



## Energy Management in Intelligent LonWorks® Homes

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# Energy Management in Homes

- Managing energy to
  - Monitor consumption
  - Reduce consumption
  - Optimise consumption patterns
- What can be managed
  - White goods
  - Air conditioning
  - Other appliances (heaters, kitchen appliances, etc)
  - Lights (indoor, architectural, landscaping)
  - Audio/video

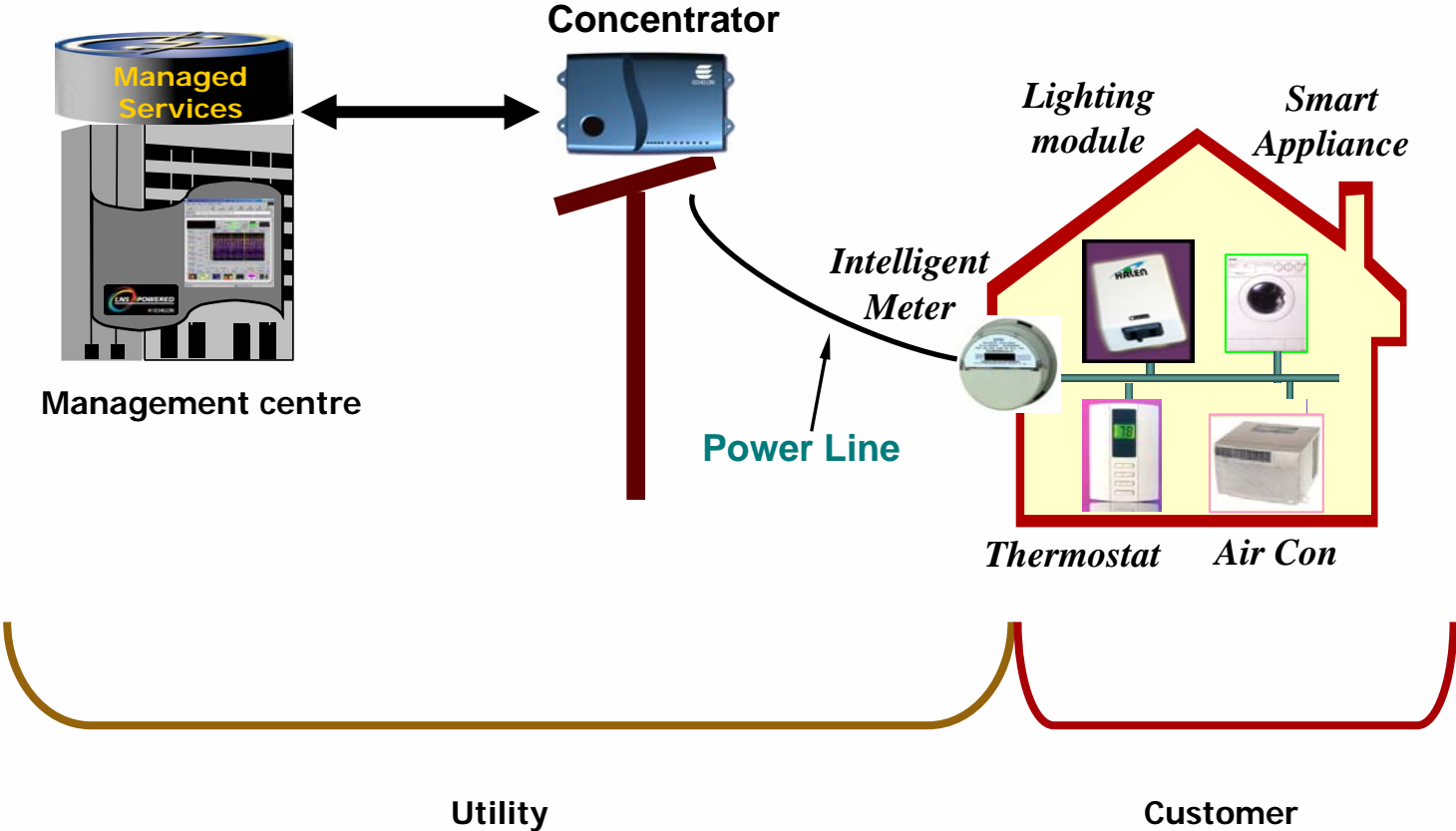
# Driving Factors

- Consumers' desire to save money
- Compliance with international pollution treaties (Kyoto protocol and EU initiatives)



