

# Advantages and Disadvantages of how to Store Data from Smart Home Devices

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## Abstract

Smart Home systems are systems through which any home, business or process in the industry can be controlled remotely via a mobile device via a secure internet connection.

At any given time, Smart Home devices download data and store it either in personal storage or in one of three types of cloud structures: private cloud, public or hybrid cloud.

The choice of how to store this data is strictly individual and depends on the confidentiality and criticality of the recorded data.

This article gives the advantages and disadvantages of storing data from Smart Home devices in different types of clouds and personal storage.

## Keywords:

Smart Home, smart devices, lighting, heating, security, security, personal storage, private cloud, public cloud, hybrid cloud.

## 1.Introduction

Nowadays, the life of mankind is unthinkable without the Internet. It is a global network through which full connectivity and communication is achieved regardless of distance, time and physical ability. The Internet of Things is a natural continuation of the development of this process. It is a platform that seeks to bring all services, systems and devices together. All this is in order to achieve through the use of information technology maximum comfort and efficiency of our environment.

Every home uses high technology, which serves both for entertainment and to achieve comfort in our way of life. In the fast-paced everyday life, the increasing employment of people and the desire to save energy in order to protect the planet, the desire to manage the home remotely and the resources used for this leads to the entry of the Smart Home system - or Smart Home.

Smart home appliances include technology that can automate and control security, air conditioning, heating and ventilation, and that can extend to household appliances such as dishwashers, dryers and refrigerators. This technology is becoming increasingly popular.

All sensors and sensors that are part of the Smart Home system, in addition to feeding data to the control devices, constantly receive a lot of data from them at any given time. Depending on the equipment manufacturer used, the data that can be downloaded varies by type and format.

At the same time, each user can specify what type of data he wants to be stored by his devices for tracking and analysis. The data generated is not large in volume, but over time this volume could increase significantly. This data needs to be stored somewhere for a user-defined period. There are two options for data storage - either in the cloud or in local storage, which can be in the form of an SD card built into the controller for managing the Smart Home system.

These devices can be controlled and monitored remotely, usually via the Internet using a central hub. However, it is known that there are very few globally accepted industry standards applicable to smart home systems. This creates problems for homeowners who want to automate their homes. Without industry standardization, it is possible for someone to invest in an entire system that will not communicate adequately with all devices. Then the hacking problem arises.

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Often the user has to buy an entire intelligent system from only one vendor, although there is open source software that can be used with their own hardware. The customer could invest in a complete system of a company, but what would happen if the manufacturer is acquired and stops the maintenance of the systems produced so far? In 2016, Google acquired one such company, Revolve Hub, which had its own Nest storage and monitoring system. After shutting down the servers by Google, the whole system becomes useless, which increases the risk of hacking the smart system. [1]

## 2. Advantages of Smart Homes

One advantage of having a smart home is the convenience it can add to your daily routine. You can program lighting, security, ventilation, heating and other functions to meet your daily needs. You can also control many features in your home remotely. You can always customize what you choose to make part of your smart home.



**Figure 1:** Smart home security

You can decide what is most important to you and then add products of your choice. Some people may decide that what they need most is an automated home security system, or they want an intelligent thermostat to be able to control the temperature when residents are not at home.

Most systems are not as difficult or expensive to install. Smart devices can often save you money and also help you show where you can save money by tracking energy consumption and costs.

Globally, the total smart home market is expected to grow from \$ 76.6 billion in 2018 to \$ 151.4 billion by 2024, with a complex annual growth rate of 12 percent.

In particular, the use of smart lighting is expected to triple by 2022.

In terms of growth, it is estimated that by 2020, the availability of some level of smart housing technology will increase to 59 percent of housing, at least according to studies by the global consulting firm Ernst and Young (based on data from the UK) [2].

Mobility, big data and a focus on the consumer are the three market trends that are forcing companies to embrace the cloud. The choice of solution depends on numerous and sometimes contradictory requirements and comes down to three types of cloud environments - private, public or hybrid cloud. The data collected by the intelligent system is stored in different ways, each of which

determines how, according to their capabilities, the degree of security they want to achieve. Each storage system has its advantages and disadvantages.

### **3. Personal storage**

Storing data in personal storage - be it a computer, flash card or server is a commonly used solution for the home, where the data is stored for a short period of time or is not of great importance for analysis and research. The mobile device used for the user interface of the Smart Home system management takes data from this storage via a secured internet connection.

In order to have a longer data collection period, given their volume, greater security and analysis, the data received from smart home devices is stored in the cloud. The cloud can be private, public or hybrid, and again, the choice of what exactly to do is the choice of the user for security and accessibility.

Cloud technology is a model that enables network access to shared resources such as Internet networks, servers, storage arrays, and software applications with minimal involvement or management by the service provider.

The use of cloud technologies has the potential to achieve great economic benefits. The cloud model breaks the established payment methods because it applies another pricing model - pay-per-use model. Thanks to this, consumers can accurately measure consumption and pay for as much resource as they have spent. With this model there is no need for an annual contract and the establishment of minimum levels of resource consumption. Usually you can activate resources whenever you want and pay for the period during which you used the resource.

The cloud is remarkable for its flexibility, speed and convenience. Its elasticity allows for dynamic cost configuration. Elasticity makes it possible to account for how much resource is consumed in response to how much resource is needed.

