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

802.16e Release 1.0 Semiconductor Solution

THE HIGHEST LEVEL OF INTEGRATION IN THE WiMAX INDUSTRY

Based on state of the art 65 nm technology and five 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.

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.

LOW POWER CONSUMPTION

In addition to the low power consumption enabled by its core 65nm architecture and *mimo*MAX technology, SQN1220 employs state-of-the-art power reduction techniques to further reduce power consumption. Special care has been put on minimizing power consumption in standby mode to further

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 H-FDD
- Ultra-low power < 350 mW (fully loaded MIMO traffic)
- High throughput > 40 Mbps
- Mature, comprehensive, multi-platform software

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.

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SQN1220

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extend the battery life of embedded devices. Smart software algorithms optimize resource management for additional power reduction improvements. The SQN1220 consumes less than 350 mW of power with fully loaded MIMO traffic and less than 0.5 mW in standby.

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 H-ARQ up to CAT 4.

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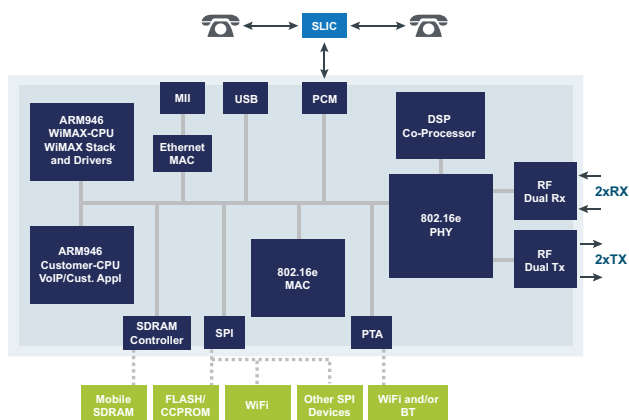
The software runs on an ARM processor, providing flexibility, while the MAC hardware acceleration greatly enhances system performance and throughput. Complete support for mobility is provided, including handover, sleep mode, and idle mode.

THE INDUSTRY'S MOST MATURE SOFTWARE PACKAGE - S³MAX™

Sequans' comprehensive software package, S³MAX, is based on five years of Sequans' proven field experience. It is running in all major deployments around the world, making it the most mature solution in the global WiMAX ecosystem. S³MAX includes the entire 802.16e software stack and all drivers and host applications required for a complete WiMAX system.

S³MAX also provides a full simulation and verification environment, which can be easily customized to address specific needs.

THE FOLLOWING FIGURE DEPICTS A TYPICAL ARCHITECTURE FOR SQN1210

PRODUCT CHARACTERISTICS

CHIP POWER CONSUMPTION
» < 350 mW in active mode (fully loaded MIMO traffic)
» < 0.5 mW in standby mode

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 with 512 and 1024-point FFT
» 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
» H-FDD
» Adaptive QPSK, 16QAM and 64QAM modulation
» Fast feedback channel
» H-ARQ (up to CAT4)
» 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

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