



Adding WiFi to Your Embedded System

WPG Americas & Gainspan

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Your partners for Embedded Wi-Fi



Multi Market Leader 32 bit ARM MCU



Leader Ultra low power embedded
Wi-Fi



NXP's & Gainspan's largest
distribution partner



GainSpan: Low Power Embedded Wi-Fi for IoT

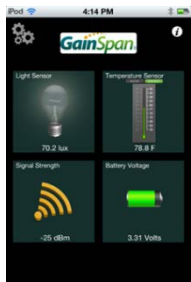
SOC's



Modules & SDK's



ADK/Mobile Apps



- Low Power 802.11b, 802.11 b/g/n SoC's
- Pin compatible, size and cost optimized modules
- Evaluation kits and boards

- MCU based hosts
- Serial to Wi-Fi commands
- Application development kits

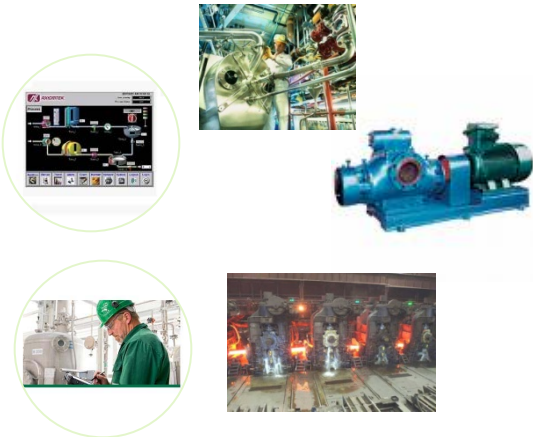
Some Typical Applications



Healthcare and Fitness

Audio and Video

Smart Energy



(Industrial)



(Commercial)



(Home)

Control and Monitoring



GainSpan Low Power Serial to Wi-Fi Solution (as easy as 1,2,3...)

1

Select NXP MCU Host

- 32-bit ARM Cortex MCU
- Small (6KB) driver/reference code
- Application code
- Serial to Wi-Fi with AT commands**
- No new tools**

“Application”
Wakeup

2

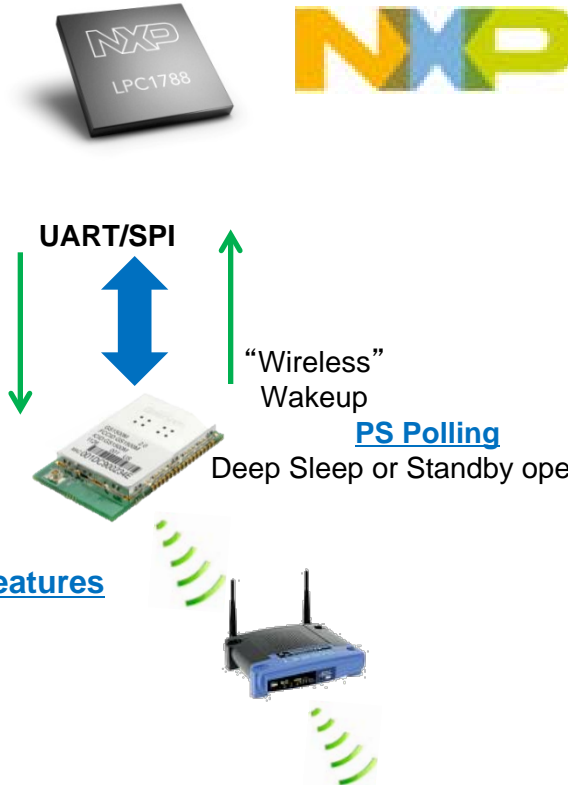
Select Embedded Wi-Fi Module

- GS1011MI – 802.11b low power - (Default module located on NXP Demo)
- GS1011ME – 802.11b extended range
- GS1500M – 802.11b/g/n
- GS1550M – 802.11a/b/g/n

(Optional)

