



# Wireless ZigBee® and Sub-GHz Solution SoC/SiP Supporting Internet of Things (IoT)

AMF-IND-T0274

Derrick Klotz



October 2013

Freescale, the Freescale logo, ARMv6, C-5, CodeTEST, CodeWarrior, ColdFire, ColdFire+, C-Wire, the Energy Efficient Solutions logo, iMote2, iMote2GT, PFG, PowerQUICC, Processor Expert, QoIQ, QoIQv2, SafeAssure, the SafeAssure logo, StarCore, Symphony and VortiQa are trademarks of Freescale Semiconductor, Inc. Reg. U.S. Pat. & Tm. Off. AirBot, BeBit, BeeStack, CoanNet, Flexis, LayerScope, MagiK, M6C, Platform in a Package, QoIQ Converge, QUICC Engine, Ready Plug, SMARTMOS, Tower, TurboLink, Vybrid and Vybrid are trademarks of Freescale Semiconductor, Inc. All other product or service names are the property of their respective owners. © 2013 Freescale Semiconductor, Inc.







# KW2x – 2.4 GHz Smart Energy & Home Automation Solution from Freescale







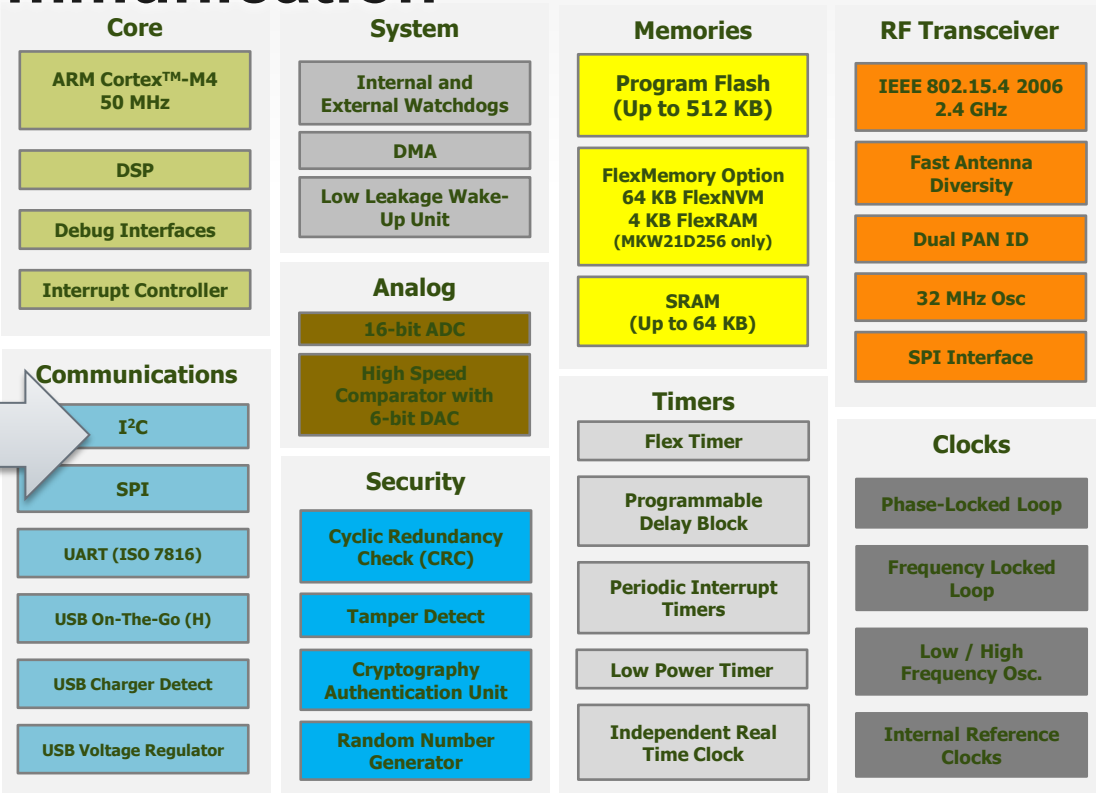






# Connectivity and Communication

- SPI
  - Full-duplex
  - Master and slave mode
  - Buffered transmit and receive with FIFOs
  - DMA support for FIFOs
- Inter-Integrated Circuit (I2C)
- I2C SMBus version 2 compatible
- Up to 100 Kbps
- Multi-master operation
- DMA support
- UART
  - Full-duplex operation
  - Programmable TX/RX polarity
  - Idle line or address mark wakeup
  - Hardware parity
  - DMA request
- USB Interface - OTG
  - USB 2.0 compliant
  - On-chip FS and LS transceiver
  - USB host mode
  - USB device mode
  - Suspend mode /low power
  - Supports HS with off-chip transceiver











