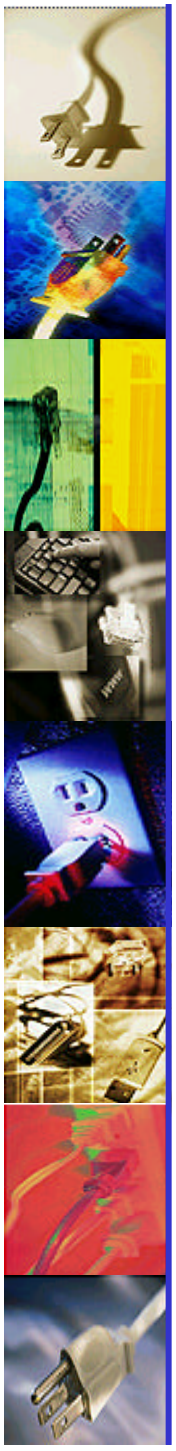
HomePlug Powerline Alliance

Enabling the Connected Home

Rev. 3.0

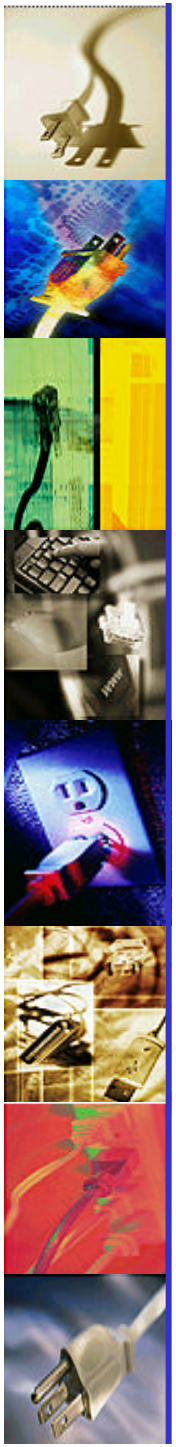
An Introduction



Who Are We?

HomePlug Powerline Alliance, Inc. is:

- **A nonprofit corporation**
- **Established to provide a forum for the creation of open specification for home powerline networking products and services**
- **Created to accelerate demand for these products and services through the sponsorship of market and user education programs**



Who's Behind HomePlug?

HomePlug Powerline Alliance

Founding members include:

3com

SONICblue

Cisco Systems
Empowering the Internet Generation

COMPAQ

CONEXANT

Enikia

intel

Intellon
No New Wires.

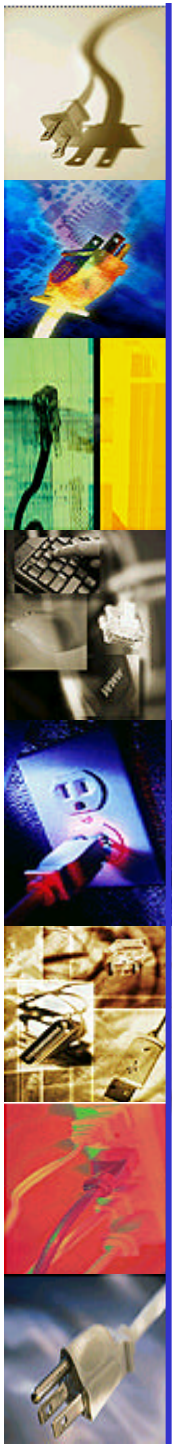
MOTOROLA

Panasonic

AMD

RadioShack Corporation

Texas Instruments



What the Members Bring

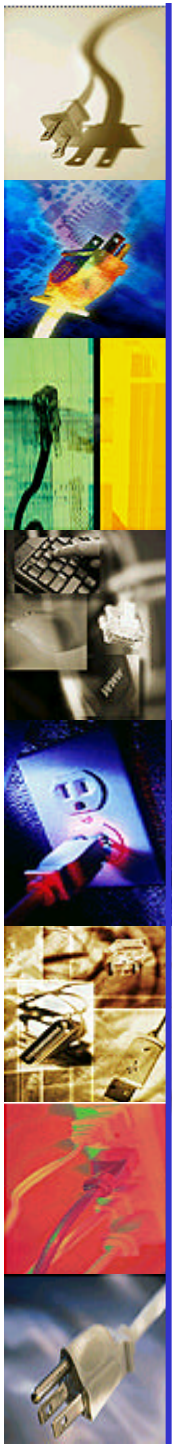
- **Perspectives representing all aspects of home networking, including:**
  - Services & Content
  - Retail
  - Hardware & Software
  - Semiconductors
  - Technology
- **Core capabilities and financial/time commitment to develop, launch and market powerline technology**
- **Membership includes 80 industry leading companies that are shaping the future of home powerline networking technology**

