PAN1315 + MSP430 Q&A
June 10, 2010 Announcement Date

What is TI announcing and what are the benefits?
Furthering TI's efforts to incorporate wireless connectivity technologies into more portable designs, TI has coupled its proven, seventh-generation *Bluetooth*® offering, the CC2560, with a pre-embedded *Bluetooth* stack running on TI's MSP430BT5190 microcontroller (MCU). This integration will reduce design barriers and provide the following benefits:

- Best-in-class RF performance and low power consumption
- Industry-leading 7th generation *Bluetooth* technology
- Ready-to-go wireless platform simplifies the development process
    - Pre-integrated and pre-validated *Bluetooth* serial link on MSP430 system
- Add *Bluetooth* capability to your existing MSP430 applications enabling new product designs in the embedded wireless application space
- Flexibility and Upgrades

What are the key features and benefits of the MSP430 + PAN1315 *Bluetooth* solution?

Tool name	Features and benefits
PAN1315 evaluation module kit (EMK) advanced development tool	• Low-cost platform helps customers evaluate and test designs in early development phases to estimate total R&D investment • Full hardware and software solution, pre-tested with *Bluetooth* 2.1+EDR (enhanced data rate) support • Pre-embedded *Bluetooth* stack from Mindtree with serial port profile (SPP) for TI's MSP430BT5190 family • Optimized to bring best-in-class *Bluetooth* technology to the MSP430 MCU • System integration and testing speeds time to market • Highly flexible platform enables customers early prototyping capabilities of embedded wireless applications • Pre-integrated system hardware solution: Host controller interface (HCI)-based module from Panasonic coupled with TI's MSP430 microcontroller (MCU) • Pre-embedded *Bluetooth* stack from Mindtree with SPP running on TI's MSP430BT5190 family • Proven *Bluetooth* silicon technology reduces customer product risk • MCU software foundation eases integration of customer-specific applications and allows existing MSP430 customers to add *Bluetooth* technology with minimal development effort

What are the target applications for customers using the MSP430 + PAN1315 *Bluetooth* solution?
Serial link *Bluetooth* applications:

- Blood glucose meter

- Thermometer
- Pulse oximeter
- Smart metering
- Remote control
- Industrial Sensors
- And more

What are the key market drivers for customers to use the MSP430 + PAN1315 *Bluetooth* solution?

The **MSP430 + PAN1315 *Bluetooth* solution** eliminates wires for customers employing embedded applications which need to connect with devices such as mobile phones and laptops with *Bluetooth* connectivity.

What are the kit prices?

Customers using the PAN1315 EMK will additionally need these items:

- Two MSP430F5438 Experimenter Board - $149 (each)
- USB Debugging Tool - $99

What is your roadmap to support other TI platforms?
We have a roadmap for continued support of proven TI platforms

- We are working with the Stellaris® technology team to add *Bluetooth* to these solutions
- Additionally TI is working on an applications processor based solution starting with the OMAP35x+WL1271 WiFi & Bluetooth Platform
- Plans for continued support of TI platforms will follow based on market demand
- Partners can also be contracted to develop additional combinations of TI Connectivity devices with TI embedded processors

What is the CC2560?
The CC2560 is the transceiver used in the PAN1315. It is a 7th generation *Bluetooth* device from Texas Instruments that supports *Bluetooth* 2.1+EDR.

Best-in-class RF performance & power consumption. With this device, the Panasonic PAN1315 module is able to achieve:

- Rx sensitivity: -93 dBm (GFSK, BER=10^{-3})
- Maximum Tx output power: +10 dBm

What is the PAN1315 EMK

The PAN1315 EMK is development tool used as a plug in option in conjunction with the MSP430F5438 Experimenter Board. The tool includes two PAN1315ETU (Easy To Use) boards each containing a Panasonic PAN1315 *Bluetooth* 2.1+EDR HCI Module, on board antenna and RF thru-line connector. This is a highly versatile, advanced software development tool that helps customers easily design new applications using Panasonic's PAN1315 –a CC2560-based *Bluetooth* module.

