AIR™

Anaren Integrated Radio

Bluetooth SMART

How to use *Bluetooth*® SMART to turn a smartphone into your device's new control panel

Features AIR module (A2541)
-- with Emmoco software

emmoco
EMBEDDED · MOBILE · CONNECTIVITY

Texas Instruments Design Network

ZigBee Member

Bluetooth SIG Member

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Anaren®
What'll we think of next?®

Bluetooth 101

- Bluetooth is “a wireless technology standard for exchanging data over short distances from fixed and mobile devices, creating personal area networks with high levels of security”
- Bluetooth is managed / created by the Bluetooth Special Interest Group (SIG) (www.bluetooth.com) which is a global trade association with over 19,000 member companies
- In 2010: Bluetooth SIG announced, Bluetooth Core Specification v4.0 with low energy technology

What is BLE?

- *Bluetooth* low energy technology is an evolution in technology that enables new applications in wireless devices that are able to last months or even years off a small, button-cell battery
- This does not replace existing Bluetooth -- it adds to it. (So headphones and speakers remain Bluetooth.)
- BLE lets you connect your low-power device to smartphone or tablet creating an excellent user interface

Why use BLE?

- Ultra-low peak, average and idle mode power consumption
- Ability to run for years on standard, coin-cell batteries
- Low cost
- Multi-vendor interoperability
- Enhanced range

About *Bluetooth*® SMART

- Bluetooth SMART devices connect to Bluetooth SMART-ready smartphones using Bluetooth low-energy technology
  - denoted as Bluetooth 4.0 on smartphones
- Bluetooth SMART ready smartphones & tablets include:
  - iPhone, iPad, iPod Touch with iOS v5 and above
  - Android v4.3 devices with Bluetooth 4.0 hardware

What can a Bluetooth connection do for you?

- When within range, use a smartphone or tablet to *see inside* your device/equipment:
  - monitor & collect performance data
  - adjust settings
  - do preventive maintenance
  - troubleshoot
  - upload software updates
  - and more

  …all touch-free & without opening a cabinet!

- No limits on what data can be displayed (smartphone/tablet vs. LCD panel)
- Secure: Only those with your “app” (eg: field technicians) have access
- Many competitive advantages & possibilities

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How do you leverage *Bluetooth* SMART without building your own radio & months of programming?

AIR™

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Introducing AIR modules (A2541) with *Bluetooth®* SMART technology & Emmoco software:

emmoco
EMBEDDED · MOBILE · CONNECTIVITY

Now it's easy to turn a smartphone into your device's new control panel!

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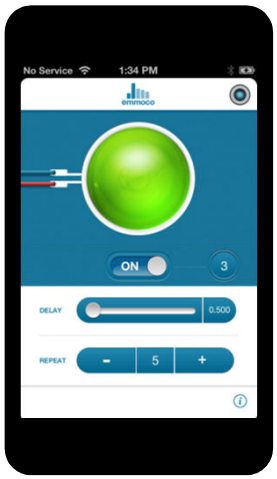
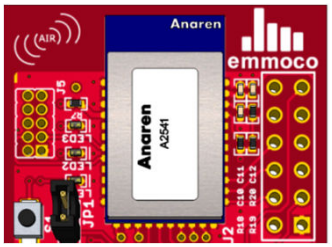
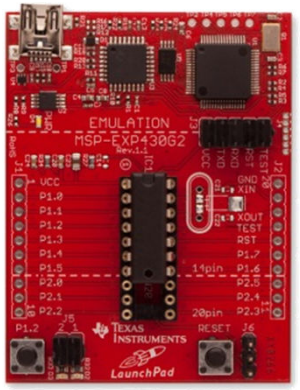
Our approach: Turn a smartphone into your new control panel – in 90 days



Emmoco-enabled Smartphone app
(iOS / Android)



Certified module w/ *Bluetooth* SMART (BLE) wireless connection



Embedded device based on any micro
(MSP430, TIVA C, TI 3000, others)

