

SECURE SMART GRID DEVICE for HOME AREA NETWORKS Using WIRELESS APPLICATION PROTOCOL

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Abstract:

The use of Internet and Mobile user reliance on Internet services, along with advancement of portable computing devices and wireless communication networks has been growing tremendously. This growth pattern is also seen in the day to day accidents that occur primarily due to negligence. House hold monitoring has become tedious to mankind and there is a need of a computing service that serves this purpose. In order to provide such an end-to-end solution, an open architecture is required to provide the intelligent network solution. To ensure the Secure and efficient communication between human being and managed devices for Smart Grid and Smart Home, this project propose the architecture and design of a secure access gateway (SAG) for home area networks. Wireless Application Protocol (WAP) is a widely used mobile Internet access solution, enabling users browse on the go. This paves way to a secure access gateway at homes and building controllable smart homes through WAP.

Keywords: - Home Assistant, Smart Grid, SAG, WAP

INTRODUCTION:-

The Internet is becoming an ever essential and integral part of our lives, expanding well beyond the desktop and personal computer. In addition, Hand-held phones with Internet facilities are an integral part of a person's life these days and blooming technologies like Wireless Application Protocol (WAP) are starting to monopolize the day to day functions, offering convenient, simple and ease of use in the typically frantic lifestyle.

For example, when a person leaves for a vacation, and he is not sure of whether he has switched off every device and appliance at home, a cell phone can be used to connect to the device-networking gateway in the home. The enabled appliances are checked and turned off remotely, as needed. Using your cell phone, you can pay for drinks in a vending machine as the phone remotely manages your account information for billing purposes. These and many other device networking solutions will find that a WAP-enabled cell phone is a convenient and appropriate technology for monitoring, managing, configuring and controlling embedded devices. Connecting everyday devices to the Internet is only a part of the solution. Once connected, a complete end-to-

end solution needs to be in place to realize the promise of networked devices. In order to provide such an end-to-end solution, an open architecture is required to provide the intelligent network solution.

In the wire line domain, the high-speed wire line links and the core routers are used as the backbone network, whereas the servers host the contents provided to the mobile Internet users. On the wireless domain, handheld devices such as Mobile Phones, Personal Digital Assistants (PDAs), Portable PCs, Smart Phones, etc., are used as end-user terminals. At the wire line / wireless interface, the base stations (Network Controller or Mobile Switching Center) are used to provide wireless network access points to mobile users.

The system proposes the following features :-

1. This project proposes the architecture and design of a secure access gateway (SAG) for home area networks.
2. The proposed architecture contains three major components: the remote wireless enabled device (called C-Mobile), the Secure Access Gateway (SAG), and the

Smart Home managed devices, especially home devices for Smart Grid.

3. The main idea of the proposed secure access authentication. WAP gateway used for secure authentication.

Control of Automation via Internet

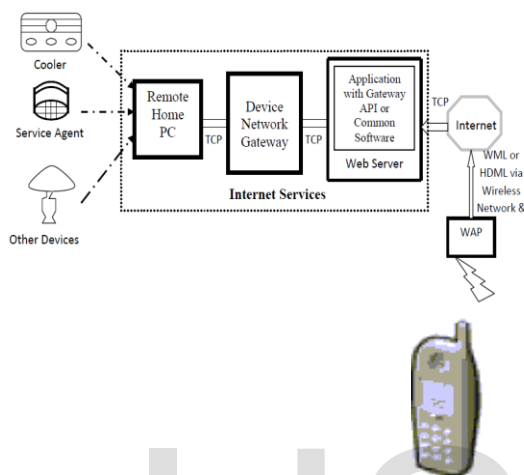


Fig 1: Schematic diagram for control of automation through internet.

The main purpose of the protocol stack is to ensure reliable and secure transfer of the content. The WAP protocol stack has four layers; the model is very similar to OSI – model. A simple WAP application consists of a client application (WML and WMLS pages) that the WAP gateway downloads from the application server and passes to the user agent for execution (micro browser). More efficient applications are made with server side enhancements, like CGI scripts, servlets etc.

The content can also be located on a separate web server from where the gateway receives it. The content and applications are addressed with an URL in the same way as in any other Internet protocol. From the user point of view WAP offers *dynamic* user interface in a similar manner as web browsers for desktop computers.

