

POWERLINE Communications

Powerline communications uses the existing electrical wiring within a residence as a networking infrastructure and enables the digital home without the requirement for new wires. The HomePlug 1.0.1 specification is an industry standard for implementing powerline communications.

AC power wiring is a harsh environment for high-speed data communication. The random nature of the wiring connections results in mismatched impedances that cause significant amplitude and phase variations over frequency. In addition, the devices connected to this network (motors, lights, switches, etc.) along with external sources (amateur and citizens band radio) induce significant amounts of random noise into the network.



HomePlug technology overcomes these problems with a combination of physical and data link layer techniques. At the physical layer, an OFDM scheme with tone allocations, variable modulation techniques, FEC and bit interleaving is used to adapt to the specific characteristics of the link. The link layer adds error detection, an automatic repeat request process, and also provides quality of service (QoS) and security functions.

Powerline communications implemented using the HomePlug standard provides the convenience, easy setup and robust performance required for digital homes.



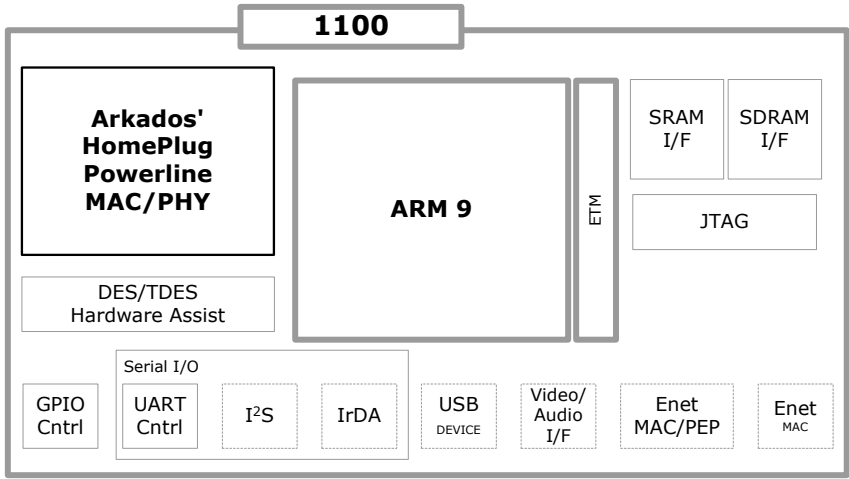
Arkados Total Integration Concept™ 1100 Series Processors

*highly-integrated HomePlug-compliant SoCs
for multimedia and data networking*

The Arkados ArkTIC family of HomePlug devices has been architected to minimize component count, solution cost and time to market for a wide variety of digital home applications. All of the functions required for any HomePlug node, including a 32-bit CPU core and a variety of communication interfaces, are included in a single device. The AI-1100, the first device available, will implement the HomePlug 1.0.1 powerline-networking standard with follow-on devices implementing HomePlug AV and HomePlug BPL when those specifications are finalized. The programmable nature of the Arkados implementation allows OEMs to extend the functionality of the HomePlug technology.

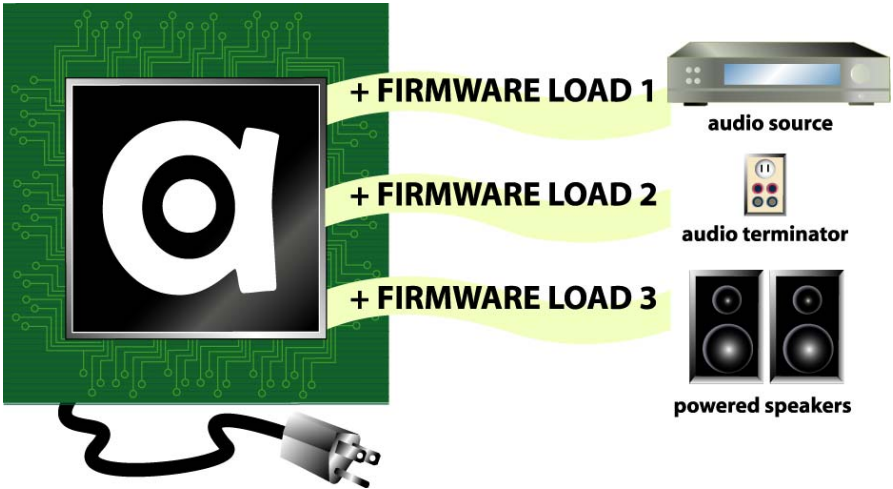
ArkTIC devices are bundled with application firmware to provide a fully functional solution. The software-driven implementation allows for customer defined modifications and extensions to the base applications. The current list of applications includes audio end points (source, terminal, streaming client, powered speaker), residential gateway (wired and wireless) and Ethernet bridge. A variety of audio transport protocols are being implemented, while VoIP terminal functions and security video are planned for the future. With the ratification of HomePlug AV, full-featured video and multi-channel audio will be available.

Figure 1: A block diagram of the 1100 Family of processors



Firmware Loads Define Vertical Applications

The built-in ARM9 processor allows applications to be run directly on-chip. Multiple vertical applications can be built by loading different firmware. This feature can broaden product offerings, and extend the product lifecycle.



Features

- HomePlug-Compliant Powerline Interface
 - Fully HomePlug compliant MAC/PHY
 - Arkados extensions for increased performance and future-proofing
 - Programmable MAC functions for full flexibility
- ARM926 Processor
 - 16k instruction cache & 4k data cache
 - Memory Management Unit
 - Embedded Trace Macrocell (ETM9)
- SDRAM Controller
 - Supports external parts up to 256Mb
- SRAM Controller/Expansion Bus Interface
 - Supports external boot Flash or external SRAM and acts as a general-purpose interface bus for external logic
- Ethernet controllers
 - Standard MII port (802.3u) - or - PHY Emulation Port (PEP) MII (emulates Ethernet PHY)
- Video/Audio DSP Interface
- USB Device
- Serial I/O Controllers
 - I²S for direct connection to audio DAC
 - IrDA
 - 16550d compatible UART
- GPIO Controller
- JTAG / Debug Interface
- 0.18µ CMOS, 1.8V core, 3.3v I/O

ArkTIC Applications

The rich set of I/O ports, and the powerful on-chip processor, allows the ArkTIC family of devices to be used in a wide variety of different applications, including

- Networked Digital Audio
- Whole-House PVR/DVR and IP TV
- Residential Gateway
- Wireless Access Point
- Multimedia router
- USB-to-powerline bridge
- Ethernet-to-powerline bridge
- Voice/data integrated devices

Arkados ArkTIC (PN: AI1100)
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