What is the PAN1315

Is a surface mount device (SMD) Bluetooth 2.1 + EDR HCI module based on TI's CC2560, with a 58.5mm^2 footprint. The module is designed to accommodate a printed circuit board pad pitch of 1.3mm and as little as two layers for easy implementation and manufacturability. The PAN1315 is available to OEMs from Panasonic and all customers through distribution.

Customized variations of the PAN1315 platform are available for OEMs. Visit Panasonic's website www.panasonic.com/ti for additional information.

Will there be additional modules?
Customized modules from Panasonic are available. As the product line matures addition platforms will be added to the standard line up, Panasonic currently has plans to build extended temperature range as well as integrated antenna versions.

From www.panasonic.com/ti

Part Numbers:

Part Number	Description
ENW-89818C2JF	PAN1315, CC2560 HCI module, no antenna
ENW-89818C2KF	PAN1315, CC2560 HCI module, 256K EEPROM memory, no antenna
ENW-*********	PAN1315, CC2560 HCI module, antenna
ENW-*********	PAN1315, CC2560 HCI module, 256K EEPROM memory, antenna

I don't need SPP, I need a different profile. What do I do?
Contact Panasonic as they are working with several software developers. Mindtree is able to offer a wide variety of profiles for the Ethermind stack included in the platform. They can be contracted directly for this additional work. Examples include medical over health device profile (HDP) or *Bluetooth* low energy (BLE). You can contact MindTree at *Bluetooth*@mindtree.com.

Why do I need to use this particular MSP430 (MSP430BT5190) device?
Due to license obligations TI is required to track all shipments of devices that work with TI *Bluetooth* devices and the sublicensed EtherMind stack.

What is the cost of the MSP430BT5190 device? What is different between the MSP430BT5190 and the MSP430F5438?
1Ku published pricing for the MSP430BT5190 is expected to be ~$4.95 ea. The MSP430BT5190 has additional processing steps that make it compatible with the BT stack.

When and where will MSP430BT5190 be orderable?
The MSP430BT5190 will be orderable on the TI sample store in July 2010. Availability is projected August 2010

What package types will MSP430BT5190 support?
The MSP430BT5190 device will initially be available in a 113-pin BGA package and a 100-pin LQFP package

What if I don't want a module? How much would the CC2560 device cost? Is that an option?
TI is enabling the broad market through the Panasonic PAN1315 for support reasons and design complexities.

Here are some advantages of using modules:

1. Lower risk and faster time to market

    a. RF is pre-integrated and tested
    b. Modules remove RF complexity –-> faster design cycle
2. System cost savings
    a. No RF engineering development costs
    b. No RF testing or production automation equipment costs
    c. Modules are FCC/IC/ETSI pre-certified
    d. Improved yield for main PCB (modules are 100% pre-tested)

What's the difference between the BL6450 and the CC2560?
CC2560 is specifically focused on the MCU market for broad applications. Additionally CC2560 does not support FM.

What can I do with the PAN1315 EMK out of the box?
The kit, when coupled with the MSP430F5438 Experimenter Board, enables customer's early software and hardware prototyping capabilities for wireless embedded applications. You can do advanced software development with the PAN1315 EMK production-ready module. *Bluetooth* sample applications (source code format) include:

- Accelerometer-based game
- RF link parameters
- Thermometer readings

Additional features include:

- Accelerometer
- LCD
- JTAG header
- Microphone
- Joystick
- 2 pushbuttons
- USB port
- 3.5mm headphone jack
- 34 digital I/O pins

