



White Paper:

**ClimateTalk Remote Access Standards**

*Provide a Framework for Remote Access to Legacy Thermostats and Pathway to Smart, Connected Systems*

January 17, 2012

**Abstract**

ClimateTalk is a universal language for innovative, cost-effective solutions that optimize performance, efficiency and home comfort. ClimateTalk Open Standards provide a framework for interoperability of communicating HVAC equipment and as a subset, define a set of standards for remote access which can be used as a basis for connectivity of legacy thermostats or communicating HVAC systems.

This White Paper defines the current and future capabilities for Remote Access to applications designed to ClimateTalk Open Standards.

## ***Providing a Framework for Remote Access to Legacy Thermostats and a Pathway to Smart, Connected Systems***

### **Overview**

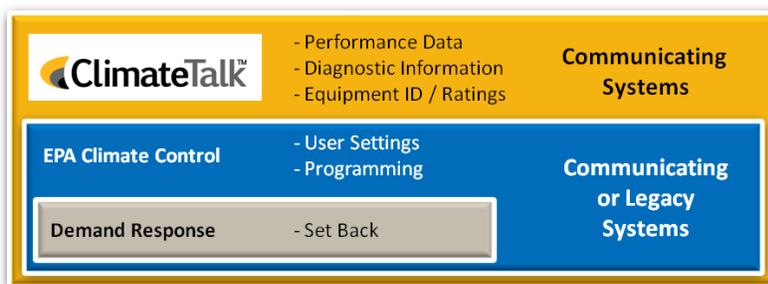
With the frenetic pace of standards development for Smart Grid deployment converging on consumer expectation for connected solutions accessible from smart phones together with advancements in energy management solutions, it is clear that the days of the thermostat sitting on a wall, minding its own business are over.

The United States Department of Energy, Environmental Protection Agency (EPA) is currently developing a new product specification for Residential Climate Controls to receive Energy Star certification (Reference: [DRAFT 2 ENERGY STAR Program Requirements for Residential Climate Controls: Version 1.0](#)). Within this standard are specific requirements for remote access to user interface settings such as temperature, programming and system settings to improve accessibility and simplify the homeowner experience. In addition, the standard implements a price signal message to enable automated demand response for a Climate Control device in a Smart Grid implementation.

However, the Energy Star Climate Control standard does not specify the framework for interoperability. ClimateTalk Open Standards can provide that framework for remote access to today's installed base of legacy HVAC thermostats and pave a path for migration to smart, communicating and connected HVAC systems.

### **Providing a Path for Migration**

In addition to enabling access to user settings currently available on a legacy thermostat, ClimateTalk Open Standards provide a framework for any device on the network to share its performance and diagnostic information system wide. While the Energy Star Climate Control standards take a big step toward improving the usability and customer experience of a thermostat, they also lay the groundwork for a fundamental change in the serviceability and automation capabilities for HVAC and other mechanical systems in the home.



As such, the ClimateTalk Alliance is working to ensure that the remote access capabilities and requirements within the ClimateTalk Open Standards meet the requirements for the Remote Interface section of the Energy Star Climate Control standard serving as an open, unified standard for both legacy and communicating HVAC systems.

The core of ClimateTalk was designed around standard communication protocol models, which allows for overall flexibility and expandability among numerous applications outside of HVAC. The open architecture also allows it to be adapted by any manufacturer.

As a result, if an OEM were to use ClimateTalk Open Standards for connecting legacy Climate Controls today, this information model would simply be extended as the system capabilities are increased and the network of connected equipment is expanded.

## Standardizing the Message

ClimateTalk Open Standards define a common information model developed for the exchange of information between disparate systems and devices. Designed to provide cost-effective control and diagnostic capabilities for residential applications, ClimateTalk is data-centric for simplified implementation. The standards enable independent decision-making within each device, providing flexibility, customization, and interoperability within a common information model.