# Dual PAN

Ability to participate in two networks simultaneously

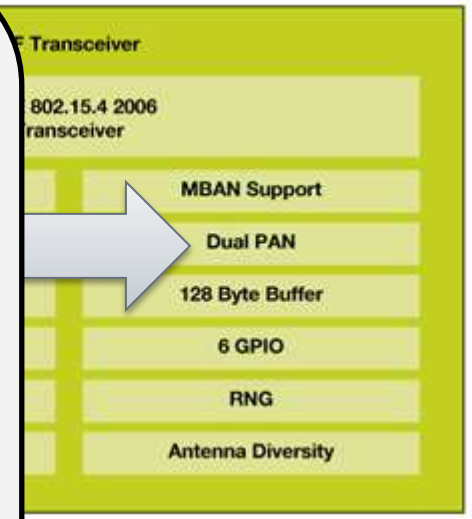
- Maintains two sets of network parameters
  - PAN, MAC address (short and long), Channel

2 channels, 2 PANs

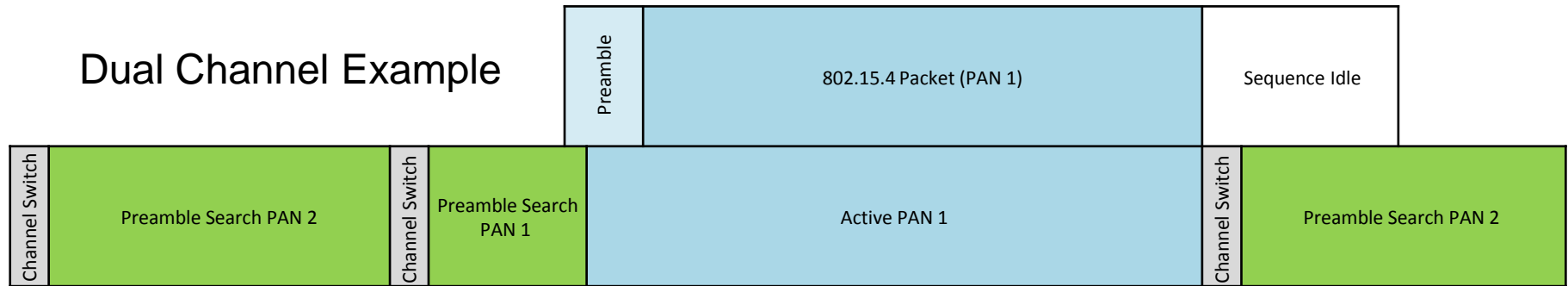
- Manual mode – software controls which PAN is active
- Automatic mode – hardware controls which PAN is active
  - Time to dwell on channel can be set from .5 mS to 3.2 seconds
  - If PAN is active when timer expired, sequence will complete before channel switch occurs
- Channel switch is 56 uS
  - Time to switch, poll, receive packet and switch back is <10mS

1 channel, 2 PANs

- Address filtering is done simultaneously
- No channel switch is necessary



## Dual Channel Example











# Features and Benefits

Features	Benefits
RF	
<ul style="list-style-type: none"> <li>Class-leading link budget</li> </ul>	<ul style="list-style-type: none"> <li>112 dB link budget provides greater range, reducing the need for external power amplifiers and lowering cost.</li> </ul>
<ul style="list-style-type: none"> <li>Low power consumption</li> </ul>	<ul style="list-style-type: none"> <li>17mA TX / 19 mA RX power consumption extends battery life</li> </ul>
<ul style="list-style-type: none"> <li>Dual PAN support</li> </ul>	<ul style="list-style-type: none"> <li>System can actively participate in 2 networks, eliminating the need for multiple radios.</li> </ul>
<ul style="list-style-type: none"> <li>Diversity Support</li> </ul>	<ul style="list-style-type: none"> <li>Freescale's FAD (Fast Antenna Diversity) allows the hardware to automatically select between 2 antennas, improving reliability in high interference environments.</li> </ul>





# MKW2x Enablement

















# KW01 – Sub GHz Smart Radio Solution from Freescale





























# MKW01 Enablement








# KW01 – Development System

- Modular Reference Board (MRB).
- Can run stand-alone with on-board mini-USB.
- Can plug into TWR-RF.
- SMA for Antenna or cable.
- Available with 30 or 32 MHz XTAL for frequency/spurious management.
- Available for 868/915 MHz, 434 MHz bands, can be tuned to 315 MHz.



# Leveraging the Kinetis Ecosystem for KW01



### HW BDM Debugger/Emulators

### IDE: Tools Compilers, Debuggers



### Radio Test Tool SMAC

### IEEE 802.15.4g IPv6

IPv6/6LoWPAN  
(Q4 '13)

### Tower EVBs & System Design