The PAN1315 EMK is a highly versatile, advanced TI *Bluetooth* development tool. The tool includes two PAN1315ETU (Easy To Use) boards each containing Panasonic's PAN1315 *Bluetooth* 2.1+EDR HCI Module, on board antenna and RF thru-line connector. Users may download the *Bluetooth* software named MSP430+CC2560 Software Development Kit (SDK) which includes MindTree's Ethermind *Bluetooth* stack, SPP and embedded sample applications running on FreeRTOS. One of the sample applications uses the accelerometer on the experimenter board to remotely control a PC based game. The SDK also includes sample applications for transmitting temperature readings between *Bluetooth* devices and displaying RF link-quality parameters on the experimenter board LCD. The combination of sample applications in source format and the peripheral rich experimenter board makes this platform a versatile tool for extensive prototyping and easy development of applications that require *Bluetooth* connectivity.

What's the difference between the CC2560 and the CC2540?
CC2560 is a full rate *Bluetooth* 2.1+EDR solution. CC2540 is a BLE solution. Additionally CC2564 is a pin compatible solution to CC2560 which supports dual mode *Bluetooth* 2.1+EDR and BLE. This device will be available in late 2010.

When can I get BLE support?
TI currently offers BLE single mode with CC2540. This solution is also available integrated with MSP430.

Additionally CC2564 is a pin compatible solution to CC2560 which supports dual mode *Bluetooth* 2.1+EDR and BLE. This device will be available in late 2010.

MindTree can be contracted for a BLE enabled stack via paid services when CC2564 is available.

What comes in the PAN1315 EMK?

- 2 PAN1315ETU (CC2560-based) development modules
- Chip antenna
- Plugs into MSP430F5438 Experimenter Board which further brings:
  - Accelerometer
  - LCD
  - JTAG header
  - Microphone
  - Joystick
  - 2 pushbuttons
  - USB port
  - 3.5mm headphone jack
  - 34 digital I/O pins
  - And more

What's the difference between this *Bluetooth* and the *Bluetooth* you just announced with the OMAP35x platform?

The WL1271 and CC2560 share the same 7th generation mature *Bluetooth* core. WL1271 additionally supports 802.11 bgn.

Do I have to pay for the software?

The Ethermind stack and SPP that is included in the platform has no NRE requirements . Any additional profiles or stack requirements can be negotiated directly with MindTree. You can contact MindTree via *Bluetooth*@mindtree.com.

If I need additional *Bluetooth* features, how do I get that?

- Available from TI
  - Data over SPP
- Available from MindTree
  - Medical over HDP
  - BLE (2H 2010)
  - MindTree can also support other profiles or applications

Where do I go for *Bluetooth* software support?

TI support

- Refer to the available reference hardware, software and collateral
- Leverage TI Connectivity Wiki for information on set up, platform details, user guides and more: www.ti.com/connectivitywiki
- Ask an engineer about Wireless connectivity at the MSP430 forum: http://e2e.ti.com/support/microcontrollers/msp43016-bit_ultra-low_power_mcus/f/default.aspx

MindTree (www.mindtree.com) offers:

- System integration capabilities including hardware and software design services
- HDP solutions
- BLE stack and profiles

Panasonic (www.panasonic.com/ti) offers:

- Customized modules and HW design services
- Antenna support

- Panasonic support questions can be directed to their website – www.panasonic.com/ti

What kind of support can I get from the forum?
Getting support on the platform: free vs. paid

Community support	*Paid services*
Feature set as defined in the Release Notes document	**Features not included in the software releases are considered Enhancements – i.e. outside the set defined in the Release Notes document**
Demo applications exercised as per the user guide instructions and with the *Bluetooth*® accessories defined in the same document	Extension and/or customization of demo applications; or interoperability with additional *Bluetooth* accessories
Bugs reproduced on the MSP430F5438 Experimenter Board together with the official PAN1315ETU Card and the official TI software release contents	**Bugs only reproducible on customer target hardware and/or modified software**
Questions related to the official PAN1315ETU card which uses the Panasonic PAN1315 module	Questions related to customized *Bluetooth* adapter cards, or related to a wireless module other than the Panasonic PAN1315 module
Questions related to the official MSP430+CC2560 *Bluetooth* software development kit (SDK) and documentation	**Questions related to software that has been ported to different hardware or modified from the official TI software release**
	User Interface (UI) integration and/or customization
	Bugs inherent to non-TI and non-MindTree owned components, such as FreeRTOS
	API's not listed in the official API documentation accompanying the software release
	Official certification testing and support
	Panasonic PAN1315 module customizations
	System integration for customer prototypes or final products