- **ClimateTalk 1.x**

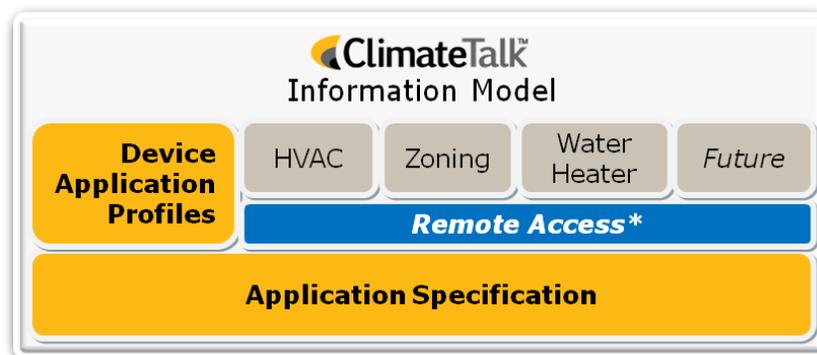
The HVAC Application Profile and Application Specification as published as part of ClimateTalk 1.x Open Standards defines Remote Access requirements for HVAC systems.

The published standards provide a framework for the majority of the requirements defined in the Energy Star Climate Control standards. While the messaging is defined, in most cases, the messages are defined as *Optional* which can result in different implementations of the profile and potentially cause issues with interoperability. The gaps in what is currently defined and what is defined as *Mandatory* for all ClimateTalk devices have been defined and will be closed with the next revision of the open standards package.

- **ClimateTalk 2.x**

The next version of the ClimateTalk standard, V2.x addresses the above issues or gaps in ClimateTalk 1.x by mandating all the EPA required Specifications for Remote Access. For example, ClimateTalk 2.x standard requires that the controls shall implement the required data elements for remote access in accordance with the requirements defined in the Energy Star Climate Control standard.

In addition, in ClimateTalk 2.x, remote access requirements will be made consistent for all application profiles, as shown in the figure below;



*\*Harmonized with Energy Star Climate Control - Remote Access Requirements*

The Table below provides a detailed overview of the current Energy Star Climate Control Tier-1 requirements and Remote Access requirements along with the equivalent Message types or Control Commands currently available in ClimateTalk standard and the implementation roadmap.

Requirement Classification	EPA Residential Climate Controls - Remote Access Requirements	Climate Talk		
		Equivalent Message/Control Command	Current Status in 1.x	Proposed Status for 2.x
<b>ID</b>	Unique Thermostat ID	Identification Pull	Mandatory	Mandatory
<b>Read Status &amp; Settings</b>	Room Temperature	Status	Optional	Mandatory
	Active Cool/Heat Setpoint	Status	Optional	Mandatory
	Active HVAC Mode	Status	Optional	Mandatory
	HVAC Mode Setting	Status	Optional	Mandatory
	Active Fan Mode	Status <i>(T-STAT perspective)</i>	Optional	Mandatory
	Current Hold State	Status	Optional	Mandatory
	Humidity Control Setting	Status	Optional	Mandatory
	Active Humidity Control Status	Status	Optional	Mandatory
	Current Hold Mode Type	Status <i>(Only when in HOLD mode)</i>	Optional	Mandatory
	Program Schedule	Configuration	Optional	Mandatory
	Installer Settings	Configuration	Optional	Mandatory
	Away Mode Status	NA	NA	Add Mandatory Status MDI
	Fan Mode Setting	NA	NA	Add Mandatory Status MDI
	Humidity Sensor Reading <i>(Optional)</i>	NA	Optional	Add Status MDI and make it accessible if implemented
<b>Adjust Status / Remote Access</b>	Time Sync	Real Time/Day Override	Optional	Mandatory
	Active Heat/Cool Setpoint changes	Heat/Cool Setpoint Modify	Optional	Mandatory
	HVAC mode Change	System Switch Modify	Optional	Mandatory
	Program Schedule Change	Heat/Cool Profile Change	Optional	Mandatory
	Select Active Program Schedule (Profile/Steps).	Program Interval Type Modification Heat Profile/Cool Profile Changes	Optional	Mandatory
	Hold Mode change	Permanent Setpoint Temp and Hold Modify/Setpoint Temp and Temporary Hold/Setpoint Temp and Timed Temporary Hold/Hold Override	Optional	Mandatory
	Away Mode	NA	NA	Add Mandatory Control Command
	Tier Level Price Settings change	NA	NA	Add Mandatory Control Command
	Fan mode change	NA	NA	Add Mandatory Control Command

