MICROWAVE LINK RECEIVING LEVEL VARIATION DETECTOR WITH EARLY WARNING SYSTEM

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ABSTRACT

Mobile communication industry microwave links play a major role in establishing a connection between two or more towers. Due to some reasons, the receiving level of the microwave link can be changed. In present day practice, mobile communication service providers take two or more days to inform regional engineers. It will cause to reduce data transmission and loss data in the network. To overcome this problem, the microcontroller based system has been developed. The developed system uses a GSM module to send message to regional engineers. By using this system, the regional engineers can identify receiving level variation quickly and bring back to normal as soon as possible. Then the mobile communication service provider can bring expected level of the network availability.

Keywords: Microwave Link, Receiving Level Monitor, Liquid Crystal Display GSM Module.

1.0 INTRODUCTION

Today wireless technology is used in many applications well integrated into our everyday life. Planning a good, stable and reliable microwave network can be quite challenging. Careful planning and detailed analysis are required for a microwave radio system before the equipment can be installed. A poorly designed path can result in periodic system outages, resulting in increased system latency, decreased throughput, or worst case, a complete failure of the system. It is generally agreed that a microwave signal is a signal whose fundamental frequency is between 300 MHz and 300 GHz (1 GHz = 109 Hz). In terms of wavelength, a microwave signal has a wavelength between 0.1 cm and 100 cm the waveguide is a hollow mechanical structure

that permits the propagation of microwave signals from one point to another with the least possible loss. Most commonly used waveguides are those having a rectangular form. There are, however, a variety of rectangular waveguides, each being identified according to its internal dimensions. Each type of waveguide allows microwave propagation within a particular frequency band. The figure 1 is shown main components are used in microwave link.
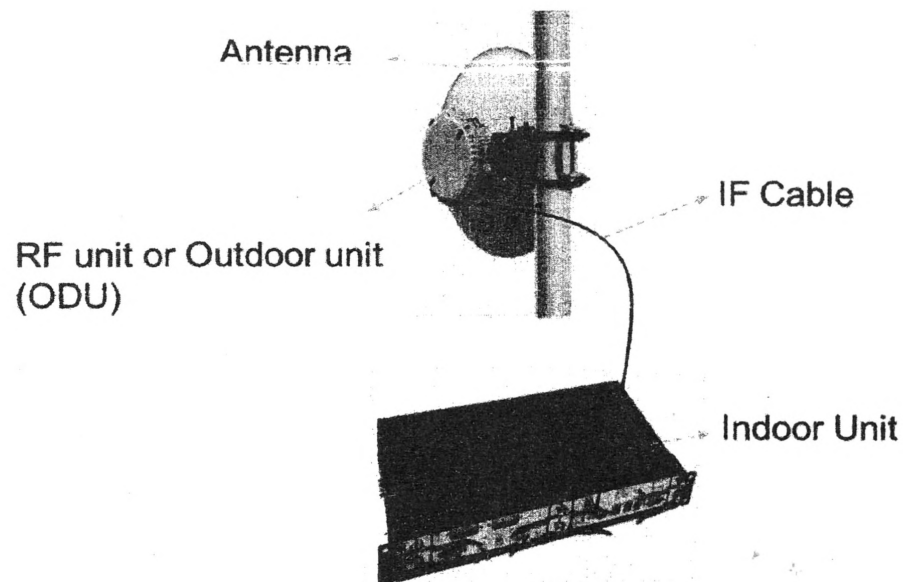

Figure 1 : Elements of the Microwave Link

Indoor Unit (IDU): It is used for the assigning the frequency, power to ODU for microwave link. It is also used for observing the alarms in working Link.

Outdoor Unit (ODU): It is used for the allowing the different frequency and power for getting the maximum receiving power. It is of two types upper band & lower band, the upper band is having more Tx frequency then the Tx of lower and the Rx of upper is the Tx of lower and vice versa.

Antenna: It acts as transmitter which can transmit and receive the microwave signals.

Receiving Level: The receiving level is the actual received signal level (usually measured in negative dBm) presented to the antenna port of a radio receiver from a remote transmitter.

2.0 EXPERIMENTAL

The microwave link receiving level alarm detector with early warning system was designed is shown in the figure 2. TL072 OPAMP, PIC 16F877A Microcontroller, LCD display and SIM900A GSM module were used to develop the system.
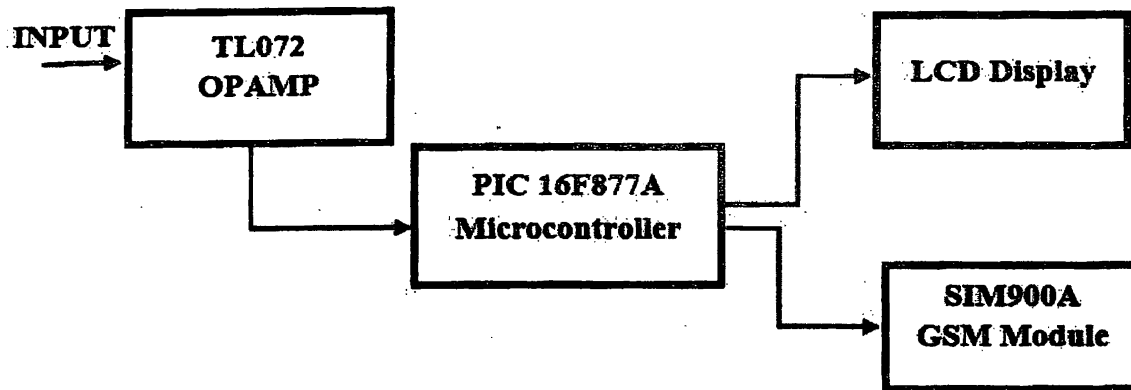
Figure 2: Block Diagram of the designed System

TL072 OPAMP: The OPAMP is used as a unity gain amplifier because of the developed system is connected to the Outdoor unit in the microwave link directly. Then equipment current of the outdoor unit goes through the developed circuit, it is caused to the actual function of the Outdoor unit. To overcome this problem OPAMP is serially connected to the input signal and output is connected to the microcontroller. The main feature of the OPAMP is a high impedance at the input then the equipment current doesn't go through the designed system.

