Andes e-Report

Content:

Andes Technology Corporation Listed in the Deloitte 2015 Technology Fast 500™

Andes Technology Corporation, the leading Asia-based suppliers of small, low-power, high performance 32-bit embedded CPU cores, today announced that Deloitte Touche Tohmatsu Ltd. (DTTL) listed Andes Technology in its 2015 Technology Fast 500 annual ranking of Asia's 500 fastest-growing tech companies. Achieving a 124 percent growth over the period 2011 to 2013, Andes met the rapid revenue growth rate criteria of this award program.

"We are extremely proud to have made the Deloitte 2015 Technology Fast 500 list for 2015," said Frankwell Jyh-Ming Lin, President of Andes Technology Corporation. "Andes began as a start-up in Hsinchu Science Park, Taiwan with funding from local venture capitalists. Ming-Kai Tsai, Chairman of Andes, has been a guiding force in the success and growth of the company. He is also Chairman and CEO of MediaTek, Inc., the biggest Taiwan fabless semiconductor company. Our initial success was in Taiwan, but we quickly expanded our customer base into China, now second only to Taiwan in new customers, followed by Korea and Japan. With the recent formation of our U.S. operation based in San Jose, California we are now expanding with design wins into the U.S. market."

"With just over 100 employees in the company, 80 percent of which are engineers, Andes has created a unique CPU core architecture and wide range of CPU products, peripherals and software tools," said Dr. Charlie Hong-Men Su, Andes CTO and Senior Vice President of R&D. "Together, these have attracted over 100 customers who cumulatively have shipped over 1.5 billion chips containing our IP and contributed to our rapid growth. Our 3rd party ecosystem, Knect.me, has gained international support as has our customer base. This award is particularly timely as it occurs the same year we received the TSMC 2015 Partner of the Year award in the New IP category."

"The Technology Fast 500 Asia Pacific program has become a barometer for company growth," said Ichiro Nakayama, DTTL Leader Technology Fast 500 Asia Pacific. Among the top 500 companies in the 2015 ranking, the biggest increase was seen by companies with revenues between US$10-$50 million, with 154 companies in 2015 compared to 108 in 2014. Andes was among this group. "The ranking data tends to reveal a great deal on the industry sectors and gives insight to the latest technologies which are shaping the future," Nakayama added. "By identifying these trends, we can begin to speculate on the impact of these changes to the regions and markets."

About Deloitte's Technology Fast 500

The Deloitte Technology Fast 500 is the pre-eminent technology awards program in Asia Pacific, and now in its fourteenth year, it includes eight Asia Pacific locations: Australia; China (including Hong Kong); India; Japan; South Korea; New Zealand; Singapore and Taiwan. Combining technological innovation, entrepreneurship and rapid growth, Fast 500 companies -- large, small, public, and private -- span a variety of industry sectors, and are leaders in hardware, software, telecom, semiconductors, life sciences and emerging areas, such as clean technology. These companies are transforming the way we do business today. For more information about Deloitte Touche Tohmatsu Ltd. (DTTL), please visit the Deloitte website.

Andes Technology Corporation Reaches 1.4 Billion Cumulative Shipments of AndesCores™ Through Over 100 Customers Worldwide

Over 390 Million SoCs With AndesCores Shipped in 2015, Double the Reported 2014 Shipments; While AndeSight™ Eclipse-Based IDE Reached 10,000 Installations Globally

Andes Technology Corporation, the leading Asia-based supplier of small, low-power, high performance 32-bit embedded CPU cores, today announced that its customer base of 100 licensees have now shipped over 1.4 billion SoCs containing AndesCore 32-bit CPUs. Last year the company recorded over 390 million SoCs shipments with AndesCore 32-bit CPUs, an amount double the total reported by the 2014 Linley Group Report "A Guide to CPU Cores and Processor IP."

In addition, the company's AndeSight Eclipse-based integrated development environment (IDE) continues widespread adoption, reaching 10,000 installations globally at the start of 2016.

