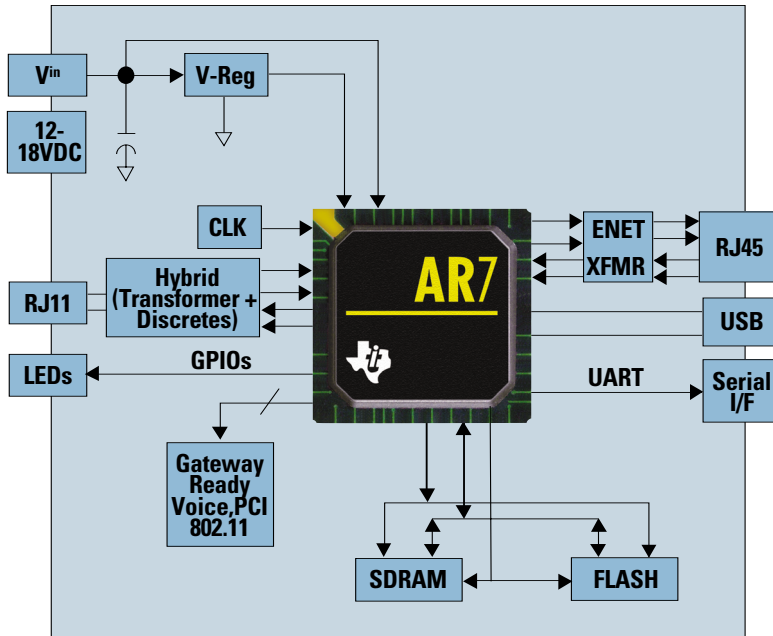


## Product Bulletin

# AR7 Family of Single-Chip ADSL Solutions



**AR7 configuration options include single-port Ethernet, 4-port Ethernet or wireless 802.11 router designs.**



The new AR7 Asymmetric Digital Subscriber Line (ADSL) solution

combines a high-performance communications processing engine with optimized routing software to provide unparalleled home networking performance in a single chip design. The AR7 provides manufacturers with unique flexibility and performance required to address the need for efficient delivery of enhanced broadband applications, content and services throughout home and small office networks. By utilizing AR7, original equipment manufacturers (OEMs) can develop ADSL products quickly and cost-efficiently, while adding their own

intellectual property for product differentiation. The AR7 is the first solution to support the new, higher performance standards, ADSL2 and ADSL2+, allowing OEMs to compete in markets demanding higher-bandwidth services.

The AR7 supports multiple designs whether the need is for a simple bridge/router, integrated access device (IAD) or residential gateway (RG). DSL products based on AR7 will allow consumers to network multiple PCs and wireless appliances and have increased access to entertainment and business services. TI's AR7 is better able to deliver these services with a faster, higher performance communications processor. With improved loop performance

**Key Features:**

- TurboDSL™ Packet Accelerator boosts multi-user network performance by 3X
- Dynamic Adaptive Equalization delivers 10% improved carrier service area coverage
- Code compatible with AR5
- Supports all ADSL standards including G.dmt (ITU 992.1) Annexes A, B, C, I, J, ANSI T1.413i2, G.lite (ITU 992.2), ADSL2 and ADSL2+
- Linux®-based software stack enables customer-specific value-added features and functions
- Full support of home networking interfaces enhances flexibility
- Passes DSL Forum TR-048 working with all commonly deployed DSLAMs
- 324 BGA package with 1.0-mm ball pitch eases product design and manufacturing

and increased DSL coverage, consumers will enjoy faster data rates at greater distances. In addition, TI's TurboDSL™ Packet Accelerator boosts multi-user downstream data rates by 3X.

### Complete Solutions for Greater Flexibility

The AR7 family of solutions comes with everything needed to start producing TI-based ADSL modems: a complete reference design kit, industry-leading software, drivers and a comprehensive maintenance and support package. Different reference designs are available demonstrating how the AR7 can be used in multiple configurations.