HomePlug Membership

3Com Corporation
3R
Adaptive Networks
AES Corporation
Alcatel
Alliant Energy
Ameren Corporation
American Power Conversion
Analog Devices
Ascom Powerline Comm. AG
Bose Corporation
Broadcom Corporation
Cinergy Corporation
Cirrus Logic
Cisco
Cogency Semiconductor
Compaq
Conexant Systems
Consolidated Edison
Core Technology
CYGNAL Integrated
DATASOFT ISDN Systems
Digigram SA
Digital 5
DS2
Efficient Networks
EMTAC Technology
Enikia
Ericsson
ESS Technology
Excelsus Technologies
Farallon Communications
France Telecom
Fujitsu Limited
Hawaiian Electric Company
Hewlett Packard
HomeConnect LLC
ILEVO AB
Intel Corporation
Intellon Corporation
Invensys Network Systems
iReady Corporation
ITRAN Communications
Keyin Telecom
LG Electronics
Linksys
M@in.net Communications
Montana-Dakota Utilities
Motorola
NETGEAR
Nokia Networks OY
nSine

80 members
(as of 2/2001)

Oneline AG
Panasonic Technologies
PG&E Corporation
Philips Power Management
Phonex Broadband Corp.
PolyTrax Information
Portal Player, Inc.
Potomoc Electric Power Company
ProSyst
Pulse Specialty Components
RadioShack
Rainmaker Technologies
Sanyo Electric Company
Scenix Semiconductor
ShareGate
Sharp Laboratories of America
Siemens AG
Sohoware
SONICblue
Tality UK Limited
Tamura
TECO Energy
Telewise Communications
Telkonet
Terayon Communications Systems
Texas Instruments
Valence Semiconductor
Xilinx



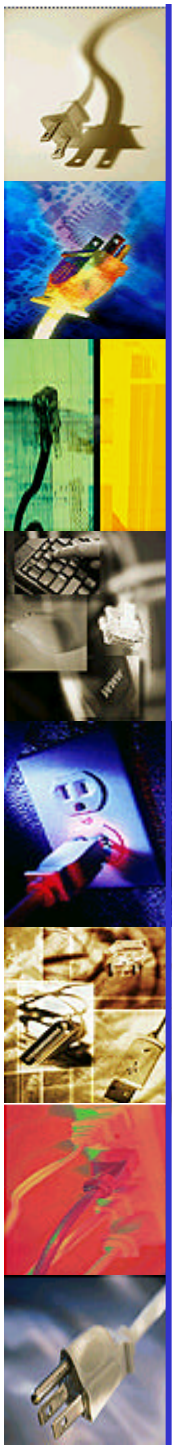
Our Beliefs

Our Vision:

To deliver Internet and multimedia from every home power outlet and enable the connected home through worldwide home powerline networking standards

Our Mission:

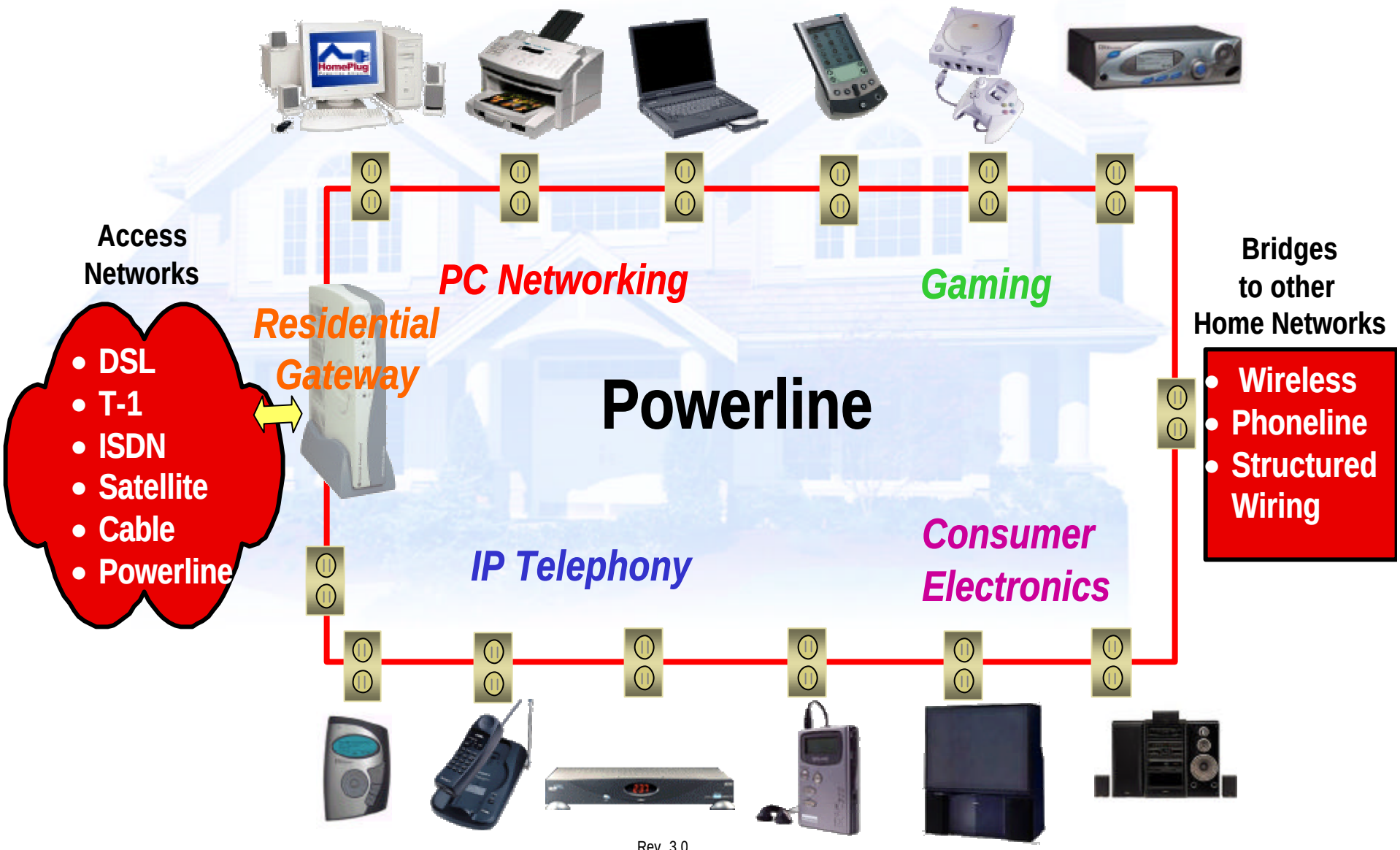
To enable and promote rapid availability, adoption and implementation of cost-effective, interoperable and standards-based home powerline networks and products



A Glimpse at the Future

The Connected Home

HomePlug's Connected Home



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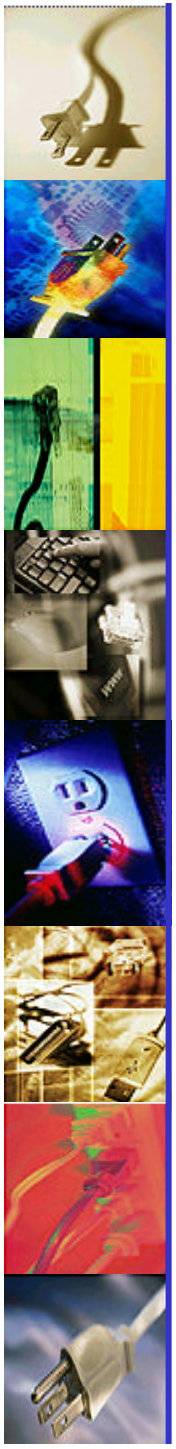
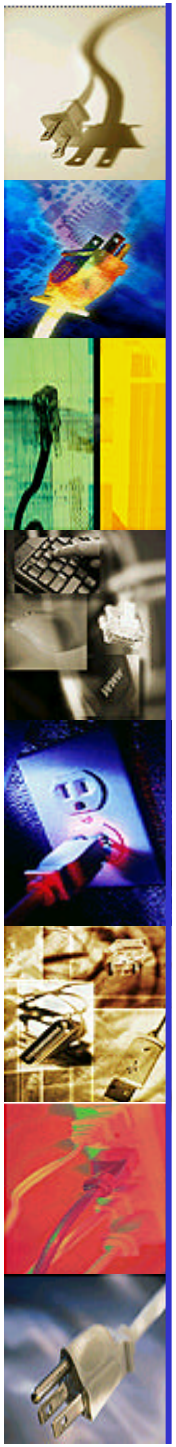