What testing, verification, and certification has this platform gone through?
The PAN1315 module has been tested against *Bluetooth*, FCC, IC & CE specifications.

Where has the MindTree stack been used in the past? Is the stack robust?
MindTree Ethermind *Bluetooth* Stack
- ✓ 30+ Customers; Products are shipping in volumes
- ✓ *Bluetooth* SIG Associate Member since 2000
- ✓ Annually BQB Qualified *Bluetooth* Components
- ✓ Regular Participation in UPFs
- ✓ *Bluetooth* SIG Specifications Participation

Can we put the stack on other MSP430's?
The *Bluetooth* sublicensed stack supporting SPP can only be used with the MSP430BT5190. Mindtree can be contracted for feasibility studies on using the *Bluetooth* stack on other MSP430 versions as well as other MCUs in general.

The *Bluetooth* sublicensed stack supporting SPP can run on the MSP430F5438, but it will perform as demo quality code and time out periodically.

When are the tools and kits available?
The PAN1315 EMK is available to order off the e-store and through distribution at the end of April 2010.

Is the platform production quality today?

The hardware is in Beta Quality at end of April. The Software is alpha quality end of April, and we expect Beta to come within 2Q. We expect both hardware and software to be production quality by end of 2010.

Where can I learn more about the module?
You can find more information on the Panasonic PAN1315 module at www.panasonic.com/ti. More information is also available from the Wireless Connectivity Wiki www.ti.com/connectivitywiki.

What volumes will Panasonic support?
Panasonic supports the broad market through distribution and can support sample quantities through high volume mass production requirements.

Why does my software keep timing out?
If you are using the MSP430F5438 device in your experimenter board, the software detects this and times out periodically. To fix this, you can order MSP430BT5190 devices at www.ti.com/msp430bt.

Where can I buy these kits and modules?
The PAN1315 EMK as well as the MSP430F5438 experimenter board, can be ordered at http://www.ti-estore.com at the end of April 2010. Panasonic will release a development kit, part number EVAL_PAN1315, in September, that includes the PAN1315ETU and MSP430F5438 experimenter board.

Can I use the software with code composer studio (CCS)?
Currently the platform does not use CCS. This is something we are looking at on the roadmap.