"Ongoing adoption of the AndesCore architecture continues to rise and we expect the 2016 shipments to go well beyond the 390 million shipments in 2015," stated Andes Technology Corporation President, Frankwell Jyh-Ming Lin. "By leveraging the AndesCore architecture's high performance, low-power, and small size, our licensees are developing unique applications in brushless DC motors, touch panel displays, automotive back-up cameras and many more. The architecture is ideally suited for the increasing number of designs targeting the Internet of Things."

"As a result of the increased shipment volume of chips containing AndesCore CPUs, the AndeSight™ software integrated development environment (IDE) has seen steady shipment growth reaching a cumulative 10,000 seats at the end of 2015," stated Charlie Su, Ph.D. Andes Technology Corporation CTO and Senior Vice President of R&D. "The AndeSight IDE implements a high efficiency compiler that allows compiled code to deliver best-in-class performance and compactness. Besides program development, code upgrading, and debugging, AndeSight also

provides numerous advanced features. These include code coverage analysis, function profiling, performance meter, and a simple interface for customers to hook up their SoC-dependent GUI. AndeSight serves both IC design houses and system companies, enabling the former faster time to market and allowing the latter to facilitate their market development."

About AndesCore™

AndesCore comprises a series of high performance 32-bit CPU core families targeting different emerging embedded applications markets. The small gate count and highly power-efficient 2- and 3-stage N705 and N801 families are replacing 8-bit/16-bit microcomputer in consumer applications. The N705 and N801 families deliver better power efficiency (DMIPS/mW) than competing 32-bit processors. Security extensions of AndeStar™ architecture in the AndesCore™ S801 secure processor core family provides code and data protection from physical attacks and malicious debugging. This makes the S801 family ideal for secure cards, IoT, and device authentication applications.

Andes E801 family targets Internet of Things (IoT) applications with the unique Andes Custom Extension™ (ACE). The ACE environment enables designers to specify the architectural element that makes the core ideal for IoT applications. With Andes' Custom-OPtimized Instruction deveLOpment Tools (COPILOT™), designers can create custom instructions that differentiate their design from competitive offerings based on standard instruction set processors. By adding special instructions, not easily discoverable by hackers, ACE also provides stronger security to a design.

Andes in the News

2016/03/29

EETimes:

CEO interview: Andes' cores for IoT suit Europe

Andes Technology Corporation Announces a Design Win in ITE Tech. Inc. IT835X Series Sensor Hub Chips Targeting the High Growth Wearable & IOT Market

Andes N801 CPU Core Executes ITE's Sensor Fusion Algorithm for Accelerometer, Gyroscope, and Magnetometer to Greatly Reduce Wearable Power Consumption

Andes Technology Corporation, the leading Asia-based suppliers of small, low-power, high performance 32-bit embedded CPU cores, announced that its N801 CPU core has been designed into the IT835X sensor hub chip from ITE Tech. Inc. based in Hsinchu, Taiwan. The Andes N801 32-bit CPU core executes ITE's sensor fusion algorithm for accelerometer, gyroscope, and magnetometer-core elements found in most wearable devices. Andes N801's best in class MIPS/mW specification enables the IT835X to achieve reduced power consumption while providing the high performance the sensor fusion algorithm demands.

"We're very proud of our sensor hub system-on-chip (SoC)," stated Mr. Lawrence Liu, General Manager-Business Division at ITE Tech. Inc. "Soon after we launched the chip, it won several OEMs' design for mobile device application. Our choice of the Andes N8 CPU core with its small gate count and superior MIPS-per-mWatt performance helps make the IT835X sensor hub chip a competitive offering to win customers in the fast growing sensor hub market. With the Andes N8 32-bit MCU, the IT835X operates independently to integrate sensing information and significantly reduces the burden on the system CPU to achieve the low-power requirements of smartphones, tablets and wearable devices."

