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## Home Automation Proposal


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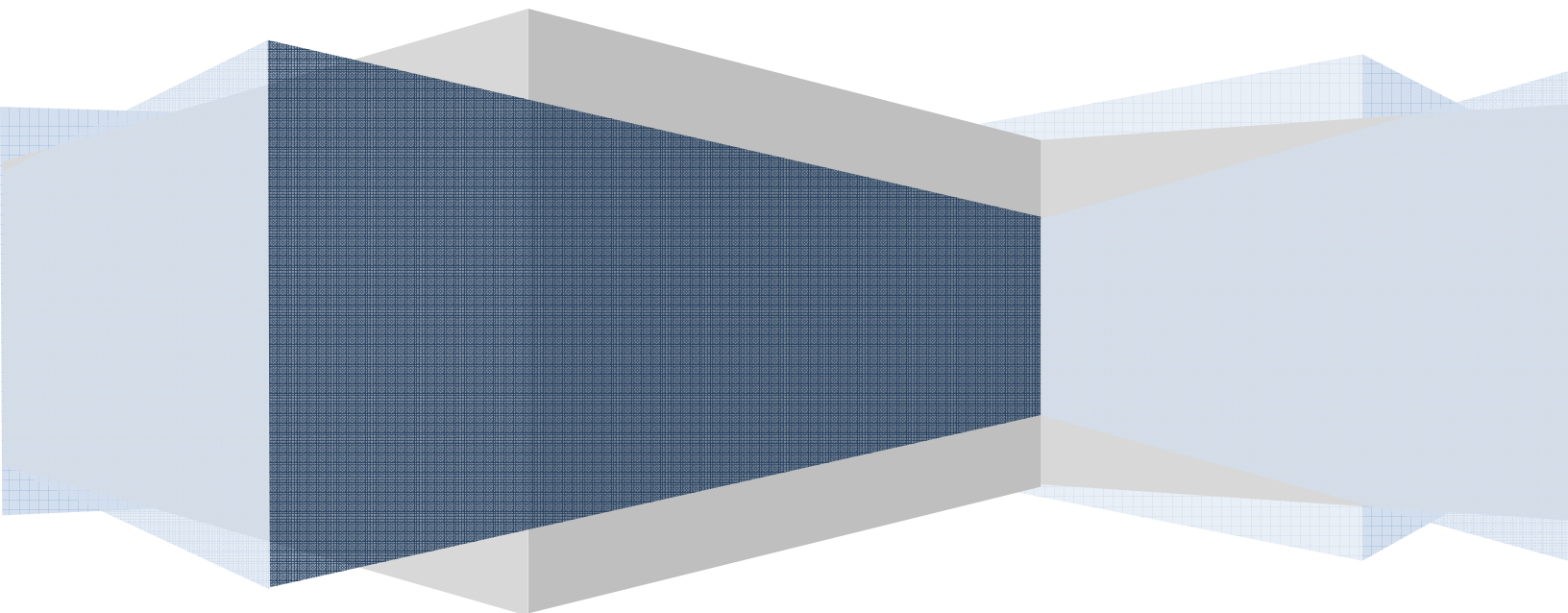
**Missouri University of Science and Technology**

# **Home Automation Proposal**

**Paul Parham, Nathan James, and Bonnie Bachman**

**Department of Business & IT**

**December 17, 2010**



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## **1 Executive Summary**

### **1.1 Objectives**

The objective for Phase 2 of the Motorola project is to propose a comprehensive home automation system that can be launched in the next one to two years. Currently, there are many entertainment, security, and home control devices on the market but no device that ties these systems together for consumers. The goal is to develop a system that can be easily installed, cost efficient, and able to provide genuine home automation to consumers.

### **1.2 Consumers**

The most important consumer features include entertainment, security, and energy management. Consumer spending on home automation is expected to dramatically increase in coming years.

### **1.3 High Level Solution**

The proposed solution will use existing technologies to create a home network. This system utilizes an entertainment hub, which handles entertainment content, and a communication hub, which communicates with house hold networks and modules. Users will have the opportunity to buy modules (light switches, light bulbs, security cameras and many more) that can be easily installed in the home. Modules regulate the control on/off functionality and send energy management feedback to the user. Consumers will use their computer, tables, or web page to send commands to the communication hub, which in turns sends commands to modules in the home.

