Introducing
Phonelines Home Networking

The Home Networking Challenge

- Creating a technology that can deliver high-speed networking in the home is a challenging task
  - Commercial networks are designed from the ground up to minimize noise & interference
    - High-speed, corporate networks typically use fiber optic, twisted pair, or coaxial cables that are dedicated for a single use
    - Manufacturers are free to design commercial network products for reliable, noise-free environments
  - Most homes do not have dedicated high-speed network wiring
    - Cost & labor required to install such wiring is high for homeowners & small business owners to fund

Home Networking Requirements

- Consumers prefer home networks that
  - Use the existing wiring infrastructure
  - Are easy to install
  - Leverage existing standards
  - Work together with common OS and software platforms
- Home networks must implement a QoS mechanism
  - Quality of service provides low latency for telephony, and streaming audio & video applications
- Home networks should be very robust and provide connectivity to essentially every home

Home Networking Requirements

- Home networks should support data rates in excess of 10Base-T Ethernet
  - Provide scalability to 100Mbps
  - Compatible with earlier generations and be future safe
    - Employ scalable & extensible designs to prevent “fork-lift” replacements when upgrading networks in the future
- They must provide reasonable privacy at the physical layer
- Home networks must be implementable at low cost with a wide variety of products

Phoneline Home Networking

- Networking information appliances in the homes using existing phone lines infrastructure
  - Using existing phone lines and regular phone jacks to connect consumer devices such as PCs, digital TVs, DVD/MP3/CD players to each other and to the Internet
  - Exchange of data, voice and video between appliances using phone lines

Are Phonelines A Natural Solution for Home Networking?

- Yes
  - Phonelines meet most of the HN requirements
    - Uses pre-existing home telephone wiring to transmit data
  - Phonelines HN is promoted aggressively by the home phoneline networking alliance (HomePNA)
    - 115+ members
    - Endorsed by top OEMs for different industries
      - PC manufacturers sell phoneline home networks as add-on with PCs
  - Technology can be easily integrated into silicon

Are Phonelines A Natural Solution for Home Networking?

- But
  - Home phonelines were not designed for high speed data transmission between multiple appliances
  - Phone jacks are not ubiquitous in every home worldwide
    - Technology could lose momentum when it attempts to move beyond the US
      - While US households tend to have multiple phone jacks, other countries are often limited to one or two phone jacks per home
  - Homes with multiple phone lines are limited to confining the network to one phoneline

Issues

- Random wiring topologies & signal attenuation
  - Telephone wiring structure within each home is different
  - Home phoneline wiring system is a random “tree” topology
    - It is not a hub structure similar to business networks
    - Simply plugging in the phone or disconnecting the fax changes the tree
    - This topology can cause signal attenuation
      - Open plugs & unterminated devices can cause impedance mismatches, signal echoes & lead to multi-path signals
- Signal noise
  - Appliances, heaters, air conditioners, consumer appliances & telephones can introduce signal noise onto the phone wires

Issues

- Changing transmission line characteristics
  - Network must be able to function reliably despite changes resulting from someone picking up the phone or receiving a fax, or an answering machine recording a message
- Coexistence with other phone line equipment & compliance with FCC regulation
  - Must use signals with low power levels
    - Further complicates the task of establishing adequate signal-to-noise ratio
  - Must work without interrupting existing phone services
- Performance
  - High reliability at speeds of at least 1Mbps

Phoneline Market Outlook

- Huge short-term and long-term growth outlook for phoneline home networking*
  - In 2000, phoneline-based home networks will account for 34% of the installed base
  - By 2004, proportion will grow to 72% of total HN market's installed base
    - Widespread PC OEM support & multiple aftermarket solutions
    - HomePNA is the de facto phoneline networking standard
    - Widespread educational marketing campaign will gain marketing acceptance for the technology

* Source: IDC