Customize Module Networking Features

SDK-Builder™



Development/Evaluation Kit



3

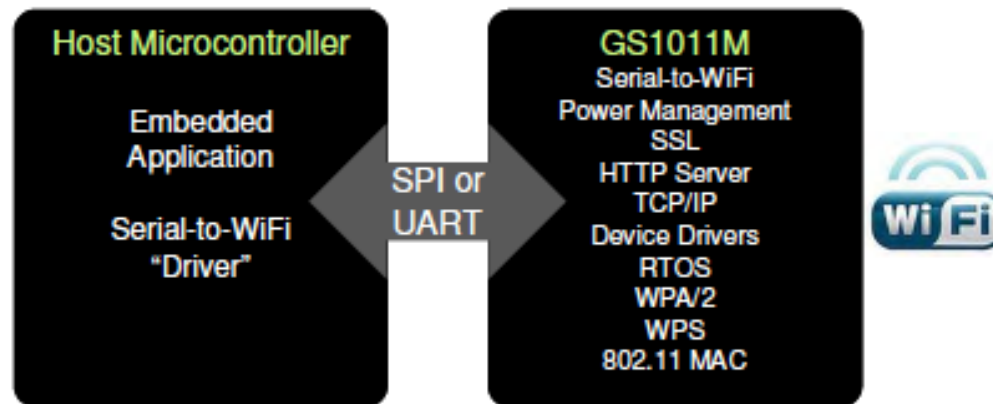
Develop Mobile & Web Apps

- Use HTTP methods with XML
- GainSpan ADK with GSLink™
- Provisioning, setup
- Firmware updates
- Applications – web servers or clients

Connect to the Cloud (Optional)

Serial to Wi-Fi Demo Overview

- ▶ The NXP/GainSpan demo kit will provide customers the means to evaluate capabilities of the GainSpan GS1011 ultra-low power wireless module and the Serial-to-WiFi embedded software for Wi-Fi 802.11b networks.
- ▶ The GainSpan Serial-to-Wi-Fi embedded software allows device and appliance manufacturers to easily add Wi-Fi capabilities to their products with minimal impact on the NXP microcontroller firmware.
- ▶ Enables customers to develop software on their existing NXP microcontrollers to support the “AT” command set, and connect it to either the UART or SPI interface onboard the NXP/GainSpan evaluation board.



NXP/GainSpan Demo



Functions on board:

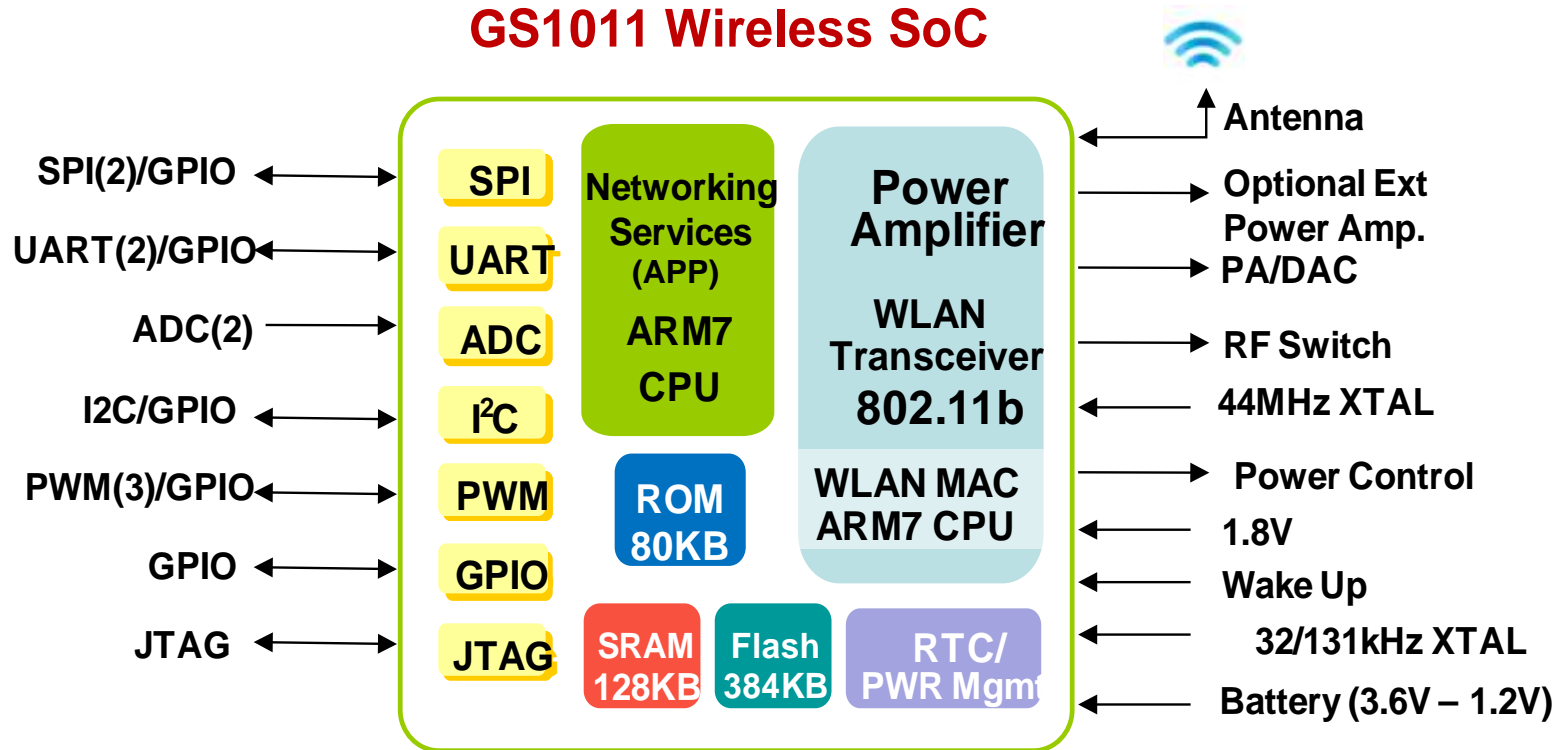
- ▶ TFT LCD Panel
- ▶ Accelerometer
- ▶ Temperature sensor
- ▶ Light sensor
- ▶ LED dimming