## 2 Solutions and Substantiation

### 2.1 Product and Service Description

The proposed system, detailed in Appendix 1 and shown at high level in Figure 1 below, will consist of two main hubs, the entertainment and communications hub. These hubs work together to connect the home and network across different modules. A tablet, phone, or web app will serve as the control point for the home.

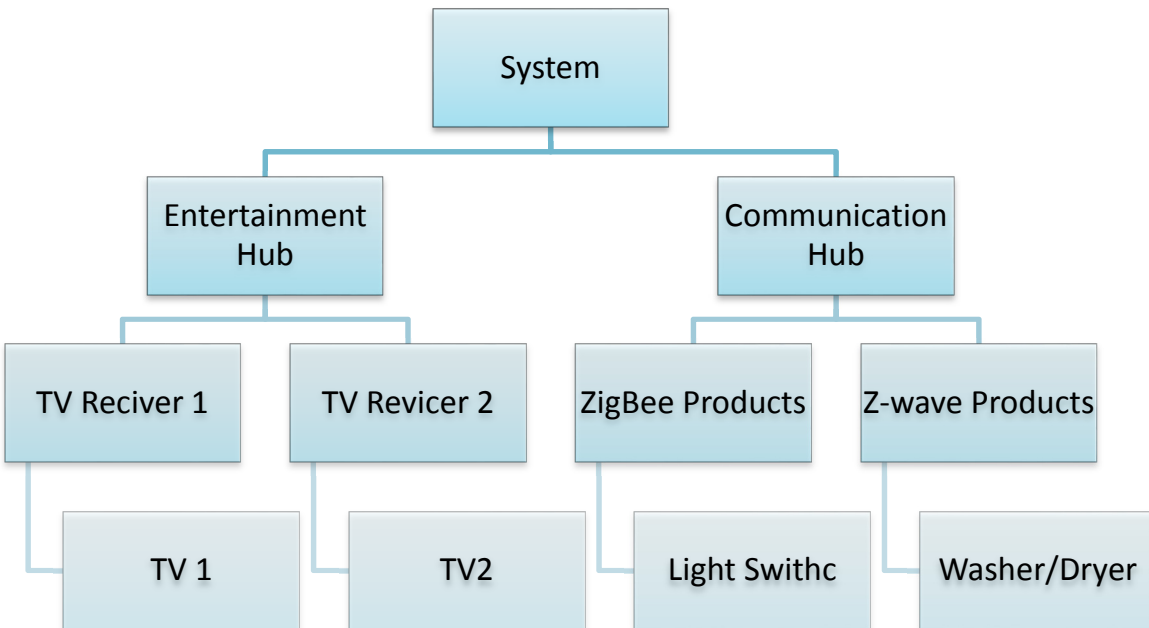


Figure 1: Brief Outline of System

#### 2.1.1 Entertainment Hub

The entertainment hub's function is to manage and distribute content. The hub, Figure 2, will consist of a set top box (STB), which contains an integrated digital video recorder

(DVR), and TV receiver boxes. The STB, receives content from outside the home, processes it, then pushes the desired content to TV receiver boxes in the house. Each TV that is hooked up to a receiver box can watch live TV or can play and record shows on the main DVR. The system has only one DVR, but can play and recorded multiple shows at once on separate TV sets. The STB should be able to receive content from fiber optics or satellite and have some Internet TV (IPTC) functionality built in.

Figure 2: Diagram of STB and Receivers

### **2.1.2 Communication Hub**

The communication hub's job is to communicate with wireless devices, home automation equipment, and modules. The hub contains Wi-Fi, ZigBee, and Z-wave communications. Wi-Fi is used for personal computer devices while ZigBee and Z-wave communicate with the home automation modules. The communications hub receives commands from the users and then pushes the commands to supporting modules.

