### (Approx. 2403 words)

### A Cautionary Tale of Cloud-Based Apps

By Joel Ewing, President, Bella Vista Computer Club
president(at)bvcomputerclub.org

#### Insteon Home Automation

Around 2014 I started using Insteon home automation devices to control some plug-in electrical devices around my house. Insteon produced several different modules using a proprietary peer-to-peer communication protocol to communicate with an Insteon hub in your house, which used an Ethernet connection to your router and your home LAN to connect to Insteon-owned cloud servers on the Internet.

The Insteon devices and hub use a unique combination of wireless RF (not Wi-Fi) and powerline signaling. Each device module acts as a repeater to ensure all modules can communicate with the hub. In addition, there was a smartphone/smartpad Insteon app that, in concert with the Insteon cloud service, allowed you to schedule state changes (turn-on, turn-off, dim) for the individual Insteon modules, manually change the module state remotely, or monitor the condition of modules in the case of sensor modules.

The smartphone Insteon app allowed you to monitor the state of the various modules while away from your house as long as you had Internet access on your smart device. Manual remote control of lights from outside the house was not that useful to me but could, I suppose, be used to add some randomness to simulate people in an empty house or turn off a light unintentionally left on. On the other hand, remotely controlling lights or other plug-in devices while in your house from the comfort of an easy chair or bed was very convenient, as was the scheduling of lights that should always go on and off at regular times.

The peer-to-peer communication between the modules and the hub made the system very reliable. Over the years, I've only had one module fail -- after one of our cats marked it as his territory in the usual cat fashion. Unfortunately, I've also had two hubs die on me in four years. After the 2nd one failed, I did some research and found that I shouldn't have plugged the hub into a UPS, as some of the high-frequency components of the AC output of a typical home UPS unit running on the battery tends to stress the hub power supply and cause early failure. Since then, I've plugged the hub into an outlet with only surge protection and have had no other hardware failures.

The modules I found most helpful were those that would plug into a regular outlet and provide a module-controlled outlet for the controlled light or other device. The most useful aspect of these modules was that they could be easily moved and redeployed for a different use. Over the years, we acquired three different varieties: an un-grounded dimmer (which could be used as a switch), an un-grounded switch, and a grounded switch rated for outdoor use. We also acquired a water-leak sensor, which was deployed in a storage area under the house near the water heater.

Over the years, we have made good use of the Insteon system. For example, we have used Insteon to control several table lamps in several rooms, indoor and outdoor Christmas lights, and heating devices in the cats' outdoor houses. Until April 13 of this year, we had never (outside of testing) gotten a warning from the water-leak sensor, but it proved its worth when torrential rain and a drainage problem outside resulted in water under the house. The leak sensor did its job and made it possible to resolve the issue before damage could be done.

#### The Demise of Insteon

After the water-leak detector saved the day (talk about fortunate timing), our Insteon automation stopped working. Trying to use the Insteon iPhone app to manually control the lights also failed with the app's inability to log on to Insteon. The Insteon hub's normal green LED was red. It was unclear whether there was some failure in our hub or what. After some research, some people had been concerned about the long-term prospects of Insteon in 2021, that others were now reporting similar failures like ours, and that the Insteon forum for discussing device problems also seemed to be down. One of the possibilities for a red hub light was an inability to communicate on the Internet, but Internet access was otherwise working. Power cycling the hub produced no change. The conclusion at the time was there was some problem with the Insteon Internet service, but no indication the problem was permanent.

After being down for a day, speculation continued to increase, but no official word. By April 16, the consensus finally became that "Insteon is dead." The only semi-official notification received was an email finally sent to my Insteon account email on April 21 from SmartLabs Inc (the parent company of Insteon) revealing "Insteon Users: Important Notice to Creditors": a notice dated April 12, indicating that SmartLabs Inc had on March 22 assigned its assets for liquidation. A week after the initial April 14 failure, the insteon.com website now has a general notice that "the company was assigned to a financial services firm in March to optimize the assets of the company," which I guess is legalese for "expect an end of all service on some arbitrary date after March 22". It's beyond me why they couldn't just spend the same amount of effort and have the website clearly state that all Insteon cloud services for support of Insteon hubs have been discontinued as of April 14, 2022, so people wouldn't have to guess what's going on.

I was a little ticked off that Insteon gave no heads-up on what was about to happen. Even notification as they pulled the plug would have been an improvement to avoid wasting time diagnosing a problem that couldn't be fixed. But, unfortunately, in retrospect, Insteon's business model probably doomed them: they provided a free Internet service with an increasing number of users and very little long-term income from those like me once they had all the automation modules they had needed. Add to that the reduced sales from financial and supply chain disruption during the pandemic...

Perhaps the lesson to be learned here is that products that require a free cloud service to function should be regarded as having planned obsolescence -- you don't know what the plan is.

There are alternatives, but for most people that aren't technically savvy, or have access to someone that is, this means that their Insteon hub and device modules have become expensive doorstops.

#### Finding an Inexpensive Free Alternative

Having to replace all your Insteon modules and hub with a different system and hardware means throwing out hardware that may represent a sizable investment of hundreds of dollars. Unfortunately, there don't appear to be any suitable commercially available solutions that can utilize the Insteon hardware.