HomePlug Direction

- HomePlug is committed to the successful deployment of powerline communications technologies for both home networking and access applications.

- The HomePlug 1.0 specification is targeted at the home networking application, and HomePlug is pursuing a Frequency Division compatibility mode, in which the HomePlug equipment does not use spectrum needed by access equipment.

- HomePlug is committed to working closely with global standards bodies to ensure that access and home networking technologies do not interfere with each other.

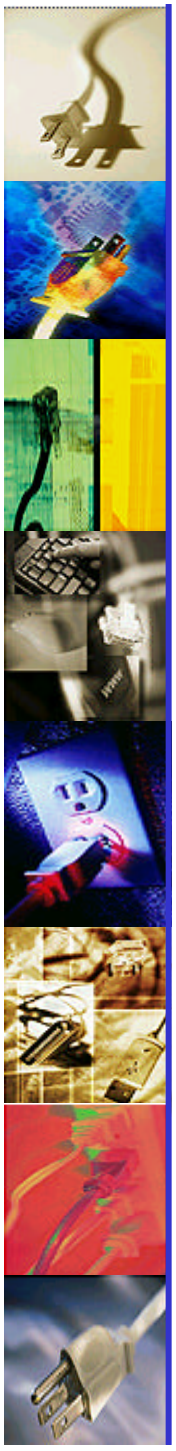


Powerline benefits for the Connected Home

HomePlug Powerline Alliance

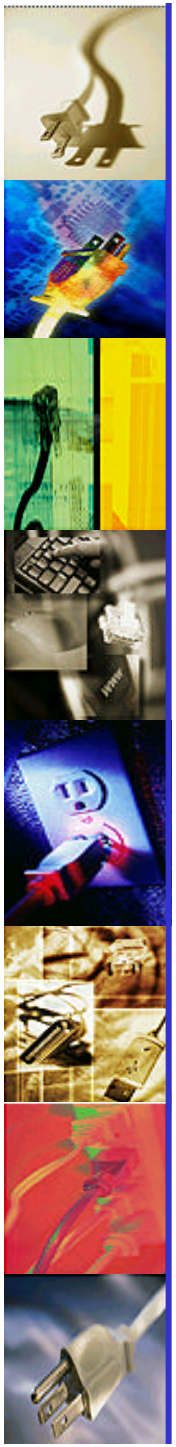
Powerline technology is:

- **The most pervasive medium – multiple outlets in every room**
- **Cost effective**
- **Available worldwide**
- **Easy to adopt by consumers**
- **Easy to install**
- **Utilizes existing power source for communications**