"We are extremely pleased that ITE Tech chose the N801 as the central processor in their IT835X sensor hub chip," said Al Kuo-Chi Lin, Vice President of Andes Technology Corp. "Sensor hubs are key elements in wearable electronics to help reduce the applications processor's load. The AndesCore™ series offer many features for wearable electronics. They include CoDense™ for very compact code size; StackSafe for automatic detection of stack overflow; PowerBrake for a purely digital way to scale frequency and power without a clock divider; FastWakeUp for Automatic CPU state save/restore for fast power-down/power-up; and FlashFetch, which is separate IP to speed up internal Flash and allow execute-in-place external Flash support. Andes Custom Extension (ACE) provides programmable acceleration and energy reduction through the use of custom instructions."

Wearable Application

In the paper "ZOE: A Cloud-less Dialog-enabled Continuous Sensing Wearable Exploiting Heterogeneous Computation," Nicholas D. Lane, et al detail a match-box sized lapel-worn sensor that continuously senses data to determine three major variables: Personal Sensing-physical activity, transport (car, train, etc.), and stress; Social Sensing-conversations with others; and Place Sensing-work or home. Zoe is built around three processors: an applications processor running the algorithms that analyze data from the accelerometer and gyroscope sensor hub (an IT835X with Andes N8) that provides personal sensing, the microphone sensor that provides social sensing, and place sensing. The design goal for ZOE is to operate all day on a single battery charge. In the paper, the authors observe that the three-processor approach achieves this goal, providing a 30 percent increase in system operation as contrasted with running the three discrete functions on the one applications processor.

High Growth Wearable Market

According to the International Data Corporation (IDC) Worldwide Quarterly Wearable Device Tracker, vendors shipped a total of 27.4 million units

during the 2015 holiday quarter, besting 4Q14 levels by 126.9 percent. For the full year, vendors shipped a total of 78.1 million units, up a strong 171.6 percent over 2014. "Triple-digit growth highlights growing interest in the wearables market from both end-users and vendors," noted Ramon Llamas, Research Manager for IDC's Wearables team. "It shows that wearables are not just for the technophiles and early adopters; wearables can exist and are welcome in the mass market. And since wearables have yet to fully penetrate the mass market, there is still plenty of room for growth in multiple vectors: new vendors, form factors, applications, and use cases. This will help propel the market further.

About ITE Tech. Inc.

ITE Tech. Inc. (abbreviated as ITE) is a professional fabless IC design house, established in 1996 and headquartered in Hsinchu Science Park, Taiwan. ITE is well known as the global leader in Super I/O as well as Keyboard and Embedded Controller technology. The market share of ITE's Super I/O products, adopted by many well-known PC manufactures, has been over 40 percent worldwide. Following steady growth, ITE is gradually expanding its product line and technology expertise. Currently ITE employs many highly qualified engineers specializing in software/hardware development on PC/NB Controller, Digital TV Receiver Controller, Multimedia Controller, and Analog IC as well as marketing talents.

After many years of technology integration, ITE has developed much advanced Silicon Intellectual Property (SIP) and highly integrated system software/ hardware technology. Through the combination of diverse products, a total solution can be provided to customers by the concept of system platform. Moreover, ITE strategically cooperates with globally leading suppliers to enhance final product development and speed the Time-to-Market schedule. After growing with customers, ITE provides high quality products to customers thereby creating a win-win situation for both. For more information about ITE Technology, Inc., please visit http://www.ite.com.tw/en/

2016 Andes-Embedded Forum

Offering insightful observations and analyses on the IoT market, the 2016 Andes-Embedded Forum has ended successfully. In the event, Hornet, Andes' total solution to ease and accelerate the development of IoT SoCs and applications, was announced. Other highlights in the speeches of the event included the launch of an enhanced instruction set architecture, a novel CPU family and its characteristics, new features of the AndeSight IDE that shorten time-to-market efficiently, and the Knect.me (Andes IoT ecosystem) solutions as well as their applications. For more about respective speeches, please refer to the briefings below:

- **Andes Technology Corporation Announces Quick-Start Design Package That Significantly Reduces Time to Market of SoC Designs**
- **Andes IP Solutions for IoT**
- **Andes Software Solutions for IoT**
- **Knect Intelligent Applications to Real World**

