Setting the standards:
HomePlug Powerline Alliance

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A fabless semiconductor company focused on powerline communications semiconductors

- Offers an all-in-one highly-integrated ArkTIC platform for high-speed transmission of converged multimedia, voice, and data traffic over AC electrical wires
- Board of Directors Member and active contributor to the HomePlug Powerline Alliance
- A wholly-owned subsidiary of CDKnet.com (OTC BB: CDKN)
Standards Spur Growth

- **Proprietary technologies**
  - Typically exhibit good performance in one dimension
  - Confirm the feasibility (or the lack of it)
  - Develop subject matter expertise
  - Test the viability of a potential market through field trials and initial deployments

- **Standards based technologies**
  - Exhibit good performance in all dimensions
  - Typically superior in performance due to collaboration of a significant number of contributors
  - Available from multiple vendors
  - The competition pushes the envelope in all dimensions, price, performance, etc.
  - Interoperable products from multiple vendors accelerate the adoption and remove risks associated with a proprietary source
Setting the standards:
HomePlug Powerline Alliance
HomePlug Alliance Overview

- **March – June 2000:**
  - Alliance founded by 13 industry-leading companies
  - Specification development process is created
  - Baseline technology selected
- **June 2001:**
  - HomePlug 1.0 Specification released
- **February 2003:**
  - HomePlug AV effort is started
- **January 2004**
  - HomePlug BPL effort started
- **Today:**
  - HomePlug Command & Control MRD is completed
  - HomePlug 1.0 based products are sold worldwide
  - HomePlug AV Specification is in its final stages
  - HomePlug BPL MRD is completed, Baseline selected
- **Membership:**
  - Approximately 50 members strong
HomePlug Powerline Alliance

- The world’s only open alliance that develops compatible/interoperable specifications and certification programs for the full spectrum of powerline communication technologies:
  - HomePlug Command & Control
  - HomePlug 1.0
  - HomePlug AV
  - HomePlug BPL

- Strict Certification processes ensure multi-company product interoperability
The Vision: All Together Now

Services

HomePlug BPL

HomePlug AV, 1.0, C&C

Medium Voltage lines

High voltage transmission lines

Transformer

Low voltage lines

Power plant

Power substation

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Benefits of Using HomePlug Technologies

- High number of convenient outlets
- Specifically designed for low- to high-bandwidth applications
  - Reliable bandwidth
  - Whole house coverage
  - Robust QoS with tight control of latency and jitter
- Cost competitive with other Networking- and AV-class solutions
- Created through HomePlug’s proven multi-company standards setting process
- Backed by multiple vendors
- Compatible and interoperable technologies (HomePlug 1.0/AV/BPL)
Specification Status

- **HomePlug 1.0**
  - The only globally recognized industry-standard multi-vendor specification for high-speed powerline networking
  - Millions of products sold on six continents
  - “Toaster-easy” to install

- **HomePlug AV**
  - Specification nearing finalization

- **HomePlug BPL**
  - MRD completed with contributions from all members of value chain: service providers, utility companies, technology companies
  - Baseline selected (HomePlug AV)

- **HomePlug Command & Control**
  - MRD Published
  - Proponents currently submitting for technology bake-off
HomePlug 1.0
HomePlug Products

- Millions of HomePlug products have shipped throughout North America, Europe, and Asia.

  - Certified Products:
    - Routers, Bridges, Adapters
    - Wireless Access Points
    - Audio Endpoints and Speakers
    - VoIP Phones
    - Security Cameras
    - PCs with HomePlug Built-in
HomePlug Products

- Millions of HomePlug products have shipped throughout North America, Europe, and Asia.

- Cable modem installation using Netgear ETH adapters
- DSL modem installation using BellSouth ETH adapters
- WiFi extension using BellSouth ETH adapters (mail out)
- Remote room home networking using Linksys ETH adapters
- Remote room home networking for desktops using Netgear ETH adapters
- Remote room home networking using Linksys ETH adapters (Internet broadband configurator)
- WiMax antenna positioning and VoIP modem installation using Clearwire ETH adapters
- DSL modem installation using Sagem ETH adapters
HomePlug Enabled Companies
Recent Announcements

- Cable Labs issues RFP for HomePlug-enabled cable gateways
- Packard Bell introduces HomePlug-enabled desktop PCs and Media TV for European market
- Radio Shack launches HomePlug-enabled audio player and speakers
- Devolo introduces HomePlug-enabled ADSL modem for European market
- Comcast, Bell South, Cox, America On-Line, Earthlink, and France Telecom begin deploying HomePlug adapters for broadband installations
HomePlug AV
Video Content is Driving the Trend

- **VOIP**
  - 64 kbps

- **Stereo CD Audio**
  - 1.5 Mbps

- **HDTV**
  - 19-24 Mbps

- **Web Access**
  - 0.5-5 Mbps

- **Std Def TV**
  - 3-6 Mbps

- **TV Shows**

- **Live Events**

- **Content on Demand**

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Music | TV Shows | Live Events | Content on Demand
HomePlug AV Applications