- Utility goals to influence demand and align it with supply
- Corporate goals to create more "green" products

# Two Parties in Home Energy Management



# Utilities

- Economic benefits
  - Better and more predictable energy usage patterns
    - Total energy distributed in predictable patterns
    - Fewer peaks
    - More targeted grid maintenance and improvement
  - Expedient energy floor
    - Almost real-time trending of energy used
    - Much more effective energy trading
  - Better operations in open market competition
- Environmental benefits
  - Lower energy consumption enables faster adoption of renewable energy sources



# Customers

- Economic benefits
  - Less energy consumed
    - Smaller bills
  - No peaks and predictable usage pattern
    - Cheaper energy
- Service benefits
  - Better contracts
    - TOD tariffs
    - Customised kWh limit
  - Load shifting
    - Smart appliances never exceed max energy allowed



# Two Approaches to Energy Management

- Household scale
  - Intelligent appliances
    - Intelligent on/off controls
    - Limited local load shifting
  - Intelligent switches and sensors (light, motion)
    - Home lights regulation
- National scale
  - Intelligent appliances
    - Automatically take advantage of TOD tariffs
    - Make energy consumption predictable
  - Meters
    - Intelligent (share information with electric appliances for more effective load shedding/shifting)
    - Communicating (report consumption pattern to the utilities)



# Household Energy Management

- Automatic and built into the system
  - Lights turn themselves off when nobody in the room
  - Washing machine ask other appliances if ok to run
  - Refrigerator temporarily switches off automatic defrost feature to reduce the load
  - House automatically reacts to changes in energy pricing

→ needs intelligent systems and appliances





# Household Energy Management

- Users easily and frequently monitor energy consumption
  - Per-appliance (!) itemised bill
    - Appliance manufacturers may pay more attention to the energy efficiency of their products (much as PC manufacturers pay attention to CPU power consumption) which could become a selling point
  - Make consumers more aware of energy consumption
    - Reduce or optimise usage of high-consumption appliances
- better with intelligent meter

# What's needed for an effective EM program?

- Right strategy
  - Inside the home: smart systems and appliances
  - Outside the home: the utilities
- Right technology
  - Based on international standards
  - Low-cost
  - Easy to install
  - Easy to use
  - For new and existing homes

# What Has Changed to Make This Happen?



- LONWORKS® is now accepted as an open standard
  - ANSI/CEA 709.1/2, EN14908-1/3/5
- Echelon actively participates in CEN, CEA, ISO
  - Committees/members reveal new opportunities
- Active re-engagement with UPnP
  - Technical and steering committee
  - Software object for HA
- Cost-effective power line solution
  - Power Line Smart Transceivers, switched-leg circuit
- Active involvement with CECED (European appliance manufacturers association)
  - Development of a powerful self-installation methodology (ISI)
  - Mapping of Chain on LonMark object
- Adoption by Samsung has garnered a lot of interest
  - Legitimized LONWORKS for use in home automation
- Emergence of market movers in international markets
  - Samsung
  - KyungDong
  - DongMoon
  - SecyourIT



