DIY Zoning: Sensor Network

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1. Equipment necessary

There are different kinds of hardware that allows to measure the temperature. The option discussed here is 1-Wire devices. This doesn't necessarily mean that this is the best option for you, however, 1-Wire devices definitely have some benefits: they're cheap, available, and simple to work with.

All the instructions below assume that 1-Wire devices are selected as a sensor hardware platform.

1.1. 1-Wire Adapters

The first thing to do is to buy the 1-Wire adapter. There are several models available: DS9097U, The LINK, and USB based adapter (I believe that the model name is DS9490R. Do not mix it with DS9490B - the former is USB to RJ-11, the latter is USB to iButton holder interface).

> **Warning:**
> There are several DS9097x modifications, and not all of them work equally well. Definitely avoid DS9097E, for it is based on an obsolete chip.

> **Warning:**
> USB 1-Wire adapter may never be supported - read on.

Out of these,

- DS9097U is the most basic and least expensive. There are several modifications: for 9-pin and 25-pin serial port, and with or without capability to write 1-Wire device internal EPROM.
- The LINK is more expensive, but much more stable and generally works better.
- USB adapter is unlikely to be supported other than via shell based sensor coupled with OWFS. Maxim never released USB support for this adapter. Last version of OWAPI, 1.10, is dated 2005, there's been zero movement since. If all you need is to read temperature, you're fine with this adapter, though.

1.2. 1-Wire Sensors

You will need to buy at least temperature sensors, DS18S20. Be careful to get the up-to-date

sensors - there is an older version marked as DS1820 that is known to lose accuracy over time (details here). Other types of sensors are supported as well - complete list is in Part List section.

1.3. 1-Wire Auxiliary Devices

You will probably need some MicroLAN couplers, or branch switches, DS2409, and possibly some addressable switches, DS2406 or DS2408 (if you decide to implement the HVAC actuators as 1-Wire devices. More about it later {include link to the relevant chapter}).

To make everything perfect, you'll need some pressure and humidity sensors. Several options are available: you can build a humidity sensor yourself following directions from Maxim, or buy one from AAGElectronica (pressure and humidity).

Two humidity sensors are minimum (one at HVAC return, one at HVAC supply), two pressure sensors are minimum (one at HVAC return, one at HVAC supply), three is optimal (one before the air filter at the return, one at HVAC return, one at HVAC supply).

Note:
Do not neglect ESD protection diodes.

FIXME (VT):
It seems that Maxim stopped distributing ESD protection diodes. Hmm... Have to look for replacement...

1.4. Cable

CAT-5 cable would be a good choice.

Note:
You may want to consider a "plenum rated" cable if you are planning to run the wiring through the ducts.

Warning:
Check your local building codes: they may forbid running any kind of wires, even plenum rated, through the ducts.

2. General wiring considerations

Keep in mind that the preferable network configuration is a bus, a star is possible (using DS2409), but there are drawbacks to that, in particular, overhead of branch switching. Star may be unavoidable for some physical configurations, though.

You have to decide at this point whether you want to have your 1-Wire devices powered or using parasite power. Powered bus will be faster and more reliable, however, it will be more prone to unfortunate accidents - shorting out the parasite powered network generally has no effect (except losing sensor signal, which DZ is quite capable of handling), while shorting out the powered network has quite predictable consequences.

If you are planning to branch the 1-Wire network, or use 1-Wire devices for HVAC actuators, you will have to have at least a part of the 1-Wire network powered. Don't try to save on the power supply quality, this will bite you later.

Also keep in mind that if you decide to go all the way, then you'll need the servo wiring as well, so some advance planning won't hurt.

3. Ordering equipment

Vendor list is available from from Reference Library section, and the parts list is here.

4. Installing the sensor network

> **FIXME (VT):**
> References to all the necessary schematics should be made available here. Not all of them are, however. Refer to data sheets on Maxim site until this is fixed.

> **FIXME (VT):**
> Driver for a servo controller based on DS2890 is not yet available - if you need it, let me know, I'll rush it in.

5. Next Step

Now that you have the sensor network installed, time to take care of Data Acquisition.