### **2.1.3 Home Automation Modules**

The third part of the system is the introduction of home automation modules. Modules may be added to the home network and includes on/off, energy feedback, and some

programmable features. These modules will be based upon the ZigBee and Z-wave low power home automation standards. Users will be able to buy individual modules at the local store, e.g., a light switch or home security camera. Once installed, the user is able to program the lights or view the security feed with their phone.

#### **2.1.4 User Control**

The system will be controlled through a web portal making it easy to build apps for smart phones, tablets, and TVs. This flexibility provides the user with different options to access their home and change home settings. Figure 3 outlines the communication between devices. A user at the office, for example, may want to see if they left the oven on. They can open a phone application on their smartphone, which sends a signal to the communications hub which then communicates with the oven via ZigBee or Z-wave. The information is sent back to the smart phone via the Internet. If the oven is on the user can.....

**Figure 3: Communication Example**

Another feature of the system can be found on the user's home page which can display the current energy usage and display the energy use in terms of dollars. It will also make suggestions based on the modules feedback and user's habits, such as lowering

the heating temperature by two degrees which, through the application's calculations, can tell the user how much money may be saved with the specific reduction in temperature.

## **2.2 Competitive Comparison**

Current entertainment systems that use a single DVR to play and record on multiple TV include Direct TV and AT&T U-verse. Each system is currently available on the market and both bring content to a main STB which in turn pushes the content to receiver boxes connected to TVs. AT&T uses fiber optics while Direct TV uses a satellite signal. AT&T U-verse also uses a communication type hub that controls both the home phone and Wi-Fi in the house. ADT has recently teamed up with the Z-wave brand and now offers a home automation system in addition to their security packages.

The proposed system would bring together the entertainment and content provided by AT&T U-verse with the security and home control of ADT. The functions provided by these systems would be controlled by a single application that is delivered through multiple platforms. In addition, the proposed system would be compatible with ZigBee and Z-wave devices.

## **2.3 Future Products and Services**

**3 The future is modular based. Modularity allows manufactures to integrate ZigBee and Z-wave components into more applications which concomitantly enhances the appeal and increases the functionality of home automation. The module market is expected to rapidly expand in the future (any references for this)?. For instance, refrigerators will be able to issue warnings about spoiled food or expiration dates. Shopping lists can be**



**auto generated and sent directly to the phone for access in the grocery store.. Doors will automatically unlock when the owner is in proximity and preference lighting will turn on based on the user profile. Motorola does not have to invest or create every module, but it's role is indeveloping a platform that supports and encourages manufactures to implement home automation systems into their products. Market Analysis Summary**

### **3.1 Market Segmentation**

The market is generally divided into five age segments; Generation Y (18-30), Generation X (31-44), Younger Boomers (45-54), Older Boomers (55-65), and Seniors (66+). Figure 4 glimpses at the future and shows the technology divide and behavior between each generation.