## Enabling Consistent, Robust Connectivity

While the messages above serve as a standard for communicating with the HVAC system, the ClimateTalk standards also define requirements for networking to enable “plug-n-play” operation as well as minimum requirements for establishing a physical connection. There are several ways the enriched information available on a ClimateTalk network can be accessed remotely. The intention of this white paper is not to *prescribe any one method or limit any developer’s ability to develop alternate solutions*.

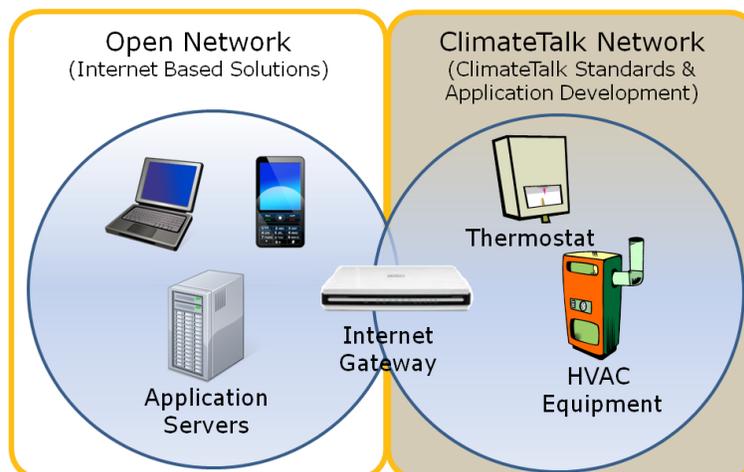
However, the purpose of this section is to outline common characteristics of an Internet Gateway by which we can;

- Develop a method for home owners, businesses, contractors, utilities, manufacturers all want to reach into the system to access the wealth of data available from the ClimateTalk network
- Enable ability to gather data for reporting, view/edit current device settings, weekly schedules, etc.
- Enable users to store and serve this data locally from their home or office while others will want to store and serve the data from the cloud
- Enable 3<sup>rd</sup> party application development to anyone to create web/mobile based applications or integrate with other systems such as demand response, security, etc.
- Create a standards based methodology that will provide cross platform compatibility between manufacturer’s devices

ClimateTalk has been architected to provide flexibility in application development. Carrying this forward from local devices to remote solutions, the ClimateTalk Alliance is in support of solutions that enable;

- Customers to connect to web servers to gain access to ClimateTalk device data
- Vendors to create cloud based applications, APIs and services
- Manufactures to create product differentiation
- 3<sup>rd</sup> Party web based collaboration and development

As shown in the diagram below, the ClimateTalk Alliance will continue development of Application Profiles and define the mandatory messages that will be available through an internet gateway. Once established, internet, smart phone or other remote access applications can be developed based on the published set of standards.



This “Internet Gateway” can be a standalone device or integrated into any of the communicating nodes in a ClimateTalk Network. In a legacy system, the Internet Gateway would simply talk to the thermostat exchanging user setting information as defined in the previous section. When connected to a communicating system, the Internet Gateway would have the basic thermostat settings plus additional performance and diagnostic information available only on communicating systems using the same methodology and standard basis.