Today's Opportunity

Why Powerline Technology, Why Now



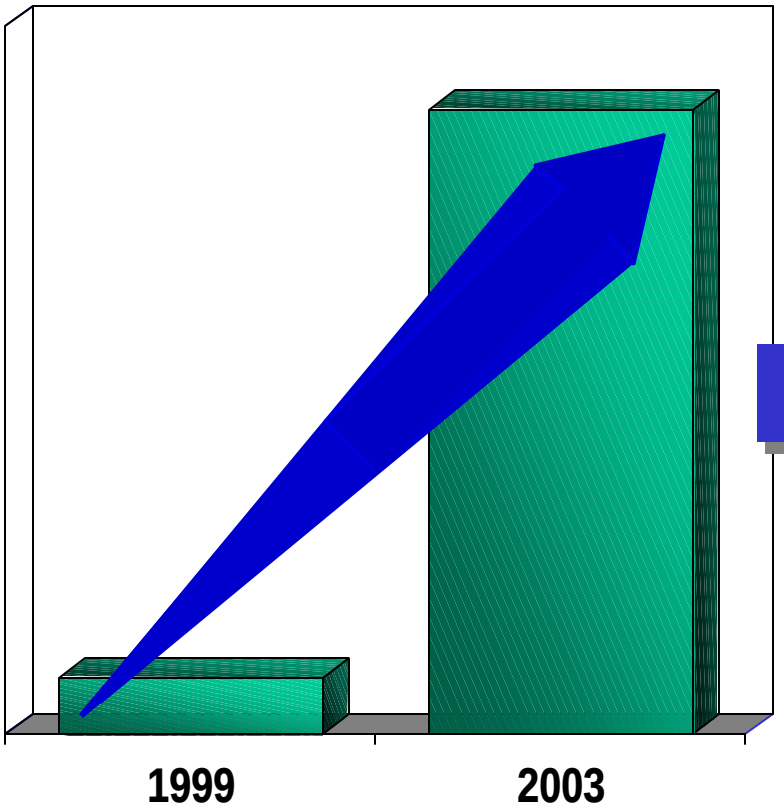
Driving Market Trends

Accelerating market acceptance of home networking:

- **Exploding Internet usage**
- **Increasing broadband penetration as service costs decline and ease of installation improves**
- **Development of new Internet devices and smart appliances driving the standardization of home networking**
- **Growing number of multiple-PC homes**

The Proliferation of Applications

The explosive growth of broadband subscribers is creating a surge of high-bandwidth applications



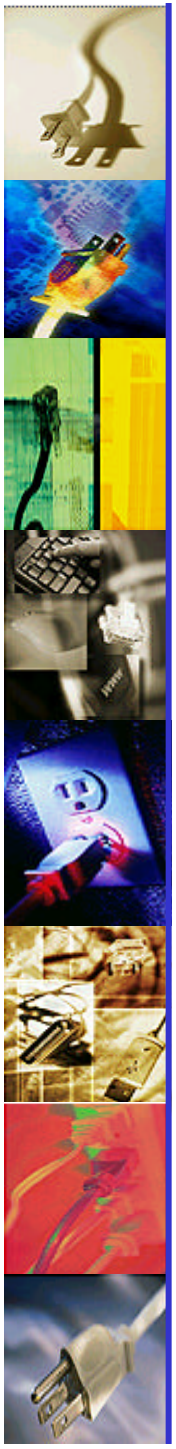
- Internet Connection Sharing
- Streaming Video
- Interactive Gaming
- E-Commerce
- Internet Telephony
- Digital Imaging
- Streaming Audio
- Interactive Entertainment

Historical Powerline Challenges

Overcoming Historical Powerline Challenges

Challenge:	Solution:
• **Immature technologies** – Low speeds and attenuation – Interference issues	• **Mature technologies/Internet capability** – Ethernet class speeds achievable – Reliability – New algorithms – Silicon improvement
• **Lack of consumer adoption**	• **Consumer market need** – Smart appliances
• **Lack of standards**	• **Standards-driven**
• **Regulatory issues**	• **FCC approval**

HomePlug Status



HomePlug Goals & Objectives

Make Home Powerline Networking a Reality

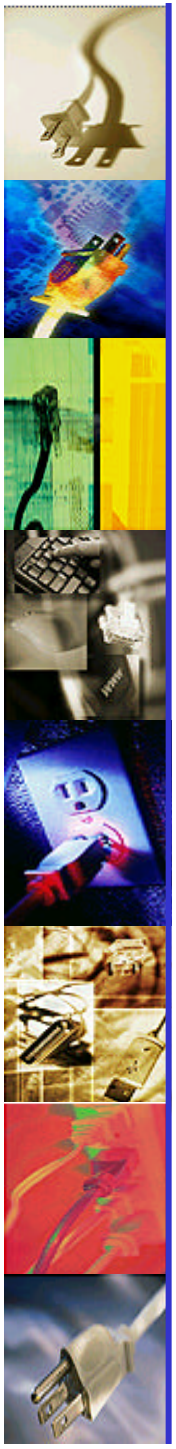
- Selected baseline technology for Ethernet-class home powerline networking v1.0 specification in May 2000
- Finalized full draft specification in December 2000