Hardware

&

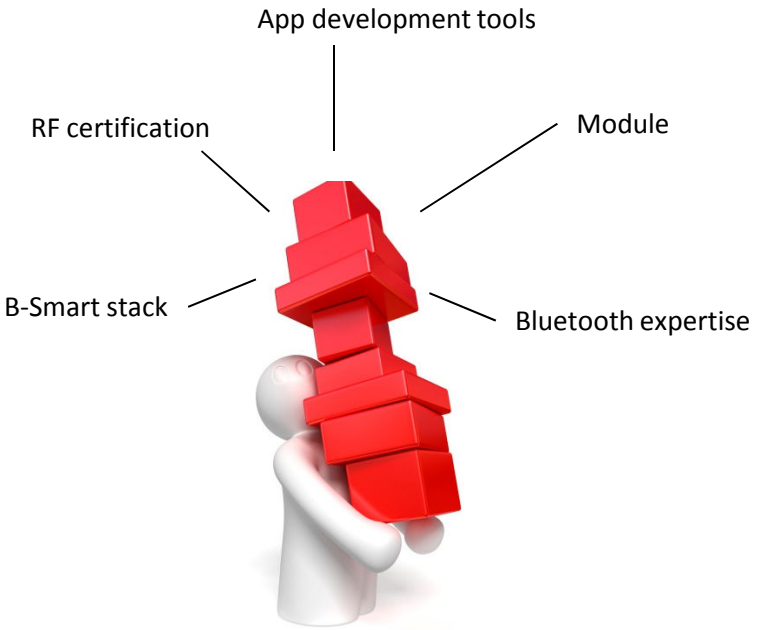
Software

Anaren A2541x24xx AIR module featuring *Bluetooth* SMART technology, B-Smart stack, and BoosterPack dev tools

Emmoco software & cloud-based “app development”

