SQN1220 Mobile WiMAX System-On-Chip for Voice/Data CPE and Gateways

802.16e Enhanced Semiconductor Solution

THE HIGHEST LEVEL OF INTEGRATION IN THE WiMAX INDUSTRY

Based on state of the art 65 nm technology and seven years of Sequans' proven field experience, the SQN1220 delivers baseband and triple-band RF in a single die -- the highest level of integration yet achieved in the WiMAX industry -- leading to unprecedented achievements in performance, power consumption, and size.

APPLICATIONS

The SQN1220 delivers wireless broadband connectivity for portable, nomadic and fixed Mobile WiMAX® applications. It is designed specifically for voice/data CPE, gateways, and personal hotspots.

KEY BENEFITS OF SQN1220

VOIP AND NETWORKING APPLICATIONS

The SQN1220 features an embedded CPU for a high level of processing power, enabling the support of up to two VoIP channels and networking applications, and eliminating the need for an external DSP or CPU in most WiMAX CPE products. This CPU is open for customer applications, and operates on Linux OS, thus enabling simple integration of the customer networking stack. Sequans also provides key applications such as EAP supplicant, and OMA-DM.

ADVANCED MIMO – *mimo*MAX™

SQN1220 features *mimo*MAX, Sequans' patent-pending, low-complexity MIMO algorithm for maximum likelihood performance on the downlink and 2Tx on the uplink for 2Tx diversity and optional full 2x2 uplink MIMO.

DUAL TRANSMIT CHANNELS AND CLOSED-LOOP DIVERSITY

SQN1220 implements dual independent transmit chains with the world's most advanced 2Tx closed-loop diversity (2T-CLD) algorithm, for significantly increased link budget, improved cell coverage, and superior mobile performance. 2T-CLD delivers diversity gains well beyond single Tx solutions and ensures the best diversity for any channel environment. These gains are achieved in a manner completely transparent to existing base stations.

FUTURE-PROOF WITH TRUE UPLINK MIMO

Sequans' 2Tx capability allows for the added performance gains provided by uplink MIMO via Matrix A for those base stations that support it. Only Sequans, as the only provider of 2Tx across its entire mobile station product line, can make this future-proof promise.

4G-EZ LOW POWER CONSUMPTION

In addition to the low power consumption enabled by its core 65nm architecture and *mimo*MAX technology, SQN1210 employs state-of-the-art power reduction

HIGHLIGHTS

- 65 nm, single die, baseband and RF
- Embedded network CPU for VoIP/data CPE and gateways
- 10x10 package
- Triple-band RF: 2.3-2.4, 2.5-2.7, 3.3-3.8 GHz
- Dual independent channels downlink and uplink
  - Maximum likelihood MIMO decoder on the downlink
  - 2 Tx with closed loop diversity on the uplink
- TDD and FDD
- 4G-EZ ultra low power consumption
- High throughput > 40 Mbps
- Mature, comprehensive, multi-platform software
- WiMAX Forum Certified™

SEQUANS' 4G-EZ TECHNOLOGY

Sequans' 4G-EZ™ is a collection of innovative 4G platform technologies that provide device manufacturers and operators with solutions for outstanding performance, ease-of-use, and ease-of-design, aimed at enabling truly mass-market 4G.

SEQUANS COMMUNICATIONS

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techniques—4G-EZ ultra low power technology—to further reduce power consumption. Special care has been put on minimizing power consumption in standby mode to further extend the battery life of embedded devices. Smart software algorithms optimize resource management for additional power reduction improvements.

HIGH THROUGHPUT

SQN1220 delivers maximum theoretical throughput and the full line rate in all configurations for a combined downlink/uplink throughput of more than 40 Mbps. The SQN1220 supports all categories H-ARQ.