WAP server security protocol (WTLS) is a noteworthy issue in WAP specifications. The WTLS protocol provides content encryption, content integrity and server authentication using certificates. WTLS is based on TLS/SSL; it is only optimized for use over wireless networks. The data from terminal to base station and to gateway, and

data from gateway to web server can be encrypted. However the data must be decrypted in the gateway, because the terminal uses WTP (Wireless Transfer Protocol) and the Internet uses HTTP as a transfer protocol. Direct conversion from a protocol to another is not possible in secure mode at least in the version. This established networking infrastructure provides the primary conduit between the gateway and the Client. TCP/IP is leveraged as it is with the existing base of development, diagnostic and monitoring tools

In our experiments we used Nokia WAP Server 1.0 as a gateway and Nokia 7110 telephone (software v 4.69) as terminal equipment.

a. Client Application

This is the user interface or application in whatever forms it needs to be for the specific solution. The first user interface technology that comes to mind when considering networked devices is usually a web browser. Browser technology is appropriate for remote configuration, management and service. However, for aggregating information from a large number of devices in a non-persistent network, a database would better serve as the client. Custom or enterprise applications, telephony, cell phones, PDAs and pagers, are examples of user interfaces that can interact with devices through the gateway.

There are other approaches to device networking that differ in the communication networks, the extent of the gateway functionality and the flexibility of the client applications. However, this discussion will focus on the principles of managing the device network from a client application, specifically a WAP-enabled device.

b. Focus on The Client Application

When an end-to-end is considered, for a device networking solution, there are many important factors that should be considered to be incorporated into the design.

C. WAP-Enabled Devices as Clients

There are many instances where cell phones, pagers or PDAs provide the appropriate

technology to fill the solution requirements at the client end of the device network. Many of these devices are capable of communicating via WAP. WAP is an open, global specification that empowers mobile users with wireless devices to easily access and interact with information and services.

ARCHITECTURE :-

Home Automation using WAP/WML & JAVA

Automation and especially remote automation will obtain substantial benefits when applying these new techniques. The basic idea of WAP is to bring the same services that are used in Internet, available also for the mobile users. It defines the application environment, the communication protocol itself, as well as an application layer consisting of a markup language (WML) and scripting language (WMLS). WAP pays attention also to limitations of mobile phones: small displays, slow data transmission and limited input capabilities.

WAP satisfies the new needs in industry and home automation. With WAP you can control and monitor everything that can be connected to the Internet. Nowadays your washing machine as well as fieldbuses may have Internet capabilities. Its real significance is revealed when we need wireless data transfer. We are no longer tied to our computers; we have almost the same functionality in our mobile phones. The key to the security is naturally a gateway, which translates WAP requests into HTTP requests, converts the responses to WAP, and encodes content to binary form.

In Nokia WAP Server you can protect control commands transferred from the Nokia WAP Server to WAP terminals by combining the Nokia WAP Server with the Nokia WAP Server Security Pack. Similar solutions are also available from several other vendors' gateways, e.g. Infinite Technologies WAP Lite. There are also some security problems with different software versions of Nokia 7110, e.g. software versions before 4.75 don't support WTLS. In such industrial experiments like our pilot process where user controls the process, it is important that security is

guaranteed and no one else can control the process than an authorized user.

Home Automation

Emergence of distributed intelligent control systems and home automation has changed the traditional concept of smart consumer appliances and their control architectures. The smart consumer appliances won't be the standalone devices anymore; they already have on board computers or abilities to be connected to home network and other local or global networks. It is not difficult to envision a local domestic network based on all these smart appliances.

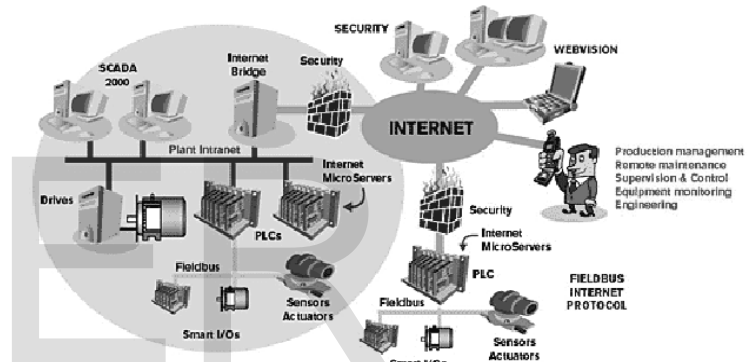


Fig 2: Architecture for SAG home automation system.

