Powering IoT with Integrated On-Chip Communications

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IoT market opportunities

Huge range of applications

- Home Automation
- Agriculture
- Wearables / Healthcare
- Surveillance Audio / Video
- Retail / Transport

Wide range of requirements in and across markets
Components of IoT devices

Broadly similar but with varying degrees of functionality

- Components of IoT devices
  - CPU
  - Wireless Communications
  - GFX & Display
  - Security
  - Power Management

- Headless Devices
  - Leakage Power Dominant
- Intelligent Devices
  - Active Power Dominant
- And everything in between

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IoT wireless standards: ranges and data rates

- **LTE Cat (0)**
- **Cellular LTE, HSXPA**
- **Wi-Fi 802.11ah**
- **Wi-Fi 802.11 b,g,n,ac**
- **Z-Wave**
- **RF4CE**
- **Bluetooth**

Ranges:
- 1m
- 10m
- 100m
- 1km

Data rates:
- 100Kbits
- 1Mbits
- 10Mbits
- 100Mbits
- 1000Mbits
Different Markets – Different Priorities

- Home Automation
- Wearables
- Surveillance
- Transport
- Agriculture

- Throughput
- Power
- Range
- CPU
IoT application by comms data rate requirements

Majority of IoT applications handled by BTLE / Wi-Fi-802.11n / 802.15.4 / LTE

- 802.15.4 LTE CAT0/1
- 802.11ah
- 802.11n
- 802.11ac

Categories:
- Sensor Hubs
- M2M
- Personal Health
- Wearable
- Voice
- Audio
- HD Audio
- Home Security
- Home Automation
- Remote Metering
- Industrial internet
- BTLE 4.0/4.2

Data rates:
- 100Kbits
- 1Mbits
- 10Mbits
- 100+Mbits

Applications:
- Home Security
- Industrial internet
- Voice
- Audio
- HD Audio
- Home Security
- Streaming video
- Sensor Hubs
- M2M
- Personal Health
- Wearable
- Home Automation
- Remote Metering
- Industrial internet
- BTLE 4.0/4.2
Connectivity for IoT

Different standards for different applications

- Wi-Fi – 1x1 802.11n
- Low Power Wi-Fi – 1x1 802.11n
- LTE-CAT-0/1
- 802.15.4
- Bluetooth Smart (BTLE)
- Bluetooth Smart Ready (BT – 4.1)
- 802.11ah
Supporting Multi-Standard Communications
Enigma RPU: connecting everything

Highly configurable multi-standard on-chip communications

High Perf.

Low Power

High Performance Connectivity

Low Power Connectivity

Comms

Graphics

CPUs

Video & Vision

Connected SoCs are the future

Enigma RPUs are the ideal, scalable and proven answer
What is the Ensigma RPU?

A complete end-to-end solution – software to antenna

- Efficient, scalable and flexible integrated communications IP
- Explorer RPU: High performance - Wi-Fi, BT, TV, radio
- Whisper RPU: Ultra-low power, small area – LP Wi-Fi, BTLE, 6LowPan
Connectivity Integration

- Small Form factor key for wearables / mobile devices
- Started with Mobile / APP Processors
- Most New Wearable chips have connectivity integrated
- This trend to continue for all IoT segments
  - WiFi, 802.15.4 well underway
PowerGearing™ for Ensigma Whisper

Optimizes both static and dynamic power consumption

- Highly Optimized Listen Mode
- Faster Wake-up / Sleep Times
- Lower Frequency of Operation
  Optimal Data Path Width in Sub Blocks
- Rapid Sync Convergence
Low power consumption for IoT and wearables

Devices can wake up quickly and consume less power in the process

Tightly coupled modem/processor design enables the best connected standby power compared to other connectivity solutions
Connectivity for IoT

- Connectivity integration key to achieving low power / low cost devices for IoT

- Several connectivity standards expected to coexist
  - Solutions should address multiple standards

- Solutions need to be designed for power

- Imagination’s low-power Ensigma Whisper RPU is the right solution
Thank You

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