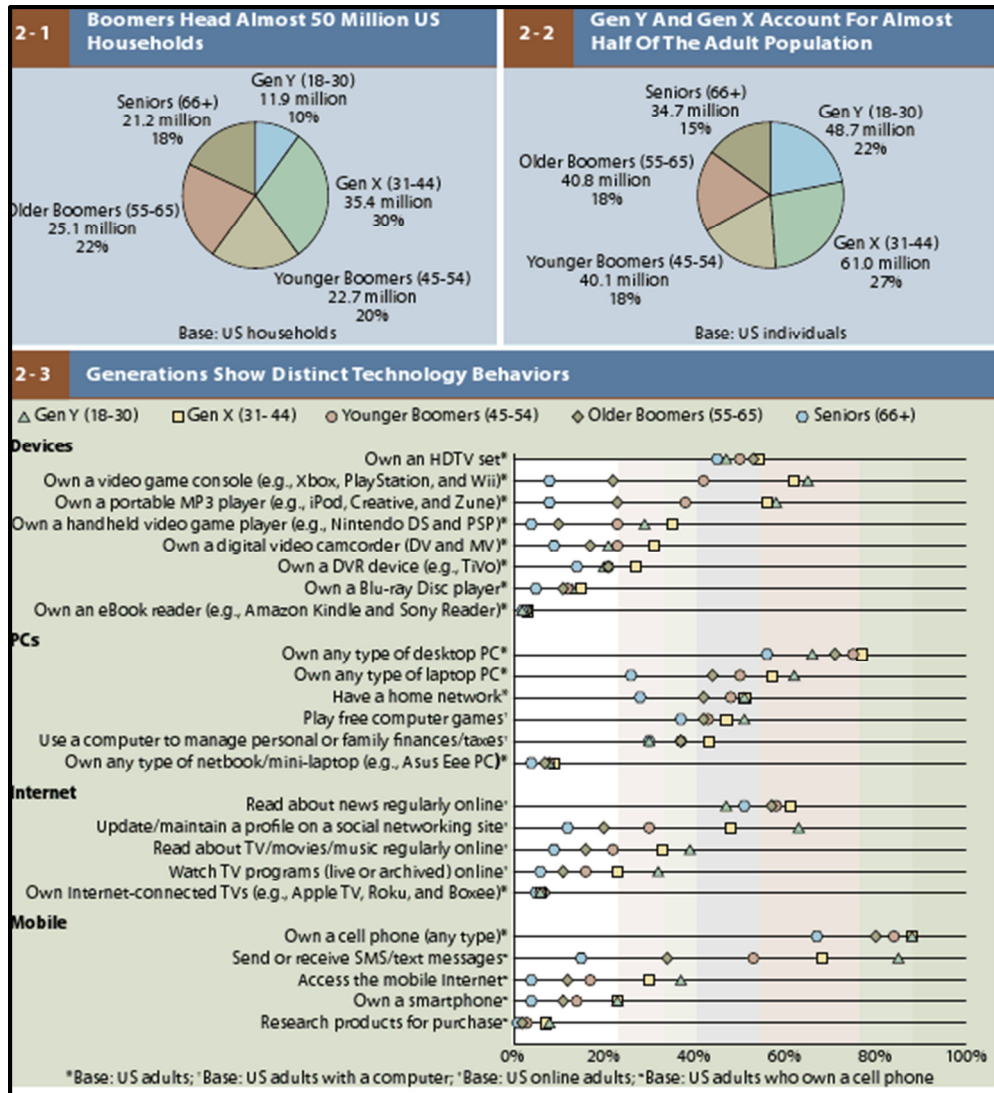


Figure 4: Generation Technology Behavior

### 3.2 Target Market Segment Strategy

The proposed target markets include Gen Y, Gen X, and the Younger Boomers because of their technology adoption rates and the percent of households they head. Gen Y and Gen X lead the adoption curve and are likely to own a smart phone. These generations are outpacing Boomers and Seniors in almost all technologies. Younger Boomers are behind the adoption curve of most technologies but are keeping pace with the mobile adoption rate. In addition, the Younger Boomers spend more money on tech-related items and services. Generation X heads the

majority of the households at 30% followed by the Younger Boomers at 20%. Generation Y only head about 10% of the U.S. household, but this number is expected to expand in the coming years.

The strategy recommended is?

### **3.2.1 Market Needs**

The most important features consumers want in their home automation system include energy management, entertainment, and security (rfpmagazine). These features need to be controlled by an intuitive user interface that provides integrated services for the home network .

### **3.2.2 Market Trends**

About 43% of users understand the home automation concept but have not installed a home system, while 50% were not aware of home automation or its capabilities. Lack of awareness, expense, and perceived lack of need are the major challenges to home automation (ABI). The home automation market is expected to exceed \$11.8 billion by 2015 and is growing at a rapid rate. About 39% of consumer intended to purchase a system within three years.

## **4 Industry Analysis**

#### **4.1 Industry Participants**

ZigBee and Z-wave: The two emerging wireless protocol standards targeted for home communication between devices are ZigBee and Z-wave. Both standards have low energy usage and have supporting alliance manufacturers. It is noted that Motorola is a founding member of ZigBee.

#### **4.2 Distribution Patterns**

Systems and modules are typically sold online with a very limited availability in stores. Some systems, such as Z-wave, can be bought through ADT as part as a security package. The lack of retail availability is an area that Motorola can capitalize on and improve.