- **HomePlug AV adds value as a primary or complementary connectivity technology**
  - Sole solution for whole house distribution of AV content
  - Backbone for wireless (802.11x and UWB)
  - Part of a hybrid network
    - Extension of MoCA or Ethernet to areas without wired outlets
    - Wireline network for fixed devices, leaving wireless network free for mobile devices

- **HomePlug AV extends proven performance of HomePlug 1.0 to AV-class bandwidth applications**
  - SD and HD video (including IPTV)
  - Digital video
  - Higher speed Internet sharing (ADSL2/2+ and VDSL)
  - Higher speed in-home and commercial networks
HomePlug AV Features

- 200-Mbps class networking
- Robust, near-capacity Physical Layer for reliable communications over noisy power line channels
- Highly-efficient MAC layer
- TDMA and CSMA based access with AC line cycle synchronization
- Quality of Service (QoS) guarantees
  - guaranteed bandwidth reservation
  - tight control of latency and jitter
  - high reliability
- Advanced Network Management functions and facilities capable of supporting plug-and-play, user and service provider set-up and configuration
- Tight security based on 128-bit AES
- Backward compatibility with HomePlug 1.0
- Co-existence modes enabling Broadband over Powerline (BPL) co-existence, multi-network operation and hidden node service
HomePlug AV Status

- Integrated technology components from several companies
- Technology components have already been tested in real-world environments
- Fully-licensable
  - Designed to enable multiple IC vendors
  - Technology contributors and SWG participants participate in an IP licensing pool
- Specification (currently over 300 pages) contains the detail required for vendors to bring AV ICs to market quickly
- All interested companies are invited to contribute
- SWG process underway to complete specification process by June
AV System Overview
Physical Layer Highlights

- **Windowed OFDM** – 917 usable carriers
  - 1.8 – 30 MHz frequency band
- **Channel Interleaver, Turbo Convolution Code, Data Scrambler**
- **Robo Mode**
  - Broadcast communications, 5 & 10 Mbps
- **Bit Loaded Payload Mode**
  - 200 Mbps channel rate / 150 Mbps information rate
  - Tone Maps – synchronized with the AC line cycle
- **Point-to-point Channel Adaptation**
  - Modulation density BPSK to 1024-QAM per tone
  - FEC Rate
  - Multiple Cyclic Prefix Lengths
- **Power Line Cycle Adaptation**
  - Allows adaptation to time-variant line cycle noise
AV Medium Access Control

- TDMA channel access with Contention-Free and Contention-Based (CSMA/CA) periods
- Beacon-based design
- BSS architecture with Central Coordinator (CCo)
  - Authentication of new stations joining the BSS
  - Association of new stations joining the BSS
  - AC line cycle synchronized Beacon Generation
  - Admission control for CF sessions
  - Scheduling CF and CSMA allocations during each Beacon period
- Highly efficient
  - Efficiently supports simultaneous VoIP and HDTV traffic
QoS Control

- **Extensive control to provide QoS through Convergence Layer**
  - Interfaces through Ethernet Service Access Point (SAP) to higher layers
  - Control SAP allows tight application control for explicitly establishing connections for traffic requiring QoS.

- **Packet Classifier**
  - Inspects incoming traffic from Ethernet SAP
  - Identifies traffic as belonging to established connections, or not
  - Inspects payload for connection identifying information such as a TCP header

- **Auto Connect**
  - Used to autonomously establish connections for traffic
  - Uses classifier and traffic profiling to identify QoS streams.
Interoperability and Coexistence Features

- **HomePlug v1.0**
  - Preamble similar to HomePlug 1.0
  - HomePlug 1.0 coexistence mode adds 1.0 Frame Control
  - Provided through CSMA period which uses 1.0 channel access
  - AV devices can also interoperate

- **Access BPL**
  - HomePlug BPL baseline is natively interoperable
  - Highly efficient coexistence through TDM or through FDM
  - Fully flexible sharing in time
  - Access and in-home networks can negotiate any slice of time within frame
  - Provides for maximum spectral diversity
  - Proprietary BPL co-existence using 1.0 TDM or FDM mechanisms

- **Neighbor Networks**
  - Allows for cooperation between neighboring networks to avoid interference
HomePlug Alliance: Created to Lead

- Brings together some of the PLC industry’s top technical engineers
- Already enabled successful powerline products around the world in an organized and timely manner
- Developed relationships with leading industry alliances, standards organizations, and regulatory organizations
- Natural fit for any near-term standardization efforts in the powerline space
- World’s only organization that certifies interoperability of high-speed powerline products from multiple vendors
June 16 & 17: SAVE THE DATE!

- Get all the latest information on HOMEPLUG AV -- the world’s only industry-standard 200 mbps powerline communications technology
- Network with Industry Leaders in Powerline Communications
- Meet and learn from analysts, venture capitalists, market specialists, and business leaders

HOMEPLUG™ Powerline Technology Conference
The Palms Hotel, Miami Florida
June 16-17, 2005
Thank You!

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