PIC 16F877A Microcontroller: Microcontroller PIC16F877A is one of the PIC Micro Family microcontroller which is popular at this moment, start from beginner until all professionals. Because it is very convenient use the PIC16F877A and also it uses FLASH memory technology, so that can be write-erase until thousand times. The main task of system, analogue digital conversion is done by the microcontroller. And also builds a connection between Liquid Crystal Display and GSM module.

SIM900A GSM Module: The GSM shield is used to send/ receive messages and make/receive calls just like a mobile phone by using a SIM card by a network provider. We can do this by plugging the GSM shield into the Arduino or PIC Microcontroller board and then plugging in a SIM card from an operator that offers GPRS coverage. The GSM module is used to send final output to regional engineers.

LCD Display: The LCD screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is a very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being, LCDs are economical, easily programmable, have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. With the help of the LCD, the rigger who is the person do the link alignment can see the current receiving level of the microwave link.
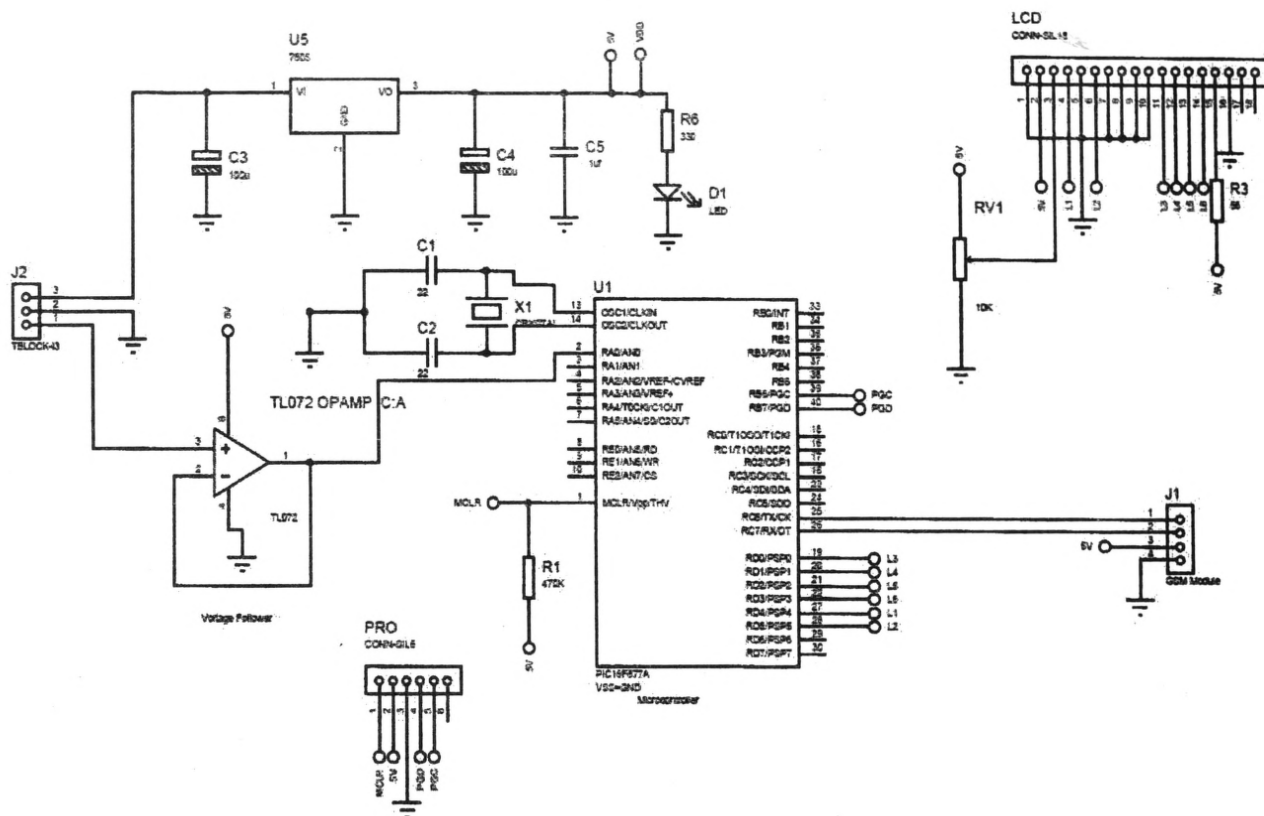
Figure 3: Implemented circuit sketch diagram

3.0 RESULTS AND DISCUSSION

The final outcome of this research project is the receiving level variation alarm messaging system for the regional engineers. Yet they have not a system to identify this faulty when it is occurring, because of the current working process is followed by the system operators. By using my system directly the regional engineer can identify this faulty and make the necessary arrangement as soon as possible. Then the system becomes back to normal immediately.

The LCD display is used as the interface which shows the current receiving level. It's more beneficial to rigger who do the link alignment at the top of the tower. This device contributes lots of advantages to Network Service Providers to maintain their microwave link.

4.0 CONCLUSION

By the sanctity of data transmission in the telecommunication, we have reduced the microwave acknowledgement with the particular alarm at particular frame, by providing the proper troubleshooting command action with respective to the feedback error signal. Due to minimization of microwave error signal we can improve the quality of microwave signal and maintain the data transmission speed at the desired level.

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