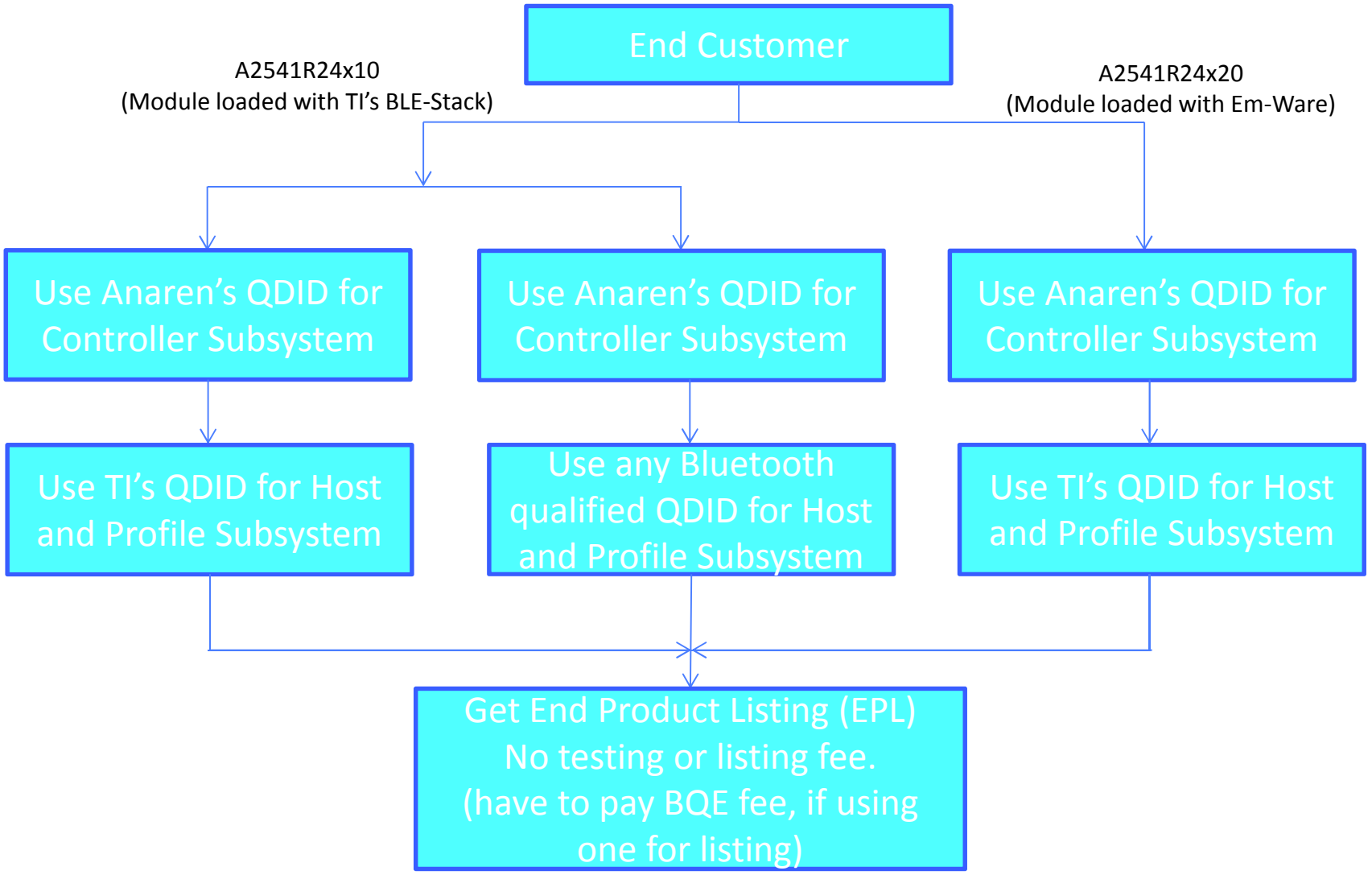
What you WON'T have to do

- Read a 2,000 page Bluetooth manual
- Design RF hardware / antenna
- Certify sophisticated RF hardware
- Devise your own profile
- Uproot your development tools
- Add lots of embedded micro code
- Track perpetual changes in smartphone OS software



We've done the heavy lifting for you!

It's easy to get your end-product listing (EPL) from *Bluetooth* SIG



Not just a module, a total solution!

NRE-free production

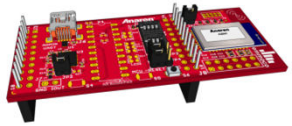
Initial consultation

Production stage

- **Anaren's A2541x24xx**
  - small, compatible footprint
  - regulatory certification
  - 100% tested
  - choice of integral or connectorized antenna
- **Production support** (e.g. layouts, certification, packaging, etc.)
- **Plant & consultant contacts**

AIR™ SUPPORT for Bluetooth® SMART

Development stage



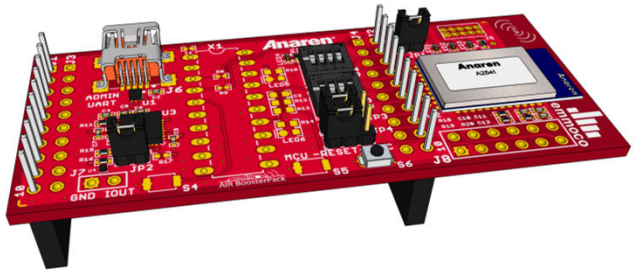
- **CC2541 BoosterPack kit (A2541x24xx-ADB1)**
  - works with TI's MSP430, TIVA C (aka: Stellaris), and TI 3000 LaunchPad
  - B-Smart stack lets you develop your wireless connection "right out of the box"
  - then jump on Em-hub to get started on your smart-phone app!
  - includes __ AIR-equipped BPs, User's Manual, code examples, more

Application stage

- **Em-hub from Emmoco lets you develop your smart phone app in an intuitive, secure "cloud" portal**
- Additional custom-app support from Emmoco is also an option

It starts with our B-Smart BoosterPack

- Anaren A2541R24A-ADB1 - $49
- Everything you need to add the A2541 to your system
- Great out-of-the-box experience
- Integrate with your micro quickly
- Includes Emmoco app development tools & access to Em-hub



Development stage

Next, build your app fast – with Emmoco software & Em-hub

- Schema specifies data-pipe between iOS and embedded
- Emmoco generates put / get style APIs based on schema
- Works with any micro's toolset (add one .c file -- ~150 lines)
- Examples to get you started
- Bluetooth knowledge not required
- RF knowledge not required

```
schema Blinker {

    /* -------- resource cmd -------- */
    enum Cmd {
        START_CMD, STOP_CMD
    }
    Cmd cmd {
        writeonly
    }

    /* -------- resource count -------- */
    int16 count {
        readwrite
    }

    /* -------- resource delay -------- */
    num <0.5, 2.0, 0.100> delay {
        readwrite
    }

    /* -------- resource ledState -------- */
    enum LedState {
        LED_OFF, LED_ON
    }
    LedState ledState {
        readonly
        indicator
    }
}
```

