

DIY Zoning: Design Contract

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1. Introduction

One of the project's primary goals is to make the consumer value of the system unbeatable. During the implementation it has become clear that not only the consumer value can be significantly improved, but also the serviceability. Following is a brief summary of features already implemented (or ready to be implemented).

2. Consumer Features

- Temperature can be maintained on per-zone basis;
- Each zone can have a different schedule;
- Schedule for cooling and heating can be different, both on setpoints and timing;
- Individual zones can be put "on hold" (i.e. maintain the set temperature with no regard to the schedule);
- Individual zones can be shut off without affecting the rest of the house;
- A zone may be "non-voting" - in other words, it will not cause the HVAC unit to turn on. However, the unit will not be shut down until the zone demand is satisfied;
- The whole house may be put in "away" mode, with a given duration;
- In "away" or "shut off" mode the system will take measures to conserve energy. In particular, if less energy will be spent maintaining the house or zone at preset temperature than shutting off the unit and then re-heating (or re-cooling), it will maintain the temperature;
- Individual zones can be programmed to maintain the preset temperature regardless of the settings for the rest of the house (computer room in the summer);
- System is able to track the air filter condition and warn the user about the necessity of cleaning or replacing the filter;
- On failure, the system issues a diagnostic code that allows the system to be serviced faster.

3. Installation

- The system is able to operate with wide range of A/C units, starting with basic single-speed fan, single-speed compressor and ending with arbitrarily variable unit (like Trane XV1500);
- The system is able to operate with both low cost registers and high quality dampers;
- Modulating dampers can be combined with open-close dampers in the same installation;
- Static pressure bypass dampers are not required;
- Existing thermostats may be used as control signal sources.

4. Fault Tolerance and Serviceability

The system is able to recognize and alleviate several frequently occurring total or partial failure scenarios related to:

- Indoor fan;
- Compressor;
- Dampers;
- Sensors.

5. Monitoring and Instrumentation

- The system is able to produce detailed data streams that can be used to visualize the system behavior, enable short term troubleshooting and long term trend analysis;
- The system provides access mechanism that exposes system tuning parameters for remote access.

6. Remote Access

- The system can be completely controlled using Web and mobile application interface.

7. Home Automation Integration

- The system is based on open protocol specification and can be controlled by any home automation software or hardware that supports these protocols;
- The system can be integrated with existing security systems to automatically enter and exit "leave" mode;
- The system can react to abnormal temperature conditions (such as overheating computer room or sudden temperature spikes) and either take corrective measures or issue alerts, including, but not limited, to Email and SMS messages.