A cheaper Open Source alternative can restore the functionality of an Insteon hub and all the Insteon modules. Still, it requires some technical expertise to set up another machine on your home network with a specialized Operating System. That machine could be a Raspberry Pi with 2 GiB RAM, or an older (but not too old) retired machine. On the other hand, if you have a system that runs 24x7 that can support running a Virtual Machine with a UEFI boot and that can be network "bridged" to appear on your local LAN subnet, then it is possible to use a Virtual machine with 1.5 GiB of RAM. on existing hardware.

The Open Source software that will do the job is Home Assistant. The Home Assistant server is available in image downloads of Home Assistant OS (HAOS) for installation on an x86-64bit or Raspberry Pi architecture. In addition, there are corresponding Home Assistant (HA) apps for smartphones that will allow you to configure and control the Home Assistant server, or it can be done using any browser and the exact LAN IP address and port for the HAOS server.

Conceivably you could run Home Assistant OS on an older retired computer, but it would have to be recent enough hardware to support 64-bit architecture and UEFI (non-secure) boot. If you use a virtual machine rather than actual hardware, it is required to set up bridged networking so the virtual machine gets its address on your LAN. In the case of my Linux system and KVM virtual machines, bridged networking was the most challenging part of the process. The Home Assistant OS must be on your primary home LAN subnet for the iPhone apps to find the Home Assistant server and for the Home Assistant server to detect your Insteon hub (and other IoT devices in your house that it can support). It would probably also be a good idea to configure your router to assign a fixed LAN IP address to the Home Assistant server machine.

When configuring Home Assistant for your Insteon hub, you will probably need to supply the login name and password on the base label on the hub. Once it connects with the hub, it should go through device discovery and gradually locate all the powered-up Insteon modules, except perhaps for sensor modules. I had to press the reset button on the module to get it to see my leak sensor module. The LED light on the hub will remain red -- apparently, that only turns green if the hub can talk to the Insteon cloud server and no longer exists.

The discovered Insteon modules will initially only be identified in Home Assistant by their Insteon hex ID value of the form hh.hh.hh and by the module type. If you haven't saved documentation that maps the module IDs to their location, you may have to power modules On/Off from Home Assistant one at a time so that you can associate meaningful names with the modules. Where I had only one module of that particular type, the module type was sufficient to know the related module location.

The Insteon scheduling was in the Insteon cloud, which is all lost and will have to be built again on Home Assistant. The approach is different, but I found it more convenient than what Insteon used. In Insteon, a schedule belonged to a device, or you had to define a "scene" of multiple devices if you wanted a schedule to affect multiple devices; you couldn't have more than one schedule set to trigger at the same minute. In-Home Assistant, you have Automation Entities, which include one or more triggers that initiate the automation and one or more actions that should be performed when the automation is triggered. The actions can change the state of one or more device modules within the same automation definition. If an automation action is triggered while a previous action is still in progress, you can specify if and how you want them to interact. To me, the Home Assistant approach is more natural and more flexible.

If smartphones are running the Home Assistant app, one of the possible automation actions is sending a message to the HA app on that smart device. The connection between the server and the smart device app is by LAN IP address, which can only work while your phone is on your home network. I don't know if a message to a phone not currently on the home LAN is queued to be sent when possible or what. If it is an alert that you need to receive promptly no matter where you are, there is probably some way to do that (email?), I haven't had the time to research that yet.

There are ways to make a Home Assistant server running HAOS at your home accessible from the Internet, but to do this securely on your own is a non-trivial exercise. The native communication for the HA server on HAOS uses an insecure http protocol on port 8123. You wouldn't want to open that port to the HAOS system on your router because your HA login credentials would be sent over the Internet in the clear, potentially exposing your home automation to attack. I don't know how to do it yet, but I know there are ways to create an https secure interface that could be used to either directly or indirectly access the HAOS system. That, in turn, requires that you own (at an annual charge) an Internet domain name that is defined to point to your external Internet IP for your home, and if you don't have a business IP account with a fixed Internet IP address, you also need some process to update the IP address of your domain name if your Internet provider changes your Internet IP address. I see this getting complicated in a hurry. Suppose you only want access to your HA server from the Internet to receive notification alerts from HA on your iPhone when you are away from home. In that case, I think it may be less work to find solutions that address the notification issue.

There is another secure and simple option if you must have access to all your Home Assistant automation away from your home over the Internet, but it is not free. You can subscribe to the Home Assistant Cloud service provided by Nabu Casa, Inc. at either $6.50 monthly or $65 annually. This service offers a secure Internet interface between your smart device and their service, which in turn uses a secure interface to the Home Assistant machine at your house. Since it is a charged subscription service, it is probably more likely to stay around than Insteon's free cloud service, but that does mean you can again become dependent on a third-party cloud application that is not under your control and become locked into one more continuing payment for the indefinite future.

It took almost a week to get all the bugs out, mostly trying different ways to get a virtual machine properly bridged to my home LAN. Still, I finally got everything I needed working: automation with HAOS running on its own [virtual] machine with remote control over my home Wi-Fi and LAN from the HA app on iPhones, all controlling the Insteon hub and Insteon modules. I have found the HA interfaces and flexibility more convenient than what was originally provided by the Insteon apps and Insteon cloud servers. The best part is that all the pieces required to keep it working within my home are now under my direct control with no added cost but time.