UPNP® TECHNOLOGIES FOR THE SMART GRID-ENABLED HOME

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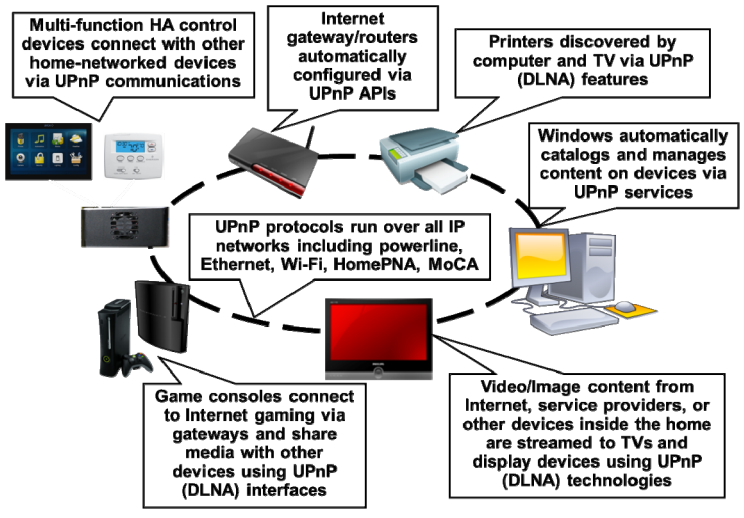
INTRODUCTION

UPnP technologies are a broad and internationally accepted set of open industry standards transforming and simplifying the connectivity and usability of devices and services within the home (part of the Customer Domain in Smart Grid-speak). These UPnP standards translate to more than a dozen years' worth of interoperable IP-based netTeworked devices in the home, with hundreds of millions of new UPnP-based products shipping each year. In September 2010, In-Stat projected that more than a billion additional products based on UPnP Audio/Video (A/V) technologies would ship by 2014 — not counting gateways and applications such as Home Automation and Smart Grid.



The UPnP Device Architecture is an open networking platform that leverages existing and widely deployed Internet protocols like TCP/IP, HTTP, and UDP. Additionally, the UPnP architecture supports data transfers among all networked devices by defining a standardized mechanism to discover and control devices using Extensible Markup Language (XML) and Simple Object Access Protocol (SOAP), two key standards for Internet Web messaging. The UPnP Device Architecture supports plug-and-play networking with automatic discovery, whereby a device can dynamically join a network, obtain an IP address, announce its name, convey its capabilities upon request, and learn about the presence and characteristics of other devices—all vital requirements in consumer-friendly applications. A device also can leave or be removed smoothly from a network without leaving behind unwanted state information.

UPnP technologies are widely adopted and recognized by global standards organizations including DLNA, CableLabs, CEA, Broadband Forum, HGI, OpenIPTV Forum, CENELEC's SmartHouse Roadmap, CEN/CENELEC/ETSI JWG Report on standards for smart grid, and the International Organization for Standards (ISO) and International Electrotechnical Commission (IEC).

Additionally, UPnP gateways allow bridging to other international standards like BACnet, ECHONET, KNX, and ZigBee Smart Energy Profiles (SEP) using free and publicly available documentation and specifications with royalty-free terms. The UPnP core specifications and Device Control Protocols (DCPs) are internationally-recognized standards (ISO/IEC 29341-x).

LEVERAGING UPNP FORUM TECHNOLOGIES FOR SMART GRID INITIATIVES

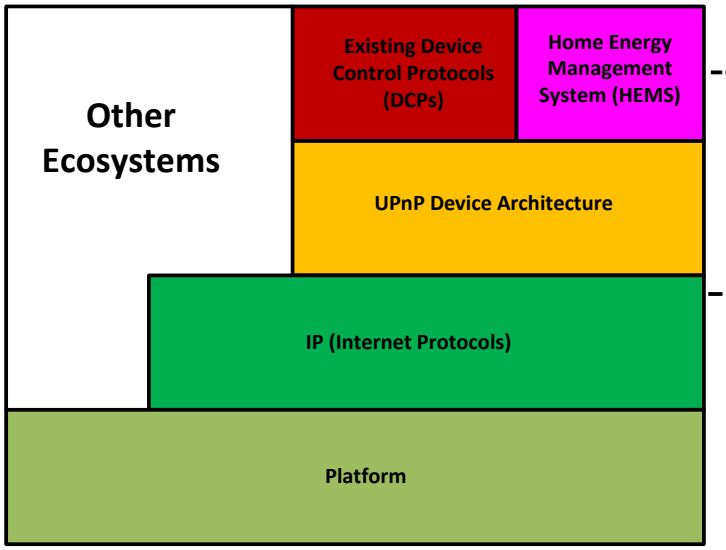
The Smart Grid encompasses many worldwide initiatives to develop a comprehensive electrical grid with the intelligence to improve efficiency, lower energy costs, and provide energy management features. UPnP technologies can play a vital role in energy management by providing a common communications architecture from a utility or energy service provider into the Home Area Network (HAN) and between all of the intelligent devices within the home.

Consumers are not willing to buy all new devices just to support integration with Smart Grid and Smart Energy platforms, nor will they live with technology islands that cannot communicate with each other. Today's connected world demands reliable and secure solutions that are easy to use and control with multi-vendor flexibility, while providing a balance between comfort, convenience, and cost.