Andes Technology Corporation Announces Quick-Start Design Package That Significantly Reduces Time to Market of SoC Designs

Solution Reduces the Time Consuming and Error Prone Task of Creating and Verifying Glue Logic to Integrate Disparate Elements of a SoC Design

Andes Technology Corporation, the leading Asia-based supplier of small, low-power, high performance 32-bit embedded CPU cores, today announced the Quick-Start Design Package, a complete solution that significantly reduces time to market for SoC designs. The package includes the new AndesCore™ N650 CPU IP, AndeShape™ AE100 Platform IP, and AndeSight™ IDE software development environment. The new compact N650 CPU provides the performance-efficiency needed for entry-level SoC, and the new Platform IP offers several highly-optimized peripherals and the bus fabric that SoCs require to surround and enable customer logic. By pre-integrating and pre-verifying processor, fabric, and peripherals, the package jump-starts customer's SoC projects with a solid foundation and reduces custom glue logic design teams need to create. Instead of hardwired control logic, customers can use software created with AndeSight™ IDE to debug the SoC and control the various peripherals.

"Time-to-market is a major concern for every SoC design and one task that slows a design progress is writing RTL code for developing standard IP blocks, integrating them, and spending 70 percent additional effort in verification," said Frankwell Jyh-Ming Lin, President of Andes Technology Corp. "The Quick-Start Design Package provides an optimized plug and play solution that saves effort developing common functions that are not providing any significant added value to their final design. CPU based system using software to control the peripheral elements reduces risk for SoC designs by eliminating the need to hardwire everything."

"By running control software on the new Andes N650 CPU IP, design teams reduce their risk considerably and shorten their silicon development schedule," said Charlie Hong-Men Su, Ph.D., Andes Technology CTO and Senior Vice President of R&D. "For example, it's a simple software revision to change the configuration of PCIe, DDR boot sequence, and other functions post-silicon. In addition to facilitating software development and optimization, the AndeSight™ IDE allows access to the entire

system for chip-level debugging through the JTAG interface. By re-using the production-quality processor and peripheral controllers, and extensible bus fabric, the Quick-Start Design Package reduces design teams' risk of a silicon resping."

About the Quick-Start Design Package Solution

The individual elements of the Quick-Start Design Package—new AndesCore™ N650 CPU IP, AndeShape™ AE100 Platform IP, and AndeSight™ IDE software development environment—come with their own unique features. The new N650 CPU core is a 3-stage pipeline architecture with 16 general-purpose registers and multiply and divide instructions. The core delivers 25 percent better DMIPS/MHz performance and 40 percent better DMIPS/mW power efficiency than its competitive counterpart in the TSMC 90LP process.

The N650 CPU IP core has memory mapped I/O, a 32-bit wide AHB-Lite bus, up to 32 vectored interrupts, 4-priority nested interrupts, and power management instructions—essential for power sensitive designs. The core comes with Embedded Debug Module, 2-wire Serial Debug Port and up to 8 breakpoints/watchpoints.

The new AE100 Platform IP features a new AHB Configurable Fabric with 24-bit address width and 32-bit data width. It supports up to 8 AHB masters, up to 30 AHB slaves and up to 31 APB slaves. Components of the fabric include AHB-Lite master multiplexer, AHB-Lite decoder and AHB-to-APB bridge. Other peripherals included are a Low-latency RAM Bridge, general purpose I/O (GPIO), watchdog timer, programmable interval timer and UART.

The AndeSight Eclipse-based IDE provides a fully functional Andes C and C++ integrated development environment that enables managed build system. It comes with a profiler, code coverage, code size analysis, chip profile, in-system programming, and advanced debugging. The tool chain includes compiler, assembler, linker, loader, libraries, and debugger. Also provided are a core simulator, pre-defined models of AndeShape™ SoC platform, and external plugin APIs.

Availability

The Quick-Start Design Package will be available the third quarter of this year. The Andes Quick-Start license includes the following:

- AndesCore™ N650 CPU IP
- AndeShape™AE100 Platform IP
- AndeSight™ IDE Software Development Environment

Also available is either a full-featured ADP-XC7 or a compact Andino F1 (Arduino-Compatible) optional development board along with Andes High-value service and support.

