Marvell SMILE Plug

Enabling Classroom 3.0: Secure Content, Teacher Control

PRODUCT OVERVIEW

Marvell® is excited and proud to create Classroom 3.0 with SMILE Plug. The SMILE Plug is a revolutionary way to change how technology is used in the classroom, offering unprecedented access to secure digital content, a seamless delivery mechanism, and a simple teacher interface to fully control the classroom.

Marvell's SMILE Plug enables education institutions to create a micro-cloud within a classroom, facilitating a simple, low-cost way to network classrooms. The SMILE Plug eliminates the problems of inconsistent Internet access within a classroom environment, safely and securely providing connectivity in the classroom. The SMILE Plug also securely delivers digital content to a range of devices, including personal computers and handheld devices. Teachers and students can now tap into an unprecedented amount of open or premium digital content. The SMILE Plug also allows teaches to control and run interactive classrooms with real-time feedback and analytics, deepening the learning experience.

The Marvell SMILE Plug is being developed in partnership between the Stanford® University School of Education and Marvell—both of whom share the vision of using technology to revolutionize and improve the way students learn and educators teach. The SMILE Plug, which is named and built with Stanford's Mobile Inquiry Based Learning Environment (SMILE), will provide the ability to establish a local Wi-Fi network for up to 60 students. SMILE turns a traditional classroom into a highly interactive learning environment by engaging students in critical reasoning and problem solving while enabling them to generate, share, and evaluate multimedia-rich inquiries. In addition, this creates access to many more SMILE learning applications. To simplify deployment and management of the SMILE Plug, Marvell has developed a plug administration API and user interface called Plugmin.

Fig 1. SMILE Plug Reference Design (Modes: Off, On, Error)

SMILE PLUG COMPONENTS

The SMILE Plug contains the Marvell Plug Computer, as well as all of the software tools needed to develop applications for the platform. I/0 interfaces include 2x Gigabit Ethernet, 2x USB, Wi-Fi, and SD card slot up to 32GB. The Plug Computer is an embedded computer that plugs into the wall socket and can run network-based services that normally require a dedicated personal computer. Featuring a Marvell ARM-based CPU running up to 2GHz CPU with 512MB of Flash memory and 512MB of DDR3 memory, the Plug Computer provides ample processing power and resources to run any embedded computing application. Network connectivity is via Gigabit Ethernet; peripheral devices can be connected using USB 2.0 and Wi-Fi.

- **Software Tools**

The SMILE Plug will be based on Arch Linux™ for ARM and NODE.js, as well as a plug administration API and Stanford's SMILE environment and software development kit (SDK). All components adhere to the open-source model, making the SMILE Plug an ideal platform on which to develop or port any additional learning applications. The Plugmin administration client runs on Android-based devices and enables easy administration of the SMILE Plug. Used in conjunction with the SMILE Junction Server Administration Client, the teacher can easily control or run interactive classroom learning experiences.

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SYSTEM-ON-CHIP (SOC) SOLUTIONS

The SMILE Plug Computer incorporates two of Marvell's industry-leading system-on-chip (SOC) solutions to drive unparalleled application performance and connectivity in online classroom environment:

- **Marvell ARMADA 300 CPU SoC**

This is a high-performance integrated controller. It integrates the Marvell developed CPU core that is fully ARMv5TE compliant with a 256KB L2 Cache. The Marvell ARMADA™ 300 (88F6282) builds upon Marvell's innovative family of processors, improves performance, and adds new features to reduce bill of materials (BOM) costs. The 88F6282 is suitable for a wide range of applications such as routers, gateway, media server, storage, thin clients, set-top box, networking, point of service and printer products. For product information, visit http://www.marvell.com/embedded-processors/armada-300/assets/armada_310.pdf

- **Marvell Avastar 88W8764 Wi-Fi SoC**

This is a highly integrated 4x4 wireless local area network (WLAN) system-on-chip (SoC), specifically designed to support high throughput data rates for next generation WLAN products. The device is designed to support IEEE 802.11n/a/g/b payload data rates. The Marvell Avastar® 88W8764 provides the combined functions of DSSS, OFDM, and MIMO baseband modulation, MAC, on-chip CPU, memory, host interfaces, and direct-conversion WLAN RF radio on a single integrated chip. The device supports 802.11n beamformer and beamformee functionality, enabling a simplified, integrated solution. For product information, visit http://www.marvell.com/wireless/assets/Marvell-Avastar-88W8764-SoC.pdf

KEY FEATURES AND BENEFITS

FEATURES	BENEFITS	
• Wi-Fi support for 60 clients	• Marvell Avastar 88W8764	• Creates a classroom micro-loud for up to 60 students
• Easy deployment and management	• Plugmin administration API and UI that enables both Android and Kinoma access to administer the plug	• Provides simple plug and device pairing • Provides plug server status and control • Provides software configuration management
• Backup battery	• 5V lithium Ion polymer battery for back-up power • Ideal for situations when electrical power source is inconsistent	
• Open Platform	• Arch Linux for ARM • NODE.js • NPM (node package manager)	• Plugmin administration API and UI • Stanford SMILE Junction Server
• SMILE Junction Server	• Stanford's SMILE plug server/client environment and SDK • Access to more open source SMILE learning applications	
• High-performance with low power	• Marvell ARMADA 300 (88F6282)	• Ideal for always-on computing tasks
• Debug support	• Jtag access	• Additional ethernet port

THE MARVELL ADVANTAGE: Marvell products come with complete reference designs, which include board layout designs, software, manufacturing diagnostic tools, documentation, and other items to assist customers with product evaluation and production. Marvell's worldwide field application engineers collaborate closely with end customers to develop and deliver new leading-edge products for quick time-to-market. Marvell utilizes world-leading semiconductor foundry and packaging services to reliably deliver high-volume and low-cost total solutions.

ABOUT MARVELL: Marvell is a leader in storage, communications, and consumer silicon solutions. Marvell's diverse product portfolio includes switching, transceiver, communications controller, processor, wireless, power management, and storage solutions that power the entire communications infrastructure, including enterprise, metro, home, storage, and digital entertainment solutions. For more information, visit our Web site at www.marvell.com.

ABOUT STANFORD UNIVERSITY SCHOOL OF EDUCATION: Aiming towards the ideal of enabling all people to achieve maximum benefit from their educational experiences, the Stanford University School of Education seeks to continue as a world leader in ground-breaking, cross-disciplinary inquiries that shape educational practices, their conceptual underpinnings, and the professions that serve the enterprise. The School also seeks to develop the knowledge, wisdom, and imagination of its students to enable them to take leadership positions in efforts to improve the quality of education around the globe. For more information, visit http://suseit.stanford.edu/research/project/smile.

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