Applications stage

Contrast: With and without Emmoco

- Without Emmoco: A morass of HW- and BLE-specific APIs

TI BLE HCI Vendor Specific HCI Guide

- Emmoco: Store and Fetch APIs for your data

```
40
41  void Blinker_count_fetch(Blinker_count_t* output) {
42      *output = countVal;
43  }
44
45  void Blinker_count_store(Blinker_count_t* input) {
46      countVal = *input;
47  }
48
49  void Blinker_delay_fetch(Blinker_delay_t* output) {
50      *output = delayVal;
51  }
52
53  void Blinker_delay_store(Blinker_delay_t* input) {
54      delayVal = *input;
55  }
56
```

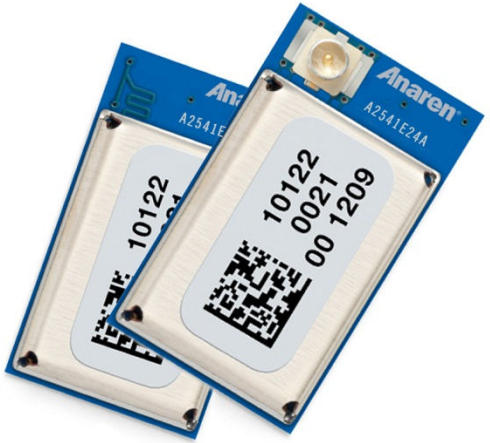
Applications stage

Need additional help on the smartphone application side?

- Emmoco offers a full suite of design services
  - support
  - training
  - embedded hardware and software design
  - iOS app development

Finally, move to production: With our AIR A2541R24x AIR module

- TI CC2541 SoC for Bluetooth Smart (BLE)
- PCB antenna or U.FL connector options
- Minimizes design cost and real estate:
  - 32 MHz and 32 KHz crystals included
  - DC/DC Converter for 30% power savings included
  - Small, Surface-mount: 11 x 19 x 2.5 mm
- 90dB link budget, up to 40m range (outdoor LOS)
- -40 to +85C Industrial temp range
- FCC/IC certified and ETSI compliant
- 100% RF tested



AIR Module	Antenna	Status
A2541R24A20Gx	PCB	Samples Now | Production Fall 2013
A2541R24C20Gx	U.FL	Samples Now | Production Fall 2013

Production stage

Again: Not just a module, a total solution!

NRE-free production

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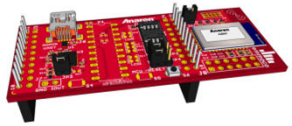

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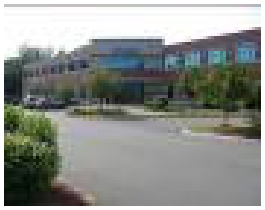
Roadmap

- Coming early 2014:
  - A2541E24x module with Range Extender
    - footprint compatible with standard module
    - 100dB link budget
    - brings range up to 150m (outdoor line-of-sight)
  - Android support
  - Low power modes
  - Additional features

Who is Anaren

- Founded in 1967 in Syracuse, NY
- RF / microwave technology always the focus
- Manufactures 140 million components annually
- $160 million revenues
  - 65% Space & Defense vs. 35% other wireless
- 860 employees
- Global manufacturing and sales locations (US, UK and China)

Anaren Microwave/
Anaren, Inc. (HQ)
Syracuse, NY
160,000 sq. ft. (owned)



Anaren Ceramics, Inc.
Salem, NH
65,000 sq. ft. (leased)

Anaren
Communications
Suzhou, China
76,000 sq. ft. (leased)

Anaren, MSK
Syracuse, NY
43,000 sq. ft. (owned)

Anaren, Unicircuit
Littleton, Col.
45,000 sq. ft. (owned)

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