Drive Adoption of Home Powerline Networking Specification

- Publish Ethernet-class home powerline networking v1.0 specification in 2001
- Promote worldwide industry leader membership in the Alliance

Enable Rapid Implementation of Interoperable, Cost Effective Home Powerline Networking Products

- Make available to consumers HomePlug compliant products and powerline Internet devices and smart appliances in 2001



HomePlug Activities

Marketing Requirements Document

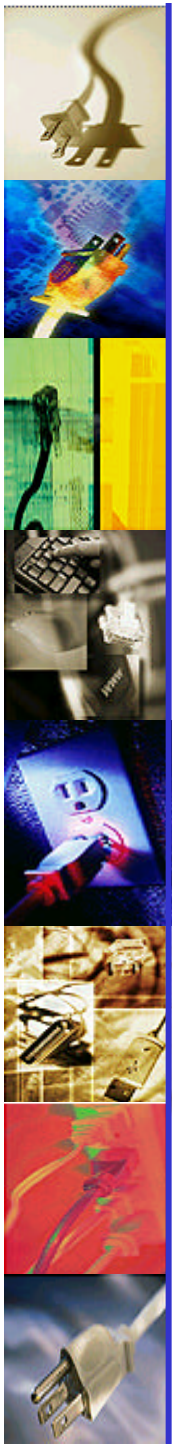
- Finalized the MRD that includes:
  - Ethernet-class, QoS, Latency, Reliability, Coverage, Coexistence, Maturity
  - For PC, Gaming, IP Telephony and CE applications (IP & Multimedia)

Formed the TWG (Sponsors & Participants)

- Created the RFP (Request for Proposal) process, evaluation matrix, proposal outline
- Created the Field Test Plan
- Created the Lab Test Plan (almost 100 pages document ~30 different tests)
- Planned the logistic & staffing for the Technology Evaluation Phase

Invited Technology Proponents

- Surveyed WW market for powerline technology Proponents
  - Identified & invited almost 20 Proponents to participate in HomePlug Bake Off
  - 10 responded

