

# MANAGEMENT OF HETEROGENEOUS IOT DEVICES OVER UNITE ABSTRACTION ON GATEWAYS

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IoT devices differ in their structure and interaction interfaces. This heterogeneity of IoT devices in Smart House management systems increases the complexity of such systems and make them hard to use. Introducing of abstraction for devices will allow to enclose devices heterogeneity details in some Gateway devices and hide for higher levels of the system.

Heterogeneity in IoT systems of Smart Houses causes high complexity of the systems, which are aimed to manage several independent devices. The absence of unification in the structure and interaction protocols of different devices makes systems-aggregators create parallel interaction flows on each abstraction level of the system, which make the system cumbersome horizontally and hard to scale.

According to this, it is interesting to build the architecture of the Smart House management system, which allows to decrease difficulties connected with devices heterogeneity and thus decrease costs for creation and maintenance of such systems. And also, taking into account the idea that a more simple system is more stable and reliable, the simplification will also improve the reliability of such systems. The simplification of the system should be achieved by decreasing the system levels which are aware of devices heterogeneity details, trying to unify and abstract as much part of the system as possible. It will allow decreasing the heterogeneity in the system itself.

Currently, existing Smart House management systems are using devices Gateways, which are performing the function of connection with IoT devices, however exposing the details of devices heterogeneity (Figure 1). Thus even the highest abstraction levels of the system — the User Interface (UI) level contains heterogeneity, which in particular is in the UI control elements, which are different for different types of end hardware devices. It does not only make the system complex in general but also makes the UI structure on the front-end user applications for Smart House management more complex, which makes the User Experience(UX) worse.

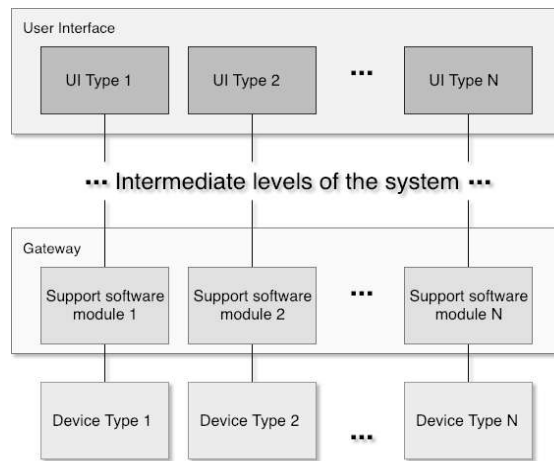


Figure 1 — Heterogeneous management system structure

It is obvious that it is impossible to get rid of heterogeneity at the Gateway-devices level because they have to interact with different end devices. However, by introducing abstractions in the interaction interface of the Gateway and upper abstraction levels, it is possible to avoid heterogeneity on all the system levels upper than Gateways (Figure 2).

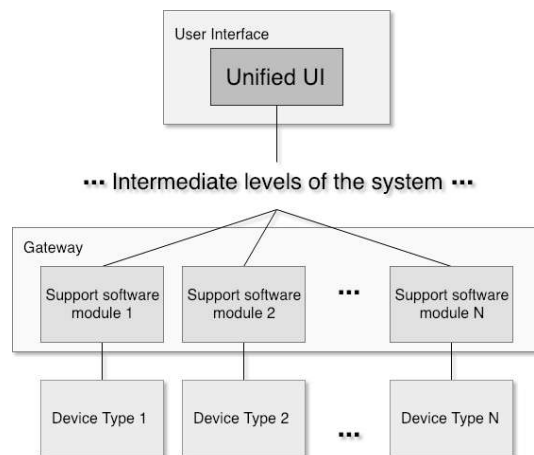


Figure 2 — Structure of the management system with abstraction

In order to work out a structural and functional abstraction for potentially any IoT device in Smart House systems, we should consider all the existing devices by their structure and the ways they interact with Gateways and also predict possible structural and functional schemes for all devices which can ever appear potentially. To achieve this, we should abstractly consider all the possible ways of interaction between Gateways, which will help to work out abstraction, which covers all the use cases.