. For railway communications/monitoring and energy power distribution systems, having high system reliability is additionally critical.

Figure 1. MicroTCA.4 with rear I/O, as shown in these 8U and 2U versions, was originally designed with high-energy physics applications in mind. But, they have also been adopted in railway, broadcast, and Mil/Aero applications.

Figure 2. Rugged conduction-cooled MTCA.3 systems are not just used in Mil/Aero applications they are also a good fit in pole-mount outdoor network edge, energy, and other industries.
If an AMC board, fan, or PSU were to start to reach non-critical or critical limits, the MicroTCA carrier hub (MCH) in the system could divert power and other resources to other parts of the system, which is built for redundancy and failover.

A remote message can be automatically sent to a control station for servicing. It is possible in a MicroTCA system to have 99.99999% uptime. With the rear I/O requirement, a MTCA.4 system is an excellent fit. The 8U version could provide 12 slots with rear I/O with full redundancy. The 2U MTCA.4 chassis platform can hold up to 6 slots with rear I/O. The systems in this example utilized a 40 GbE MCH for fast communication to a processor and 4-port GbE module for network communications. With the modular versatility of MicroTCA, the same chassis architecture was used in both applications, with some variations of the modules needed. With full system management and failover functions, the system can ensure 99.99999% uptime.

Video processing requirements range from rugged airborne applications to broadcast markets for video compression/media transport. Rear I/O is attractive for some systems for convenient I/O to other devices. Live broadcast requires heavy video processing, post-processing and buffering. So, there are a range of FPGAs and processor AMCs from Intel based x86 quad cores to Freescale, Tilera, etc. The ability to edit on the fly and in the field from live streams and not take up much space in a rack is critical. As many boards in the system don’t require rear I/O, utilizing a hybrid MTCA.0 and MTCA.4 chassis can be very effective. In this 2U example, there are 4 MTCA.0 slots and 4 MTCA.4 slots with rear I/O. Those familiar with MicroTCA know of the typical rackmount products for communications systems. Less known are ruggedized versions for outdoor use. A ruggedized 6-slot 1/2 ATR (figure 2) per the MicroTCA.3 standard is being used for an edge-of-network device placed on street lamps.

Of course in the Mil/Aero market is where the MicroTCA shines with its superior SwaP-C. For radar signal processing applications, high speed digitizers can be utilized on the AMC with an FPGA carrier with an FMC mezzanine for the A/D and D/A. Figure 3a shows a Virtex-7 FPGA carrier with an on-board QorIQ P2040 PowerPC (PPC). It is advantageous to provide a host processor so that each board in the system can act independently. Further, several of the distributed processing functions can be handled via the PPC, allowing the FPGA board to work more efficiently. Figure 3b is an FMC at 4.0 GSPS at 12-bit ADC and 5.85 GSPS (in mix mode) at 14-bit DAC. Depending on the number of signals that need to go across the FMC, it sometimes is required to have the two married in one board due to pin-out limitations. Thus, you can have dual ADC or dual DAC and a Virtex-7 FPGA on one AMC. Providing plenty of memory for buffering is essential in many signal processing applications. Therefore, several banks of an efficient SRAM memory can be provided, such as QDR-II.

High speed signal processing is also a requirement in high-energy physics applications. In these systems, usually several channels are required from multiple inputs for the control systems and DAQ in the experiments. MicroTCA has become the architecture of choice for these applications, utilizing the MTCA.4 specification with rear I/O. The compact size, light weight, and low cost (compared to other high-performance architectures such as AdvancedTCA) are also advantages. As precision timing is essential, the multiple clocking lanes in MicroTCA are additionally important. Utilizing the double-module card size which includes the RTM connector, AMC boards mating from the front and rear can offer a several channels, MSPS speeds at often 12- to 16-bit rates, and clock/trigger I/O.

Figure 4 shows the block diagram of a MTCA.4 AMC and its mating RTM. For ease of cabling, the majority of the I/O channels are on the rear board, with 12 ADC at 125 MSPS. The front AMC example holds dual 250 MSPS DAC and, in this case, a Kintex-7 FPGA with a clock and jitter cleaner. Often, physics applications only need one or two slots. To save space and costs, 1U MTCA.4 chassis platforms offer an advantage. The MCH and a mid-range Ivy-Bridge or Atom processor (usually heavy processors are not required) can be incorporated into the chassis so that slots are not sacrificed for these inherent functions.
Securing IoT designs – from edge node to the cloud

By Alexander Damisch, Wind River

Along with integration, security is the top challenge in moving IoT faster into key growth areas such as critical infrastructure and the industrial market. Providing all the platforms for both installed base systems as well as new deployments, from the device level up to the cloud, security can be taken care of from a system point of view.

When considering an IoT application, the developer needs to think about the end-to-end solution. Increasingly, the gateway is seen as an important part of this solution, but there is a lot of infrastructure in between to consider; when thinking about this, the openness of the overall approach will be crucial. IoT is about sharing and collaboration, therefore open standards and integration with the eco system is vital. This is in order to allow third party applications and other vendors to integrate with the infrastructure.

Security is a key requirement of any IoT solution, not only that of the communications between the edge nodes and the cloud, but also of the devices themselves. Other factors include the associated communication latency, and increasingly, aspects of functional safety as stipulated by IEC61508, particularly for use in industrial automation designs. For industrial IoT designs, developers also need to consider the typical lifecycle of any piece of equipment used in such an industrial environment.

A service life of 20 to 30 years is not uncommon, especially for the larger items in industrial and process control plants. Because it is difficult to predict what an end-to-end system may look like in the future, the implementation of standards that allow ease of upgrading systems in-situ will be a key requirement. Use of open IP-based communications protocols such as MQTT, XMTP, and light-weight M2M are all key. These protocols have a number of similarities and are ideal for use with gateways. Particularly, they have the ability to work over a network that is not always on. Unlike a classic IT network, where if a cable is broken then communication completely fails, these protocols support a publish/subscribe model. MQTT uses a publish/subscribe approach where, depending on what information you require, you decide what information you need. It is event-based and provides a completely open approach. IP-based protocols like MQTT are also transparent to an application layer protocols.

Another important factor for many IoT applications is that the communications latency needs to be guaranteed. If you look at standard IP communication, obviously we know that standard TCP/IP has no latency guarantee. In fact, you can easily have a hundredth of milliseconds delay for clearing buffers and so on. TCP/IP is not made for low latencies. Some protocols can have a lower latency by using UDP, but it does not guarantee low latency, especially if you go over multi-hops or over a switched network. However, using UDP means that you cannot control quality of service. As a consequence you have no ability to plan and measure your worst-case latency across the network. That’s again where the time-sensitive networking standard comes in, when using the appropriate layer 2 switches can guarantee latency.

There are several aspects of security to consider. How your edge node or gateway boots is one of them. The need to ensure that your boot image is authorized and secure is crucial. If not, running a modified version of the same package would most likely bypass all the other security measures the application uses for data and communication. For example, from a secure boot point of view, in Wind River Intelligent Device Platform XT stack we are using silicon-specific features to make sure that we have a secure storage of the key. If you do a secure boot process with a signed and encrypted image, using a challenge and response mechanism you can have 100% certainty that the key in use has been verified and is valid. Next is run-time security.

For example, within Wind River Intelligent Device Platform XT, we make sure that if somebody has tried to modify the application we detect this with certain measures at the operating system level. We’re using technology from Intel Security to achieve this and it is based on allocating processes permission to run specific resources. If a process attempts to access a resource it is not permitted to use, then it can be removed and be highlighted for investigation. Security within data com-
munication is vital too and there are many established ways of achieving this. Another consideration to overall security is to ensure that when a network or edge node is removed that all the data contained in that device is either encrypted or removed. Disposal of a device gives the ability for the security keys to be retrieved.

Any gateway would not be complete without being able to support APIs. APIs provide a means of controlling data communication from the edge node to the cloud to allow some degree of local control. For example, consider a very simple temperature sensor used for controlling a heating system as the edge node. You can collect temperature readings and decide whether to aggregate them and store locally or pass it straight to the cloud application. Now it might be the cloud application that decides that when, say, the temperature has gone below a pre-defined threshold it will turn on the boiler and heating pump. However, an API could put that intelligence into the gateway. But while the provisioning of an API into a gateway might appear straightforward there are security and maintenance considerations. API development tends to focus on using Java Open Service Gateway Initiative (OSGI)-based run-time environments or scripting languages such as Python, Node.js and LUA. Use of C/C++ compiled objects tend not to be favored due to potential security breaches.

Building an extensible gateway dictates building in provision for adding, updating and deleting APIs. Clearly, performing this in a secure manner is important. Managing the edge nodes and their communication routes to other edge nodes and the cloud is also key. Use of management standards, such as OMA-DM, LWM2M and TR68, for use in a multi-agent architecture that covers all aspects of device management, over the air updates, post-deployment of applications, resource provisioning through the use of configuration files is preferred.

When faced with the daunting challenge of building an open yet secure IoT gateway, developers might consider basing their design on a readily available platform in order to speed their application into the market. Already mentioned in this article is Wind River Intelligent Device Platform. This is a scalable, sustainable, and secure development environment that simplifies the development, integration, and deployment of gateways for the IoT. Based on Wind River standards-compliant operating systems, the platform provides device security, smart connectivity, rich network options, and device management. It includes ready-to-use components built exclusively for developing IoT applications.
Touch, discover, and solve – demand more from your next scope!

By Taku Furuta, Keysight Technologies

Modern oscilloscopes offer so much more beyond the traditional top four specifications. Touch technology has become an option with oscilloscope design as with all other devices, and helps trigger signals instantaneously. The Keysight InfiniVision 3000T X-Series is one example of the latest scopes equipped with this and many other new features.

Nowadays most digital oscilloscopes in the market meet the minimum specification requirements for general purpose troubleshooting and debugging, which was not the case ten years ago. The bandwidth, sampling rate, channel count, and memory depth are known as the top four specifications of the scope, and in these respects the majority of scopes now provide more than adequate performance. The good news is that digital oscilloscopes are rapidly evolving beyond these top specifications to provide extra value. Demand more from your next oscilloscope!

Beyond the top four specifications, you quickly realize the latest scopes have better displays, often with better waveform visualization technologies. Why are display and visualization important? Because the oscilloscope is fundamentally a waveform viewing tool. For example, the Keysight InfiniVision 3000T X-Series provides an 8.5-inch capacitive touchscreen display with an ultra-fast one million waveforms per second update rate using proprietary MegaZoom IV technology. The faster the waveform-update rate, the higher is the probability of visually discovering anomalies in designs due to a lower dead-time between each acquisition. Dead-time is the inevitable time between acquisitions where an oscilloscope cannot acquire any data due to processing previously acquired data. In another word, you could be missing true anomalies that exist in the design simply because the oscilloscope does not update waveforms fast enough. At the end of the day, if you can’t see a problem, it’s hard to fix it.

Note that many of new scopes nowadays come with a standard touchscreen, some with the latest capacitive technology just like your favorite smart phones. Capacitive touch technology became popular several years ago, but today, it is expected as standard. Demand your next scope to have it!

Some scopes leverage the higher level of usability that a capacitive touchscreen offers to address the common usability challenge of powerful but complex advanced triggers. Setting them up appropriately is a challenge even for oscilloscope experts. In the case of the InfiniVision 3000T X-Series, the Zone Touch Trigger comes standard in addition to the advanced triggers. With Zone Touch Trigger, you can draw a box around the signal of interest, select must or must not intersect, and then the scope triggers and isolates it. The tedious advance trigger setup could take more than 10 steps and still might not isolate what you want, but with the new zone touch trigger, if you can see it, you can trigger on it. Demand better signal isolation from your next scope!

Furthermore, the capacitive touchscreen enables productivity. Moving, flicking, and precisely positioning waveforms at your fingertips are easier than ever. Customize the docking information side bar in the way that best suits measurement needs. The alphanumeric keypad replaces a tedious knob rotation entry to accelerate annotation experience and data inputs. In addition, the InfiniVision 3000T X-Series offers three ways to access scope features: touch GUI for those who prefer tablet or smart phone touch interfaces, front panel buttons and knobs for traditional oscilloscope users, and the Keysight Insight pull-down menu for users who prefer Windows-like operations.

Once you discover and isolate the phenomenon of interest, it is time to solve the problem. The instruments integration is another trend in oscilloscopes to provide more benefits beyond the banner specifications. The InfiniVision 3000T X-Series integrates six instruments in one scope to make it a home-base measurement instrument. The 16 digital channels help not only to visualize digital signal phenomena, but also to time-correlate them with analog signals, like a logic analyzer. With virtually every digital designs including one or more low speed serial protocol buses like I²C, SPI, or CAN today, the hardware-based serial protocol trigger and decode solutions relieve engineers from error-prone
manual counting of 0s and 1s. In some protocols like CAN or LIN, it decodes the data to more human-friendly symbols beyond the HEX, ASCII, or binary decode. An arbitrary waveform generator (AWG) is another popular instrument integrated into scopes these days as stimulus and response testing often augments troubleshooting scenarios. In the case of the InfiniiVision 3000T X-Series AWG, it also comes with a waveform modulation feature as well as a popular on-screen waveform editing tool. Finally, this scope series provides an optional 8-digit counter with the totalizer leveraging it, a 3-digit digital volt meter, all very handy tools for everyday problem-solving tasks. Fortunately, oscilloscopes often come with a frequency domain analysis feature called Fast Fourier Transform (FFT). However, this usually provides one-dimensional analysis rather than three. With the standard time-gated FFT feature of the new scopes, you can quickly time-correlate analog, digital, and frequency domain phenomena in a single display, providing more insights into the design. Knowing exactly how long it took for the signal to hop from one frequency to another after a specific digital command may be the key data for troubleshooting. Demand more instruments and multi-domain integration in your next scope!

Don’t forget that the latest general-purpose portable scopes come with powerful software and probes beyond traditional scopes, some standard and some optional. For example, let’s look into power-related measurements. It is said that many power analysis measurement errors are due to human errors like incorrect setups. With optional automated power analysis software on the 3000T X-Series, you are setup error-free, giving you the best chance of evaluating power design most efficiently. Additionally, the scopes support an ultra-low current measurement probe to address the troubleshooting of the emerging battery operational devices, and a power rail probe to view the most precise details of power integrity design challenges.

The Keysight BenchVue software (free) and the N8900 Infinium Offline Oscilloscope Analysis software (optional) are two examples where the software solutions open up new possibilities for oscilloscope utilisation. For example, you can control, capture, and log measurements from multiple instruments, like oscilloscopes, simultaneously with the innovative Keysight BenchVue, even if you are sitting away from the instruments, perhaps in your home office. The Infinium Offline Oscilloscope Analysis software allows analyzing captured data offline, potentially using more powerful analysis features than are available on a scope. If you simply want a full remote control of the scope, as if you were sitting in front of it, just connect to the scope via LAN from your PC or tablet device to change settings, save data, and/or capture screenshots. The new InfiniiVision 3000T X-Series supports all the mentioned features. Demand more software solutions from your next scope!
**Tools & Software**

**IAR Systems shortens build times in Embedded Workbench for ARM**
IAR Systems updates its leading development tools for ARM with new device support as well as new functionality. Version 7.40 of IAR Embedded Workbench for ARM introduces support for ARM Cortex-M7 microcontrollers from STMMicroelectronics and Atmel. In addition, the tools now feature parallel build for shorter build times, as well as an integration of IAR Systems’ new tool C-STAT for powerful static code analysis.

