

AHRI Smart & Connected Ad-Hoc Committee Activities

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Smart & Connected Ad-Hoc Committee

- **Formed in late 2011**
- **Purpose: develop an AHRI position on “smart” equipment**
- **Recently completed Proposed Framework for Demand Response Performance and Communication Specifications for Smart/Connected Variable Capacity Unitary HVAC Equipment**
 - CEE
 - EPRI
- **Developed within the framework of the White Paper on smart/connected HVACR and water heating equipment**
 - Submitted to docket with AHRI comments on April 30, 2014
- **Specs might be used to advance the utilization of demand response ready equipment on utility load-management and load-shaping programs**

Objectives of Specification Development

- **To apply the specifications to unitary variable capacity air-conditioners and heat pumps**
- **To specify a standardized set of equipment performance characteristics in response to demand response signals for:**
 - utility demand response program managers
 - building owners or occupants
- **To specify essential information communicated between the utility and HVAC system.**

Vision for Connected Building's Equipment

- **Demand response ready equipment**
 - has the capability to receive, interpret and act on a signal received from a utility or a third party;
 - automatically adjusts operation according to preset minimum performance standards depending on signal contents and settings managed by the user or consumer; and
 - communicates the product's relevant status back to the utility
- **A simple and standardized methodology to allow utilities and end users to save money and energy**

Demand Response (DR) Specifications

➤ DR-ready system

- pre-programed
- able to receive, process and respond to signals using specified communication protocols via internet or other means to be determined

➤ Communication protocols might possibly include

- OpenADR 2.0 A or 2.0B
- SEP2.0
- Others to be determined

➤ Signals includes

- Configuration signals
- Signals for operation of continuously-variable systems
- Signals for operation of discretely-variable systems

Configuration Signals

Utility Side

UC 1.1: Utility Setup
Interrogation Signal

UC 1.2: Utility Signal for
Degree of Unloading

UC 1.3: Maximum
Temperature Rise

UC 1.4: other configuration
specification(s)



DR Unit Side

CC 1.1: Unit info signal
(e.g. size and unloading
type etc.)

Signals for Operation of Continuously-variable Systems

Utility Side

UV 1.1: Utility Reduce Maximum Input Power

UV 1.2: Utility Confirmation Request

UV 1.3: Utility Advanced Notification of DR Event

UV 1.4: Utility Exit Pre-Cool Mode

UV 1.5: Utility Exit Reduce Maximum Input Power Mode Now

UV 1.6: Utility Peak Load Price

UV 1.7: Utility Exit Peak Load Price



DR Unit Side

CV 1.1: Customer Verification Signal to Utility

CV 1.2: Customer Response Estimate Signal

CV 1.3: Customer Emergency Override

Signals for Operation of Discretely-variable Systems

Utility Side

UD 1.1: Utility Reduce Maximum Input Power

UD 1.3: Utility Advanced Notification of DR Event

UD 1.4: Utility Exit Pre-Cool Mode

UD 1.5: Utility Exit Reduce Maximum Input Power Mode Now

UV 1.6: Utility Peak Load Price

UV 1.7: Utility Exit Peak Load Price



DR Unit Side

CD 1.1: Customer Verification Signal to Utility

CV 1.3: Customer Emergency Override

Key Challenges to Increasing Market Uptake

- **Cost**
- **Lack of standards to design to**
- **Rapid changes in connectivity technology**
- **Disagreement as to what extent equipment must be characterized.**

DOE Can Help Industry Address Key Challenges

➤ **Help with standards development**

- IT
- Networking
- Internet
- Security

Timeline for Market Uptake of Connected Equipment

- **Main driver: Interest in home automation and remote connectivity**
- **Expect to complete standard for Demand Response Performance and Communication for Smart/Connected Variable Capacity Unitary HVAC Equipment in 2 years**

Current Status

- **The specifications have been distributed to Unitary Small Engineering Committee for consideration.**
- **Staff contact:**

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