Home Appliance Connectivity: Limitless Potential

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AHAM
ASSOCIATION OF HOME
APPLIANCE MANUFACTURERS

Leadership ➤ Knowledge ➤ Innovation

ABOUT THE ASSOCIATION OF HOME APPLIANCE MANUFACTURERS

AHAM represents manufacturers of major, portable and floor care home appliances, and suppliers to the industry. AHAM's membership includes over 150 companies throughout the world. AHAM members employ tens of thousands of people and produce more than 95% of the household appliances that are shipped for sale within the United States. The factory shipment value of these products is more than $38 billion annually. The home appliance industry, through its products and innovation, is essential to consumer lifestyle, health, safety and convenience. Through its technology, employees and productivity, the industry contributes significantly to the US job market and the nation's economic security. Home appliances also are a success story in terms of energy efficiency and environmental protection. The purchase of new appliances often represents the most effective choice a consumer can make to reduce home energy use and costs.

AHAM is also a standards development organization, accredited by the American National Standards Institute (ANSI). The Association authors numerous appliance performance testing standards used by manufacturers, consumer organizations and governmental bodies to rate and compare appliances. AHAM's consumer safety education program has educated millions of consumers on ways to safely use appliances such as portable heaters, clothes dryers, and cooking products. The Association's Verifide program provides independent testing by verifying the volume, energy, and in some cases, performance of common household appliances to ensure they will perform according to manufacturers' stated claims.

Introduction

Connected devices will be in nearly every home by 2020, when the total number of those devices is expected to reach 26 billion.[1] Many products touting "smart" features — including home appliances — have already hit the market. The growth of the Internet of Things in homes — including usage-based design of appliances, chore automation, and devices for safety, security and energy management — is projected to have an economic impact of $250-$350 billion by 2025.[2] And while connected appliances will offer significant value for the consumer, their arrival has also triggered questions among potential buyers regarding privacy, security and the deep potential connected appliances have to simplify consumers' lives. AHAM member companies are leading the way in bringing connected appliances to customers around the world and are committed to addressing those concerns so that consumers are able to access the full, life-enhancing potential of connected appliances.

Connectivity is not simply another new feature. It will allow consumers to save additional time, conserve energy, integrate the use of renewable energy and pave the way for faster and more accurate repairs. The world of new features connected appliances offer will continue to grow and evolve as technology improves and new customer needs are recognized and met.

It won't be long before appliances like these, which already are being produced, become common sights in homes
- Dishwashers that can be operated remotely if you forget to turn them on before leaving home
- Refrigerators that can order new groceries when supplies run low
- Ovens that can let you know when your dinner is ready
- Clothes dryers that can send you an alert when the dryer vent needs to be cleaned
- Appliances that can be repaired remotely, without anybody visiting your home
- Electric toothbrushes that monitor whether children spend enough time brushing

Appliance manufacturers are developing products that offer these and countless other features that could make consumers' lives much easier. And while new features will come and go as technology and customer needs' evolve, the goal of manufacturers — to provide products that offer meaningful, tangible, life-enhancing benefits — remains the same.

Smart, Smart-Grid Enabled, and Connected Appliances: The Difference

As appliance manufacturers introduce connectivity to products, a number of terms may be used to describe this new functionality. Some of these terms are used interchangeably:

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[1] Gartner, Inc. (2014) Gartner says a thirty-fold increase in Internet-connected physical devices by 2030 will significantly alter how the supply chain operates [Press release].Retrieved from http://www.gartner.com/newsroom/id/2688717

[2] McKinsey Global Institute. (2015) The Internet of Things: Mapping the value beyond the hype. San Francisco, CA.

"smart," a blanket term used to describe enhanced, interactive functions that may or may not require an Internet connection; Smart-Grid enabled, which refers to a device's ability to interact with a modernized energy grid; and connected appliances, which utilize an Internet connection to offer new and enhanced features.

- **Smart appliances:** "Smart" is a general term to describe a multitude of enhanced features and functions available on appliances today. Some of these devices may have the capability to adapt their own functionality and offer enhanced features according to user habits or needs. These "smart" appliances may or may not be connected to the Internet.
- **Smart-Grid Enabled:** The Smart Grid is the ongoing modernization of America's electricity delivery system. Rather than the one-way system of utility companies delivering electricity to the consumer, the Smart Grid creates a two-way exchange and allows homes to send information to utility companies regarding energy use and power needs.[3] This allows utilities to provide more efficient power delivery. Smart appliances provide a tool for utilities to increase the efficiency of the entire grid by responding to their signals to reduce or delay their consumption of energy.
- **Connected appliances:** Connected appliances offer a new level of interactivity and an array of new features. Many allow users to access them remotely via a phone, tablet or as part of a home energy or automation system. They may also include smart appliance functions that allow them to interact with the Smart Grid.