TRIPLE-BAND RF

The SQN1220 supports all main international WiMAX bands: 2.3 to 2.4, 2.5 to 2.7 and 3.3 to 3.8 GHz.. Its advanced RF technology supports both TDD and FDD and features direct conversion architecture, on-chip calibration to remove DC offsets and optimize VCO performance, and on-chip digitally-controlled AGC for fast settling time.

FULL-FEATURED MAC LAYER

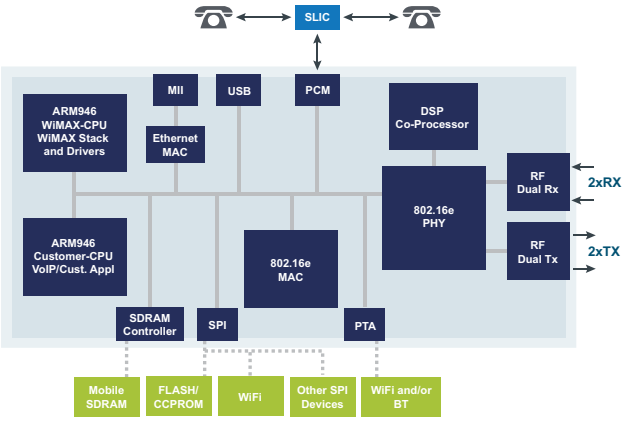
SQN1220's extremely efficient MAC implementation is strategically partitioned between hardware and software to maximize available throughput and reduce power consumption.

The software runs on an ARM processor, providing flexibility, while the MAC hardware acceleration greatly enhances system performance and throughput. Complete support for mobility is provided, including handover, sleep mode, and idle mode.

4G-EZ COMPREHENSIVE SOFTWARE SUITE

Sequans' comprehensive 4G-EZ software suite is based on seven years of Sequans' proven field experience. It is running in all major deployments around the world, making it the most mature software solution in the global WiMAX ecosystem. 4G-EZ software includes the entire 802.16e software stack and all drivers and host applications required for a complete WiMAX system. Host software includes a turnkey package for all major operating systems (including Android, Windows, Linux and Mac OS X), Sequans' own connection manager, a seamless 3G/4G handover implementation, a supplicant engine for EAP authentication, a standards-compliant OMA-DM client, and a field diagnostic tool. The 4G-EZ software suite also provides a full simulation and verification environment, which can be easily customized to address specific needs.

SQN1220 BLOCK DIAGRAM AND EXTERNAL INTERFACES



SEQUANS COMMUNICATIONS

4G Innovation

PRODUCT CHARACTERISTICS

THROUGHPUT

- 40 Mbps total DL + UL

TRIPLE-BAND RF

- 2.3 – 2.4 GHz
- 2.5 – 2.7 GHz
- 3.3 – 3.8 GHz

PHY

- S-OFDMA PHY
- Supports 2 Rx antennas and 2 Tx antennas
- DL MIMO: MRC, Matrix A + MRC, Matrix B
- UL MIMO: Matrix A
- Tx diversity: dual or single Tx with advanced closed loop diversity algorithm (2T-CLD)
- TDD with a configurable UL/DL split
- FDD
- Adaptive QPSK, 16QAM and 64QAM modulation
- Fast feedback channel
- H-ARQ (all categories)
- Fast scanning

MAC

- Layer-2 packet forwarding
- AES-CCM encryption
- PKMv2 privacy protocol
- Real-time services
- Concatenation, fragmentation, packing
- Automatic repeat request (ARQ)
- Payload header suppression (PHS)
- Advanced QoS features
- Optimized handover
- Sleep mode
- Idle mode

DATA INTERFACES

- MII
- SDIO
- USB 2.0 (with integrated PHY)
- USB HSIC*
- PCM

MEMORY INTERFACES

- SDR/DDR mobile SDRAM
- SPI flash/EEPROM

PACKAGING

- 10 x10x1.1 mm VFBGA package

**utilizes SMSC's Inter-Chip Connectivity™ technology*

SEQUANS COMMUNICATIONS

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