In figure-1, shows the home networking, it is possible to remotely control how home automation systems work. Therefore, to improve the system performance a lot, for instance, to read utilities automatically to view home surveillance cameras at office, and to adjust the residential environments. (i.e. lighting, temperature, cooler so on).

ALGORITHM DEVELOPED :-

Before programming the AT89C51 the address data and control signals should be set up according to the Flash programming mode. To program the AT89C51 take the following steps.

1. Get the desired memory location on the address lines.
2. Get the appropriate data byte on the data lines.
3. Activate the right combination of the control signals.
4. Increase EA to 12 V for the high-voltage programming mode.
5. Pulse ALE / PROG ones to program a byte in the Flash array and the lock bits. The byte write cycle being self-timed takes no more than 1.5 meters. Repeat steps 1 through 4, Change the address and data for the entire array or till the end of the object file is reached.

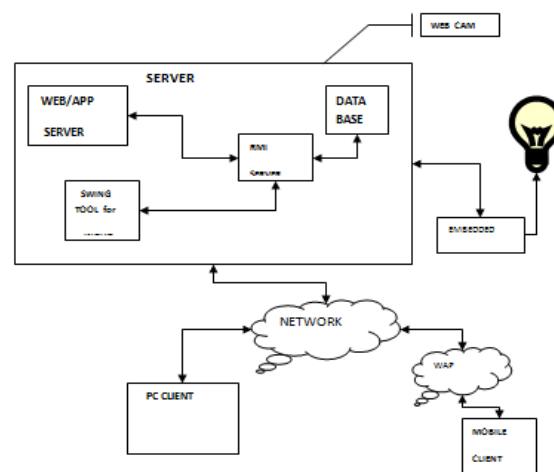


Fig: 3

PROJECT CONTROL FLOW :

The product control flow for this project can be represented in the diagram. It shows that a network has been established between a Smartphones and a WAP browser. A webcam directly operates using the instructions given by the web server. The server can be accessed using any WAP browser in Smartphones. The RMI will serve as the medium to control home equipments.

A separate secure login system is created by the server. Each user has to go through the authentication process to access the Home Network. Each user is allotted a separate session state along with a specific session expiry time.

A means of communication is established in the network using RMI interface which provides serial communication between the control station and micro-controller for setting the specific Device State.

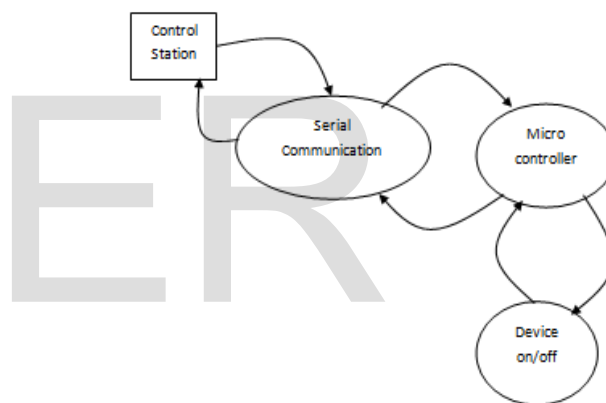


Fig: 4

CONCLUSION

Reliable and efficient communication between human being and devices plays a key role for Smart Grid and Smart Home. In this article, we discussed the design of a secure access gateway (SAG) for home area network. The SAG serves the purpose as the interface between the remote users and their devices, such that real-time secure monitoring and control of the devices can be achieved through a Smart Phone. The major challenges for the design and deployment of the SAG lie in the ever-increasing demand on security and capacity. We enhance the security from both the network layer and the physical layer. A framework on how to improve the system security, capability, robustness and scalability through

cognitive networking is provided thereby a potentially, secure monitoring and control of home devices through wireless communications will gradually penetrate into the world surrounding us and bring great changes to our daily lifestyle.

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