AHAM History on Connectivity

AHAM's leadership in connected and smart appliances extends back to the days when those innovations were still concepts. AHAM has long engaged with many other organizations — government, utilities and standards-making organizations — since the early development of the Smart Grid and the Internet of Things to ensure that the consumer's voice is heard and represented by AHAM members as new technologies emerge. AHAM's first Smart Appliance Task Force, formed in 2001, led development of the CHA-1 standard, the first that addressed communications elements of connected appliances.[4]

AHAM continues to pave the pathway to bring smart appliances from the minds of innovators to homes around the world. The Association is an early member of the Smart Grid Interoperability Panel, which brings together utilities, regulators, manufacturers and other key stakeholders to address issues related to energy use, security and communication. In addition, appliance manufacturers, both individually and collectively through AHAM, have taken steps to develop updated "common command" guidance to help create an environment that

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[3] U.S. Department of Energy. (n.d.) Smart grid. Retrieved from http://energy.gov/oe/services/technology-development/smart-grid

[4] Association of Home Appliance Manufacturers. (2007) Connected Home Appliances – Object modeling. Washington, DC.

encourages the development of connected appliances that fit seamlessly into the existing technology infrastructure of more homes. AHAM also developed the AHAM SA-1 standard, the most current standard for common commands of connected appliances.[5]

White papers, such as this document, have been one method of engagement. In 2009 AHAM published *The Home Appliance Industry's Principles & Requirements for Achieving a Widely Accepted Smart Grid*.[5] In it, AHAM emphasized the need for three essential elements necessary for the Smart Grid to effectively interact with consumers:

> 1. Energy pricing must provide incentives to manage energy use more efficiently and enable consumers to save money.
> 2. Communication standards must be open, flexible, secure and limited in number.
> 3. Consumer choice and privacy must be respected; the consumer is the decision maker.

In 2010, AHAM published *Assessment of Communication Standards for Smart Appliances: The Home Appliance Industry's Technical Evaluation of Communication Protocols*. This report presented AHAM's methodology and technical analysis of smart appliance communications protocols.

AHAM has also been working with the ENERGY STAR program to integrate smart capability into the specifications for appliances, which have been completed for refrigerator/freezers, clothes washers, clothes dryers, dishwashers and room air conditioners. These specifications detail how a smart appliance will respond and provide energy management once a signal is received and provide a platform for greater efficiencies to the electrical grid. The specifications also provide for open communication protocols for third parties to interface with smart appliances.

These papers, as well as various presentations, meetings and engagements with working groups and committees throughout the development of these technologies have helped AHAM share the consumer voice.

Value Proposition of Connected Appliances

Do you have enough hours in the day? Most busy people are likely to answer "no." Appliance manufacturers have built their reputations on producing products that give time and value back to the people who use them. Connectivity will open doors to new levels of time-savings and convenience. How great is its potential? A recent study estimated that connected appliances could save a typical household 100 hours a year — the equivalent of more than four complete days and nights, or two-and-a-half 40-hour weeks.[6]

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[5] Association of Home Appliance Manufacturers. (2009) Smart Grid White Paper. The Home Appliance Industry's Principles & Requirements for Achieving a Widely Accepted Smart Grid. Washington, DC.

[6] McKinsey Global Institute. (2015) The Internet of Things: Mapping the value beyond the hype. San Francisco, CA.

Here's a glance at a few of the many ways connected appliances can enhance and simplify the lives of consumers:

Peace of Mind

Going out of town for a while? You'll need to know your appliances will stay in good working order while you're gone. Connectivity offers a way for you to be notified if any problems arise and get them taken care of before you get home. Connectivity offers the potential for remote monitoring to ensure your appliances are functioning properly or are ready to be used again when you arrive.

Are you caring for an older or ill relative or friend? Connected appliances can make your job a bit easier. Monitoring how often the refrigerator is opened, or how often water is dispensed can give you some peace of mind that your loved ones are staying nourished and hydrated. Keeping track of how often other appliances are used can let you know that they're moving around the house and are able to perform day-to-day tasks.

Ease of Repairs

The days of waiting around for a repair technician to come to your home, diagnose a problem and, if the proper parts are available, make the repair, could be numbered. Connected appliances have the potential to revolutionize the way appliance repairs are diagnosed and addressed and make inconvenient repair appointments a thing of the past. Manufacturers are developing new features that will allow repair technicians to identify problems before they arrive so they can bring the right tools and parts for the job. In some cases, the appliance owner may be able to make the fix with video or phone guidance from experts. In others, it's possible the problem could be fixed remotely via corrections or upgrades to software.

Connectivity makes it possible for manufacturers to keep track of trends in appliance performance and use that information to improve on existing and future appliances. When problems with non-connected appliances arise on a significant scale, manufacturers often have to wait for those problems to be reported by users. With connected appliances, manufacturers can be notified of problems automatically as they happen. They'll be able to quickly address minor problems before they become major problems, and do it with little or no interruption of the appliance's function.