News ID 2815

**Mouser: turn any PC into a powerful engineering test device**
Mouser Electronics is now stocking the Analog Discovery USB Oscilloscope from Digilent. This USB oscilloscope is a powerful and portable multi-function test and measurement tool that turns any PC into a powerful engineering test device. The Analog Discovery lets developers build and test analog and digital circuits in virtually any environment, in or out of the lab. This flexible tool combines the functions of several types of test equipment, allowing developers to easily build and test digital and analog circuits in an easy and cost-effective manner.

News ID 2810

**Keysight: solution for testing of 802.11ah-based IoT devices**
Keysight Technologies announced that its N7617B Signal Studio for 802.11 WLAN software is the industry’s first flexible 802.11ah signal creation solution and supports a variety of Keysight vector signal generators. Signal Studio provides flexible, standard-based waveforms, perfect for testing 802.11ah-enabled Internet-of-Things devices.

News ID 2809

**AdaCore releases GNAT Pro 7.3**
**Ada Development Environment**
AdaCore released GNAT Pro 7.3, the latest version of the company’s Ada Development Environment. GNAT Pro 7.3 incorporates performance improvements, new functionality, and many other enhancements. It is part of the annual cycle of a major release for the company’s products, and Q1 2015 will also see new versions of the CodePeer deep static analysis tool for Ada and the SPARK Pro verification environment for high-integrity software, as well as the launch of the QGen model-based development and verification tool for Simulink and Stateflow models.

News ID 2727

**PragmaDev starts on-line survey on software modelling and their usage**
PragmaDev starts its 2015 on-line survey on software modeling technologies and their usage on its web site. This survey is open to anyone interested by the topic and all participants get a chance to win an iPad mini. The last few years the number of modeling technologies has dramatically increased, vertically to address different aspects of the development process (requirements, architecture, specification, design, test), as well as horizontally to address different domains (telecom, automotive, avionic).

News ID 2803

**MicroSys: RTOS with enhanced focus on ARM architecture**
Microware OS-9 is known for decades for hard real time performance, highest reliability, adaptability and scalability, supporting the wide range of embedded CPU architectures, from 8-bit in the beginning to high-end platforms, like multi core ARM, Freescales Power Architecture, iMX platforms and x86 and compatible CPUs. OS-9 for ARM is a complete solution for real-time applications using ARM architecture based development hardware.

News ID 2792

**Rutronik: Detect it! solution kit from Renesas**
The Detect it! solution kit from Renesas Electronics Europe, based on the new RL78/I1D microcontroller group, is designed for detector applications and provides ready to use demonstrators for the most typical detectors used in security and fire protection systems. The Detect it! solution kit is available at distributor Rutronik as of now. The RL78/I1D microcontroller group offers a comprehensive set of analogue features.

News ID 2791

**Telit adds ARM compiler to App Zone offering**
Telit Wireless Solutions announced the availability of the ARM Compiler as an optional addition to the Telit AppZone, the integrated development environment for its popular GE910, HE910, UE910, UE866 and UL865 cellular modules. By agreement with ARM, Telit can now offer the ARM Compiler as an option to optimal performance and size management. For professional grade, real-time functionality, the optional ARM Compiler enables you to take full advantage of the module’s embedded processing capabilities.

News ID 2781

**Lauterbach integration of TRACE32 with Timing-Architects tool suite**
Lauterbach announced the integration of Lauterbach TRACE32 with the Timing-Architects Tool Suite. The integration allows the import of hardware traces of single- and multi-core applications recorded by TRACE32 into the TA Inspector.

News ID 2632

**Rogue Wave Software partners with TZ to help develop more secure software code**
Rogue Wave Software and TZ Consulting announce they will partner to provide solutions that allow companies across the German region to safely use open source code in their software development processes.

News ID 2711

**Digi-Key expands Mentor Graphics’ EDA tools portfolio with new features**
Digi-Key expanded an expanded suite of the recently released professional-level Mentor Graphics EDA/CAD tools. Premium versions of both the Designer Schematic and Designer Layout tools are now available, featuring unlimited connections. In addition, Import from xDX Designer and PADS Layout for reference designs, as well as import from third party schematic capture and layout tools has been added.

News ID 2769

**iSYSTEM: software debugging, tracing and testing within one single IDE**
iSYSTEM released a new version of iSYSTEM test API and test case editor testIDEA. In 2009, more determined than a simple functional testing tool for software developers, testIDEA today is a comprehensive and flexible tool for the software test of single and multi-core embedded systems. 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.

News ID 2758

**Infineon: new version of DAVE Development Platform for XMC MCUs**
At Embedded World, Infineon Technologies announced the new version of its development platform DAVE, the “Digital Application Virtual Engineer” for its 32-bit microcontroller families XMC1000 and XMC4000. Infineon has equipped the virtual DAVE engineer such that the development time for embedded systems on the basis of the XMC microcontrollers is further reduced thanks to efficient, component-based software development.

News ID 2730
Altium: new release of TASKING C compiler for Renesas RH850
Altium announces a new release v2.2r1 of its TASKING C compiler suite for the RH850 architecture from Renesas Electronics, delivering support for new RH850 microcontroller variants, code optimization improvements, and an integrated on-chip debugger.
News ID 2747

Cadence announces Stratus high-level synthesis platform
Cadence Design Systems announced the Cadence Stratus high-level synthesis platform, that can be utilized across an entire system-on-chip design. This next-generation platform integrates Forte Cynthesizer and Cadence C-to-Silicon Compiler into one tool to deliver 10X productivity improvement, 20 percent better power, performance, and area quality of results, and 5X faster verification versus a hand-written RTL flow.
News ID 2738

Lynx: security product support for new ARM-based IoT designs
Lynx Software Technologies announced that both its LynxOS 7.0 RTOS and its LynxSecure separation kernel hypervisor are moving to new ARM-based processors. The development allows the military-grade security offered by these products to be applied to the protection of ARM-based embedded designs addressing IoT markets such as industrial control, factory automation, connected automotive, smart energy, medical and transportation.
News ID 2735

ARM launches mbed IoT Starter Kit - Ethernet Edition
ARM launched the ARM mbed IoT Starter Kit - Ethernet Edition to channel data from Internet-connected devices directly into IBM’s Bluemix cloud platform. The combination of a secure sensor environment by ARM with cloud-based analytics, mobile and application resources from IBM will allow fast prototyping of new smart products and unique value-added services. The first products developed using the kit are expected to enter the market in 2015.
News ID 2733

CSM and Vector reinforce their integrated measurement technology solution
CSM and Vector have agreed to work together intensively and engage in a joint venture for long-term and sustainable development and sales. In the future, users of measurement technology in automotive and commercial vehicle development will benefit from a closely coordinated complete solution for software and hardware products from Vector and CSM.
News ID 2646

HCC Embedded: fail-safe file systems for eMMC Flash with advanced test verification
HCC Embedded has introduced fail-safe file system support for eMMC Flash that simplifies software integration and guarantees the integrity of data. HCC Embedded’s range of eMMC drivers supports high-performance file operations, fail-safe operations, and secure erase. Devices with JEDEC eMMC 4.4, 5.0, and later interfaces (JESD84-B50) are supported. All file systems are supplied with an advanced test suite to verify correct operation.
News ID 2695

Phaedrus: Tracealyzer for embOS provides streaming trace on SEGGER J-Link
Safety-critical specialist distributor Phaedrus Systems announced the availability of embOS-Trace. This sophisticated tool from Percepio offers an unprecedented insight into the runtime world for embedded software developers using SEGGER embOS and SEGGER J-Link debug probes. Percepio embOS-Trace is the latest member in Percepio’s Tracealyzer family and the embOS integration has been developed in collaboration with SEGGER.
News ID 2694

Vector Software announces integration with Wind River Simics
Vector Software announced that VectorCAST is now integrated with Wind River Simics. Using the integration, developers can rapidly test complex designs, in parallel on hundreds of simulated target boards, which dramatically reduces cycle times for complete testing.
News ID 2764

Wind River expands IoT-enabled product portfolio
Wind River has enhanced and expanded its Wind River Helix product portfolio to address the system-level opportunities and challenges of the Internet of Things. In addition, the company has created an IoT professional services offering to assist customers with the creation and deployment of IoT applications.
News ID 2763

PRQA enhances its static analysis solutions
PRQA | Programming Research announces further enhancements and additions to both its Framework environment and QA-Verify code management web interface. These latest releases further strengthen PRQAs complete code management solution, making inspection and compliance with coding standards more effective, improving integrations and giving greater visibility to stakeholders within the decision-making process.
News ID 2715
Developing and debugging deeply embedded applications in UML

By Daniel Siegl, and Wilfried Nesensohn, LieberLieber Software, and Heiko Riessland, PLS

It is often hard to prove functional safety for deeply embedded systems with complex multicore SoCs. In such cases a model-based development platform like Enterprise Architect, used with a code generator optimized for embedded applications and a model-based testing tool, makes this problem relatively easy to solve.

Model-based development is finding more and more followers, and the field of industrial and automotive embedded systems is no exception. This is hardly surprising, since especially in these challenging areas of technology it is in fact more important than ever to use mechanisms that help to ensure that the product complies with all requirements and safety criteria. A growing use of multicore architectures increases this pressure even further, since the complex interactions in the parallel execution of software also significantly complicate the detection of functional safety.

Basically, working with models to develop embedded applications has many advantages, such as: continuity from requirements management to final C/C++ code, object- and component-oriented development without having to switch to C++, and less effort when switching to C++ later on.

In the case of already-running embedded projects, practical experience shows that the best course of action is to begin to develop parts of the functionality using the model-based approach. In this way, the fairly new model-based approach can be brought - step by step - into the company without having to discard existing code while overwhelming developers. In general, it is important to always keep in mind the specific requirements of the embedded environment. The considerations include, for example: the limited performance of the hardware; the code must efficiently conserve resources; a software bug detected too late is an often costly affair (e.g. expensive auto recalls); the code must satisfy very specific standards (MISRA); and it should integrate well with existing code.

The use of a model-based development platform such as Enterprise Architect from Sparx Systems demonstrably improves not only the development process of software and systems, but also communication between the people involved. The graphically-oriented representation in UML enables instant documentation of the software architecture and development process, and makes it easier for non-UML professionals to understand.

UML/SysML are very broadly-applicable languages, but were not specifically designed for creating embedded systems. In order to adapt the Enterprise Architect modeling platform (figure 1) - now with over 330,000 licenses in operation worldwide - to the specific requirements of embedded engineering, LieberLieber software therefore combines two key functions in the LieberLieber Embedded Engineer product package: code generation (uml2code) and debugging UML (UML debugger). As part of the entire tool chain, this solution, which is aimed primarily at embedded software developers and software architects, but which can also be useful for testers and integration managers, enables code generation from UML structures, state machines and activity models and generates platform-independent C++ and MISRA-compliant C code from UML models.

A characteristic valued by most customers is the potential coexistence of handwritten and generated code. However, it should be ensured that generated code is only altered by changes in the model or the generator. This ensures that model and code are identical at all times. Basically, the automatic code generation especially makes sense if the code generator is not a black box, but a living part of the project. The variety of template-based solutions for code generation can have a negative influence on acceptance by developers and thus also the will to adapt.

In practice, code generators are therefore much more successful when they themselves are programs and can thus adapt to the familiar tools. However, should the complexity of the templates become too great, maintainability and finding fault are far more difficult than, for example, in a code generator that was developed in C# and can debug normally with Visual Studio. A particularly great benefit from code generation can be achieved...
when parts of a project are generated from a model based on the state machines or activities as agreed among the respective departments. Thus, as has already been mentioned, model-based development has a particularly high value when implemented for automatic code generation and subsequent debugging. By eliminating complex configuration parameters and any frameworks, entry into model-based code generation is greatly facilitated by uml2code. Decisions at the model level can be transparently traced in the generated code—which is easy to read and well-structured. Project-specific requirements for code generation are implemented directly in the supplied source code. As a result, the requirements are easy to understand. In addition, the generated code can be integrated without any problems into existing software projects, the advantages of the model-based and the traditional development can thus be combined virtually as desired. Moreover, since the code generator source code is included, there is no dependence on the solution suppliers. In order to shift software development completely to Enterprise Architect, the following rules—necessary for embedded engineering—are also included in LieberLieber Embedded Engineer for Enterprise Architect. Instead of dynamic memory management, which is a violation against the MISRA C rules, objects are created statically, and state machines are instead implemented by a whole set of functions via short and effective case distinctions.

The LieberLieber UML Debugger also offers users a graphical UML debugger, integrated into Enterprise Architect, that allows the testing and debugging of the software, modeled in UML or SysML, directly on the model level. The debugging of the model can be started directly with the code generated from the model and compiled with any compiler. The code generator and the debugger form a closed circuit and allow debugging at the implementation level—namely the UML model. Thus, a possible error even right at the source—the model—can be located and corrected.

Coupling with the Universal Debugging Engine (UDE) by PLS, a tool specialized in optimized target access and detailed architecture support, allows the execution and debugging of the models directly on the actual target hardware. This is possible thanks to the UDE object model, which is based on COM technology from Microsoft. COM allows programmatic use by a variety of programming languages, including the world of .NET such as C#. COM refers to the totality of all documented objects, methods, properties, and data types as an object model. This means that almost all functional aspects of the Universal Debug Engine are covered. The LieberLieber UML debugger uses the object model of the UDE for, among other things, a connection to the microcontroller and the programming of the application into the flash memory of the target. It is also able to set breakpoints. This is done directly in the model, for example, on a particular state of a state machine. Due to the integrated code generation, it is known what line in the generated C/C++ code this corresponds to. This can be handed over to the debugger for the setting of breakpoints. Furthermore, the program execution can be started and stopped via the object model. It is even possible to read out the variable values and display them in the UML debugger.

The coupling of a modeling tool with a code generator optimized for embedded systems and a model-based testing tool with hardware-level debugger gives the designer the advantage to not only design software at the model level, but also test and debug it on the real target. This seamless integration between tools increases the acceptance of such development methods, reduces the occurrence of errors and represents a large gain in efficiency. This innovative approach is suitable for new as well as existing projects.

**Product News**

- **LDRA: tools provide functional safety verification within Hercules SafeT® CSPs**
  
  LDRA is collaborating with Texas Instruments to provide automated unit testing capabilities as part of TI’s new SafeT® Compliance Support Packages (CSPs) for TI’s Hercules MCUs software components. SafeT® CSPs help TI customers comply with functional safety standards, reducing verification and validation efforts so that they can focus on differentiating their industrial and automotive systems, which will accelerate time to market.
  