#### **4.3 Main Competitors**

Main competitors include ADT, Direct TV, and AT&T. Both Direct TV and AT&T currently offer systems that utilize one DVR that can provide content to multiple TVs. ADT offers a home automation package in addition to its security system. A user today could build a basic system and have home automation if they subscribed to both AT&T and ADT.

##### **4.3.1 Secondary Competitors**

There are many secondary competitors in the market. The two main systems used in home automation are ZigBee and Z-wave. The ZigBee alliance (ZigBee) and Z-wave alliance (Z-wave) each have hundreds of partners. These include, Control 4, AT&T, D-Link, Cisco, Whirlpool and many more. The Internet TV market has particularly expanded in the last few months with the introduction of such products as Apple TV, Google TV, Boxee Box and more. These systems are making it easier for people to cut cable (Neff, 2008), but are limited to content provided by the

Internet. These Internet TV boxes are expected to grow and offer increased services in the future.

## **5 Strategy and Implementation Summary**

### **5.1 Value Proposition**

The home automation revenue is expected to grow to about 11.8 Billion by 2015 (Parks). There are many competitors in the current market and Motorola must act now to claim its market share.

### **5.2 Competitive Edge**

Motorola has several key advantages which will be helpful when developing this system. Motorola is a founding member of Zigbee and is at the forefront of developing wireless communications system. The company also has a strong background in the STB market and has developed useful partnerships with distributors. With the recent acquisition of 4Home, Motorola should have a solid starting point for building a comprehensive home automation system.

### **5.3 Marketing Strategy**

A significant market share is crucial to launching future products in the home automation market. The marketing strategy is to target the Younger Boomer, Gen X, and Gen Y consumers. The entertainment and communications will be marketed as one unit but users will have the option of just buying the communication hub. This opens the market to more consumers who may want some form of home control but may not want to pay for TV services.

### **5.4 Pricing Strategy**

Although a specific pricing strategy was not performed as part of this Phase 2 project, pricing will play a significant role in the overall positioning of the system. In general terms, the system (entertainment hub, communication hub and control phone) should come in near \$500 with a subscription cost less than \$10 per month (Botterweck, 2009). The idea is to sell a subsidized or free system that will be paid for by a subscription base. Subscription features will be finalized during the next phase of research but current ideas include subscriptions for TV content, security systems, text message alerts and advanced program ability of home automation features. **What about energy? Or will this be a itered approach where entertainment is first?**

### **5.5 Distribution Strategy**

Motorola has a good distribution strategy with its existing STB line of products. It is recommended to continue this strategy by releasing similar STB to different content providers. However, to truly reach the home automation market it is important that modules are sold in local retail stores. Motorola will not be producing the vast majority of the home automation modules. Thus, it is important that appliance and other product manufacturers are encouraged to install ZigBee and Z-wave receivers in their products. It is important that Motorola develops or works with providers to create a logo or symbol that will be placed on modules and will identify the product as one that works with the system in their home.

### **5.6 Strategic Alliances**

Motorola must bring together entertainment, security, and energy management into one system and should look for partners that can help accomplish this. Motorola has a good foothold in entertainment STB but may want to look into partnering with internet TV providers