- The standalone Ethernet/USB single-port bridge/router kit features a complete hardware, software and support package that enables manufacturers to design cost-effective single-port ADSL solutions.
- The full-featured expandable Ethernet/USB/Wireless multiple-port router kit is capable of interfacing with other high-speed communications devices, such as a 4-port Ethernet switch and 802.11 a/b/g transceiver.

This full-featured reference design kit includes complete router software and Application Programming Interfaces (APIs) for value-added software enhancements.

The AR7 family is driven by TI's new single-chip communications processor, featuring an integrated MIPS-based™ 32-bit RISC processor, DSP-based digital transceiver, and ADSL analog front end (AFE). The AR7 solution merges the functionality of three chips into one, greatly reducing the bill of materials (BOM) required for OEMs and enabling a more cost-effective and easier to design solution. The communications processor provides 52% faster performance compared to TI's previous AR5 ADSL solution, boosting end-user performance.

TI's high-speed, low pin count VLYNQ™ interface provides a glueless connection to other high-speed devices, allowing the AR7 to connect to wireless, voice, security and other VLYNQ media devices. OEMs can add additional applications and functions using the VLYNQ interface to address changing market requirements. With the VLYNQ interface as well as AR7's other interfaces, the AR7 can be used in many different configurations, including:

- Single port bridge/router
- 4-port Ethernet router
- 802.11 wireless router
- USB2.0
- Voice over Protocol (VoP)

The AR7 includes integrated power management functions, reducing overall system cost and allowing simplified power control design. The integrated power management also allows better dying gasp performance and allows the central office to power down the modem when it is not transmitting, saving money and power.

### ***Extending TI's Technology***

The new family of AR7 products expands TI's widely deployed ADSL portfolio with the most advanced solutions targeted at the rapidly growing market for home and office DSL networking. The solutions combine TI's leading DSP and analog technology with premier networking software and systems expertise.

In addition, all TI ADSL products are pre-qualified in TI's world-class interoperability labs. They are also rigorously tested in local exchange carrier (LEC) labs and the field for interoperability with competitive solutions. The AR7 family leverages earlier generations of programmable ADSL PHY products that have been LEC-qualified for full-rate G.dmt and G.lite deployment in all major carrier networks.

The AR7 family supports all ADSL standards including G.992.1 (G.dmt) Annexes A, B, C, I, J, G.992.2 (G.lite) and ANSI T1.413 issue 2. When trained to a supported TI-based ATU-C, the AR7's capabilities extend to include ADSL2, ADSL2+, Extended-Reach ADSL and All Digital Loop ADSL technologies, which support higher downstream transmission rates.

### ***The Key to Home and Office Networking***

One key area of needed improvement in the home network is faster performance in multi-user environments. End users' slow performance can be especially noticeable in processing-intensive applications such as multi-player gaming. TI's TurboDSL boosts multi-user downstream performance by 3X with faster acknowledgements. TurboDSL increases packet throughput giving users a fast multi-player gaming experience.

TI's AR7 also increases the loop performance with technology that monitors line distortion created by bridge taps and other impairments and then adapts by matching the central office's (CO) transmit response resulting in a better data rate and greater distance. In addition, AR7 provides 10% improved carrier service area coverage by utilizing Dynamic Adaptive Equalization to achieve the most out of every tone under any condition.

Networking versatility comes from a variety of interfaces that provide connections to wired and wireless Ethernet bridging and routing, USB, MII and TI VLYNQ devices. TI's VLYNQ interface provides a seamless, high-speed interface to other TI devices, allowing for functions such as multi-port Ethernet switching, 802.11b bridging, voice applications, and VPN and IPSEC support. With a wide range of interface possibilities, the AR7 can provide for the media and applications needs of a home and small office.

### ***Software Platforms***

The AR7 includes a Network Support Package (NSP) that runs on Linux® and VxWorks®

operating systems and provides all needed network functions. The flexibility and ease of use provided by these industry-standard OS interfaces help make applications more portable, allowing developers to quickly address different market segments and manufacturer preferences. In addition, a Platform Support Package (PSP) is included which has the management Application Programming Interfaces (APIs), DSL and SAR drivers as well as documentation.