Andes IP Solutions for IoT

Andes Technology Announces Latest AndesCore™ IPs

Andes Technology Corporation, a global leader in designing and marketing high-performance/low-power 32-bit processors and the associated SoC platforms, announced a series of AndesCore™ IPs based on its latest AndeStar™ V3m+ Instruction Set Architecture and the accompanying AXI Platform IP in the 2016 Andes-Embedded™ Forum.

The AndesCore™ N, D, E, S CPU core series consist of Novel series of CPU cores from 2 to 8 stage pipeline, DSP series with supplement of high-efficiency DSP instructions, Extensible series which allow users to define their own instructions for application-specific acceleration, and Secure series for integrated protection against hardware and software attacks. The advancements in Andes Technology's V3m+ ISA and pipeline optimization bring in new members with 10% smaller code size and 15% higher performance to the families of 3-stage pipeline cores. These new CPU IPs are N820 evolved from its popular 3-stage precedent, E830 with Andes Custom Extension (ACE) capability, and S830 with security protection mechanisms native to its architecture.

Also unveiled in the 2016 Andes-Embedded™ Forum is the AndeShape™ AE300 AXI-based Platform IP, a set of pre-integrated and pre-verified hardware building blocks for SoC system design. The AE300 includes AXI Bus Matrix, AXI up-sizer and AXI down-sizer allowing comprehensive architectural design flexibility with configurable address bits and data width. It also contains AHB/APB bridges essential for SoC integration.

To meet the wide variety of design requirements for the IoT market, Andes Technology has made great efforts for its IPs to be ideal for either single task functions that run on bare metals, time-critical applications on real-time operating systems, or complicated software services on Linux platforms. Features such as CoDense™, StackSafe, PowerBrake and FlashFetch further significantly increase the competitive advantages of Andes CPU IPs by either shrinking down the program memory demand, safeguarding from software runaways, slashing the idle power consumption, or boosting the flash memory access time.

To learn about the latest developments of AndesCore™ technologies and AndeShape™ IP features, visit http://www.andestech.com/ and contact Andes Technology's representatives for details.

Andes Software Solutions for IoT

In AEF-11, we highlighted the new and advanced features of BSP and AndeSight while revealing Andes software solutions for IoT applications. Andes efficient ROM patch solution and Linux toolchains with NPTL and TLS supports are the new features in the latest BSP v4.1 release. In AndeSight v3.0, new features include HW stack protection, general exception handler, instruction tracer, register bit field display, Arduino plug-in support and COPILOT support.

Andes tools are good for IoT SW development as they reduce both development costs and time to market: AndeSight Lite is a free IDE for IoT promotion and prototyping in highly diverse market and there is another IDE dedicated for N6 CPU core based on AndeSight MCU; AndesCore D1088 with highly optimized library is very powerful and useful for DSP application development whereas AndesZ Zigbee protocol stack and Andes6 6LoWPAN protocol stack solutions are very suitable for developing smart connected devices.

Knect Intelligent Applications to Real World

In the era of Internet-of-everything, many important factors should be considered and well integrated into SoCs. Those factors, including connectivity, sensing, security, safety, and service, are essential and also necessary to modern smart devices and applications. To be ubiquitous and widely used in a digital daily life, the convenience of use, real utilities delivered to end user, and protection of privacy on use of those devices and services will be critical among all other features.

We find it's still incrementally innovated but not radically constructed by function extensions, technology fusions, and changes of business model. There is a notable gap to integrate those features into an IoT oriented SoC and also much effort required besides reaching fundamental benchmarks on performance and power consumption. To ease this integration procedure, Andes forms a new Internet of Things community, knect.me, to connect silicon IP providers, software component vendors, developers of cloud service frameworks, application developers, system integration vendors, and chip vendors to a common platform. Based on the belief of "quantitative changes bring qualitative changes," we expect the knect.me eco-system will inspire more collaboration and innovations and connect technologies to real world applications.