NXP/GainSpan Demo Benefits & Features

- ▶ Easy integration of Wi-Fi and web connectivity to devices with existing NXP microcontroller and UART or SPI interface.
- ▶ Offloads Wi-Fi and TCP/ IP networking from smaller host NXP microcontrollers.
- ▶ Simple AT commands for configuration and data communication.
- ▶ Support for over the air firmware updates using external flash
- ▶ Supports Infrastructure, Limited AP and Adhoc networking, Direct connect
- ▶ Two UART and SPI ports. Clock Data rates are
 - UART: up to 921 Kbps
 - SPI: up to 3 Mbps
- ▶ Full Wi-Fi and networking stack services including TCP/UDP/IP, DNS, DHCP, HTTP and SSL.
- ▶ Wi-Fi Security
 - WEP, WPA/WPA2 Personal
 - WPA/WAP2 Enterprise
 - Wi-Fi Protected Setup (WPS 2.0)
- ▶ Power Save Modes – PS-Poll, Sleep, Deep Sleep, Standby

GainSpan GS1101 SoC Summary

GS1011 Wireless SoC



- **WLAN ARM 7**
 - Wi-Fi Radio, PHY, MAC, 128KB Flash
- **Networking Services ARM7**
 - 256KB Flash
- **Peripherals**
- **RTC and Power Management**