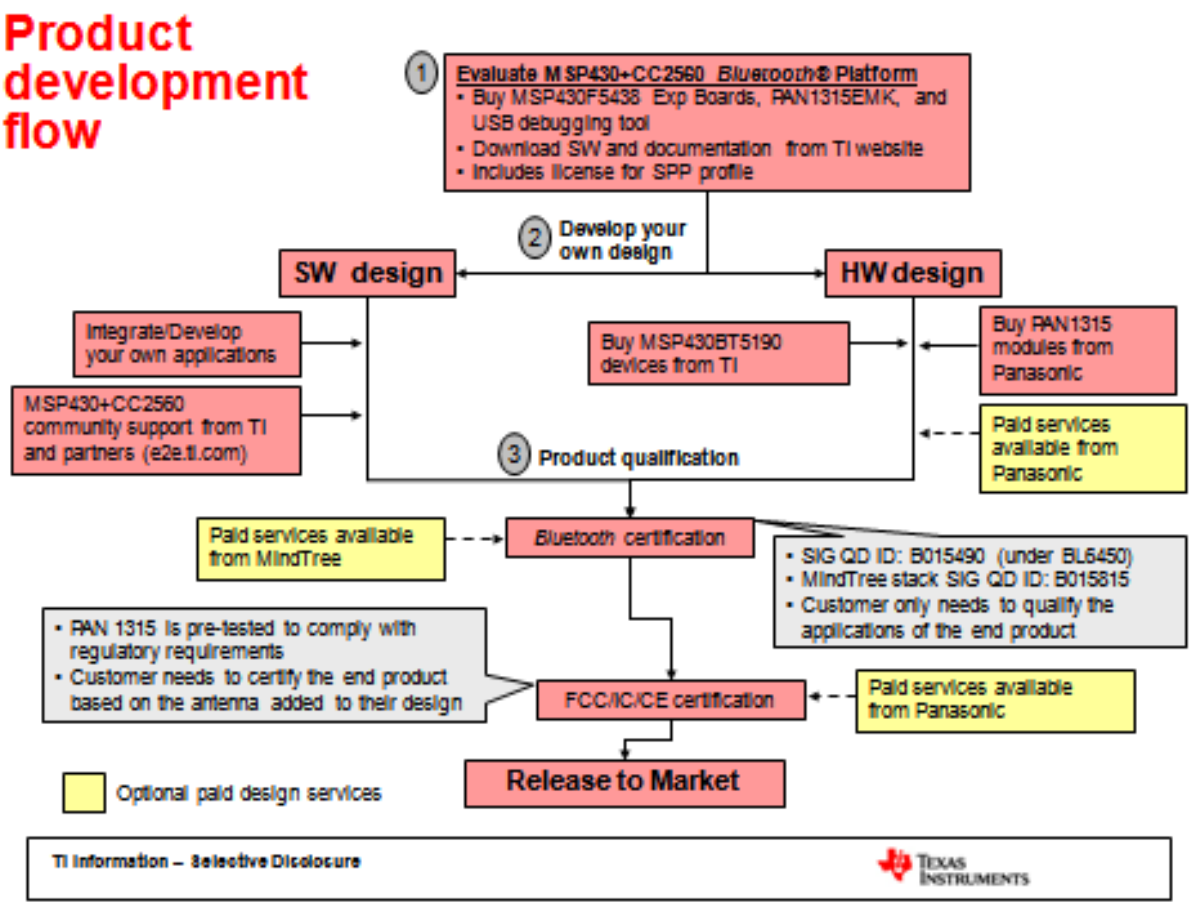
What compiler options do I have?
Currently the platform only works with IAR Embedded Workbench.

- **IAR Embedded Workbench for TI MSP430**

The IAR Embedded Workbench for TI MSP430 is a set of development tools for building and debugging embedded applications for MSP430 microcontrollers using assembler, C and C++. It is provided by IAR Systems.
The MSP430+CC2560 SDK Demo and Sample Applications can be used with the KickStart Edition and the Evaluation Edition.

For more information please go to the IAR Web Site or visit IAR KickStart and IAR Embedded Workbench for TI MSP430 Wiki Site

What do I need if I'm going to build a product (i.e. hardware, software, tools, licensing, equipment, etc.)?
Customers can start by evaluating and developing on the EZ430-RF2560 and the PAN1315 EMK kits.



What kind of support exists for the FreeRTOS?
There is community support. Around FreeRTOS and additionally customers can move to a commercial license for a product called OpenRTOS which will include support and additional features. **http://www.freertos.org/main.html**

What OS' does this support? Can I use my own RTOS?
A modified FreeRTOS V6.0.2 is used to support the Ethermind *Bluetooth* stack. Please refer to the Developer Guide included on the Wiki for more details.
Other RTOSs are not supported in the Platform, but customers can work directly with MindTree for paid services.