  News ID 2693

- **PRQA: support for modern C++ features and improved coverage for MISRA C++ and HIC++**
  
  PRQA announces an upgrade to its flagship products QA+C and QA+C++. The new releases of these leading static analysis tools for the C and C++ environments incorporate new functionality covering: Dataflow analysis, enhanced Graphical and Command Line Interfaces, support for the latest Modern C++ language features, and an improved level of coverage for compliance with the MISRA C++ and High Integrity C++ coding standards.
  
  News ID 2614

- **Embedded Office: Cert-Kits for Hercules MCUs from TI**
  
  Embedded Office is now offering its µC/OS-MPU Cert-Kits for the Hercules TMS570LS31x/21x and Hercules RM48 microcontrollers from Texas Instruments. These ARM-Cortex-R4F-based MCUs offer scalable performance, connectivity, memory and safety features. These MCUs include safety features implemented in hardware, which help customers develop differentiated industrial and automotive functional safety applications.
  
  News ID 2601
In this article the author provides a brief review of the past 12 months with HIC++ V4.0, identifying the rules which have been most frequently referenced, looking at some of the feedback from the user community, and touching on some of the ongoing discussions between the experts on the best way to use the new language that is Modern C++.

On 3 October 2003, PRQA published the initial version of the High Integrity C++ coding standard (HIC++). Over the subsequent decade the developer community has downloaded this coding standard a staggering 25,000 times. Exactly 10 years after the initial publication, on 3 October 2013, we released a major revision of HIC++. The updated V4.0 rule set builds on the lessons of the previous 10 years, incorporating feedback from the HIC++ user community, learning from other standards, and most importantly addressing recent changes made to the C++ language itself (in particular C++ 2011).

Many, including Bjarne Stroustrup himself, see Modern C++ as a whole new language [http://www.stroustrup.com/C++11FAQ.html#think]. ISO C++ 2011 added many new features, and a key objective of many of the changes has been to make the language easier to use and to enable developers to explicitly express their intent rather than through learned idioms. As a result, modern C++ is (or should be) a safer language than its predecessor. We are also more aware of the importance of well constructed rules, in particular, that rules need to be enforceable, unambiguous and have a clear rationale. Rationale is extremely important as this enables informed decisions to be made about conforming to or deviating from a rule within a given context. A rule that is vague or not enforceable - either through manual inspection or automatic analysis - is useless and a waste of the engineer’s valuable time. Wherever possible, rules should be automatically enforceable, freeing up time to focus on the higher level design and structural issues. And, of course, we feel compelled to point out that all automated static analysis tools are not equal (!), specifically in terms of their accuracy - minimizing false positives (noise) and false negatives (a failure to identify genuine issues).

The V4.0 rule set has been derived from multiple sources: rules adopted from V3.3, the prior version of HIC++ and improved (retired, merged, reworded, relaxed or extended), rules adapted from other existing standards, advice from the experts (such as Herb Sutter, Scott Meyers, Anthony Williams), direct analysis of the ISO C++ 2011 standard by PRQA language experts, and monitoring of language changes for C++ 2014 and beyond through direct participation of the C++ Committee meetings. Overall the transition from V3.3 to V4.0 is summarized as an excerpt from PRQA whitepaper: High Integrity C++ Coding Standard V4.0 - an overview and shown in figure 1. HIC++ continues to differ from the other mainstream coding standards such as MISRA C++ and JSF++. Unlike JSF++ no major feature is prohibited, instead the best available advice is provided for the correct use of all language features. Furthermore HIC++ addresses issues using the C++ approach of a single powerful rule that removes the need for many disjoint rules. Rule 12.5.6 (see below) is a good example of this as it avoids the need for rules relating to checking for self-assignment or providing the strong exception guarantee.

The adoption of HIC++ is truly global, with developers from 137 countries having visited the HIC++ website (www.codingstandard.com) since the publication of V4.0. Most interest has come from US and Germany (each accounting for 20% of visits) followed by: Russia, UK, India, Sweden, France, Poland then Switzerland, and the remaining 127 (I won’t list them all!). One of the most interesting and informative exercises has been to identify the rules which the development community has most frequently referred to, and below find the Top 5 Rules based on combination of web page hits and direct feedback on the downloaded PDF version (table 1). Let me consider each of these in a little more detail. To date Rule 8.2.4 has been consulted more often than any other rule in V4.0. No doubt this is as a direct consequence of a
recent debate between Scott Meyers and Herb Stutter. These two heavy hitters of C++ have been having the same discussion on the topic covered by Rule 8.2.4 Do not pass std::unique_ptr by const reference. The arguments on both sides are compelling, and it seems both approaches have advantages and disadvantages. Ultimately HIC++ follows the advice of Herb Stutter, that sink parameters of type std::unique_ptr should be passed by value. Scott Meyers, on the other hand, argues for a more general rule to declare sink parameters as rvalue references (&&).

void herb_sp (std::unique_ptr<int>&); void scott_sp (std::unique_ptr<int> &&);

It is great to see that the community is also consulting HIC++ to canvass our opinion on this topic!

The next most popular rule visited on the website is "Rule 4.1.1 Ensure that a function argument does not undergo an array-to-pointer conversion", whose origin comes from the JSF C++ standard. The issue arises because a function parameter that looks like an array is actually just a pointer:

```cpp
void f1 (int a[10]) { // Equivalent to void f1(int*)
    a[8] = 0; // Out of Bounds when called from f2
}
void f2() {
    int b[5];
    f1(b); // Not illegal code!
}
```

A human reviewer can easily be swayed by the array dimension in f1 believing that this is checked by the compiler, however no checking will take place. In JSF C++, the passing of array arguments is disallowed completely for this reason. HIC++ V4.0 however, allows arrays to be passed as arguments, but only when the dimension information is not lost:

```cpp
void f1 (int &a[10]) { // Parameter is reference to
    a[8] = 0; // Guaranteed to be legal
}
void f2() {
    int b[5];
    f1(b); // Cannot convert int[5] to int[10]
}
```

I must thank the HIC++ user community for all their feedback, almost all of which has been constructive and positive. Technical feedback has typically related to suggestions for relaxations of rules or the addition of clarifications. For example, Rule 2.1.1, Do not use tab characters in source files as currently worded, requires that spaces be used exclusively in source files. The rationale for disallowing tabs is to ensure that code indentation is consistent between different editors and IDEs, for example:

```cpp
if (...) {  // 1 tab before if
    ++i; // 4 spaces
    ++i; // 1 tab before ++i
} else if (...) { // 1 tab before if
    ++i; // 2 tabs before ++i
}
```

We received feedback (thanks to Jason, Larry and Dave) that this is may be too restrictive. The issue is also addressed when tabs are always used to start the line:

```cpp
if (...) { // 1 tab before if
    ++i; // 2 tabs before ++i
} else if (...) { // 1 tab before if
    ++i; // 2 tabs before ++i
}
```

Our intention is to reflect minor improvements such as this in subsequent revisions of the standard.

Developer communities are clearly a rich source of information on the best way to use Modern C++. Often, much can be learned from the questions and answers that appear on such forums. One example relates to Rule 12.5.6 Use an atomic, non-throwing swap operation to implement the copy and move assignment operators, which is covered by many questions and answers on forums such as StackOverflow. This rule helps ensure the correct copying and moving of a class while providing for strong exception safety. This is excellent advice, as well as providing a simple and consistent way to layout these members in a class. What has come to light, however, is that the V4.0 rule example can be written as:

```cpp
class A {
    A(A const&) ... // copy constructor
    A(A&&) ... // move constructor
    A &operator=(A rhs) & noexcept {
        swap(*this, rhs);
        return *this;
    }
};
```

This is a great example of where the correct approach ends up being far better and simpler than the alternatives!

In the Urbana-Champaign ISO C++ Committee Meeting (3 to 8 November 2014), a formal vote took place to remove trigraphs from the language (n3981). Trigraphs are a sequence of 3 characters beginning with ???. Their purpose is to allow C and C++ to be written on systems that don’t support characters such as {, /, # etc. Unfortunately, trigraphs don’t behave well with some of new language features such as raw string literals. One prior survey found that trigraphs were either being used unintentionally or explicitly as part of testing trigraphs! The verdict is therefore to remove them completely from the language. It turns out that Rule 2.2.1 Do not use digraphs or trigraphs was an extremely valuable rule to follow. The only remaining question is will the same happen for digraphs?

One year on and the adoption of HIC++ V4.0 has surpassed our expectations, having been downloaded an additional 3,800 times over the past 12 months. This demonstrates the continued relevance of HIC++, and reflects the fact that HIC++ continues to evolve and to accommodate Modern C++, helping to document best practices and helping developers to generate High Integrity C++ Code. HIC++ V4.0 is available at www.codingstandard.com, together with an accompanying whitepaper. If you have any additional feedback please do not hesitate to contact me at hicpp@programminresearch.com.
The ever-changing world of high speed digital design

By Lee Ritchey, Speeding Edge

This article describes the development of modern electronics in the last decade, which has brought not only advantages but also some issues. To deal with these issues developers can attend a seminar which shows how to design the required high speed PCBs.

Advances in semiconductor technology in the first decade of the 21st century have had a dramatic effect on what can be done in a single integrated circuit. Transistor gate lengths as small as 22 nanometers have made possible integrated circuits with performance at ultra-high speeds and incredible transistor densities. At the turn of the 21st century the upper limit on transistor count of an integrated circuit was 200 million transistors with data speeds as high as 2.5 gigabit per second over a single data path. Currently, integrated circuits are commonly made with more than a billion transistors with data rates as high as 28 gigabits per second over a single data path.

These advances in integrated circuit technology have made possible products that could only have been imagined a few years ago. In addition to all of the products that have been in use for many years, two very diverse new product categories have developed around these advances. These are the ultra-dense cell phones and tablets that have crept into every aspect of our lives and, driven by these same devices, the ultra-high performance routers, switches and servers that provide all of the Internet services they require.

The first of these has driven component packages to lead pitches as small as 0.4 mm or 16 mils with components on both sides of the PCB substrate. This has given rise to build up PCBs and laser-drilled blind vias as small as 0.1 mm or 4 mils. This technology has driven laminate manufacturers to develop ultra-thin laminates and pre-pregs which have glass weaves that are uniformly spread out to improve the quality of the laser-drilled blind vias. The effect of these changes is not apparent when one looks at the size of the cell phones and tablets as the external packages remain relatively the same. What these changes have done is make it possible to put entire systems, such as GPS, in the same package with the phone as well as allow the user to surf the web and watch real time TV and movies on these same devices. On top of all this, high quality cameras are included that allow the user to easily take movies and still photos. This is remarkable innovation made possible by improvements in IC technology.

The second of these has driven the performance of routers, switches and servers used in the cloud to unprecedented highs in a very short time period. Let’s imagine a terabit router introduced in 2002. It uses half a rack, weighs 350 pounds (160 kilograms) and consumes seven kilowatts of power. Five years later in 2007, the same terabit router is only 1U high, weighs 22 pounds (10 kilograms) and consumes 700 watts. More recently, the capacity of the 1U router has increased to 2.5 terabits per second in the same size package with 32 each 40 gigabit per second ports across the front panel. Where these new technologies take performance seems to have no limits.

The fastest signal on a PCB in the 2002 router was 2.5 gigabits per second. The fastest signal on a PCB in the 2007 router is 10 gigabits per second. The routers developed in 2014 contain signals as fast as 32 gigabits per second. These digital signals are operating in the frequency band once considered microwave. As a result, laminate considerations that once applied only to RF and microwave are integral to success with these products. Among these are copper loss, loss in the laminates and uniformity of the glass weave, none of which were issues as recently as 2000 with digital products. In fact, demands placed on laminate suppliers by the digital world are more difficult than those placed by the RF/microwave community.

The difference between the RF and digital world has blurred as a result of the speed increases in digital electronics. RF and microwave have usually involved signals in excess of a few gigahertz while digital was confined to below 100 megahertz. As described, high performance digital products now operate in the same frequency spectrum as many micro-
wave products, blurring the line between these two technologies. Along with the challenge of engineering data paths that operate in the microwave spectrum changes in power delivery has emerged as a major source of design problems. These same ICs that have billions of transistors often require several different power supply voltages. Examples are: 1.0V for the core at as much as 100 amperes, 1.5V for the I/O at dozens of amperes, 1.1V for the phased-locked loops and 1.2V at several amperes for the memory interface. It is not uncommon for a PCB design to have more than a dozen different supply rails with some recent designs having more than 25 different Vdd rails. Successful power delivery system design is emerging as the most difficult part of many new designs.

Until recently, much of the electronics industry has relied on PCB fabricators to select the materials, design the stack-up and calculate the impedances needed on a PCB. This method worked reasonably well before these semiconductor advances were made. With current and future designs, how well the power delivery system performs along with the quality of the signal paths is intimately tied to how the PCB stack-up is engineered. PCB fabricators are not equipped with the technical skill to account for all the issues that need to be dealt with when designing the PCB stack-up. As a result, design and signal integrity engineers must take charge of this part of the design process. This requires substantial new skills on the part of this team. These performance advances require a whole new set of design and fabrication disciplines, as well as far more knowledge of materials available with which fabricate PCBs needed by these advances, not necessary as recently as the year 2000. Due to the rapid changes in technology, university courses and text books have not been able to keep pace, leaving students with an information gap that interferes with their success doing design work on these new products. Where do engineers and designers turn for the information necessary for success with these new design demands? One place to turn is a seminar being offered by a training company located in Silicon Valley that specializes in this area. This company is Speeding Edge, whose president, Lee Ritchey, has been actively participating in designs of this complexity and shares this knowledge in three day seminars offered around the world. He is recognized as the foremost expert in this field having taught design classes to more than 9000 engineers and designers. The next European seminar is May 5, 6 & 7 in Bitburg, Germany. Anyone wishing to enroll in this class can do so by contacting Joe@Leonardy.de. More information about the seminar is available online at http://www.leonardy.de/txt_high_speed_packages.html.