For utilities, the current widespread deployment of UPnP-based products means a well-established developer and support ecosystem for delivering cost-effective energy management solutions. UPnP technologies already provide the foundation in the home to complement a variety of energy management gateways and device control scenarios incorporating well-vetted mechanisms for security, discovery, and service advertisement. UPnP technologies also support modular integration with multiple Smart Grid and Smart Energy protocols (e.g., SEP 2.0, NAESB's ESPI initiative, OpenADR, and OASIS), providing a robust, manageable, and secure IP platform to facilitate energy data communications. Utilities can easily become involved with the development and adoption of UPnP standards, as there is no cost to join the UPnP Forum or to download and contribute to the specifications.

Most Consumer Electronics (CE) vendors have already invested in UPnP technologies as a core component of their products, taking advantage of UPnP Forum resources including development tools, ecosystem, testing, and certification. Vendors like the fact that processes for interoperability testing and certification are well-established, and that the UPnP protocols provide a neutral platform for facilitating interoperability. Such a platform enables applications such as energy management, energy data communication, and device discovery across different networks of home devices. These features ease the transition of existing or proprietary energy networks to the newer IP-based Smart Grid networks of the future. Since UPnP technologies are IP-based, they are agnostic to home automation and transport protocols.

Expanding on UPnP technologies' bridging capabilities to other ecosystems, recent extensions to the Power System series of Device Control Protocols (a rich set of power systems interfaces) are now available for vendors, as shown below.



- Power System device
- Power Sink device
- Power Source device
- Power Storage device
- Power Converter device
- Power Socket device
- Power Flow device
- Generic Power Converter device
- Power Meter device
- Charger Service
- Battery Service
- Generic Power Storage device

- AutoIP
- Discovery
- Messaging
- Eventing and Control

UPnP-certified devices on existing home networks provide an ideal platform for communicating energy-related messages. Smart Grid communications (e.g., pricing, alerts, meter readings) can easily bridge to IP-based home or small business networks, allowing utilities and providers to securely communicate over the Internet or via a private IP backbone with their customers.

HOME AUTOMATION USAGES

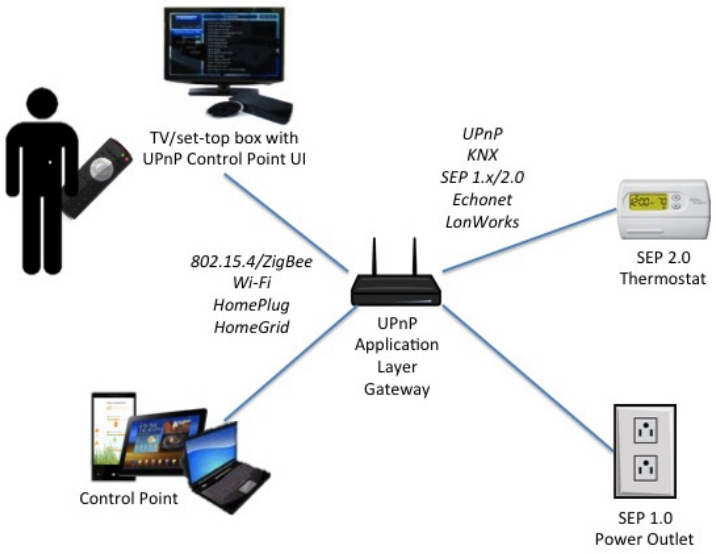
Home automation is another important use case in both the home and business environments. With the recent activity occurring in the management of energy usage (e.g. Smart Grid initiatives in the U.S., including the White House Office of Science and Technology Policy's Green Button effort), home automation is becoming even more important. The UPnP Forum has been an active player in the home automation arena throughout its history, with published DCPs for Heating, Ventilation, and Air Conditioning (HVAC), security cameras, lighting controls, and even solar protection blinds. The UPnP Forum continually cultivates new opportunities and industry trends in home automation to create new DCPs or updates to the existing home automation DCPs.

CONCLUSION / CALL TO ACTION

The UPnP Forum provides an architecture recognized worldwide for device network Addressing, Discovery, and Control, one which has been widely adapted and supported by many vendors in their products and software. UPnP Forum members are the ones driving enhancements to and deployment of new device protocols (DCPs) that will enable new and compelling usage scenarios as the needs of the market change and grow.

Core UPnP technologies can be leveraged today to support the migration of vendor-specific and proprietary solutions to open and interoperable IP-based Smart Grid systems. UPnP technologies are mature, secure, cost-effective, innovative, and interoperable, with broad adoption throughout the world, ensuring cost-competitiveness while still enabling a wide variety of implementation models and market choices.

The use of existing networks and UPnP technologies for the Smart Grid enables "quick-to-market solutions" while encouraging new categories of products and services. Connecting Smart Grid devices in the home is easy, robust, and secure using the hundreds of millions of UPnP networks already in place.



For more information about joining UPnP Forum, the forum's Smart Grid initiatives, or about certifying your product, please visit http://www.upnp.org, or e-mail upnpadmin@forum.upnp.org with the text *"UPnP Administration Request"* in the subject line of your message.