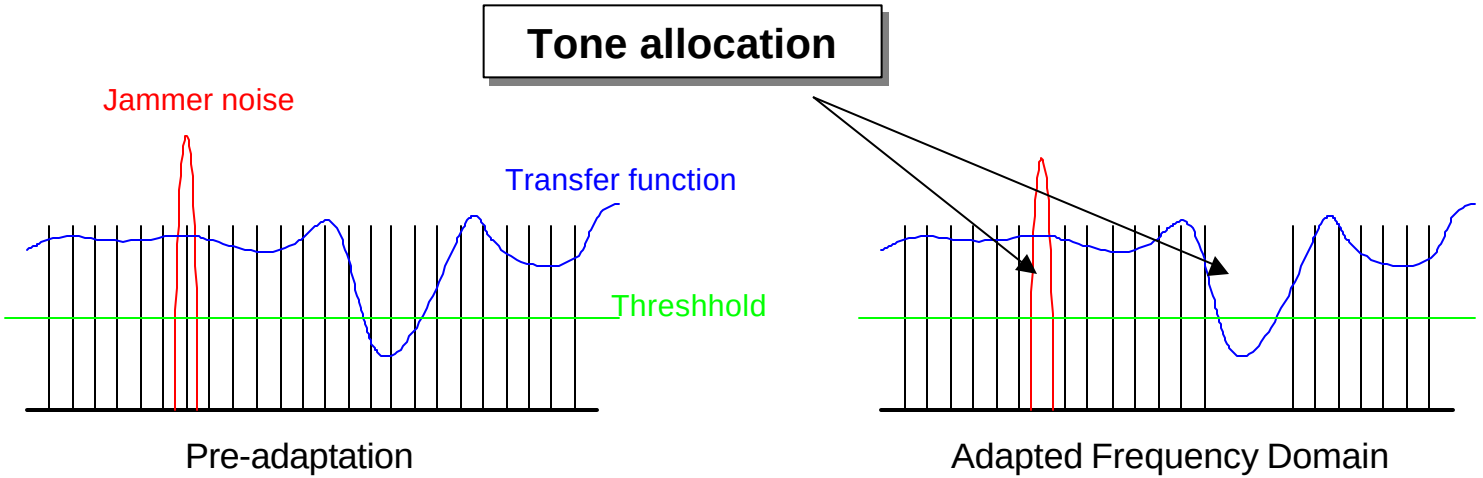


HomePlug Baseline Technology

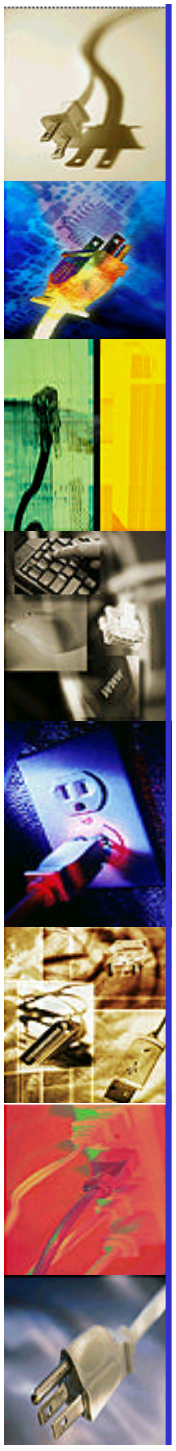
OFDM PHY and CSMA/CA MAC

- OFDM first theorized in the 1960's
- OFDM divides the available spectrum into many narrow-band carriers
  - Similar to xDSL
  - Used in consumer audio and video applications (DVB & DAB)
  - Selected by IEEE 802.11 wireless LAN committee
- Each carrier can support several modulation formats
  - ROBO BPSK QPSK QAM
- Achieves synchronization in harsh environments
- Tone allocation dynamically avoids unusable band segments
- Works with in-band jammers and interference
- Supports broadcast transmissions
- Excellent co-channel interference performance
- No channel equalization required
- No clock synchronization required