The Internet Gateway architecture elements include:

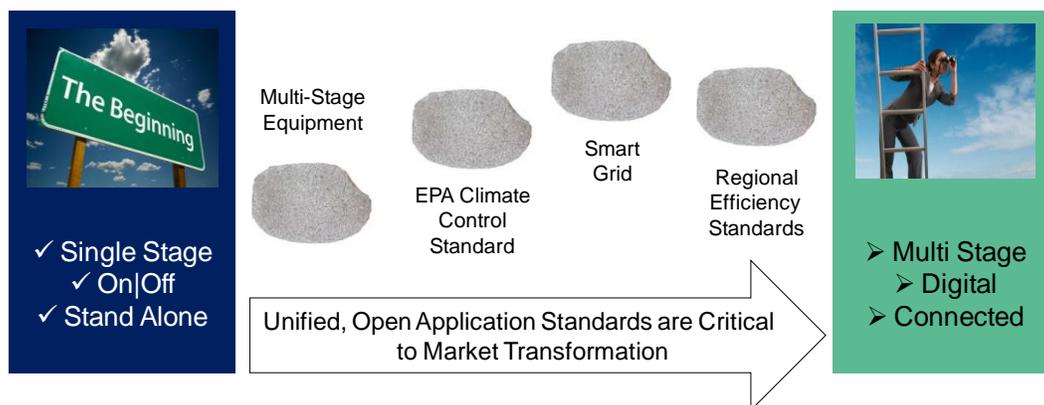
- Two interfaces
  - ClimateTalk network interface (via CT-485 or Wi-Fi, Bluetooth, etc.)
  - Local TCP/IP network (via Wi-Fi or Ethernet)
- Embedded local server (e.g. Apache/Tomcat) to provide data/services for home/office -based solutions or enabled connection to cloud servers to exchange data and configuration settings

The capabilities exist today in a ClimateTalk 1.x network and will be carried forward into V2.x standards.

As the market for internet solutions dictates, the ClimateTalk Alliance will develop API standards that enable interoperable 3rd party applications to be developed and not be bound to a particular vendor. These API standards would enable cloud services across multiple vendors while enabling implementation of additional vendor specific functionality.

## Opening the Door to Innovation

With a common set of messages and the guidelines defined within, third party developers can leverage the ClimateTalk message sets to create new, innovative, integrated applications for home energy management and control. While this paper is focused on the requirements for Remote Interface for the Energy Star Residential Climate Control, the ClimateTalk architectural model is built to enable seamless integration of additional standards as required by the market.



In conclusion, if the path to the connected home is paved with open standards, ClimateTalk is positioned to support the migration.

## What is the ClimateTalk Alliance?

The ClimateTalk Alliance is a non-profit organization of industry experts building application standards to support interoperable solutions that optimize performance while improving comfort and end user experience. Our mission is to develop open standards that provide an information model and networking standards for plug-n-play operation of HVAC, water heaters and other mechanical systems in the home for simplified installation and troubleshooting as well as ongoing system performance optimization. As an open standard, ClimateTalk opens the door for cost competitive, vendor-neutral solutions built on an interoperable framework designed for OEM differentiation.

- **Become a Member**

The alliance has three membership levels:

- Promoter
- Contributor
- Adopter

Each level includes promotion of your solutions, visibility to the industry, access to approved specifications and requirements documents, and use of the ClimateTalk brand.

Depending upon your company's membership level, membership provides the opportunity to participate on the Board of Directors and in the Working Groups developing and approving the specifications and standards. As a member of a steering committee or working group, you will play a role in setting the direction for the future of ClimateTalk Open Standards and in driving certification of the standards by an international standards board.

Are you interested the possibilities ClimateTalk provides for your company? If so, we invite you to join the other industry experts as a member of the ClimateTalk Alliance. For more information, visit our website at [www.ClimateTalk.org](http://www.ClimateTalk.org) or email [Help@ClimateTalkAlliance.org](mailto:Help@ClimateTalkAlliance.org).

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