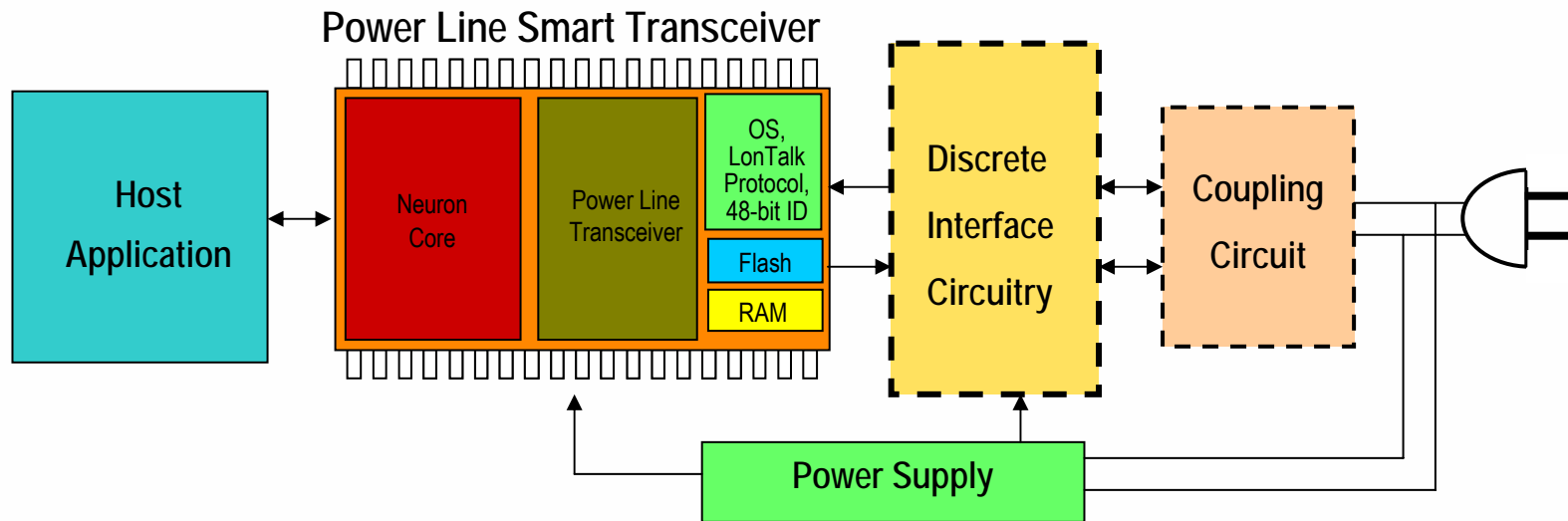
# Echelon Digital Home

- Robust Power Line Technology (silicon chip)
- Switched-leg Dimmer (reference design)
- Easy installation with ISI (code library)
- LonBridge™ (software) with device Plug-ins
- Easy and Intuitive user interface (e.g., Nearmedia software)