### Product News

- **Green Hills support Renesas’ R-Car E2 devices**
  Green Hills Software announced support for Renesas Electronics’ R-Car E2 system-on-chip device with the Green Hills INTEGRITY real-time operating system. By targeting the Integrated Cockpit with the addition of the R-Car E2, Green Hills Software continues its commitment to support Renesas’ entire R-Car series of processors. News ID 2712

- **SYSGO integrates Kaspersky Security System into PikeOS**
  The Kaspersky Security System platform is a dedicated solution designed to ensure the safety of information systems that demand enhanced security. It is available as an embeddable OEM component to manufacturers and vendors of comprehensive IT solutions. Examples of such solutions include ERP and electronic document management systems, smart grids, the Internet of Things or even critical infrastructure. At Embedded World, Kaspersky Lab and SYSGO showcase a security solution for safety-critical tasks which embeds the Kaspersky Security System within the real-time operating system PikeOS. News ID 2709

- **R&S: RTE oscilloscopes now with up to 2 GHz bandwidth**
  Rohde & Schwarz has expanded its family of R&S RTE oscilloscopes to include two- and four-channel models with 1.5 GHz and 2 GHz bandwidth. The T&M expert now offers the broadest selection of products in this class, with bandwidths ranging from 200 MHz to 2 GHz. Customers can utilize the full bandwidth of an instrument on all available channels simultaneously. News ID 2707

- **SEGGER adds security feature to Flasher: Authorized Flashing**
  SEGGER has developed a new security feature for its product flash programmer line, as well as the Flasher Portable: “Authorized Flashing” It allows to limit the number of flash programming cycles thus preventing the production of unrestricted quantities by third parties in case of external production. News ID 2702

- **HCC: MISRA-compliant TCP/IP stack to include HTTP, SMTP, SNTP/ntp and SNMP protocols**
  HCC Embedded has extended its MISRA-compliant TCP/IP stack to include HTTP, SMTP, SNTP/ntp, and SNMP protocols. HCC has already delivered the production version of these protocols to customers in the form of unrestricted quantities by third parties. News ID 2655

- **LiebelLieber Software: cooperation with Lauterbach**
  LiebelLieber Software and Lauterbach have joined forces to create a solution for the optimization and debugging of embedded software directly on the model in addition to the source code level. The solution will be presented at the Embedded World Conference as a specially-created demo version available at both companies’ stands. News ID 2651

- **Rogue Wave improves developer productivity with three product releases**
  Rogue Wave Software announces updates to three of its flagship products. Rogue Wave regularly adds new features and functionality to its growing portfolio of products in order to support developers as demand increases for higher quality, more secure software - in less time. News ID 2760

- **ARM and Green Hills: optimised compiler for Cortex-R5 processor**
  ARM and Green Hills have collaborated on an optimised compiler for the ARM Cortex-R5 processor that delivers record-setting automotive performance, enabling the Cortex-R5 processor to meet the needs of the most challenging automotive applications more cost-effectively than any other MCU solution currently available. News ID 2651
An innovative approach to a single-chip power meter design

By Graeme Clark, Renesas

This article describes the RX21A MCU which has been designed from the bottom up to meet the requirements for the next generation of solid state power meters, and also provides an solution for many other applications.

The market for solid state electricity meters has to be one of the most dynamic markets at the moment, with a number of different factors driving systems and architecture changes, all around the globe. These rapidly changing market conditions, caused mainly by the demand for smart and green energy as well as by the current global recession, make the job of the designer of the now ubiquitous solid state electricity meter ever more difficult. These demands, when combined with the constant requirement for new and innovative features in all our products constantly add to the pressure and complexity of designing any new product.

Today electricity meters have to be designed to be ever more accurate and take less power, while adding more and more features, including the ability to not only meter power, but to log data and to communicate via many different media, both wired and wireless. Any solution also has to provide the flexibility to allow the developer to react quickly to the changing market conditions. These requirements automatically lead to more and more demands to be made on the central microcontroller that can be found at the heart of any solid state electricity meter and asked how we can best provide a solution to these requirements.

The RX21A uses the popular RX 32-bit CPU core which includes an on-chip DSP function with a 48-bit multiply-accumulate register, and can operate at up to 50 MHz while still offering low power consumption. The RX21A is designed on a low power 130µm CMOS process, providing multiple high resolution analogue front ends, while offering significantly more additional functionality than existing devices at a significantly lower cost.

The key function of a power meter is of course to accurately measure the voltage and current, and hence calculate the power in real time. During the development process of the RX21A and based on feedback from previous Renesas power meter products, it quickly became very clear that there was strong requirement for making the power measurement system as
SMART METERING

Many of the solutions for electrical power measurement today rely on either hardwired DSP engine functionality or something similar to produce the final result, meaning that it's much harder to quickly follow new market requirements, such as the requirement to measure factors such as power quality.

A key design criterion of this device was to allow the power measurement to be undertaken as easily as possible, but to make the final result as flexible as possible, allowing the user to use the data as they please. To achieve this requirement, a clever combination of hardware features was developed to automate the basic process of acquiring the data and presenting the data in the SRAM of the microcontroller. The 24-bit analog-to-digital converter (ADC) module on the RX21A has been especially designed for power meter applications, and is able to support a variety of sensor technologies including, shunt and current transformer as well as Rogowski coil sensors.

The 24-bit ADC uses a second order sigma-delta converter technology, with built-in programmable gain amplifiers. Four out of the seven channels use differential inputs with gains of up to 64 and the remaining three channels use single-ended inputs with gains of up to four. The ADC system also has an internal band gap reference circuit, (BGR) which is capable of operating with an accuracy of better than 30 ppm/°C. There is also an option to provide the voltage reference externally to the device.

The RX21A is available in two versions, the standard version and the enhanced G version, the G version includes software calibration factors stored in the memory during the manufacturing process. This allows the user to develop meters with accuracies of better than Class 0.2. Three different versions of the RX21A are available, supporting single-phase meters, with three or four 24-bit ADC modules, and a version supporting 3-phase meters with 7 separate ADC modules. Seven separate ADC modules allow the user complete flexibility in designing their meter and maximises the sample rate on each channel.

Each channel sampling time can be independently controlled by an on-chip 16-bit timer (The multi-function timer pulse unit (MTU2), a 6-channel 16-bit timer module) either free running or in synchronisation with the zero crossing of the mains supply. This technique allows the phase difference caused by various sensor technologies to be removed in hardware, and this can be programmable if required depending on the sensor type used. Each of the seven channels can be controlled in synchronisation or individually, giving the designer maximum flexibility in their design, and minimises the need for additional software.

The RX21A ADC system is also capable of automating the process of moving this data from the ADC result registers into buffers held in SRAM. The device has an on-chip data transfer controller (DTC) which like a simple DMA controller can be used to transfer automatically data between the ADCs (or any other peripheral) and SRAM without CPU intervention. The on-chip data transfer controller (DTC) can easily automate this process, allowing the user to build up buffers representing a half or whole cycle of the mains, which once collected, can then be presented to the CPU for processing. The DTC is also much quicker at transferring the data, an example of this is shown in figure 2 where it can be seen that the transfer of four 32-bit values from the 24-bit sigma-delta ADC is almost 4 times faster with the DTC. This leaves the CPU available for other house keeping tasks while the data is being accumulated.

Once the metering data for a complete cycle or half-cycle is available in the SRAM, the CPU can be interrupted from it's other tasks and can then make the necessary calculations. This is made easier with the high-speed on-chip multiplier and DSP functions which allow the device to rapidly make the necessary calculations, for active and reactive power as well as other parameters. The great flexibility of this solution is that the raw data is always available to the software, so later versions can add new features and measurements as required.

An additional 7 channels of 10-bit ADC are also available on the device for a wide variety of uses if required. The 10-bit ADC can also be controlled by the on-chip timers if required.
Many of the other peripherals implemented on this device have also been implemented with the exact requirements of the power meter in mind. The RX21A includes many peripherals which have been specifically shaped by the special requirements of a power meter.

For instance today many devices are required to operate in low power mode, but still allow for low power reading. The MCU is designed to work in conjunction with an external low power LCD driver, and so has multiple I²C and SPI interfaces to make interfacing to such LCD drivers as easy as possible. The RX21A is also capable of operating in a number of very low power modes, both from an external 32 kHz oscillator or from the integrated 125 kHz on-chip oscillator. Deep standby, where the RTC and a few simple peripherals still operate, while the device is only consuming 1µA. Another enhanced feature is the on-chip real-time clock calendar (RTC), this has been designed to be easily used in a power meter environment, allowing for easy calibration in production with programmable outputs, and an on-chip calibration function to allow for the adjustment of the 32 kHz clock used for the RTC, and of course also includes leap year support. In addition the on-chip temperature sensor can be used to allow even greater calibration for the temperature deviation of the external 32 kHz clock. The real-time clock also supports a binary count mode, which can be extremely useful to allow the support of all the RTC functions while using no Gregorian calendars.

The RTC also supports a programmable alarm function which allows the device to wake up at a programmable time in the future, as well as a system of regular wake-up interrupts. Finally the RTC supports a tamper system, where a change of state of an external pin can be time-stamped inside the RTC to detect when an external event, such as the opening of the meter case occurred.

Communications is also becoming a more and more important feature of many power meters, whether for automatic meter reading, for remote calibration, for software updates or even for use as a home gateway. The MCU supports up to nine serial interfaces (SCI), five of these serial interfaces are capable of a variety of synchronous or asynchronous communications functions including high-speed UART, I2C and SPI as well as two providing dedicated multi-master I2C interfaces and two more providing dedicated high-speed SPI interfaces, as well as an on-chip IrDA interface. This huge number of serial interfaces allows the complete integration of all the metering functions into one device, a typical example of the total solution using the RX21A is shown in figure 3.

System reliability is also a key feature, and with this in mind the MCU integrates a number of features to improve reliability, including both high- and low-speed on-chip oscillators, a comprehensive low voltage detection subsystem (brown out detection), power on reset circuit, a tamper detection function, and a watchdog timer with its own dedicated on-chip oscillator. Memory reliability checking is also supported with a CRC function to support the checking of the program memory and a built-in function to support the checking of the on-chip SRAM reliability.

Most importantly the RX21A also integrates a memory protection unit, which allows the user to control access by the CPU to various parts of the memory, allowing the partition of the application into various secure and insecure portions, which cannot interfere with each other without generating a system exception. This provides a solution to many of the more difficult design decisions forced upon the designer by some current legislation.

Renesas has developed a power meter reference platform based on the RX21A, which has been designed to help users evaluate the performance of the MCU. The reference design shows a typical use of the RX21A in a 3-phase meter capable of supporting single point calibration, while achieving accuracies of better than Class 0.2S active. The meter software provides for measurement of the voltage, current, active and reactive power and the harmonic power on each phase.

Temperature compensation is provided for both the on-chip gain amplifiers, the on-chip voltage reference and for the on-chip RTC. The reference design supports a current range from 100mA to 100A with a 10mA starting current, with a meter accuracy equivalent to IEC 62053-22 (and ANSI C12.20), to at least 0.2s active and compliant to IEC 62053-23, class 2 reactive.
All-in-One Single Board Computer
based on Pico-ITX format

By Martin Danzer, congatec

There is rising demand for compact industrial computers, such as those based on the Pico-ITX form factor, that can execute tasks reliably and handle connectivity from field use up to management level. Standardization enables high volumes across a wide range of applications while ensuring that devices offering industrial reliability remain affordable.

Because modern computer architectures provide an extensive set of features and powerful interfaces such as PCI Express, Serial ATA or USB 3.0, mass-produced standard single-board computers (SBCs) can often fulfill developer requirements. However, what may at first glance appear cost-effective can quickly prove to be an expensive solution when considering full system costs. Components that are optimized for inexpensive mass production often fail to meet the demanding requirements for 24/7 use in harsh industrial environments. In addition, as soon as the next chip generation is introduced – which happens every twelve months or sooner - these components tend to become obsolete. When that occurs the costly choice is to either stock up on components or to continuously adapt products to the latest chip generation. Anyone who also requires support for customization, such as special industrial protocols, will quickly find himself left to his own devices.

It is much more efficient to use boards that provide a relevant range of integrated interfaces and functionalities, supplemented by optional pre-integrated legacy ports and special embedded features such as a real-time clock (RTC), and available for purchase for many years with flexible logistics. That this is indeed possible has been proven quite successfully in recent years by the manufacturers of standardized computer modules (COMs). So, what is better than to transfer the benefits of standardization from the world of computer modules to SBCs?

While the familiar Mini-ITX form factor with a footprint of 170x170mm dominates in the desktop processor market for the middle and upper power range of up to 65 watts Thermal Design Power (TDP), many modern applications require only a TDP of 10 watts or less. This requirement can be adequately addressed by the latest ultra-efficient embedded processors. The well-known Qseven standard has shown that a footprint of 70x70mm is large enough to produce extremely reliable computers in this performance class. When factoring in some extra space for the additional external connectors required for SBCs, the 100x72mm footprint of the Pico-ITX standard seems virtually ideal.

congatec, a leading COM manufacturer and co-founder of the Qseven standard, has for some time been providing professional all-in-one (AiO) SBCs based on Thin Mini-ITX in addition to COM Express and Qseven modules. Leveraging the synergies with the corresponding module standards even more fully, the company recently added the Pico-ITX format to its offering, thereby combining years of experience in building high-quality COMs for 24/7 industrial use for periods up to ten years with the cost advantages of high-volume SBC production.

The new conga-PA3 Pico-ITX SBC is equipped with embedded processors ranging from the single-core Intel Atom E3815 with 5 watts TDP up to the quad-core Intel Celeron N2930 with 7.5 watts TDP. Both processors are from Intel 64-bit Bay Trail family and are full system-on-chips (SoCs), which are characterized not only by high efficiency, but also by a very good price/performance ratio. Additional CPUs can easily be implemented as customized versions, given the appropriate production quantities.

The integrated Intel Gen7 HD graphics runs at a constant speed of 400 MHz with the Intel Atom E3815 and, depending on the load, between 688 MHz and 854 MHz with the Celeron N2930. It also supports two independent displays in Full HD resolution (1x LVDS, 2x24bit via an internal connector; 1x DP++; and HDMI 1.4). The hardware supports or directly accelerates DirectX 11.1, OpenGL 3.2 and OpenCL 1.2.

The RAM memory is soldered directly to the SBC. The Atom E3815 options include 1, 2 or 4 GB of DDR3L-1600, for the Celeron J1900 it is 2 or 4GB DDR3L-1333. Depending on the
With the TQMa335L, TQ-Systems has developed a small Minimodule with Texas Instruments, is ideal for device developments where high quality is required in addition to a low price. The ARM Cortex-A8 module is based on LGA technology: Here the connections of the modules are placed on the base in the form of a chessboard style grid (grid array) of interfaces (land). This allows the module to be soldered to the motherboard cheaply, without requiring a plug-in connector, using a qualified welding process.

The customer benefits from congatec experience as a manufacturer of high-quality computer modules. Synergies reduce development time and costs; existing know-how and proven infrastructure allow outsourcing of individual developments and solutions to the manufacturer where necessary. This way, a single supplier can cater for the complete spectrum from low-cost standard solutions to individual EDMS projects (embedded design and manufacturer services), while also covering a wide variety of technology platforms with form factors ranging from computer modules to complete single-board computers.

**Product News**

**TQ: ARM Cortex-A8 module for cost-intensive designs with high quality demands**

With the TQMa335L, TQ-Systems has developed a small Minimodule with high processing power which can be directly soldered to the base board. This module, which is based on the ARM processor family AM335x from Texas Instruments, is ideal for device developments where high quality is also required in addition to a low price. The ARM Cortex-A8 module is based on LGA technology: Here the connections of the modules are placed on the base in the form of a chessboard style grid (grid array) of interfaces (land). This allows the module to be soldered to the motherboard cheaply, without requiring a plug-in connector, using a qualified welding process.