I'm not familiar with TI *Bluetooth* technology, has it been deployed in the market today?
TI's industry-leading *Bluetooth* technology has been proven in the market place:

- TI has been providing *Bluetooth* solutions to the market for more than 10 years
- Market proven 7th generation *Bluetooth* solution
- Best-in-class receive sensitivity and low power modes
- Highest transmit power without external power amplifier for longer range

Is this platform already designed in with customers?
While nothing has been announced publically, TI's MSP430+CC2560 solution has interest from many customers. TI sees significant interest around the world for products shipping in 2011 timeframe.

Does this change how I get supported on my MSP430 design?
No. You will still follow the MSP430 support model for your MSP430 design. In fact support for the MSP430+CC2560 platform including the software will also be supported through the MSP430 forums and TI Wiki pages.

Who are the main competitors and why are we better?
We have several *Bluetooth* only competitors such as CSR and Broadcom, however these competitors do not have TI's broad MCU portfolio. They are offering a *Bluetooth* only solution while TI is offering a platform where the *Bluetooth* functionality is is pre-integrated into the MSP430. Also, The platform allows you to use MSP430 to do sensor/embedded application and run the *Bluetooth* stack

TI's *Bluetooth* strengths include:

- Best-in-class receive sensitivity and low power modes
- Highest transmit power without external power amplifier for longer range

How do I get support for the HDP profile?
MindTree can support customers directly with this profile. This can be demonstrated from MindTree today

Do I get the source to the stack?
Customers will need to work directly with MindTree for source code access. The TI *Bluetooth* Platform solution comes with binary *Bluetooth* stack. MindTree can be contacted at Bluetooth@mindtree.com

I like the platform, where do I start?
Leverage TI's Connectivity Wiki for details on start up information, platform overviews and other details: www.ti.com/connectivitywiki

What if I want something customized or want a different module?
Refer to Panasonic (www.panasonic.com/ti)

Panasonic (www.panasonic.com/ti) offers:

- Customized modules and HW design services
- Antenna support
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Will you be making a single-chip combining MSP430 and *Bluetooth* functions?
TI has not announced this type of product at this time.

Is this a one-off or is there a roadmap with this device?
In general, TI is taking connectivity including *Bluetooth*, WLAN and GPS into the MCU space. TI will continue building platforms and solutions for these technologies with TI MCU devices.

Will TI also add *Bluetooth* to products like Stellaris®, Sitara®, etc.?
TI is in the process of exploring the addition of *Bluetooth* to other MCUs and will continue to work on additional platforms.
TI MPU platforms are being supported via combined ***Bluetooth*** & WLAN device – for more information www.ti.com/connectivitywiki

Can TI and Panasonic deliver? What's the device capacity and lead time?

For MSP430BT5190 devices TI expects normal lead times of about 10-12 weeks by 2H 2010) Lead times for Panasonic's PAN1315 and PAN1315ETU are currently expected to be 10 weeks. Panasonic has nearly unlimited capacity.

Why would I want to switch to this product if I already have a *Bluetooth* product?
There are many benefits to switching to this product, regardless if you already have a *Bluetooth* product. TI has coupled its proven, seventh-generation *Bluetooth*® offering, the CC2560, with a pre-embedded *Bluetooth* stack running on TI's MSP430BT5190 microcontroller (MCU). This integration will reduce design barriers and provide the following benefits:

- Best-in-class RF performance and low power consumption
- Industry-leading 7th generation *Bluetooth* technology
- Ready-to-go wireless platform simplifies the development process
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- Add *Bluetooth* capability to your existing MSP430 applications enabling new product designs in the embedded wireless application space
- Flexibility and Upgrades

I don't know much about *Bluetooth* - how much do I need to know to launch this product?TI has tried to eliminate the need for customers to be ***Bluetooth*** experts by preintegrating *Bluetooth* to the MSP430 and by providing example source code applications in the platform.

The example applications show API usage for:

- Turning *Bluetooth* on; making the device discoverable; performing inquiry; pairing the devices; receive/transmit data over SPP; get and transmit RF parameters