One Less Thing: New Levels of Convenience

Connected appliances could strip away many of the steps required to use non-connected appliances. Dishwashers could keep track of when you typically use the appliance, and be set up to run automatically at those times if the door is closed. A clothes washer could provide information about the best way to wash certain types of garments, saving you the trouble of

doing the research on your own time. Ovens could include features that show you how to prepare the foods you have on hand.

These are a few examples of the near-limitless potential connected appliances have to save time and simplify lives.

Energy Efficiency

In addition to convenience, smart appliances have the potential to work with the Smart Grid to drive energy cost savings for consumers and improve our environment. Connected appliances can incorporate smart appliance features, including the ability to monitor, protect and automatically adjust operation based on the needs of the owner.[7] This may be accomplished through multiple features, including:

- Delivering information to the user on dynamic electrical pricing and the ability to adjust electricity use
- Providing the ability for the customer to access renewable energy by shifting appliance energy usage to times — such as when the sun or winds are stronger — when renewable energy is available
- Responding to signals from utility companies regarding peak demand and recommend times of day when usage is lower
- Automatically reducing use based on the user's preference
- Incorporation into a home area network or home energy management system, which provides a complete profile of and the ability to adjust elements of a home's total energy use

Safety

Connected appliances will be held to the same rigorous quality and safety standards as all appliances. AHAM and appliance manufacturers are keeping safety a priority and are looking ahead for opportunities to improve overall user safety and minimize or eliminate any new risks.

Agencies that create the safety standards for appliances already require strict safety mechanisms and features to be included in appliances that can be operated remotely. Remote operation of devices cannot override protective controls already in the appliances. Those include door interlocks to protect users from moving parts, electrical shock and fire, and mechanisms that prevent the unintended remote starting or restarting of operations that may require direct attention, such as stove-top cooking.

Product safety remains a top priority for home appliance manufacturers, and the expansion of connected appliance technology will not diminish existing safety design features and industry

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[7] Association of Home Appliance Manufacturers. (2014) Common Information Necessary to Intelligent Appliances. Washington, DC.

safety requirements. Underwriters Laboratories (UL) — the primary organization for the development of voluntary product safety standards in the United States — has already taken steps to help maintain the safety of connected appliances. AHAM is also working collaboratively with UL to develop a risk assessment tool for use in safety standards to cover the remote operation of home appliances as developments continue in this area.

AHAM will continue to work with safety agencies such as the U.S. Consumer Product Safety Commission, product and standards-setting organizations as well as others to improve product safety while providing the choices and innovative features consumers demand.

Privacy

A two-way exchange of data is necessary to utilize certain benefits of connected appliances. The data exchange stands to benefit the consumer by helping manufacturers identify and quickly fix any problems that may arise with the appliance and customize its operation based on customers' individual needs. The exchange of data can also assist with updating and maintaining security measures for the device, and maximizing energy efficiency.

Customers have long shared personal information with appliance manufacturers and retailers for the purposes of warranty, maintenance, and the distribution of product information. The protection of consumer information is an essential element in maintaining customer trust, and AHAM manufacturers ensure that consumer information is securely managed.

Manufacturers will collect information with the customer's permission. Users of connected appliances should carefully read and understand each manufacturer's policy on privacy and data collection. Good privacy policies will be clear, readily accessible, and easy to understand.

Appliance manufacturers understand they have an obligation to honor their own privacy policies and keep their customers informed on a regular basis about how their data is being used.

Security

Manufacturers are designing connected appliances with security in mind. Rather than producing the product and deciding how to make it secure, they are building secure products from the very beginning. It's a rigorous process that includes the use of industry-standard security protocols, encryption, security reviews and testing before the product reaches the market. Industry recognizes that security is an ongoing effort that should also include periodic security assessments, minimizing the amount of data collected and stored, and continued security support for products already in use.

But like any device that connects to the Internet, connected appliances do present some level of electronic security risk. The connected ecosystem includes many components in addition to appliances — connected devices, home networks, servers, mobile apps — and vulnerabilities in

any aspect of a network pose a risk. As they adopt connected appliances and other devices, consumers must also take steps to prevent electronic attacks on their devices.

AHAM encourages consumers to take an active role in preserving the security of their connected appliances. Here are specific steps they can take:

- Use modern security measures to protect Internet routers.
- Choose strong security passwords when setting up accounts to help prevent unauthorized access.
- Keep the security of connected appliances and other devices up to date with the latest firmware.
- Seek appliances and other devices that implement strong security policies and measures.

Technology is constantly evolving, and a joint effort between manufacturers and consumers is essential to keeping connected appliances secure.

Conclusion

AHAM members are committed to developing products that improve consumers' quality of life. Through continued innovation, appliance manufacturers will deliver safe and valuable features in smart and connected appliances. Respect of the consumer's privacy and security, as well as careful consideration of safety and value will remain paramount as manufacturers develop new, life-enhancing products.