



Residential Enabling Technologies The PCT

**Ron Hofmann
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What is a PCT

- ★ Programmable **Communicating** Thermostat (PCT) is a programmable thermostat (PT) with communications interfaces added
- ★ High-cost proprietary PCTs have existed as utility-defined products for some time
- ★ The purpose of the PIER PCT reference design was to dramatically lower costs by creating standard interfaces & a common **information model** independent of protocol



PIER PCT History

- ★ **In 2005, PIER held public workshops to define reference design & system integration**
- ★ **In 2006, PIER proposed & demonstrated a proof-of-concept (POC) PCT**
- ★ **In 2007, PIER facilitated an open industry forum to establish a reference design for a PCT based on the POC PCT that could be proposed in the 2008 Title 24 standards**



PIER PCT History (con't)

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- * In January 2008, the Title 24 PCT rules were challenged and the PCT reference design was removed from consideration**
- * In April 2008, OpenHAN agreed to consider the PCT reference design**
- * So far two manufacturers have built and tested PCT prototypes**



PCT Objectives

* WHAT

- ◆ One PCT set of **system integration interfaces** for all CA (US)
- ◆ Common **information model** for all CA (US)
- ◆ Works with any **minimum AMI** system
- ◆ Compatible with **legacy HVAC** technology

* HOW

- ◆ Industry works it out



Cost/Price Targets

- ★ Limit the total **cost** of all systems integration (SI) interfaces (I/Fs) component hardware to **<\$10**
- ★ Limit the total **price** of a minimum (reference design) version of a DR/EE thermostat to **<\$100** retail



PCT System Integration Interfaces

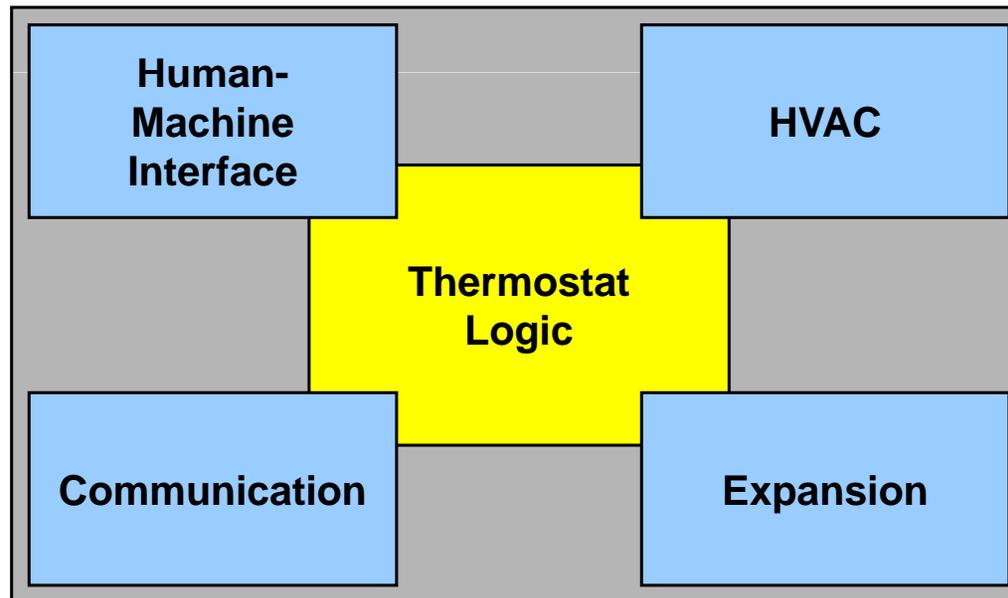
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- ★ **Communications Interface**
- ★ **Human-Machine Interface**
- ★ **HVAC Interface**
- ★ **Expansion Interface**