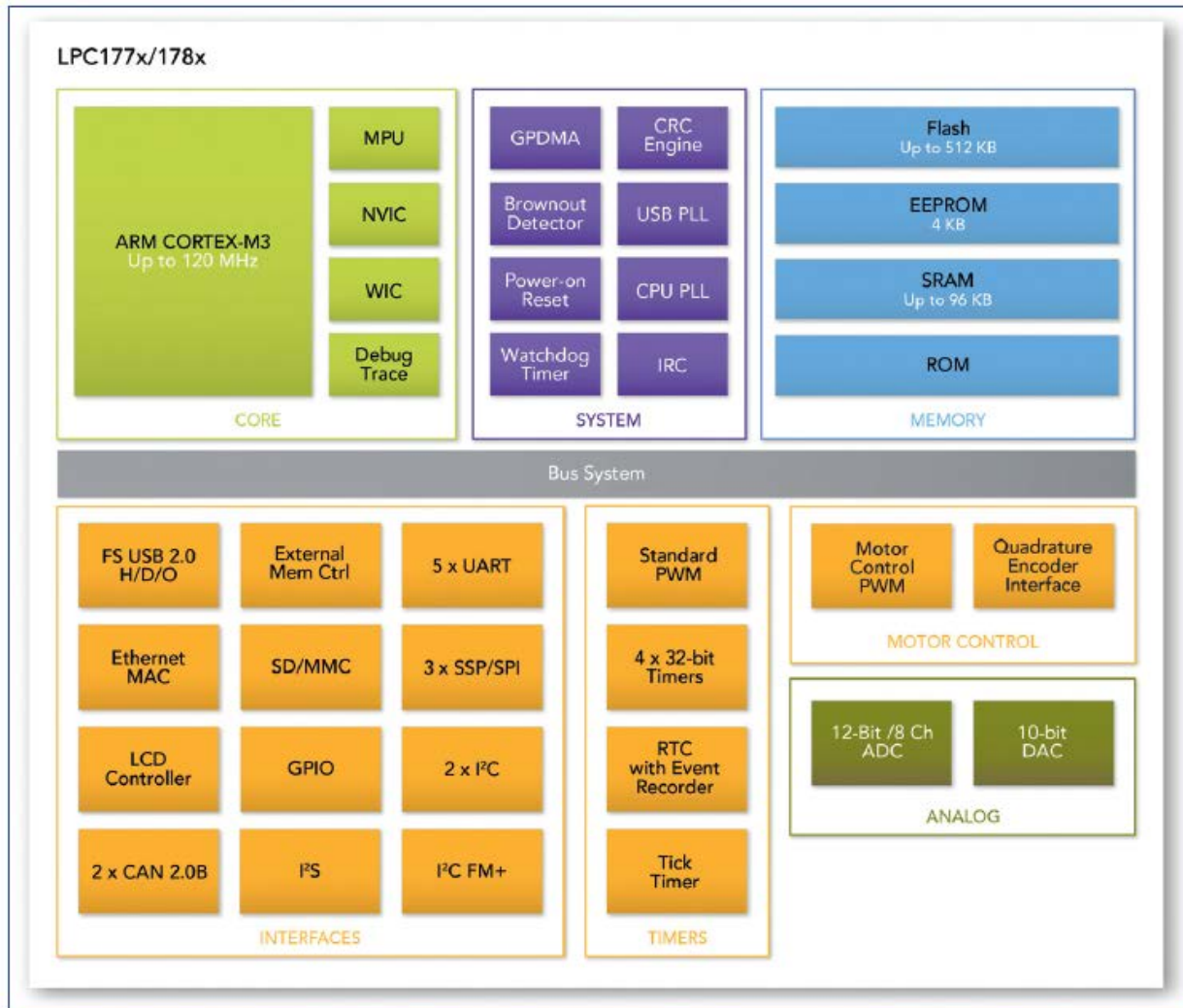
NXP LPC1788 Features



- ▶ The LPC1788FBD208 was chosen for its flexible and scalable interfaces with key features such as an External memory bus, Ethernet, USB, and optional LCD
- ▶ The LPC1788FBD208 is an ARM Cortex-M3 based microcontroller for embedded applications requiring a high level of integration and low power dissipation.

Type Number	Flash (KB)	CPU SRAM (KB)	Peripheral SRAM (KB)	Total SRAM (KB)	EEPROM (KB)	Ethernet	USB	UART	EMC ⁽¹⁾	LCD	QEI	SD/MMC
LPC178x												
LPC1788FBD208/ LPC1788FET208	512	64	16 X 2	96	4	Y	H/O/D	5	32-bit	Y	Y	Y

NXP LPC178x Block Diagram



- ▶ Low power
- ▶ High integration
- ▶ Cortex M3, 120 MHz
- ▶ 512 kB flash
- ▶ External memory controller
- ▶ Ethernet, USB 2.0
- ▶ 5 UART & 3 I2C

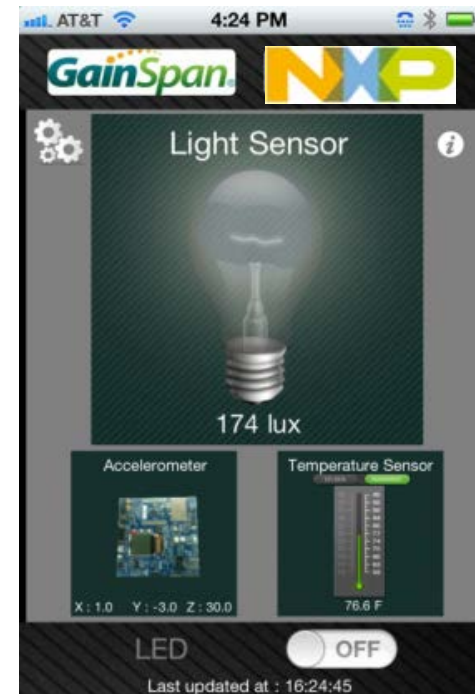
NXP/GainSpan Demo ADKs (Application Development Kit)

▶ GainSpan-NXP Wi-Fi Sensor ADK

- This ADK demonstrates the GSLink feature for communication between the NXP/GainSpan demo and an iOS or Android smart device or web application
- Works with GainSpan Wi-Fi Adapter board connected to the NXP demo board, which supports Temperature, Light and Accelerometer sensors
- Mobile Application Features
 - LEDs on the demo board can be turned on/off using an iOS or Android-based smartphone
 - Displays the temperature, light and spatial orientation sensors on the NXP Demo board