**Table 1. Processor choices for the conga-PA3 Pico-ITX SBC**

<table>
<thead>
<tr>
<th>Processor</th>
<th>Cores</th>
<th>Cache [MB]</th>
<th>Clock [GHz]</th>
<th>TDP [W]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel® Celeron™ N2930</td>
<td>4</td>
<td>2</td>
<td>2.00</td>
<td>7.5</td>
</tr>
<tr>
<td>Intel® Atom® E3845</td>
<td>4</td>
<td>2</td>
<td>1.91</td>
<td>10.0</td>
</tr>
<tr>
<td>Intel® Atom® E3827</td>
<td>2</td>
<td>1</td>
<td>1.75</td>
<td>8.0</td>
</tr>
<tr>
<td>Intel® Atom® E3815</td>
<td>1</td>
<td>0.5</td>
<td>1.46</td>
<td>5.0</td>
</tr>
</tbody>
</table>

### Figure 2. Block diagram showing implementation details of conga-PA3 Pico-ITX with Intel Atom E3800 series

The widespread and highly compact Pico-ITX form factor plus the convincing AiO concept with additional embedded features and proven legacy interfaces such as COM and LVDS enable high volumes at low prices. For a moderate premium compared to the cost of standard mass-produced goods, the customer can acquire robust computer boards with a guaranteed long-term availability of at least 7 years. The versions with an Atom processor are all suitable for 24/7 operation in harsh environments. Optional versions for the extended industrial temperature range of -40° to +85° C are also available.

The customer benefits from congatec experience as a manufacturer of high-quality computer modules. Synergies reduce development time and costs; existing know-how and proven infrastructure allow outsourcing of individual developments and solutions to the manufacturer where necessary. This way, a single supplier can cater for the complete spectrum from low-cost standard solutions to individual EDMS projects (embedded design and manufacturer services), while also covering a wide variety of technology platforms with form factors ranging from computer modules to complete single-board computers.
**Product News**

**Pentair: Schroff embeddedNUC case with integrated cooling solution**

Processors are increasingly smaller, more powerful and more economical. A good example is Intel’s Next Unit of Computing (NUC) system. This system, developed for consumer applications, combines many PC functions on a boardsize approximately 10 x 10 cm in size. To extend the benefits of the system to industrial applications, the SDT.03 working group of the SGET standardizing consortium has developed and published a specific ‘embeddedNUC’ standard as a foundation.

*News ID 2776*

**Artila: FreeRTOS platform for environmental monitoring and I/O control**

Artila Electronics releases RIO-2010PG, the new FreeRTOS programmable remote I/O module. RIO-2010PG is powered by a 32-bit NXP LPC1768 100MHz ARM Cortex M3 processor which is equipped with 64KB SRAM 512KB Flash and FreeRTOS operating system. The industrial I/O of RIO-2010PG features one 10/100 MHz Ethernet port, one full modem RS-232, one isolated RS-485, eight channels of relay, 16 photo-isolated digital inputs and one I/O interface for temperature or humidity sensors.

*News ID 2751*

**Concurrent: CompactPCI processor board with 10 Gigabit Ethernet**

Concurrent Technologies has introduced a new 6U CompactPCI board based on a 4th generation Intel Core or Celeron processor with the option of 10 Gigabit Ethernet interfaces. PP B1x/msd is a single slot air-cooled board, allowing customers to easily migrate to the latest generation of Intel processors for longer system life-cycles. Three levels of performance are offered from a 4-core Intel Core i7-4700EQ, 2-core Intel Core i5-4422E to a 2-core Intel Celeron 2002E processor with options for 16 or 32 GBytes memory.

*News ID 2746*

**CES: rugged VNX mission computer**

Creative Electronic Systems announced the first member of the ROCX-3 family of rugged VNX mission computers. Based on VPX technologies, VNX is the small form factor standard for conduction cooled modules. The base VNX 2+1 System consists of a chassis supporting two double-wide 19mm and one single-wide 12.5mm VNX modules. One 19mm site hosts an SBC, initially an AMD G-Series SoC quad-core processor with two independent GPUs. The 2nd 19mm site can host either a 2nd SBC, an image processor, or a video conversion module.

*News ID 2708*

**F&S: efusA9X module with new Freescale ARM Cortex-A9 CPU**

At the beginning of 2014, F&S Elektronik Systeme introduced its new form factor efus (easy – functional – universal – small). In contrary to the Qseven standard, which uses the same plug connector, efus was designed consequently for ARM processors. It also allows a base board with four layers only. Another module in this successful and compact (47x62mm) form factor is going to be introduced at embedded world. The CPU of efusA9X offers many acceleration functions for fast picture response, enabling animations and video playback.

*News ID 2685*

**Kontron: IoT-ready modular products with robust design**

Kontron presents the new COM Express Computer-on-Module Kontron COMe-cBL6 and the mini Motherboard miTX-BDU-U. Both the COM Express and miTX are IoT ready and equipped with 5th generation Intel Core SoC processors as well as Intel Celeron processors. The new COM Express module and the miTX are both suitable for various environments that require multi-touch display systems or maximizing limited power consumption.

*News ID 2723*

**DFI: compact and mini modules based on Atom E3800 SoC**

DFI introduces its two COM Express products adopting Intel Atom processor. The Intel Atom E3800 SoC-based modules are available in Type 6 and Type 10; providing outstanding computing capability as well as flexible expansion interfaces. To meet the requirements of today’s automation applications, BT9A3 Mini module not only delivers excellent CPU performance but also features ECC memory that provides improved data integrity and system reliability through automatic data correction.

*News ID 2696*

**Artila: FreeRTOS platform for environmental monitoring and I/O control**

Artila Electronics releases RIO-2010PG, the new FreeRTOS programmable remote I/O module. RIO-2010PG is powered by a 32-bit NXP LPC1768 100MHz ARM Cortex M3 processor which is equipped with 64KB SRAM 512KB Flash and FreeRTOS operating system. The industrial I/O of RIO-2010PG features one 10/100 MHz Ethernet port, one full modem RS-232, one isolated RS-485, eight channels of relay, 16 photo-isolated digital inputs and one I/O interface for temperature or humidity sensors.

*News ID 2751*
How to select the right modules in the embedded market?

By Wolfgang Heinz-Fischer, TQ-Group

It has been decided to use a module - now comes the much more difficult part of the decision – the search for the best solution. The number of modules offered in the embedded market is nearly incalculable. So, how do I find the optimal module for my requirements?

First of all, there is obviously the question whether there is a module in the market for the selected processor or whether another processor, for which a module is offered, could also suit. In principle, one must distinguish between modules with an x86 processor and the other architectures. Here, there are fundamental differences between the market and the supply side. When it comes to the x86 modules, there are actually only the standards, today with COM Express and Qseven. The industry standards ETX and XTX have aged a bit, but they are still offered in the market. Even Single Board Computer (SBC) are still offered, which are absolutely sufficient for some applications. However, the question sometimes is about the long-term supply availability in the same form factor and in the same design. If the plugs actually remain at the same position, can I install an SBC in my machine for a long term without alterations?

This is basically the question of the standard. To what extent is the standard actually described and fixed and how many degrees of freedom are allowed? The main expectations from a standard are surely the interchangeability of the systems of different suppliers and the scalability in order to be able to easily adapt to various requirements. If the standards meet the expectations, they are definitely helpful and practical. How close do the offered standards come to the dream of an absolute standard, or how often you are disappointed that the expectations are unfortunately not met in the actual use?

Standards in the embedded market promise that all modules, which follow this standard, are compatible and thus interchangeable. For the user, this means that they develop an application board, which follows the standard, and can then choose from different manufacturers and simply attach the module. If they require more power, they simply take the correspondingly more powerful module of a manufacturer and replace the existing module. This sounds good; but the reality is different and in 90 percent of cases, it is necessary to adapt or modify the application board.

Actual interchangeability in all cases is possible only where the standard is restricted to a very narrowly formulated specification of functions. This mainly includes PC/104, in which only the ISA and PCI Bus are fixed; all other functions are realized more or less through a manufacturer-specific plug grave. The situation is similar in case of MicroTCA and other telecom standards. On the other hand, if you have a good look at the COM Express standard managed through the PICMG, it quickly becomes apparent where the limits of a clearly described standard lie.

In case of x86 modules, all processor functions are mapped; i.e. they are available at the plug. However depending on the processor or the chip set, not all functions defined in the standard can be mapped, since these are not delivered by the processor/chip set. For example, in the COM Express standard 8x USB 2.0 interfaces are defined, which are however supported by very few processor/chip set combinations. In most cases, 4 to 6 USB 2.0 interfaces are available. Even the 24 PCI Express Lanes defined in the COM Express standard Pinout version 2 are, in all probability, not fully supported. An Atom processor for example delivers only 2 PCI Express Lanes x1. This means that I can attach the same module, e.g. COM Express Compact with a Core processor, in an application board which was developed for an Atom design; but I do not use the additional PCI Express Lanes.

The same restriction is applicable the other way round. An application board optimized for a Core processor will not support all functions when using a module with an Atom processor. The x86-module market is easier when it comes to supporting software drivers and does not make it too difficult to switch over to another module. The corresponding drivers should normally be downloaded from the websites of the chip manufacturers. Thus, while it should be carefully checked even in
case of the x86 module market whether the compatibility and scalability expectations are actually met, the market of the other architectures is far more complicated. You will quickly know that this is a completely different world even if many marketing statements try to get you to think differently.

Outside the x86-world, modules based on ARM architecture are dominant. If you take a look at the suppliers of ARM-based processors, i.e. mainly Freescale, TI, Samsung, Infineon, NVIDIA and many others, it becomes clear that the chip manufacturers have defined their specifications according to their target markets. The functions offered by the individual processors are thus partly very different. Unlike the case of the x86-architecture, this makes it nearly impossible to define a standard. The Qseven Group and the SMARC Group have both introduced one standard each. At the time of the launch itself, it was revealed that a common way or a description is almost impossible. Qseven assumes a connection between x86 and ARM, which is absolutely legitimate. Today, both architectures address partly the same applications. If the application demands only the basic interfaces such as Ethernet, USB and graphics, then an interchange of the architectures is absolutely possible except for the necessary software adjustment.

At the time of launch of SMARC, the highly different target markets of x86 and ARM were pointed out. If good graphics and fast data transfer, i.e. many PCIe interfaces, are required, the x86-architecture with the COM Express standard is the first choice. If more industry interfaces, such as mainly CAN, serial, I²C, SPI or camera interface, are required, then SMARC suits better. Even if the SMARC standard leans considerably more on the offered functions of ARM processors, it does not solve the general problem of getting the mapping of the different functions of various processor suppliers under one umbrella. Here too, it is worth taking a closer look.

For example a manufacturer offers SMARC modules with a Freescale, NVIDIA and a TI processor. The 2 CAN interfaces given in the specifications are available in case of the Freescale and TI solution, but not in case of the NVIDIA solution. The specified 3 PCIe x1 interfaces are realized in case of the Freescale solution using a bridge chip; the NVIDIA solution offers 2x PCIe x1 and the TI solution offers no PCIe x1 interface. The question about the interchangeability of the modules of a manufacturer, which all follow the same SMARC standard, is allowed here as well. And how do the new interfaces such as mainly USB 3.0 reappear in the latest standards? Are there new standards or new definitions and are these again compatible with the previous standards? In case of ARM modules, a switch-over from one architecture or one supplier to the next has an additional hurdle – the software drivers. What is still quite easy in case of x86 systems, does not work in this segment. Every module supplier, even if it offers the same processor based on the same standard, has its own BSP. Thus, this part must be adapted or developed anew in any case.

Standards in the ARM module market are thus always compromises as regards the available interfaces at the module plug. Depending on the standard and the processor used, the user does not have access to a number of functions of the processor. But they have to pay for the complete functional scope. And should the processor offer the required functions in future applications, the question remains whether these are also supported by the module.

Moreover, the application boards are mostly optimized for a certain application and power. The real world shows that if more power is required, even the application board is optimized for this additional power. It should simply be understood that a Porsche engine cannot function optimally in a Polo chassis, and obviously vice versa. This actually
Artesyn announced two new media processing accelerators, the SharpStreamer 1U Platform and the SharpStreamer 2U Platform, that enable communications service providers to significantly increase the density of their multiscreen video services by using hardware-accelerated, software-based transcoding in a standard rack server architecture.

News ID 2783

Artesyn: media processing platforms enable high density multiscreen video

That answers the question about the necessity of scalability. It is therefore worth comparing the functions available at the module plug 1:1 in order to decide whether an easy interchange is possible without modifying the application board. This prevents surprises when using a module of another manufacturer or when upgrading with a more powerful module. Otherwise, the decision can quickly rebound like a boomerang and imply a multiple of the supposedly saved costs. In any case, the desire for an absolute standard for embedded modules with ARM architecture will remain a dream. This is already shown solely by the abundance of standards in this segment.

Standards still have their legitimacy. In many cases, where the complete functional scope of the module or processor is not used, there will be a number of compatible modules from different manufacturers, which are actually interchangeable. Even reuse of parts of the old application board in the new design will obviously help in saving costs in case of the new design. As a leading solution supplier for innovative technologies, TQ takes the market requirements into account and offers proprietary as well as standard modules. The ARM-based modules are optimized for the processor; when it comes to standards, the focus is placed on the development of x86 modules.

Product News

**Vecow: quad core i7 in-vehicle fanless embedded system**

Vecow launches her latest embedded elite, IVH-7700 Series In-Vehicle Fanless Embedded System. Powered by Intel Quad Core i7/i5/i3 processor, DDR3 or DDR3L, dual channel up to 16GB memory; Intel HD 4000 graphics supports DVI-D, DisplayPort, and dual channel 24-bit LVDS triple independent displays; 4 front-access 2.5” SSD/ HDD trays, 4 GbE PoE+ ports, optional M12 connection for PoE+, dual GbE LAN ports, 4 Mini PCIe slots,

News ID 2789

**SGET finalises Qseven V2.0 carrier board design guide**

SGET Standardization Group for Embedded Technologies has finalised Version 2.0 of the Qseven Design Guide “Guidelines for designing Qseven carrier boards” successfully. Reference examples from the actual Qseven V2.0 Reference Carrier Board ensure a clear understanding of the subject. New features since the last Version 1.2 include support for USB 3.0 SuperSpeed and embedded DisplayPort, just to name the two most popular ones.

News ID 2783

**Artesyn: media processing platforms enable high density multiscreen video**

Artesyn announced two new media processing acceleration appliances, the SharpStreamer 1U Platform and the SharpStreamer 2U Platform, that enable communications service providers to significantly increase the density of their multiscreen video services by using hardware-accelerated, software-based transcoding in a standard rack server architecture.

News ID 2788

**SECO: “Just! embedded” product line**

During the Embedded World, SECO presented the new Just! embedded product line, designed to include boards which exclusively support SoC native features. The Just! embedded product family represents cost effective, energy-efficient and low power solutions of a full-standard pinout at the low cost of a proprietary module. All this results in essential, “ready-to-use” and “ready-to-market” products which allow the reduction of design risks with minimal effort and cost.