Four Proposed PCT Interfaces

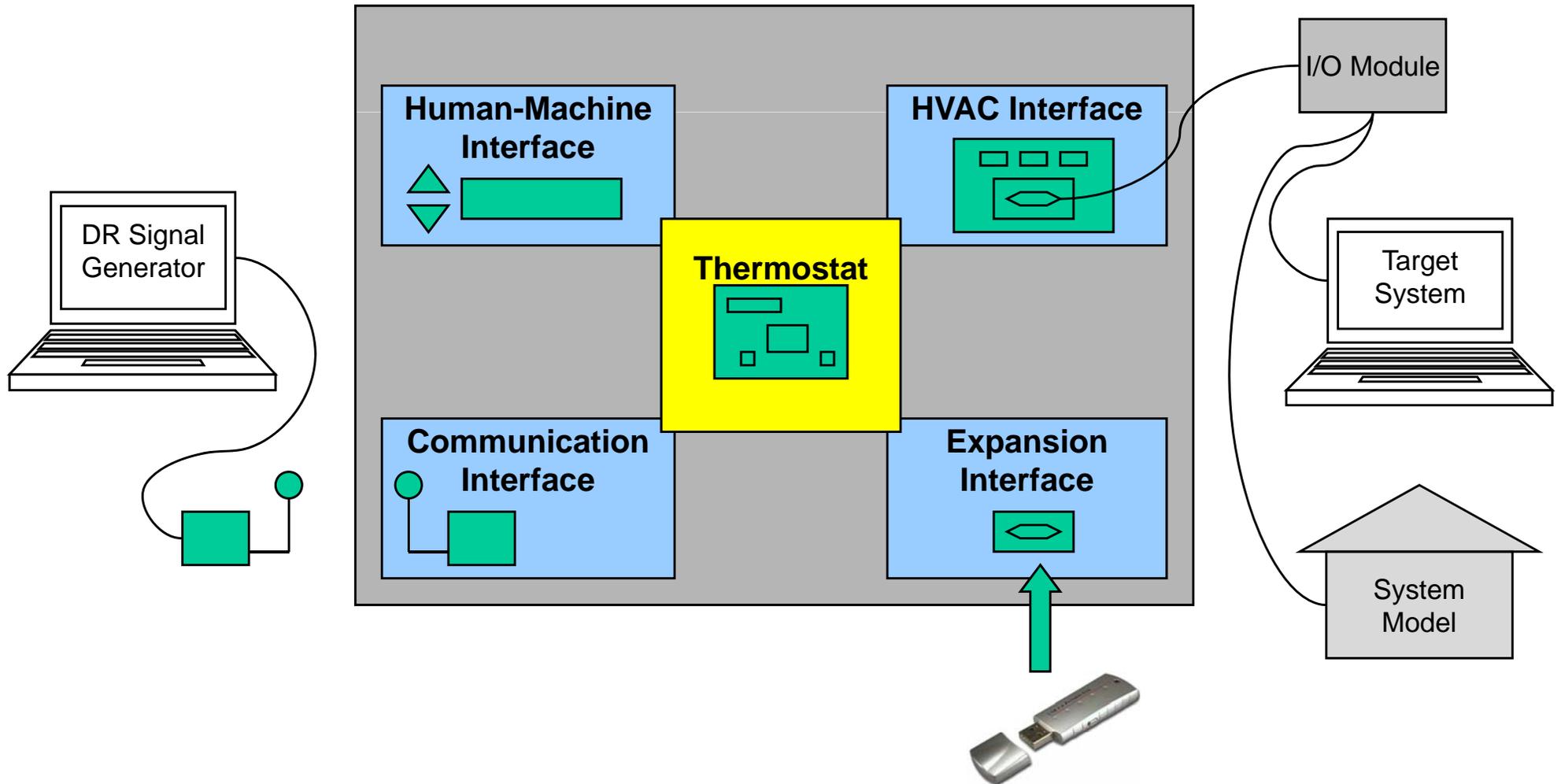
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Proof-of Concept Prototype

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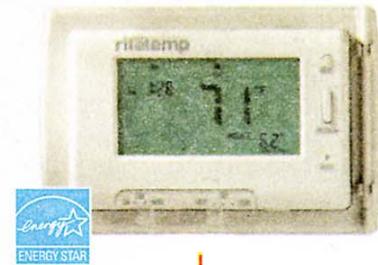
Summary of Minimum PCT Costs

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Equivalent Programmable Thermostat		\$12.70
Added Interfaces	Communication Interface	\$3.45
	Human-Machine Interface	\$0.15
	HVAC Interface	\$2.15
	Expansion Interface	\$1.75
Total Bill of Materials		\$20.20



Home Depot Advertisement



\$49⁹⁷

RITETEMP HORIZONTAL THERMOSTAT
7-day programmable. Touch screen display. Works on 99% of all systems. Also available in vertical design. (539949) (425940)



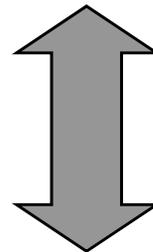
\$39⁹⁷

HONEYWELL 5/2 DIGITAL PROGRAMMABLE THERMOSTAT
4 programmable periods. Easy to program. Weekday/weekend settings to fit your lifestyle. (200110)



\$39⁹⁷

RITETEMP PROGRAMMABLE THERMOSTAT
7-day programmable with backlit screen. Easy to operate and read display. (783137)



Rule of thumb:
Selling price to cost of goods sold
between 3:1 or 4:1
 $\$12.70 \times 3 - 4 = \$38.10 - \$50.80$

**Equivalent Programmable Thermostat
cost from our bill of materials:**

\$12.70



Summary

- ★ **The PCT reference design is posted on the web complete with a proposed security and registration scheme**
- ★ **The proposed RDS & expansion port features are designed to allow for evolutionary technology growth**
- ★ **The PCT reference design is compliant with SB 1491**