HomePlug Baseline Technology

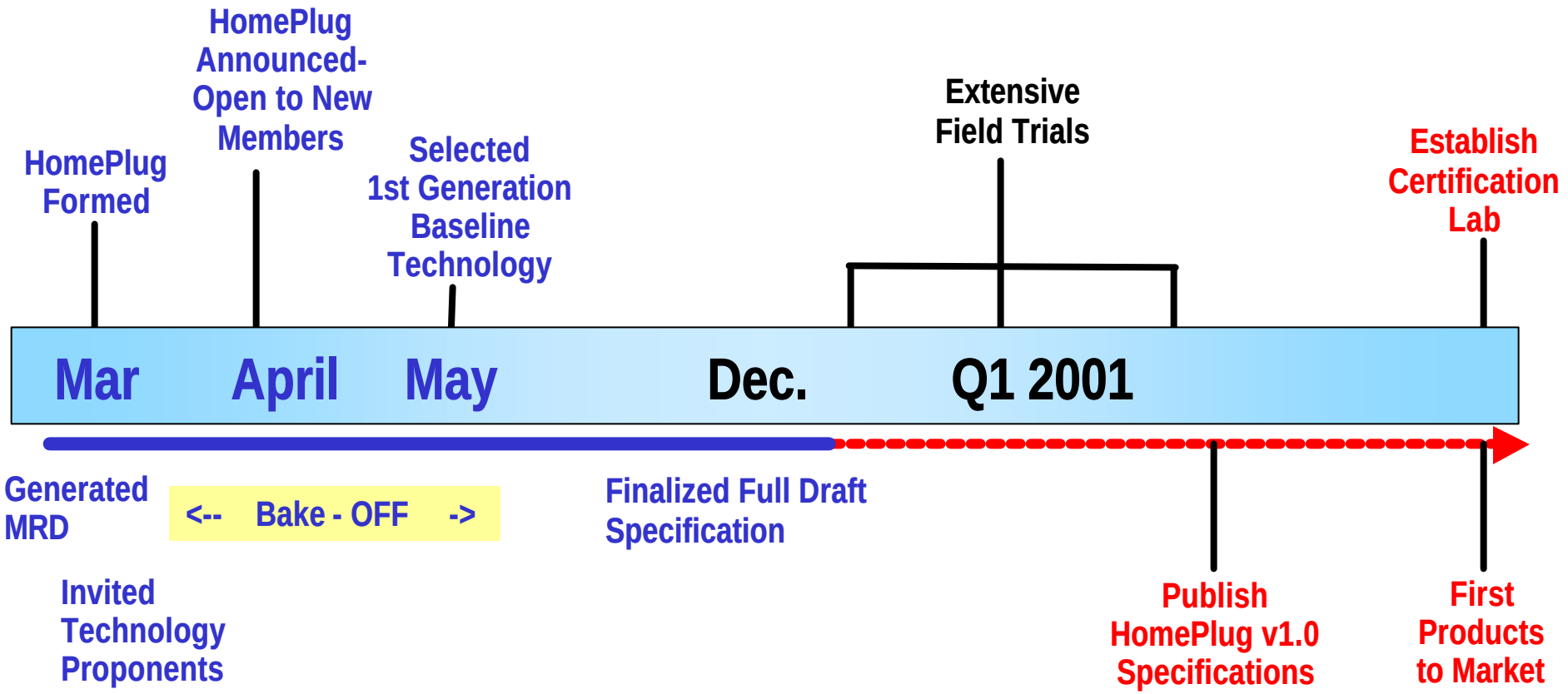


- Synchronizes in the presence of noise and jammers
- Adapts to channel characteristics (avoids unusable channels)
- Optimizes use of Signal to Noise Ratio
- Reserves Forward Error Correcting power for noise hits
- Frequencies can be masked to meet diverse regulatory requirements



Next Steps & Future Milestones

Activity Timeline & Future Milestones



= DONE

= TBD

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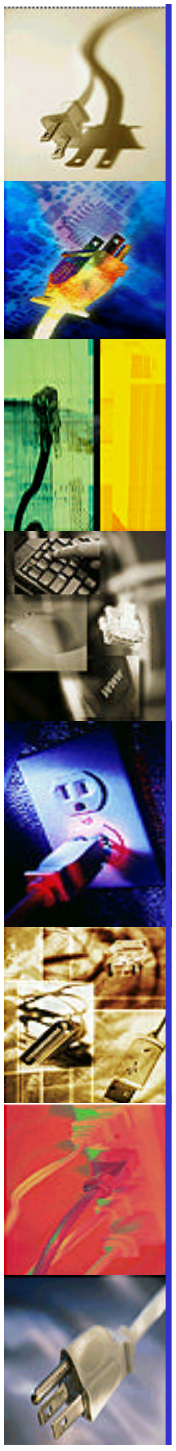
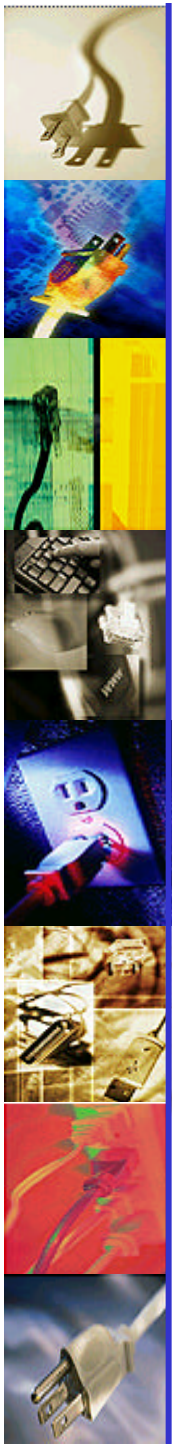


Next Steps

- **Complete Extensive Field Trials**
  - **500 homes worldwide**
  - **To be executed in beginning Q1 2001**
- **Finalize Specification**
  - **Work already in progress**
  - **Final specification to be published following completion of field trials**
- **Certification**
  - **Work already in progress**
  - **Certification Lab should be operational in 2001**



Summary

HomePlug Powerline Alliance

Industry leaders working together to:

- Create open specification for home powerline networking products and services
- Accelerate the demand for these products and services through market and user education programs

Enikia · Motorola · Conexant · 3Com · Cisco Systems · AMD · Intel · SONICblue · Compaq · Intellon · Panasonic · Texas Instruments · RadioShack