### **4. Private cloud**

The use of a private cloud in itself provides information about the confidentiality and criticality of information. However, this brings with it the main features of the private cloud, namely: investing in its own infrastructure, maintenance and security. The private cloud is used only by a certain group of people and does not have access to the rest of the Internet space.

Private cloud (or internal) infrastructure is intended for use by a single organization or group. This infrastructure is not shared with other organizations or users.

Private cloud has a higher price and level of security compared to public cloud. The private cloud is protected by a firewall and can only be accessed through an internal secure network.

Private clouds are flexible and built on services. Processes, services and information are managed within the organization itself.

In the private cloud, there are no additional security regulators, legal requirements or network restrictions that exist in public cloud structures.

Cloud service providers and customers are building an optimized and controlled infrastructure with increased security by eliminating network access to external users.

Private cloud services and infrastructure are maintained on-site or in a private environment, such as an external data center. This gives the system owner exceptional access control - IT knows where the information is located and can keep an eye on the boundaries that surround the data. Additionally, managed private clouds allow for stable service level agreements (SLAs), which can increase reliability.

The main disadvantage of the private cloud is its price. As the volume of collected information increases, a constant investment in increasing the storage space is required. Requires knowledge and IT experience, as well as constant self-monitoring. In case of incompatibility between old storage systems and upgrading with a new generation of systems, a complete replacement of the hardware may be required, which would make the investment extremely expensive.

## 5. Public cloud

The public cloud is used, where permitted, to make data publicly available and used by a large number of users. Public cloud (or external) infrastructure is freely available through Internet access to software applications and web services at the request of all users or a large industrial group of users.

The public cloud provides a flexible and cost-effective way to use IT solutions. The term public does not mean that the information of the individual user is publicly available, but defines the possibility of using the resources of cloud technology by each registered user.

Public cloud (or external) infrastructure is freely available through Internet access to software applications and web services at the request of all users or a large industrial group of users. The main disadvantage of public clouds is their unreliability. The public cloud often has a lower level of protection and may be more susceptible to attacks. Some public cloud providers also reserve the right to move data from one region to another without notifying the user, which can create legal or other problems for companies with strict data protection rules.

## 6. Hybrid cloud

The hybrid cloud is a mix between the public and private cloud, carrying the characteristics of both types of clouds. All data downloaded from a Smart Home system could be stored in both clouds, leaving only critical and confidential data in the private one.

In addition to all these ways of storing data, the cloud could be used to back up the necessary information. The hybrid cloud model allows the hosting of critical applications in the private cloud, while applications with lower security and access requirements are used in the public domain. [3].

In the last few years, the popularity of the hybrid cloud has grown exponentially and today is one of the most sought after solutions in the implementation of an enterprise IT environment. This popularity is due to the fact that the hybrid cloud not only allows companies to scale computing resources, but also eliminates the need for massive capital costs.

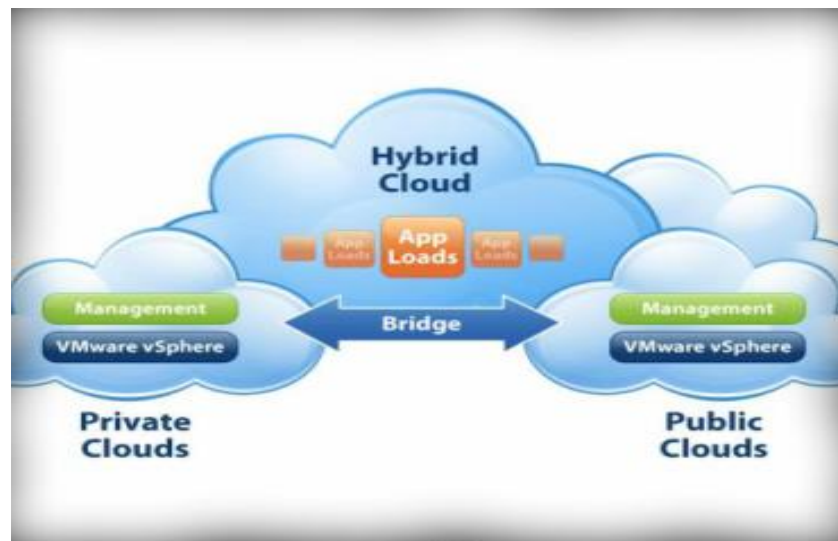


Figure 2: Hybrid cloud

Hybrid cloud is an integrated cloud service that uses both private and public cloud to perform different functions within the same organization, allowing to increase the flexibility of the infrastructure, going beyond the boundaries of corporate physical data centers.

Typically, a hybrid infrastructure is a combination of two or more clouds (private, public) that remain distinguishable even though they are connected and working together. A hybrid cloud is an infrastructure in which your servers are connected and work with your public cloud servers. Such a scenario allows companies that do not currently use a cloud to start migrating part of their systems there and eliminates the differences between the functionality in the internal and cloud services.

## 7. Conclusion

Usually, the hybrid cloud provides a balance between convenience and security. Cloud service providers often advocate a hybrid cloud approach, focusing on using the right destination for the right application, tailored to each individual's needs. Flexible and scalable: Because the hybrid cloud occupies parts of both private and public cloud services, people have the ability to combine and combine them to get the perfect balance between cost and security. Economical: Everyone can take advantage of the cost-effectiveness of public cloud computing while enjoying the security of the private cloud. They are gaining wide popularity: More and more people and companies are introducing this model. After all, hybrid clouds look like a promising solution for the future.

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