News ID 2799

**congatec: Pico-ITX SBC with Atom E3800**

congatec announces a new Pico-ITX SBC based on the Intel Atom E3800 processor series. The compact design with a footprint of 70x102mm makes the SBC highly versatile. Real-time capability and support for multiple operating systems allow use in demanding industrial applications such as mechanical engineering or automation and control systems. The Intel Atom E3800 processors are also suitable for use in the extended industrial temperature range. Thanks to their low power consumption with just 5 to 10 Watt TDP, the single-chip Bay Trail solutions are ideal for passively cooled and enclosed systems that can be used in harsh environments.

News ID 2710

**u-blox: stand-alone module supports dual-band Wi-Fi and Bluetooth**

u-blox announces ODIN-W262, a new stand-alone multimode module designed for Internet-of-Things applications. The professional-grade module makes adding wireless connectivity to any product quick and easy, with the added benefit that it is radio type-approved in countries across the world. A robust, built-in antenna provides flexibility with respect to the module’s installed position and orientation.

News ID 2678

**Syslogic equips Compact S and M industrial computers with Atom E3845**

Syslogic is equipping its Compact S and Compact M Series with the high performing Atom E3845 processors from Intel. Just a year ago, the company had suited its embedded pc Compact SL series with the Atom E3845 processors. Syslogic is a pioneer with the Compact S and Compact M series. These high performing industrial computers with quad-core processors are distinguished by their ultra-compact construction.

News ID 2795
Covering all functionalities and features of the revised CPCI Serial spec

By Rüdiger Coelln, Pentair

The new revision of the CompactPCI Serial specification was ratified in 2013. The update includes adaptations and new features which need to be implemented in a new revision of the hardware. With the revised Schroff CPCI Serial platform, Pentair is able to cover all features and functionalities within this new standard.

When CompactPCI was ratified the first time in 1995, the fundamental PCI bus was at that point of time the standard bus structure for the Personal Computer. Therefore this bus was the base for all chip manufacturers. The compatibility to the existing PC world helped CompactPCI to get an established standard, offering a scalable, flexible and cost efficient platform for all kinds of industrial applications such as in railway, audio broadcast, energy, medical, test and measurement, and oil and gas. Due to the evolution of the PC technology, the CompactPCI specification needed to be updated as well. The processing of higher data rates required serial interfaces like Ethernet, SATA or USB. Further to that a lot of hardware periphery like a HDD is more readily available with a serial than with a parallel interface. Driven by that evolution PICMG introduced the CompactPCI Serial specification, which was published in March 2011. CompactPCI Serial (CPCI.S-0) as the successor of CompactPCI offers a lot of new features while being downwards compatible to CPCI.

CompactPCI PlusIO (PICMG 2.30) is downwards compatible to CompactPCI (PICMG 2.0). It offers the modularity, robustness and economic efficiency of CompactPCI, adding fast serial data transfer inside the same 19” standard environment. The pin number of the J2 connector for 32-bit system slots is sufficient for leading 4 PCI Express x1 links, 4 SATA, 4 USB 2.0 as well as 2 Ethernet 1000BaseT interfaces to the backplane. CompactPCI Serial offers all established serial protocols, known from the consumer market, like USB for peripheral hardware including extended memory, in- and output devices or communication modules. An internal HDD can be directly connected to the processor via S-ATA. For data exchange PCIe Gen 3.0 and Ethernet 10GB BaseT provide significant increased throughput capacity. This high data transfer rate makes the platform predestined for high performance communication like broadcast, image processing or data acquisition.

With these new serial protocols another helpful feature is supported. Hot Plugging enables the user to exchange certain boards even during operation. This function increases the service-ability substantially. Hard disk drives, wireless communication boards or even CPU boards can be removed without damaging any device and disturbing the operation of the system.

To implement further features into the CPCI.S-0 standard, PICMG opened the specification for revision in 2013. One significant adjustment was the backplane setup. In the original ratified specification the system slot was on the left side only. The experience taught that some applications require the system slot on the right side. A further change was applied to the pinout of the P6 connector. Users often need to have their interfaces on the backside of the system. Therefore the I/O Signals like DVI, USB or Ethernet must be routed directly through the connector to the rear transition module. But in the original specification, the P6 connector was occupied by Ethernet signals to be routed through the backplane. With the new revision both pinouts are possible.

With the serial protocols which provide the high data transfer rate, the Hot Plugging functionality and the backwards compatibility, CompactPCI Serial is a platform for quite a wide range of possible applications. This technology is even capable to be implemented into ruggedized and conduction-cooled applications, which makes this standard applicable for all purposes. Pentair is a part of the more than 30 manufacturers within the PICMG working group and plays a significant role in defining and implementing new specifications. Thus the company was one of the first companies offering CompactPCI serial backplanes, power supplies and chassis.

The ratification of the revised PICMG CPCI.S-0 specification led Pentair to extend their product portfolio by introducing the new 4U CPCI Serial System with a width of
84HP and a huge range of possible configurations. The modular design of this family guarantees a scalability which allows individual settings without complexity. The system can be adapted to suit the needs of its user. The configuration most likely starts with the definition of the backplane. Pentair offers nearly all imaginable types of CPCI Serial backplanes with one to nine slots, different Ethernet topologies (full mesh or single star), the system slot left or right, and finally with or without rear I/O.

As previously described, Schroff also offer the two different pinouts for the P6 connector. This connector can either be used to route the Ethernet signals on the backplane or without any backplane connection, for direct routing to the rear I/O connector. The Schroff backplane family offers enormous number of different combinations. The connector for the pluggable power supply can be either integrated on the backplane, or linked with a power adapter board which connects the 12V and GND between Schroff CompactPCI Serial power backplanes and backplanes. With the available space of the 19” chassis the user could add additional power supplies for power redundancy or even realize several independent CPCI Serial systems in one chassis.

Another very important part of the infrastructure is a proper power supply. Each application has certain power requirements. The Pentair pluggable power supplies are flexible for many operational conditions and suitable for extended temperature conditions from -40°C to +70°C at full rating. Active current share supports N+1 redundancy and enables power consumption sharing between up to four power supplies, which allow a hot-swap replacement during operation. The AC PSU has a wide input range of 90-264 VAC, and provide 12V output and 5V standby as defined for CompactPCI Serial specification. Instead of a pluggable unit the user may prefer an open frame PSU which usually provides a higher output power. With the various configurations Pentair is able to cover 98% of all requirements for CPCI Serial applications. The power input is as for CompactPCI at the backside of the unit. This supports a power entry at the rear side of the system which avoids any disruptive cabling at the front.

The replaceable fan tray in the bottom of the chassis guarantees a sufficient cooling of the application. Depending of the number of used slots the fan tray can be extended on demand. So, the user can chose between two or three powerful fans to ensure proper heat dissipation. The optional fan control module monitors and regulates the temperature by controlling the fan speed. In case of a malfunction or an over temperature event an alarm by LEDs in the front panel warns the user. These LEDs also indicate the power status and give the user an overview about the status of the complete system infrastructure. To increase the serviceability the chassis can be equipped with telescopic slides. This would be quite interesting for replacing any rear I/O board. With the telescopic slides the system doesn’t need to be reinstalled out of the rack. Nothing needs to be disassembled and any maintenance at the application can be done without interrupting the operation of the system.

With this new generation Pentair is able to cover all requirements an application based on CompactPCI Serial could have. All devices like power supply, cooling or backplane are designed according the IEEE and PICMG standard and optimally matched to one another. Supported by the scalable platform the system can be configured to meet exactly the customer requirements. In addition to reduced development costs, the user also profits from short development and manufacturing times.

Beyond the mentioned modifications, the CompactPCI Serial specification is continuously being developed further. Currently the PICMG working group is defining a standard for a shelf management light for CPCI Serial. This shelf management will monitor features including power management and cooling control, event sensor logging, electronic keying, and hot-swap monitoring. These functions will be described in a subsidiary specification of CPCI.S-0.
AdaCore launched QGen code generator and model verifier
AdaCore announced the release of QGen 1.0, a qualifiable and customizable code generator and model verifier for Simulink and Stateflow models. This tool can generate MISRA C and SPARK source code producing readable, traceable, and efficient code. It is particularly suited for developing and verifying high-integrity real-time control applications, especially where safety certification is required. The tool is highly configurable thanks to its visible intermediate representation.
News ID 2717

Lauterbach supports full portfolio of Wind River operating systems
Lauterbach and Wind River are working together to ensure interoperability between all Wind River operating systems and the comprehensive debuggers built by Lauterbach. TRACE32, the in-circuit debug and trace solutions of Lauterbach will support all new releases of Wind River operating systems, including the latest Wind River Linux, VxWorks (including Virtualization profile), and VxWorks 653 platforms.
News ID 2631

LDRA: TBmanager provides bidirectional software process and artifact traceability
LDRA has secured a patent for TBmanager, its software life cycle traceability and verification system. TBmanager enables developers to bidirectionally link industry-standard objectives, functional requirements, design, code, and test artifacts to the people responsible for those activities. By helping define, enforce, and demonstrate a comprehensive verification workflow, TBmanager provides companies with the audit trail needed to achieve regulatory compliance of safety-critical standards.
News ID 2690

PragmaDev: tool to simulate deployment of connected objects
PragmaDev RTDS latest release V4.6 introduces 18 new features making it the most complete model driven development and testing tool dedicated to communicating systems. Real Time Developer Studio is based on a formal modeling and testing set of technologies allowing simulation, prototyping, verification, full code generation, debug on target, and test generation.
News ID 2649

TI: connect, control and communicate with Sitara AM437x industrial single-chip drive
Texas Instruments announced the new Sitara AM437x Industrial Development Kit. Allowing developers to differentiate and optimize motor control industrial system design the AM437x IDK aids in the evaluation of the multi-protocol, industrial communication and feedback interface capabilities of the highly integrated Sitara AM4379 and AM4377 processors based on the ARM Cortex-A9 core.
News ID 2817

EBV features TI’s multi-standard wireless microcontroller platform
EBV Electronik now offers the new SimpleLink ultra-low power wireless microcontroller platform from Texas Instruments. The platform helps customers go battery-less with energy harvesting or enjoy always-on, coin cell-powered operation for multiple years. With this industry-first technology, customers have the flexibility to develop products that support multiple wireless connectivity standards using a single-chip and identical RF design.
News ID 2756

Microchip: 3V serial quad I/O interface SuperFlash memory family
Microchip announces a new family of 3V Serial Quad I/O (SQI) interface SuperFlash memory devices: the SST26VF. This three-member “26 Series” SQI interface family is available with 16-Mbit, 32-Mbit or 64-Mbit of memory and is manufactured using Microchip’s high-performance CMOS SuperFlash technology, which provides the industry’s fastest erase times and superior reliability.
News ID 2813

Xilinx: SDSoC development environment for all programmable SoCs and MPSoCs
Xilinx announced the SDSoC Development Environment for All Programmable SoCs and MPSoCs. The third member of the Xilinx SDx family of development environments, the SDSoC development environment enables the broader community of embedded software developers to leverage the power of hardware and software ‘all programmable’ devices. The SDSoC environment provides a greatly simplified ASSP-like programming experience including an easy to use Eclipse integrated design environment and a comprehensive development platform for heterogeneous Zyq All Programmable SoCs and MPSoCs deployment.
News ID 2804

TE Connectivity: quick and safe disconnections in harsh environments
TE’s new robust EX-MATE EXD explosion-proof connector range helps enable quick and safe disconnections in hazardous environments. The new EX-MATE connectors can be wet-mated in depths of up to 50m and incorporate an ATEX-certified glazing system for the cable which is encapsulated within the overmold, making it suitable for a wide range of harsh environments.
News ID 2787
Microchip: LoRa technology wireless module enables IoT
Microchip announces the first in a series of modules for the LoRa technology low-data-rate wireless networking standard, which enables Internet of Things and M2M wireless communication with a range of more than 10 miles (suburban), a battery life of greater than 10 years, and the ability to connect millions of wireless sensor nodes to LoRa technology gateways. The 433/868 MHz RN2483 is a European R&TTE Directive Assessed Radio Module, accelerating development time while reducing development costs.
News ID 2793

Innodisk: iData Guard technology prevents data loss in power failures
Innodisk announce the development of a new patented technology, iData Guard. iData Guard is Innodisk's advanced hardware and firmware-based power failure protection system, which helps ensure SSD data integrity after sudden power outages. An informative Innodisk white paper, "Data Integrity In the Event of Abnormal Power Failure in SSDs," explains the technology behind iData Guard.
News ID 2770

Mouser launches robotics technology site
Mouser Electronics announced their new Robotics Technology site, providing developers with the resources they need to learn about the latest advances in robotics technologies, and the newest components from Mouser Electronics for building robotics systems.
News ID 2768

Atmel launches Xplained extension board with Bosch intelligent sensor
Atmel launched a new extension board for the company's popular Xplained platform at Embedded World Nuremberg. Featuring a Bosch Sensortec BNO055 intelligent 9-axis absolute orientation sensor, the new extension board connects directly to Atmel's Xplained board making it ideal for prototyping projects for the Internet of Things, wearables and gaming markets, for applications such as personal health and fitness, indoor navigation and other applications requiring context awareness and augmented reality for a more immersive experience.
News ID 2762

Toshiba: SDHC cards with built-in NFC functionality
The latest additions to the Toshiba Electronics Europe SD memory card family include the world's first SDHC memory card with built-in NFC functionality and an improved version of the company's popular FlashAir Wireless SD card.
News ID 2724

TI: multi-standard wireless microcontroller platform
Texas Instruments announced the new SimpleLink ultra-low power wireless microcontroller platform that helps customers go battery-less with energy harvesting or enjoy always-on, coin cell-powered operation for multiple years. With this industry-first technology, customers have the flexibility to develop products that support multiple wireless connectivity standards using a single-chip and identical RF design.
News ID 2759

Renases and IS2T to offer a faster go-to-market IoT strategy
Renases Electronics is expanding its collaboration with IS2T, a leading provider of state-of-the-art software technology for embedded systems, to simplify software complexities for emerging Internet of Things markets. With their latest collaboration, Renases Electronics and new Alliance Partner member IS2T extend the support of the MicroEj software platform from the RX microcontrollers to the latest Renesas RZ/A group of microprocessors.
News ID 2659

Mouser signs global agreement with Microsemi
Mouser Electronics has entered into a global distribution agreement and partnership with Microsemi. Microsemi's comprehensive portfolio features many of the company's industry-leading solutions including the SmartFusion2 and IGLOO2 product families, timing and synchronization products, and Power over Ethernet products targeting a broad range of applications in defense, security, communications, aerospace and industrial markets.
News ID 2716

Silicon Labs: 8-bit MCU portfolio designed for small-footprint IoT applications
Silicon Labs introduced the company's next-generation 8-bit MCU portfolio designed for today's ultra-low-power, small-footprint IoT applications. Silicon Labs' new EFM8 MCU family includes three lines of highly integrated, peripheral-rich MCUs optimized for exceptional price/performance value, ultra-low-power capacitive touch control and streamlined USB connectivity.
News ID 2692