The NSP includes APIs and peripheral drivers merged with gateway, security and remote management features. In addition, the NSP includes applications such as web-based management, content filtering, and VPN support, which may be customized to include OEM-specific value-added features. The NSP includes all the necessary drivers, along with source code and documentation.

### ***Industry Leading Voice Solution***

For voice enabled applications, the AR7's architecture provides best-in-class routing performance for higher speech quality. Multi-channel ATM support is provided by a dedicated hardware function of Segmentation and Reassembly (SAR) with firmware Quality of Service (QoS) support.

The AR7 solutions include complete, unmatched software for voice that has been fully integrated and tested. The solution is based on Telogy Software™ products for low bit rate (LBR) delivery of toll-quality voice via packet transport.

### ***Support that Helps Customers Get to Market Quickly***

Success and short time-to-market are achieved through a collaborative engagement between TI and the customer's project teams. A comprehensive maintenance and support package is available and includes updates for the data pump, NSP/PSP, 802.11 and design support. With the maintenance package, an OEM will be able to keep their modem design operating at the highest level of performance possible. TI offers support at key development milestones such as hardware design review, hardware diagnostics check and initial on-site software/hardware integration. Additionally, TI will perform system interoperability and performance tests on customer end products.

TI's customized training course offers a thorough grounding in TI software functions and interfaces, including hands-on experience with TI's evaluation platforms. This instructor-led classroom/laboratory workshop is tailored to the needs of each customer and offers a private forum for getting questions answered. In addition, TI provides self-paced online training covering device selection, data flow and transmission, and architectural breakdown for AR7 components.

Customers have access to comprehensive product documentation, which includes product white papers, technical documentation, application notes and frequently asked questions. TI's world-class technical support team of experienced engineers possesses the knowledge required to understand, assess and help with resolving implementation challenges through a consultative relationship.

### ***TI Products for ADSL Systems***

The AR7 solution family is designed to interface seamlessly with other TI devices. To simplify voice designs, TI offers single and four-channel analog voice codec/filters that support true toll-quality voice. TI also makes available subscriber line interface circuits (SLIC) to complete the link to the phone.

Other TI solutions extend the functionality of the IAD/RG to home networking. TI's wireless 802.11b Ethernet solution features circuitry designed to minimize noise and distortion, doubling the effective data rate of the system.

In addition, TI offers optimized power management solutions for ADSL routers, IADs and RGs. Options include complete plug-in modules tailored for the AR7 solutions, as well as discrete power devices for flexibility.

### ***For More Information***

To learn more about the AR7 family of solutions and TI's other leadership DSL products, contact your local TI field sales office or visit [www.ti.com/AR7overview](http://www.ti.com/AR7overview)

## Hardware Features

- ADSL PHY subsystem based on TI C62x DSP, with integrated transceiver, codec, line driver, and line receiver
- Integrated high performance MIPS 32-Bit RISC processor
- Integrated IEEE 802.3 PHY
- Two IEEE 802.3 MACs with integrated Media Independent Interface (MII) and Quality of Service (QoS)
- Integrated USB 1.1 compliant transceiver
- Hardware accelerated ATM SAR
- Two VLYNQ interfaces for compatible high-speed expansion devices
- EJTAG, GIPO, UART, and FSER interfaces
- 324 BGA with 1.0-mm ball pitch
- Multiple reference designs for various applications

## Software Features

- RFC2684, PPPoA, and PPPoE Support
- ITU G.992.1 Annex A, B, C, G.992.2, ANSI T1.413i2, ADSL2, ADSL2+, ER-ADSL, and All Digital Loop DSL support
- NAT, DHCP, DNS relay, VPN, content filtering
- Security features including packet filtering, firewall, denial of service, and intrusion detection
- FTP, TFTP, Telnet, and web server based management
- Peripheral drivers, documentation, and source code

## TI Worldwide Technical Support

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