**LOW COST, EASY TO USE, INTEGRATED  
OPEN SOLUTION**



# Powerline Technology

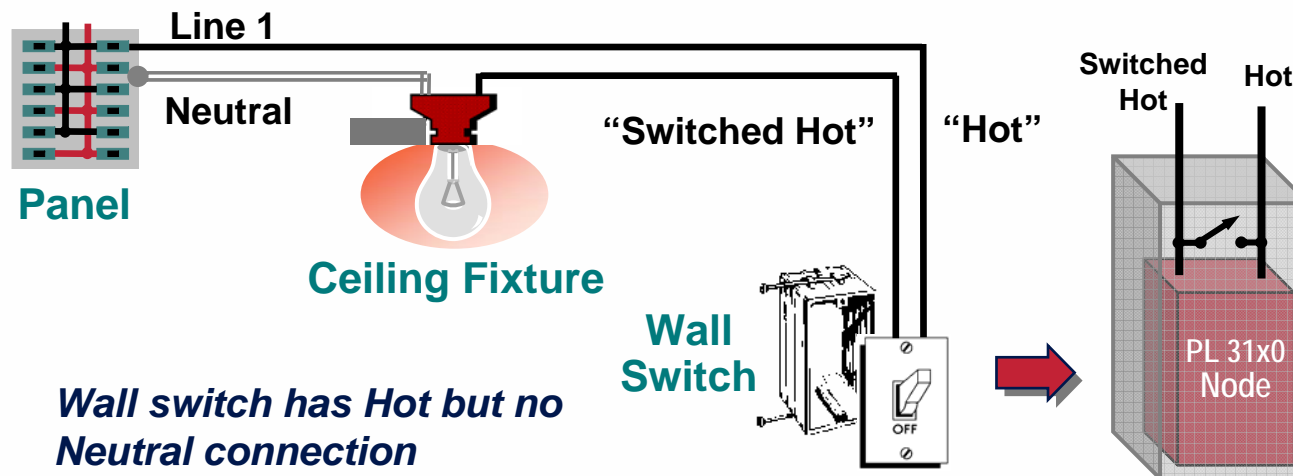


Block Diagram of Typical Device

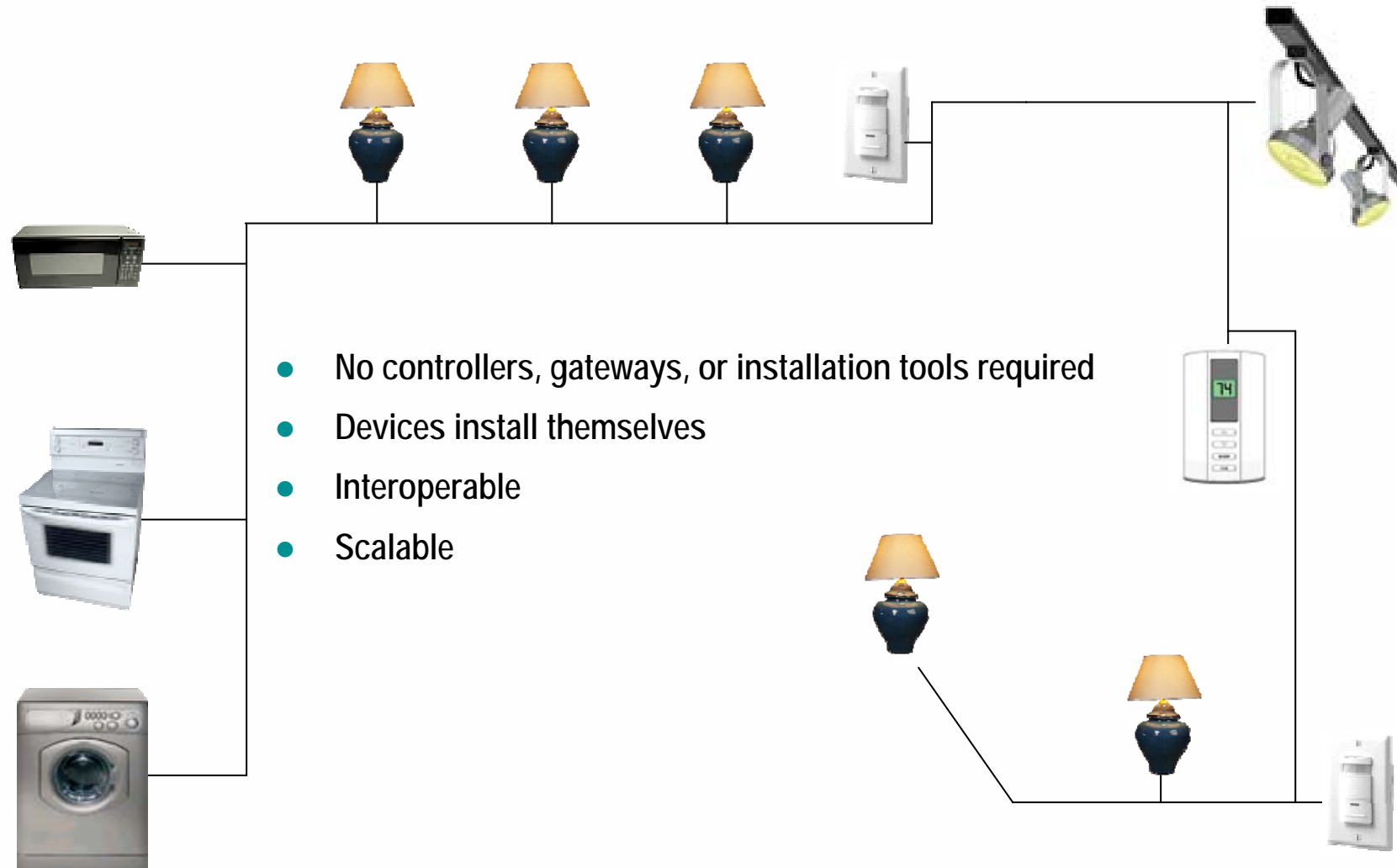


# Switched-Leg Operation

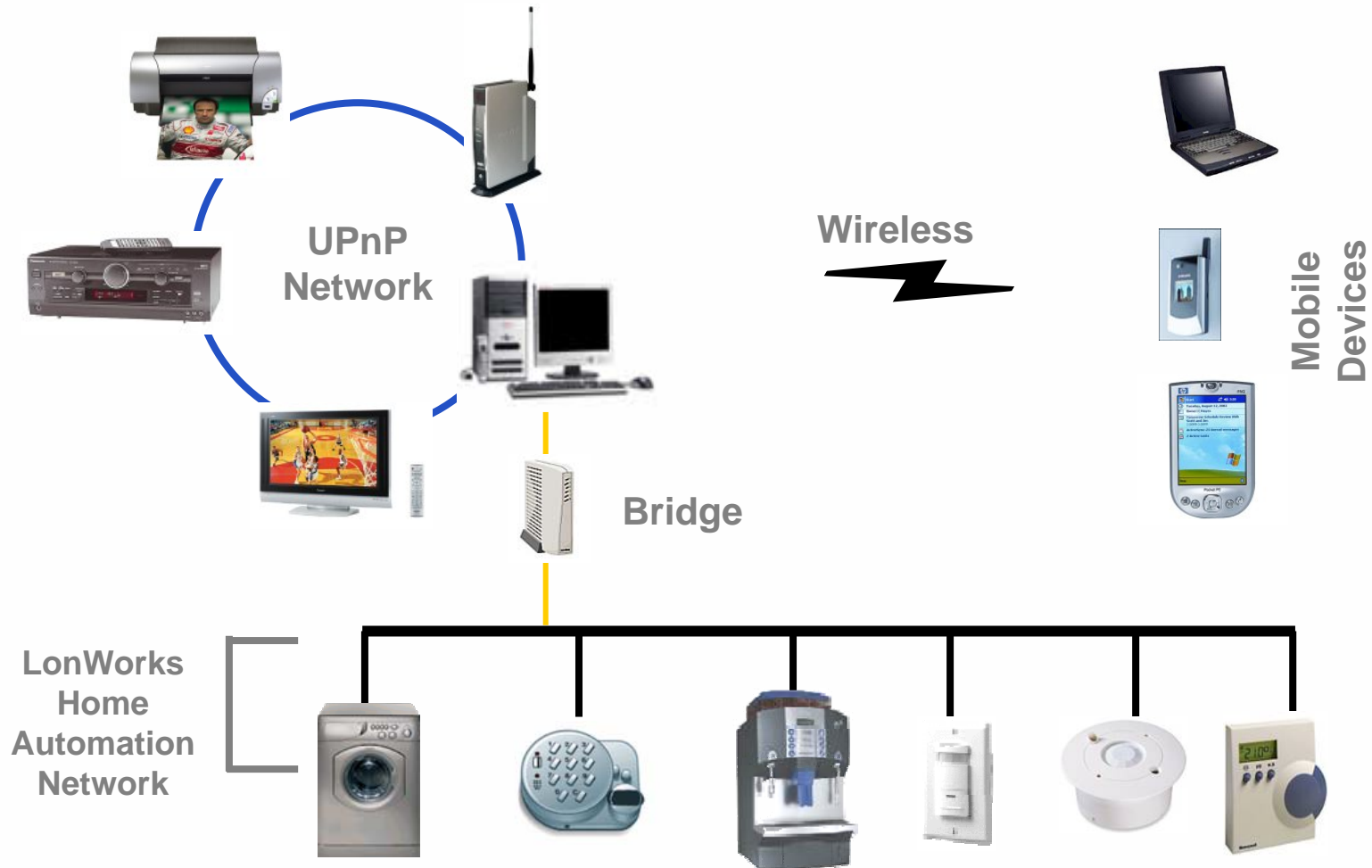
- Echelon's power line technology can operate on a switched-leg lighting circuit
  - Used in roughly 50% of all homes, a switched-leg routes the Neutral wiring (no Line wiring) through a switch or dimmer
  - Signaling on a switched-leg requires low-current node operation, high immunity to noise, and an amplifier that can handle wide variations in impedance
- Support for switched-leg circuits is essential for any type of home control application



