CHAPTER 3

SMART SPACES

Smart spaces are made up of sensors, actuators and other smart and dummy nodes. Smart nodes are those that provide services in the smart space. There could be any number of smart spaces designed in the transport layer.

3.1 Smart Space Architecture

A smart space is a physical space rich in devices and services. Communication environment of the smart space is radio based, so anyone with the device that can capture the radio range can interact with the devices of the smart space. The aim of the smart space is to integrate physical and computing environment to benefit users. The services in the smart space are offered by people or device of the space. Dynamic integration enables people and users to roam about while enabling communication and interaction across smart spaces. The basic functionality of the smart space is semantic driven service discovery which deals with the ability of the end user to use the smart space. The adaptive information of the smart space deals with how information is fetched from the user profile. The performance of the smart space entirely depends on the user migration from one smart space to another. Interoperability among heterogeneous smart space is an important issue which is dealt out in the proposed work. Smart spaces are made up of cellular system. The cells of the smart space are capable of moving within and across spaces. It is the cellular IP that allows migration from one cell to another. Cellular IP fulfills the interdomain and intradomain
movement of the devices in the smart space. The services are published in the smart space by the device and are also taken by the other devices of smart space when needed. The proposed smart space is designed with the specific components as in Fig 3.1. Smart space is designed as an enhancement of [30] with the following modules.

**Service publication Listener module:** listens for any new services being introduced in the smart space. It also deals with registering and deregistering of services.

**Seamless Query service:** is completely seamless. The profile is propagated in the network seamlessly.

**Invoke service:** invoke seamless service from other Smart Space which are heterogeneous in nature.

**Subscribe RMR:** When a device enters the smart space it publishes its meta representation to interested smart devices.

**Manipulate RMR:** The control component can manipulate RMR’s to which it is subscribed to. The reflective changes are done internally.

**Available service List:** The available service list contains the list of available services to smart space. The list can be queried for certain information like service, parameters, location of devices and other attributes of the list.

**Available RMR Subscription:** The control component must hold a list of smart space device RMR’s, to which it is currently subscribed to. This component holds information on how to update any given RMR of smart space. The reflective state component contains the internal component, which is the control component that
allows the devices to subscribe. The devices can subscribe to the RMR of the smart device and manipulate it using the internal operation of the smart space through the control component. Policies are generally used to manage the components of the smart space.

Security in the smart space is attained by granting authentication to the user. Any user who wants to access the services of the smart space is checked for authentication using digital signature scheme. If the user is found to be valid user he/she is given access to services of the space else he/she is denied rights to use the services of the space. In future this could be extended for encrypting of routes and data.

This chapter discusses the design of smart space, which plays a major role in establishing interoperability of service discovery protocols at the middleware. The next chapter will discuss in detail on the concept of interoperability.

![Fig. 3.1 Smart Space Architecture.](image)