–Web Server application

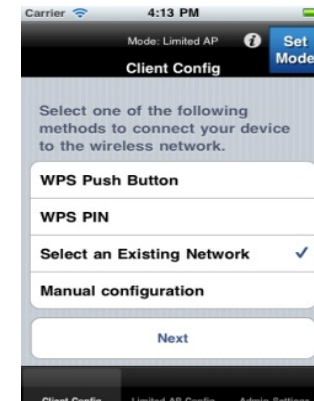
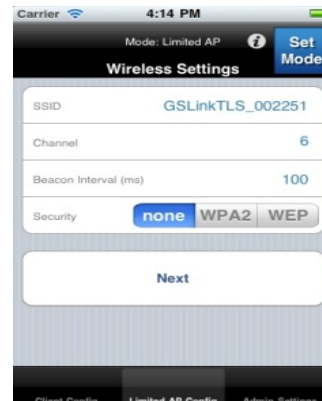
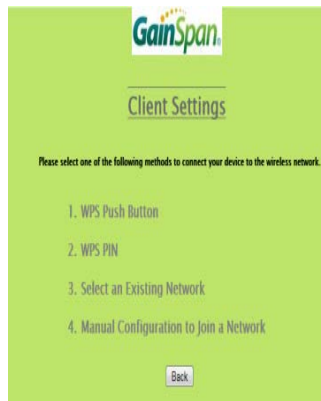
–Future **cloud connectivity, web client**



NXP/GainSpan Demo ADKs (Application Development Kit)

► Provisioning ADK

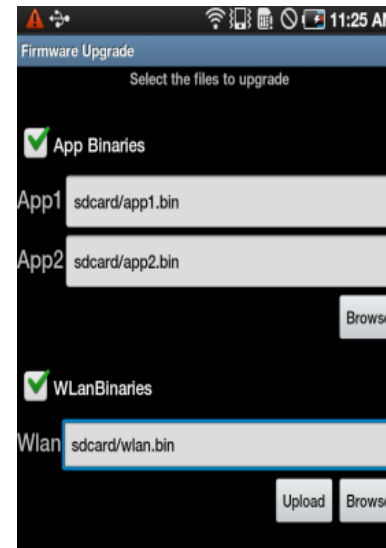
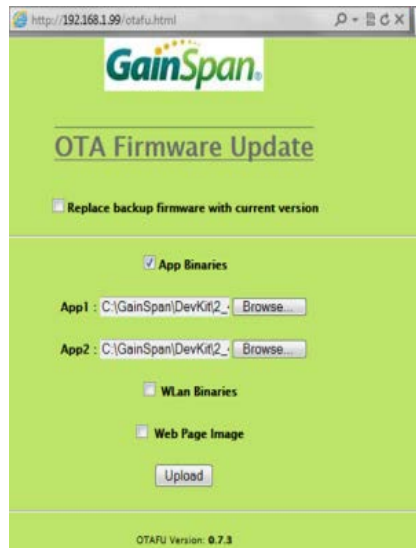
- Complete solution that enables provisioning and configuration of GainSpan Wi-Fi modules
 - Provision an embedded device (client) onto a secure network (WPA/2 Personal or Enterprise security) using web browser or smart device
 - Configure node in Limited AP mode
- Allows users to quickly configure their wireless security and network options using either smartphones (iOS or Android based) or PC (web browser)
- Web and mobile (iOS, Android native) applications



NXP/GainSpan Demo ADKs (Application Development Kit)

▶ Over-the-Air Firmware Update ADK

- Enables wireless upgrades of the embedded firmware on GainSpan Wi-Fi modules using either a web browser or a mobile application
- Update of embedded firmware can be done in Limited AP and Client modes
- Includes Backup and factory restore options
- Initiate from a Android mobile device or Web application



Connecting to the GainSpan module is as easy as using simple AT Commands

- ▶ Using AT commands, you can configure the bridge so data can be sent.
- ▶ Using a terminal app, issuing the command AT+NDHCP=1 allows the Evaluation Board to employ DHCP to obtain or renew its IP address.
- ▶ The command AT+NSTAT=? will show us the current network configuration of the Evaluation Board including the IP address. Example screen 1 shown below.

```
OK
at+nstat=?
MAC=00:1d:c9:01:99:99
MSTATE=CONNECTED      MODE=AP
BSSID=00:1d:7e:5e:5a:de  SSID= GainSpanDemo  CHANNEL=6  SECURITY=NONE
RSSI=-39
IP addr=192.168.2.53    SubNet=255.255.255.0  Gateway=192.168.2.1
DNS1=192.168.1.25      DNS2=192.168.1.26
Rx Count=12           Tx Count=4959
```

Screen 1: AT+NSTAT Output

Availability

- ▶ This demo board allows customers to quickly begin using GainSpan embedded Wi-Fi product via the NXP MCU
- ▶ Boards will be available starting May 6. Please contact WPG directly.

Contacts and resources



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Thank You for Attending