# Interoperable Self-Installation (ISI)



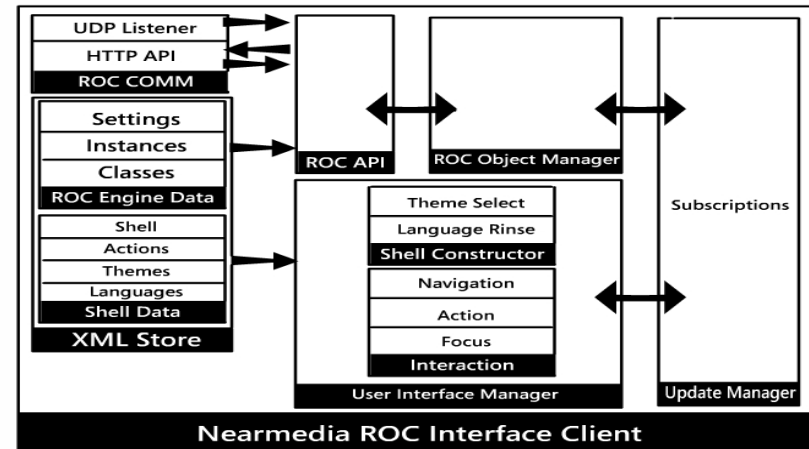
# OSGi / UPnP Bridge





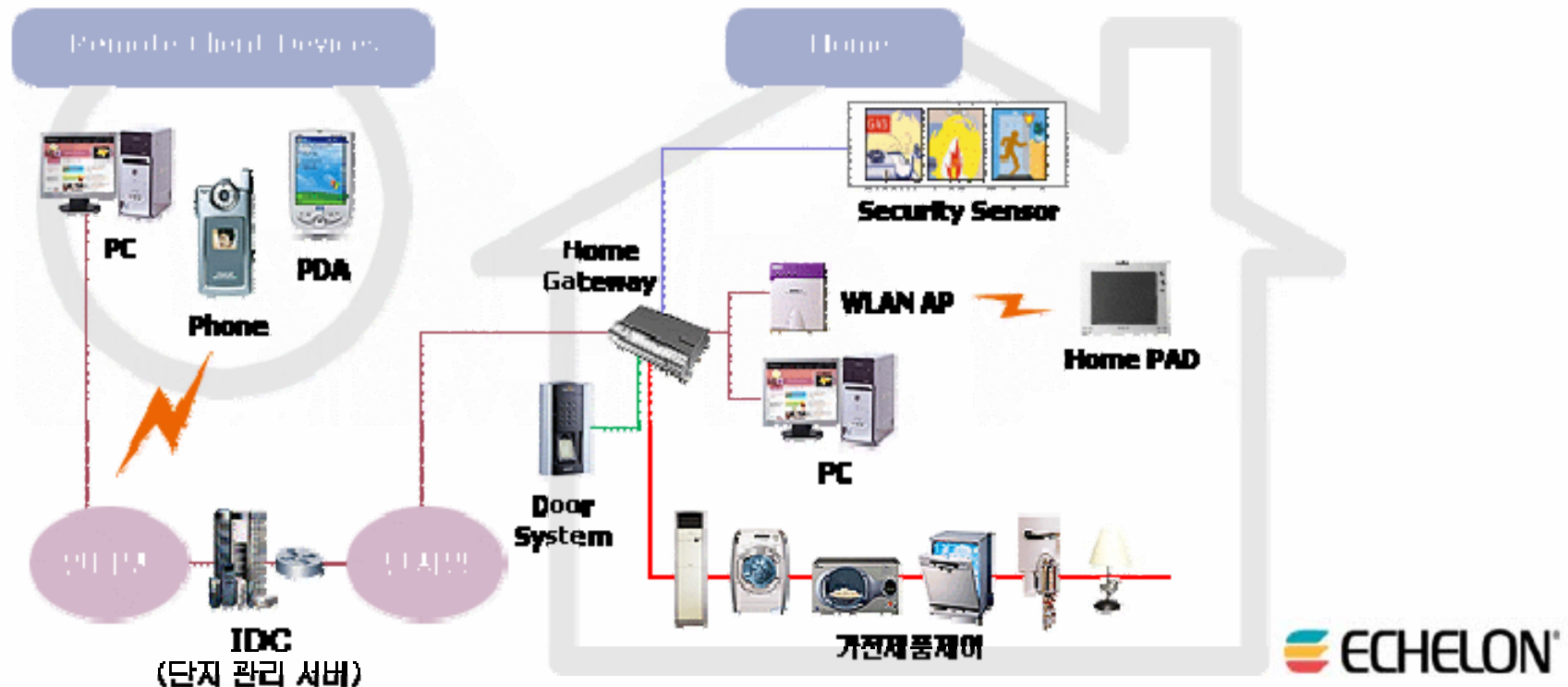
# Nearmedia UI / Software Architecture

- Intuitive, context-based user-experience for LONWORKS - based consumer devices
- Cross-platform user-interface (Media Center, mobiles, PDA) with real-time, two-way status
- Client-server and network-based architecture
- Extensible, XML-based platform
- Supports most computer OSs and MIPS Linux embedded devices
- OEM/ODM implementation-friendly software



# Products Are Available Today

- Simon
- ISDE
- BJC
- Samsung HOMEVITA
- KyungDong
- DongMoon
- Secyourit SIENNA





**Thank You**

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