Renases: out of the box RL78/I1D kit for detector applications
Renases announced the availability of its new Detect it! solution kit. The Detect it! is designed for detector applications and provides ready to use demonstrators for the most typical detectors used in security and fire protection systems. Detect it! has four hardware boards, a motion detector demonstrator, a smoke detector demonstrator, a carbon monoxide demonstrator, and a glass-break detector demonstrator.
News ID 2671

TI: easy Wi-Fi development with Internet-on-a-chip Wi-Fi modules
Texas Instruments announced the availability of its SimpleLink Wi-Fi CC3100 and CC3200 modules for Internet of Things applications. The new SimpleLink family was introduced earlier this year as a low-power platform to simplify the ability to connect IoT solutions. Developers gain additional design flexibility with a certified Internet-on-a-chip module option, allowing easy integration of embedded Wi-Fi and Internet connectivity into a wide-range of home, industrial and consumer electronics.
News ID 2663

Conrad is now authorised distributor for MikroElektronika
Conrad Business Supplies is now an authorised distributor of hardware and software development solutions from MikroElektronika for six different MCU architectures. The agreement means that Conrad customers will now have access to a wide range of development boards, accessory boards, programmers/debuggers, compilers and books for PIC, dsPIC30/33, PIC24, PIC32, AVR, 8051, PSoC, TI's and STM32 ARM Cortex-M microcontrollers.
News ID 2660

Hyperstone: new flash management technology reduces NAND-Flash wear-out
Hyperstone's new hyMap technology significantly improves endurance and random write performance for flash memory systems, thus for the first time enabling MLC for reliable industrial embedded storage systems. hyMap reduces Write Amplification (WAF) by a factor of more than 100 in fragmented usage pattern and for small file random writes. Thereby, the reduction in effectively used write-erase-cycles results in higher performance, longer life and shorter random access response times.
News ID 2640

Microchip: MCU family provides multiple independent, closed-loop power channels
Microchip announces from the Embedded World conference a new family of 8-bit PIC Microcontrollers with the PIC16LF1769 family. This is the first PIC MCU family to offer up to two independent closed-loop channels. This is achieved with the addition of the Programmable Ramp Generator (PRG), which automates slope and ramp compensation, and increases stability and efficiencies in hybrid power conversion applications.
News ID 2739
Atmel: next gen radiation-hardened mixed-signal ASICS for space applications
Atmel announced its next generation radiation-hardened mixed-signal ASIC platform for high-performance and high-density solutions for space applications. Manufactured on 150 nm Silicon on Insulator process, the ATMXI50RHA adds to Atmel’s portfolio of rad-hard solutions.

News ID 2638

TI: SafeTI process certified for development of ISO 26262 and IEC 61508
Texas Instruments announced that its SafeTI functional safety software development process is now certified as suitable for development of ISO 26262 and IEC 61508 compliant software components. TI's process was assessed by TÜV NORD, an internationally recognized and accredited independent assessor of compliance to quality and safety standards.

News ID 2637

MSC presents industrial 15.6 inch TFT displays from Sharp
MSC Technologies is presenting the LQ156M3LW01, a high-resolution TFT display from Sharp, at embedded world 2015. The LQ156M3LW01 has a fairly uncommon form factor of 15.6-inch. The industrial display provides Full HD resolution of 1920 x 1080 pixels with 16:9 aspect ratio. The integrated multi-domain vertical alignment (MVA) technology, which Sharp calls vertical alignment technology, ensures 85-degree typical very wide horizontal and vertical viewing angles, and high contrast.

News ID 2636

Infineon introduces OptiMOS 5 Power MOSFETs in 80V and 100V
Infineon extends its OptiMOS 5 portfolio with 80V and 100V variants. This latest generation of Power MOSFETs is optimized for high switching frequencies especially used in synchronous rectification applications for telecom and server power supplies as well as in industrial applications such as solar, low voltage drives and power adapter.

News ID 2615

Innodisk: detailed data recording and analysis for optimized flash solutions
Innodisk announces iAnalyzer - an easy to use storage analysis tool for customers using or considering SSD products. iAnalyzer records read/write behavior of a SSD in real-time, categorizing these operations as either sequential or random I/O, as well as segmenting by the size of the operation. iAnalyzer lets users base their storage decisions on real data, tracking their system's actual storage needs instead of working off assumptions or hypotheticals.

News ID 2613

WynMax: mini-ITX motherboard with Atom E3827
WynMax introduces new product mini-ITX motherboard WMIX-E38272 which is equipped with Intel Atom processor E3827. This system-on-chip supports system memory DDR3L 1333MHz maximum up to 8GB. Moreover, WMIX-E38272 offers integrated Intel Gen7 Graphics to provide excellent graphical performance and it comes with multiple display outputs: VGA, HDMI and LVDS. With the high standard product design,

News ID 2794

OSS announces opening of One Stop Systems EMEA
One Stop Systems announces the opening of its new Europe, Middle East and Africa (EMEA) regional facility, One Stop Systems GmbH, located in Gröbenzell, Germany. The new company, solely owned by One Stop Systems, was established in January, 2015 to service One Stop Systems’ EMEA regional customers with faster product delivery, application engineering services and technical support.

News ID 2699

VadaTech releases new Xilinx All Programmable FPGA carriers and digitizers
VadaTech has announced two new high-performance AMC boards that utilize Xilinx All Programmable FPGAs. The AMC523 is a dual 16-bit 250 MSPS Digital-to-Analog Converter featuring a XC7K410T Kintex-7 FPGA from Xilinx. The FPGA has an interface to the DDR3 memory, allowing for large buffer sizes to be stored during processing as well as for queuing the data to the host.

News ID 2698

DDC: 1553 remote terminal/monitor solution in ultra-small package
Data Device Corporation introduces Nano-ACE, the world's smallest and lowest power MIL-STD-1553 Remote Terminal/Monitor. Nano-ACE utilizes a Serial Peripheral Interface to reduce pin count and package size, so that users can now benefit from DDC's renowned 1553 functionality and reliability in an ultra small package (7 x 7 x 1mm), enabling the development of more compact and higher density boards.

News ID 2772

TQ: latest Intel technology in a compact form factor
The COM Express module TQMx50UC is equipped with the latest fifth generation Intel Core processors. The performance is scalable from Intel Core i3 and Intel Core i5 to Intel Core i7, with up to 3.2 GHz and 4 MB cache. Maximum total output is achieved with up to 16 GB DDR3L-1600. The soldered memory and the robust construction guarantee top reliability. Consistent quality and service is ensured by TQ with its own specialist development team as well as the in-house production in Germany.

News ID 2731

CompactPCI Serial goes essential
Elma Electronic introduces the new CompactPCI Serial Workstation for industrial applications. Equipped with a backplane with five slots and the system slot on the right side of the chassis, the new system platform is the ideal choice for the factory of tomorrow.

More information: www.elma.com • info@elma.com • T +49 (0)7231 9734 0
ArchiTech evaluation boards, accelerating and XTX and ETX modules with AMD Embedded G-Series SoC. Under the agreement, SILICA provides in-depth technical for M2M communication. As a leading distributor, SILICA offers features specifically for M2M communication. As a leading distributor, SILICA provides in-depth technical support and is providing software support out of the box for HUAWEI modules for their KBox family.

Artesyn: OCP platform for network functions virtualization Artesyn Embedded Technologies announced its first high performance integrated computing system inspired by Open Compute Project (OCP) standards. The Centellis OCP Platform is designed to help communication service providers dramatically lower the capital and operating expense associated with running their networks by leveraging open standard and open source hardware and software, and taking advantage of virtualization and cloud technologies.

SILICA has announced a franchise agreement with Huawei. Under the agreement, SILICA provides in-depth technical for M2M communication. As a leading distributor, SILICA provides in-depth technical support and is providing software support out of the box for HUAWEI modules for their KBox family.

SILICA has announced a franchise agreement with Huawei. Under the agreement, SILICA is marketing multi-standard 3G and 4G wireless modules in a choice of popular form factors, including LGA, PCIe and PCI-SIG M.2. Based on HUAWEI HiSilicon chipset technology, the new modules offer features specific for M2M communication. As a leading distributor, SILICA provides in-depth technical support and is providing software support out of the box for HUAWEI modules for their KBox family.

News ID 2714

SILICA: expanded 3G and 4G cellular M2M communications portfolio SILICA has announced a franchise agreement with Huawei. Under the agreement, SILICA is marketing multi-standard 3G and 4G wireless modules in a choice of popular form factors, including LGA, PCIe and PCI-SIG M.2. Based on HUAWEI HiSilicon chipset technology, the new modules offer features specific for M2M communication. As a leading distributor, SILICA provides in-depth technical support and is providing software support out of the box for HUAWEI modules for their KBox family.

News ID 2761

Concurrent: CompactPCI processor board with 10 Gigabit Ethernet Concurrent Technologies has introduced a new 6U CompactPCI board based on a 4th generation Intel Core or Celeron processor with the option of 10 Gigabit Ethernet interfaces. PP B1x/mso is a single slot air-cooled board, allowing customers to easily migrate to the latest generation of Intel processors for longer system life-cycles. Three levels of performance are offered from a 4-core Intel Core i7-4700EQ, 2-core Intel Core i5-4422E to a 2-core Intel Celeron 2002E processor with options for 16 or 32 Gbytes memory.

News ID 2746

Pentair: 100 Gbps AdvancedTCA shelf for fast data transmission Pentair is currently working on a Schloff 100G AdvancedTCA backbone. Recently, the IEEE adopted the new 100 Gbps Ethernet standard (IEEE802.3bj) which will be the base for 100G Ethernet for AdvancedTCA. The IEEE standard defines two signaling methods for 100 Gbps Ethernet data transfer over backplanes: 100GBASE-KP4 and 100GBASE-KR4. The first method uses PAM-4 coding at approximately 13Gbaud, while the second uses NRZI coding at about 25Gbaud. Along with PCIe 4.0, the IEEE802.3bj will be the most significant standard for fast data transmission on backplanes in the coming years.

News ID 2650

Toshiba adds new members to AppLite family for IoT solutions Toshiba Electronics Europe has launched two new application processors for wearable devices. The TZ1031MBG and TZ1011MBG are the latest additions to the AppLite family’s TZ1000 series, and provide single package solutions for the Internet of Things. The launch of the TZ1001MBG in November 2014 introduced a single-package application processor that integrated data collection sensors, data processing capability, flash memory for data storage, and a Bluetooth Low Energy controller for data communication. Building on this, the new application processors expand sensing functionalities by adding a gyroscope to the TZ1031MBG and a gyroscope and magnetometer to the TZ1011MBG.

News ID 2732

Infineon: OPTIGA TPM 2.0 chips secure Microsoft Surface Pro 3 tablet Infineon Technologies confirmed that its OPTIGA TPM security controller is used in the Microsoft Surface Pro 3 tablet. With the rapid adoption of Internet of Things, the opportunities for security breaches will increase significantly. Therefore, the comprehensive security solutions are essential to protect the device and its data and ensure long term satisfaction of customers.

News ID 2623

Silicon Labs launches Blue Gecko Bluetooth Smart solutions Silicon Labs unveiled a complete Bluetooth Smart solution portfolio designed to help developers minimize the energy consumption, cost and complexity of wireless IoT designs. Silicon Labs’ recent acquisition of Bluegiga accelerates the company’s ability to deliver comprehensive Bluetooth Smart solutions. Silicon Labs’ new Blue Gecko solutions include ultra-low-power wireless SoC devices, embedded modules, and Bluegiga software development kit and Bluetooth Smart software stack.

News ID 2703

DAVE: BORA Xpress CPU module based on Xilinx Zynq XC7Z015/XC7Z030 From the 24 to the 26 of February 2015, BORA Xpress will be unveiled at Embedded World, where you can find out more about the complete range of CPU modules and System-on-Module solutions from DAVE Embedded Systems. BORA Xpress is the new top-class Dual ARM Cortex-A9 + FPGA CPU module by DAVE Embedded Systems, based on the recent Xilinx Zynq XC7Z015/ XC7Z030 application processor. Thanks to BORA Xpress, customers are going to save time and resources by using a compact solution that includes both a CPU and an FPGA, avoiding complexities on the carrier PCB.

News ID 2700
**MSC: cost-optimized NanoServer embedded system with Intel Atom processor**
MSC Technologies has added the N1-A3 model to the NanoServer embedded system family with I/O Shield under the label DSM Computer. The cost-optimized industrial PC is based on the actual Intel Atom technology and has a scalable performance that ranges from dual-core to quad-core CPU.
News ID 2691

**IBASE: robust outdoor digital signage player**
IBASE Technology unveiled the 2015 iF DESIGN AWARD winning SE-92 digital signage player, a ruggedized fanless signage system based on the 5th Generation Intel Core processor. Featuring a wide operating temperature range from -40 to 75°C and 7 to 36V wide-range DC input, the SE-92 is built specifically for harsh environments in outdoor and in-vehicle applications.
News ID 2642

**Microchip: motion module makes monitoring easy**
Microchip announces from Announced World the M7150 Motion Module which combines Microchip’s SSC7150 motion co-processor with 9-axis sensors, including accelerometer, magnetometer and gyroscope in a small, easy-to-use form factor. With a simple I2C connection to most MCUs/MPUs, embedded/IoT applications can easily tap into the module’s advanced motion and position data.
News ID 2711

**ACCES I/O: 6 new mPCIe, RS-232/422/485 serial communication modules**
ACCES I/O Products released a new family of mini PCI Express multi-port serial communication cards, the mPCIe-COM Series. These small, low-priced, PCI Express Mini cards feature a selection of 4 or 2-ports of software selectable RS-232, RS-422, and RS-485 asynchronous serial protocols on a port by port basis. These cards have been designed for use in harsh and rugged environments such as military and defense along with applications such as health and medical, point of sale systems, kiosk design, retail, hospitality, automation, gaming and more.
News ID 2620

**CES unveils new branding**
Creative Electronic Systems has unveiled its new branding which marks CES’ focus on safety-certifiable, application-ready, rugged COTS mission computers and board level products. The top down design process facilitates the definition of mission computer building blocks which more readily enables SWaP optimized application-ready systems.
News ID 2677

**Powerbridge equips XFEL x-ray laser with MicroTCA computer technology**
Since 2009 the European XFEL x-ray laser has been under construction in northern Hamburg as an international joint venture involving 11 nations. XFEL is an underground superconducting linear accelerator with an overall installation length of 3.4 km and planned construction costs of more than one billion Euros.
News ID 2619

**DFI: compact-sized embedded systems with 4th gen Intel Core and Xeon processors**
DFI formally rollouts its complete product line of compact-sized embedded systems, EC500 Series, based on the 4th Generation Intel Core and server-grade Intel Xeon processors. The EC500 Series are available in fanless and fan solutions and offer high-performance computing capability coupled with a sleek contemporary design.
News ID 2634

**Eurotech releases new version of M2M/IoT integration platform**
Eurotech announced the official release of Everyware Cloud 3.5, the M2M/IoT Integration Platform. Everyware Cloud is a Machine-to-Machine Integration Platform that simplifies device and data management by connecting distributed devices over secure and reliable cloud services. Once devices are deployed, the Everyware Cloud allows users to connect, configure and manage devices through the lifecycle, from deployment through maintenance to retirement.
News ID 2630