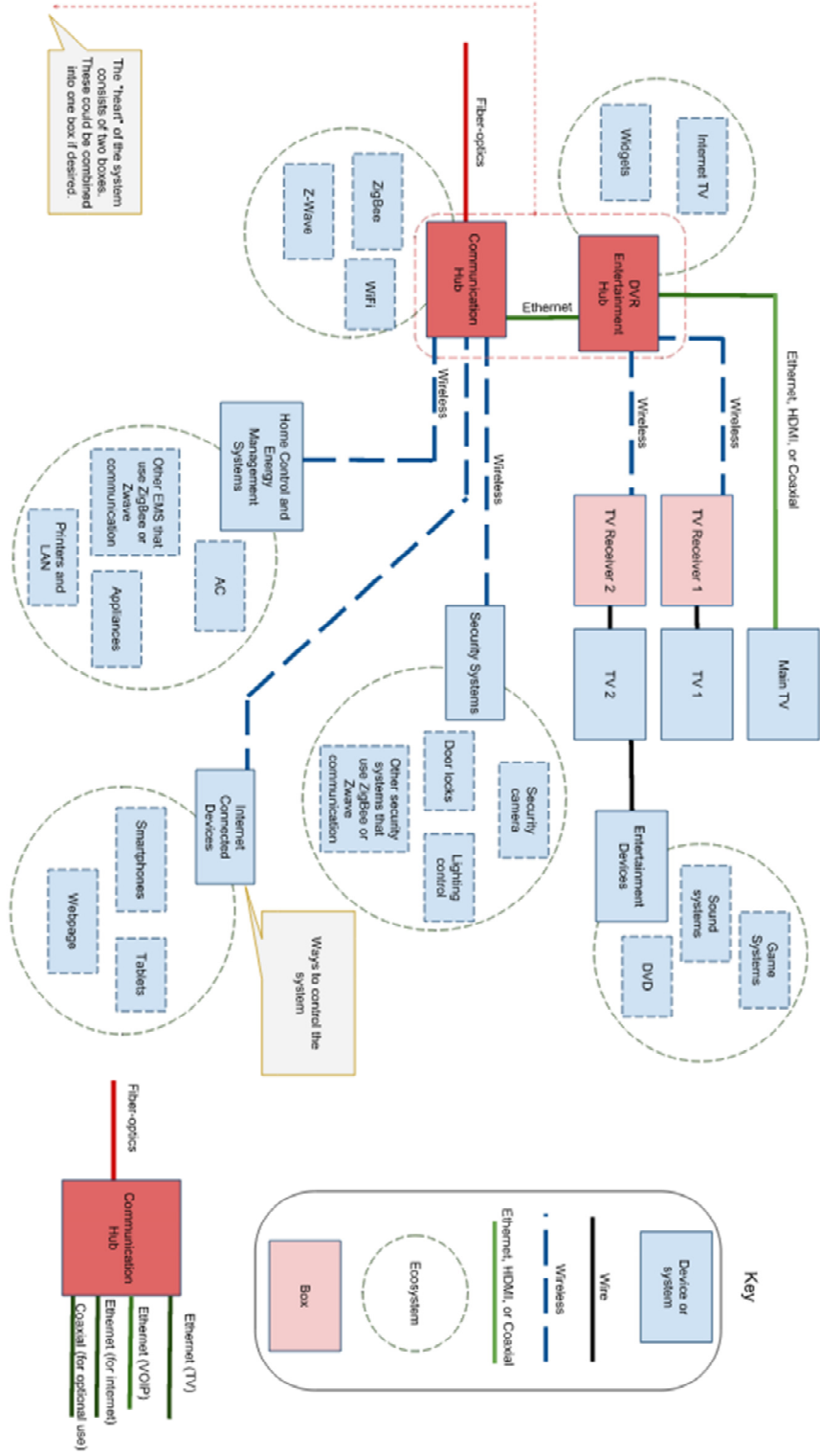
such as Google TV. This will increase the functionality and expansion of the STB. In Security, ADT may be a good partner due to their security systems and their recent home energy systems. Motorola recently acquired 4 Home but may want to look at other companies such as Control 4, and iControl.

More importantly Motorola will have to develop alliances with manufactures and retail stores to incorporate the ZigBee and Z-wave standards. Many manufactures are already a member of ZigBee or Z-wave, but few products are on shelves or even online. Whirlpool, GE, Kenmore, and other manufactures are key to developing a truly automated home. It is also important to get these appliances in stores. Motorola should consider working with Wal-Mart and other major retailers and distributors.

## **6 Conclusion**

There are many players in the current market but no system that ties all of the functions together and delivers control and information to the user in a usable way. The home automation market is growing and Motorola has an edge with its experience in STBs and mobile networking. Motorola has the capability to develop a home automation system in the next one to two years. To offer a truly automated home Motorola must get third party manufactures to integrate ZigBee and Z-wave into their products.

# Appendix 1. Detailed System





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