Most mobile backhaul networks have evolved into complex combinations of legacy voice-centric networks and new data-centric packet-switched IP networks. Stringent and varied deployments require flexible, scalable, and high-capacity modems that can support multiple bands, spectrum-efficient modulation rates, and LoS/non-LoS connections. Integrated granular traffic management, switching, packet processing, and QAM functionality have also become vital for meeting strict service-level agreements and efficiently rolling out new services that effectively monetize investments in wireless infrastructure.

Xilinx All Programmable FPGAs and SoCs and proven IP put wireless network designers a generation ahead. The industry-leading 28nm portfolio helps meet fast-changing market requirements with high-performance, low-power silicon and productivity-boosting design tools.

Design integration has become a top priority. Highly integrated Xilinx devices are letting designers implement more functions with fewer chips. As many as seven discreet devices can be replaced with a single Xilinx Zynq™-7000 All Programmable SoC. Xilinx 7 series FPGAs and SoCs are ideally suited for multi-gigabit wireless modem solutions. With on-chip packet-processing and traffic management functions, Xilinx All Programmable devices boost quality of service for converged data and voice traffic.
Applications

Point-to-Point Microwave

A 1024QAM modem core is a must have to meet stringent requirements for today’s wireless backhaul networks, where reliability, timing, and cost constraints are paramount. The Xilinx solution supports legacy interfaces such as multiple E1/T1 and SDH as well as Gigabit Ethernet. Data rates are scalable to 1Gbps in a single polarization and 2Gbps in dual-polarized mode. Enhanced phase noise tolerance enables BOM cost reduction and optimization for end equipment and exploits the benefits of higher-order modulations in field.

Supported features:

- Interface: Parallel I/Q baseband, complex or real interface
- Modulation: QPSK to 1024QAM
- Symbol rate: Software configurable 2-100 Msym/s with sub-MHz precision
- FCC and ETSI channels: Tested for spectral mask compliance
- Bandwidth: Software configurable 3.5 to 112MHz (Symbol rate* Rolloff)
- Automatic correction of Tx and Rx quadrature impairments in DSP
- Group delay equalizer: ± 600 ps to correct for analog filter imbalances
- Adaptive coding and modulation, with software-defined profile
- Closed-loop adaptive digital pre-distortion
- Reed-Solomon FEC, with configurable codeword length and payload amount
- Convolutional interleaver, with configurable depth
- Decision-directed equalizer
- DPLL module for synchronizing payload clock over link for SyncE and SDH/TDM
- Analog AGC control through 1-bit delta-sigma output
- No software required for DSP core run-time operation
- ATPC closed-loop support in hardware
- Dual-modem feature in a single FPGA with XPIC (affordable double data rate)
Next-Generation E-Band Modem

Upper millimeter wave bands are a good fit for small cell backhauling, where high capacity LoS links can be used for short-haul data transmission. The Xilinx eBand modem supports both point-to-point as well as point-to-multipoint communication modes and scales to 1 to 3 Gbps for single polarization.

Features:

- QPSK-256QAM modulation
- Up to 436 Msym/s in 500MHz channel bandwidth
- Software configurable CB: 50/100/125/150/250/375/500MHz
- I/Q baseband or real interface
- Rx analog AGC outputs
- Rx and Tx AFC outputs
- Tx and Rx imbalance correction
- Digital automatic frequency recovery
- Decision directed equalizer
- LDPC FEC
- Adaptive digital closed-loop pre-distortion
- Adaptive coding and modulation
- RGMII/SGMII GbE interfaces
- SyncE clock synchronization
- SPI interface for ATPC messaging between modem and RF microprocessor
- TDD and FDD

NEXT-GENERATION E-BAND MODEM
Packet Processing

The Xilinx packet processing solution consists of a modular Ethernet switch supporting multiple 1G or 10G ports, integrated packet processing and traffic management, quality of service, and OAM (IEEE 802.1ag and ITU Y.1731) functionality. This solution framework simplifies customization for meeting varied and diverse mobile backhaul requirements.

Scalable Devices for Functional Consolidation

For mobile backhaul equipment, Xilinx FPGAs and SoCs let designers choose the level of performance, power, and integration that matches the design requirements. The 28nm devices, design tools, IP, design services, and third-party ecosystem put designers a generation ahead, with capacity to build in higher capacity, more network intelligence, and traffic management. Xilinx modem and packet-processing solutions offer a choice of device:

- **Artix-7**: Ideal for low-bandwidth (740 DSP slices)
- **Kintex-7**: Higher performance (1920 DSP slices)
- **Zynq-7000**: Highest integration, SoC (4,000 DMIPS processor, up to 16 12.5 Gb/s GT)

On a single Xilinx Zynq-7000 All Programmable SoC, designers can implement the functionality that typically spans 2 modem chips (FPGAs, ASICs, or ASSPs), 2 PHY devices, 1 control plane processor, 1 Ethernet switch with integrated traffic management, and 1 timing and synchronization device.

Take the NEXT STEP

Visit [www.xilinx.com](http://www.xilinx.com) to learn more about the Xilinx wireless communications product portfolio and All Programmable FPGAs, 3D ICs, and SoCs.