**Artila: Web enabled remote I/O module**
Artila Electronics releases RIO-2017, the new generation of Web enabled Remote I/O module. RIO-2017 is powered by ARM Cortex M3 and FreeRTOS operating system and features one 10/100 MHz Ethernet port, eight channels of 16-bit isolated analog input and one form C relay. Web application is becoming popular due to the ubiquity of the web browser and HMI is no longer limited to use a computer.
News ID 2624

**VadaTech: dual DAC features high sampling rate and Kintex-7 FPGA**
VadaTech now offers a dual DAC compliant to the MicroTCA.4 specification for High Energy Physics. The AMC253 is a dual DAC in 250 MSPS at 16-bit resolution. It comes in a double module, mid-size (full-size is optional) and routes x8 or dual x4 PCIe to the backplane. The module features a Kintex-7 FPGA with 2 GB of DDR3 memory, allowing for large buffer sizes to be storing during processing and queueing data to the host.
News ID 2641
Axiomtek has launched the rBOX510-6COM, a DIN-rail embedded PC supporting AXView remote management. The new din-rail fanless embedded PC utilizing the Intel Atom dual-core processor E3827 with 1.75GHz and onboard 4GB DDR3L system memory. The superior rBOX510-6COM features full rugged industrial designs: dual isolated Gigabit LANs, four isolated RS-232/422/485 ports, two RS-232/422/485 ports, one isolated DIO (8-IN/8-OUT) port, front-facing LED indicators, wide range 12-48VDC power input with terminal block, and three full-sized Mini cards for 3G/GPRS/Wi-Fi connections. News ID 2622

Advantech launches MIO-2270 - a low power AFDX end system. The FPGA-Chip CS1 with integrated AFDX protocol offers a flexible alternative for communication in airplanes. Especially designed for the demands of safety-critical avionic applications, the DO-254-compliant FPGA can be certified up to DAL-A (certification support package for DAL-D available in March 2015). The FPGA chip CS1 offers customers the possibility to build AFDX-based communication systems, for the first time independent of a form factor. The FPGA can be installed directly onto the boards of an AFDX end system. News ID 2598

MEN: flexible FPGA chip for safety-critical AFDX applications. The FPGA-Chip CSI with integrated AFDX protocol offers a flexible alternative for communication in airplanes. Especially designed for the demands of safety-critical avionic applications, the DO-254-compliant FPGA can be certified up to DAL-A (certification support package for DAL-D available in March 2015). The FPGA chip CSI offers customers the possibility to build AFDX-based communication systems, for the first time independent of a form factor. The FPGA can be installed directly onto the boards of an AFDX end system. News ID 2598

DFI: 10.1-inch fanless PPC with IP65 compliant front panel. DFI launches KS310-IMX6, a Freescale i.MX6 processor-based fanless Panel PC. The fanless panel PC uses 10.1” (1280x800) industrial grade LCD panel with projected capacitive touch solution and adopts ARM architecture four/two Cortex-A9 processor at only 1.0GHz. To withstand harsh operating environments, KS310-IMX6 is made with a robust mechanical design and can operate under a wide range of temperatures from -20 to 60°C. News ID 2788

Kontron to offer CSPs adaptive and reliable NFV reference solution. Kontron is collaborating with industry leaders Red Hat and Sandvine to give communication service providers (CSPs) an economically and operationally optimized open solution to deploy cloud business services using Network Function Virtualization (NFV) infrastructure. The solution combines Red Hat Enterprise Linux OpenStack Platform, Sandvine’s network policy control platform for traffic optimization, analytics and subscriber service creation, and the Kontron SYMKLOUD high-density, modular converged hardware platform for carrier/cloud-networks. This combined solution enables CSPs to quickly implement economic, adaptive and reliable NFV infrastructure that can give them significant advantages over competitors opting for offers that are less dense, less intelligently programmable, and less suited for High Availability. News ID 2757

DATA MODUL: industrial Pico-ITX SBC based on latest Atom E3815 / J1900 processors. With the eDM-pITX-BT DATA MODUL presents a new Pico-ITX Board based on Intel Atom processors. This innovative computer board is developed according to DATA MODUL’s specification in cooperation with a long-term partner, a leading manufacturer of industrial computers. The fanless eDM-pITX-BT Board is equipped with up to 4GB DDR3L RAM. Heat sources like CPU and RAM are located at the rear side of the PCB. News ID 2612

Vecow announces VMware Technology Alliance Partner Program Elite Membership. Vecow has joined the VMware Technology Alliance Partner (TAP) program as an Elite level partner. Elite members of the TAP program collaborate with VMware to integrate and validate their products with VMware solutions to drive transformative business outcomes for customers. The TAP program enables Vecow to deliver reliable solutions that are supported by the VMware ecosystem. Our premium customers in Europe admire this partnership and phase-in Vecow products for mission-critical Power & Energy solutions.” News ID 2606

AAEON: product releases with 5th generation Intel Core processors AAEON launches 5th Generation Intel Core processors. The new processors offer line-ups that aim to satisfy a broad variety of applications that demand low power usage and high performance. News ID 2604

ARBOR: 7.85-inch fully rugged IoT handheld. ARBOR Technology added the Gladius 8, a 7.85-inch fully rugged IoT handheld device to its Gladius Android-based line. The Gladius 8 joins the Gladius 5, a 5.5” handheld launched in 2014. The device is powered by an MTK Quad-core CortexA7 processor and runs Android v4.2 operating system. Build-in multiple connectivity options and the robust design with waterproof, dustproof and drop resistance, the unit is ideal for highly mobile applications, such as logistics, warehousing, mPOS and fleet. News ID 2603

A. R. Bayer DSP Systeme: low-light cameras with built-in image processing. Critical Link’s MityCAM vision and imaging cameras combine the processing technology of Critical Link’s Cyclone V SoC-based System on Module with high performance imaging sensors from top manufacturers, including Fairchild Imaging and CMOSIS. The MityCAM’s integrated dual core Cortex-A9 ARM + FPGA fabric allow for on-board image processing, a key capability when implementing advanced algorithms or overcoming data storage and streaming challenges. Cameras feature an array of I/O options and come in multiple production-ready configurations, including fully-enclosed cameras, complete 3-board sets, and partial board sets for customers who elect to design their own sensor or I/O boards. News ID 2597
Atmel announced the company has launched DA1 as the first series in this Atmel |SMART MCU automotive-qualified product family, was complemented by the runtime analysis capacitive touch applications. The new SAM quality control. As the leading vendor of operating at a maximum frequency of 48MHz code analysis directly within the development IAR Embedded Workbench, which in 2014 announces a new tool for code control system development platform for dSPACE has introduced a new, compact performance for greater front-end flexibility. Integra V1 is the new solution for detection of integration specific faults. GOEPEL electronics presents a special Boundary Scan demo module for demonstration of integration solutions with test methods such as functional test, in-circuit test, manufacturing defects analyzer and flying probe test. By interaction with the test methods, an improvement of test coverage is demonstrated vividly.

IAR presents C-STAT add-on for extended code analysis possibilities
IAR Systems announces a new tool for code quality control. As the leading vendor of embedded development tools, the company provides the high-performance toolchain IAR Embedded Workbench, which in 2014 was complemented by the runtime analysis add-on product C-RUN. The latest product innovation, C-STAT, further extends the code analysis possibilities by adding powerful static code analysis directly within the development toolchain.

News ID 2670

dSPACE introduces MicroLabBox all-in-one development system
dSPACE has introduced a new, compact control system development platform for laboratory use, MicroLabBox, that offers high computing power and comprehensive functionalities. MicroLabBox makes creating, optimizing and testing controllers, and implementing data acquisition applications easy and cost-efficient for both industry and academia.

News ID 2639

Atmel: automotive grade ARM Cortex-M0+ MCUs with integrated peripheral touch controller
Atmel announced the company has launched its next-generation family of automotive-qualified ARM Cortex-M0+-based MCUs with an integrated peripheral touch controller for capacitive touch applications. The new SAM DA1 is the first series in this Atmel |SMART MCU automotive-qualified product family, operating at a maximum frequency of 48MHz and reaching a 2.14 Coremark/MHz. Atmel’s SAM DA1 series is ideal for capacitive touch button, slider, wheel or proximity sensing applications and offers high analog performance for greater front-end flexibility.

News ID 2713

Altim: PCB design tool for integrated SolidWorks collaboration
Altim announced PCBWorks, a new PCB design tool created to enhance workflow collaboration between electrical and mechanical designers. Created in direct response to the divide between electrical and mechanical workflows, PCBWorks provides a powerful set of collaboration tools to integrate design data with the mechanical design software SolidWorks.

News ID 2633

Mentor: Embedded multi-platform solution for industrial automation
Mentor Graphics announced the embedded systems industry’s broadest portfolio for industrial automation. In partnership with key industry vendors, Mentor Graphics now offers a solution differentiated from other marketplace products by its unique multi-platform approach and robust security architecture. Mentor Graphics new Mentor Embedded multi-platform solution enables embedded product developers to create more feature-rich, power-efficient, safe and secure systems.

News ID 2629

3S-Smart Software: safety SIL2 PSP helps cut development/certification expenses CODESYS by 3S-Smart Software Solutions is an IEC 61131-3 development system for industrial automation. In partnership with key industry vendors, Mentor Graphics now offers a solution differentiated from other marketplace products by its unique multi-platform approach and robust security architecture. Mentor Graphics now offers a solution differentiated from other marketplace products by its unique multi-platform approach and robust security architecture. Mentor Graphics new Mentor Embedded multi-platform solution enables embedded product developers to create more feature-rich, power-efficient, safe and secure systems.

News ID 2629

3S-Smart Software: safety SIL2 PSP helps cut development/certification expenses

GOEPEL: demo board for integration systems
Integra V1 is the new solution for detection of integration specific faults. GOEPEL electronics presents a special Boundary Scan demo module for demonstration of integration solutions with test methods such as functional test, in-circuit test, manufacturing defects analyzer and flying probe test. By interaction with the test methods, an improvement of test coverage is demonstrated vividly.

News ID 2616

Aitech: new rugged industrial line-up
Aitech Defense Systems is bringing its expertise in rugged, high performance embedded boards and systems to the industrial market. The new industrial line-up includes two 6U VME SBCs, one based on the Intel Haswell processor and one that is Freescale QorIQ-based. Aitech’s new rugged, industrial SBCs offer a wide range of memory storage options and I/O, making them ideal for a variety of embedded commercial, industrial and Naval applications.

News ID 2779

Altium: PCB design tool for integrated SolidWorks collaboration
Altium announced PCBWorks, a new PCB design tool created to enhance workflow collaboration between electrical and mechanical designers. Created in direct response to the divide between electrical and mechanical workflows, PCBWorks provides a powerful set of collaboration tools to integrate design data with the mechanical design software SolidWorks.

News ID 2633

Mentor: Embedded multi-platform solution for industrial automation
Mentor Graphics announced the embedded systems industry’s broadest portfolio for industrial automation. In partnership with key industry vendors, Mentor Graphics now offers a solution differentiated from other marketplace products by its unique multi-platform approach and robust security architecture. Mentor Graphics new Mentor Embedded multi-platform solution enables embedded product developers to create more feature-rich, power-efficient, safe and secure systems.

News ID 2629

3S-Smart Software: safety SIL2 PSP helps cut development/certification expenses

GOEPEL: demo board for integration systems
Integra V1 is the new solution for detection of integration specific faults. GOEPEL electronics presents a special Boundary Scan demo module for demonstration of integration solutions with test methods such as functional test, in-circuit test, manufacturing defects analyzer and flying probe test. By interaction with the test methods, an improvement of test coverage is demonstrated vividly.

News ID 2616

Aitech: new rugged industrial line-up
Aitech Defense Systems is bringing its expertise in rugged, high performance embedded boards and systems to the industrial market. The new industrial line-up includes two 6U VME SBCs, one based on the Intel Haswell processor and one that is Freescale QorIQ-based. Aitech’s new rugged, industrial SBCs offer a wide range of memory storage options and I/O, making them ideal for a variety of embedded commercial, industrial and Naval applications.

News ID 2779

Axiomtek: Atom SoC-based Embedded system with 10-34VDC wide range power input
Axiomtek has launched eBOX626-841-FL, a cost-effective fanless embedded box system utilizing a dual core Intel Atom processor E3826 1.46 GHz onboard. The incredible ultra-slim fanless embedded computer supports one DDR3L-1066/1333 SO-DIMM socket with system memory up to 8 GB, and offers two full HD displays: HDMI and VGA, four USB ports, and three COM ports to provide higher performance with full-featured I/O.

News ID 2618

MSC: large range of TFT displays with embedded DisplayPort
MSC Technologies has expanded its product portfolio with high-resolution TFT industrial displays, which provide an embedded DisplayPort interface. eDP is based on the Video Electronics Standards Association DisplayPort Standard and today is already being used in large quantities as a standard in the mass market, for example in notebooks.

News ID 2602
THREADX: WHEN IT REALLY COUNTS

When Your Company’s Success, And Your Job, Are On The Line - You Can Count On Express Logic’s ThreadX® RTOS

Express Logic has completed 17 years of successful business operation, and our flagship product, ThreadX, has been used in over 2 billion electronic devices and systems ranging from printers to smartphones, from single-chip SoCs to multiprocessors. Time and time again, when leading manufacturers put their company on the line, when their engineering team chooses an RTOS for their next critical product, they choose ThreadX.

Our ThreadX RTOS is rock-solid, thoroughly field-proven, and represents not only the safe choice, but the most cost-effective choice when your company’s product simply must succeed. Its royalty-free licensing model helps keep your Bill Of Materials cost low, and its proven dependability helps keep your support costs down as well. ThreadX repeatedly tops the time-to-market results reported by embedded developers like you. All the while, Express Logic is there to assist you with enhancements, training, and responsive telephone support.

Join leading organizations like HP, Apple, Marvell, Philips, NASA, and many more who have chosen ThreadX for use in over 2 billion of their products – because their products are too important to rely on anything but the best. Rely on ThreadX, when it really counts!

Contact Express Logic to find out more about our ThreadX RTOS, FileX™ file system, NetX™ Dual IPv4/IPv6 TCP/IP stack, USBX™ USB Host/Device/OTG stack, and our GUIX® graphics toolkit for embedded GUI development. Also ask about our TraceX® realtime event trace and analysis tool, and StackX™, our patent-pending stack size analysis tool that makes stack overflows a thing of the past. And if you’re developing safety-critical products for aviation, industrial or medical applications, ask about our TUV Certification for ThreadX.

expresslogic
For a free evaluation copy, visit www.rtos.com
Germany: info(expresslogic.de) • +49 (0) 5143 911304 • UK: info(expresslogic.co.uk) • +44 (0) 1527 597007
Copyright © 2013, Express Logic, Inc.
ThreadX, FileX, and TraceX are registered trademarks, and NetX, USBX, GUIX, StackX, and Certification Pack are trademarks of Express Logic, Inc. All other trademarks are the property of their respective owners.