Thermal Zoning for Modern Energy Efficient Homes

Thermal zoning is a design approach that groups rooms with similar heat load patterns into a "thermal zone". A thermal zone is a conditioned space controlled by a single thermostat. Today's technology allows for up to 30 thermal zones per hvac unit so that any thermal zone can be conditioned to the desired thermostat set point. Very similar to having a light switch in every room so that the home owner can choose what lights to operate, your hvac system can also give you this same control. And because each thermal zone thermostat reports the room's needs back to a control panel, the desired airflow is delivered where needed only when needed. Thermal zoning calculations are performed using Manual ZR, and Manual D duct design determines each thermal zone damper size and each branch air duct size per room. There is also a bypass duct damper system designed to balance the duct system overall pressure when the thermal zones are conditioned to the thermostat set point. A thermal zoning system with a "brain" and air zone dampers capable of providing the best available comfort everywhere in the building and is a much better choice than installing several hvac systems, zoning provides better comfort at a lower operating and lower installation cost. Although zoning has been available since the 1960's, few hvac installing contractors ever mention this option to the home owner because installing hvac contractors prefer to sell more equipment in lieu of installing a modern thermal zoning system. The "old way" design approach of using a single thermostat used with a single a/c unit that's only capable of controlling the temperature in the one room that contains the thermostat is obsolete. Modern homes are made up of many rooms with varying heat load patterns; thermal zoning is a design approach that allows control of any room containing a thermostat.

Thermal zoning is the best choice for multilevel homes, so that as a minimum, each level of the home has an independent thermostat controller and main return air grille. This zoning design approach accounts for both the water fall effect (cool air naturally dropping to the lower level) and heat rise (warm air naturally rising to the upper level) that occurs due to naturally occurring stack effect. In the past hvac contractors often sold an a/c unit per level, forgetting to take account of the stack effect that will overload the top floor a/c unit during the summer while at the same time overcooling the first level. When duct zoning is used for multilevel homes, the stack effect and waterfall effect is accounted for because all of the equipment capacity can be sent to either level at any time – and because duct zoning system thermostats (no matter how many) all report to a central brain, or control panel – the first level is not overcooled and the top level is never undercooled because the air flow per level is controlled + the a/c capacity is sent where it's needed only when required. Also zoning does not limit the number of thermostats for a typical two story home or single story home served by a single a/c unit; I can choose control for any thermal zone as desired, with up to 30 thermostats. For single story homes zoning can provide temperature control that accounts for the heat load shift associated with sun position – as solar heat loads change each hour throughout the day. Zoning can also account for the part load conditions that make up about 85% of the cooling season per year. Zoning solves the problem of entertainment, with many 4th of July visitors present; I can deliver my a/c unit's full cooling capacity to the area of the home where the party is. Zoning design can be used to group night time use and daytime use rooms so that each "time of use" area of the home has a programmable thermostat capable of automatically adjusting the thermal zone temperatures to follow the occupants' usage pattern. And for that home office, or that mother in laws suite, or that home theater, or even grandma's room where she likes a different temperature – all achieved with a duct zoning system – you sure can't do all that when using multiple a/c unit design approach using independent thermostats.

Typically when a home owner mentions to me they want two thermostats, what they really mean is that they want more temperature control. Hvac installing contractors will try to sell multiple a/c units when a duct zoning system is actually what is required, zoning outperforms multiple a/c units and is less expensive to install and operate. Once the home owner is aware that duct zoning is available using a single a/c unit they usually choose additional thermostats too – my average zoning design contains 4 thermal zones. These modern control systems for your home can also communicate with other devices like smart phones should you want to control your homes temperatures remotely.