Introduction

Public address system is an electronic system, used as in auditoriums or theaters, so that announcements, music, etc. can be easily heard by a large audience (Harcourt, 2010). A public address system is a communication system for public areas that amplifies voice or recorded message. The biggest advantage of a public address system is the ability to get Emergency alarm, routine voice message, background music or information out to a large number of people, all at the same time. They are usually used in large events, concerts and at railway stations and airports. Public address systems are also used shopping malls, corporate office, SMB Business, Industries. Such systems are very useful for the industrial & extreme sites condition. A public address system refers to a system of amplifiers, loudspeakers, zone paging system, digital and network PA system units that are used to amplify music in an outside gathering (cosmotechph, 2014).

Traditional Public Addressing Systems consists of microphone inputs and audio speakers interconnected by hard wires. With rapid development in technologies and the integration of voice, video and data in multiple applications, any existing Local Area Network can be utilize as a backbone for public address system. Utilizing any established network minimizes the need for additional wires and cables necessary for a separate public address system, consequently minimizing labor and cost.

Paging system is a communication system based on communication technology that communicates with public through speakers (Mitel, 2020). Through the system, you can quickly

and accurately publish announcements and notifications to multiple areas. Also, the Paging system can benefit from the advanced features and functions now available from IP paging systems.

Mindanao State University-Main Campus is residential university entailing huge maintenance and operating expenses. Aside from big number of academic, semi-academic and administrative buildings, MSU Marawi have student dormitories, faculty and staff cottages, and huge land areas. Moreover, being in key areas of conflict, some of MSU campuses (especially MSU-Marawi) require adequate number of security personnel. The Office of Information, Press and Publication (OIPP), it serves as the primary unit of MSU-Marawi in information gathering, processing and dissemination. Some of the roles and responsibilities assigned to the OIPP are: To prepare, write, edit and otherwise get ready for publication or dissemination by mass media, any and all news items involving the MSU-articles, studies, reports and others done by the faculty and staff; To publish the literary works of the faculty and staff; To perform such other duties as may be assigned to it by the President from time to time.

Real time networking is a non-easy task, so before move any further, system connectivity requirements must be analyzed. The right way to do it is to use broadcast mechanism. In fact, the broadcast communication techniques has more advantages over the multicast in order to develop group paging in IP-based network PA system design. Lack of proper communication in a university would bring chaos and misunderstanding, thus decreasing the efficiency of the work that needs to be done efficiently. This makes information dissemination a vital role in many university functions. As for students whom are fond of posting announcement to university bulletin board, it is very exhausting and time consuming which makes it impractical.

Implementing a Public address system that can utilize existing local area network will provide efficient and practical approach in the university's information dissemination, each other institutions can consider implementing this PA system, provided they have existing local network.

1.1 Project Context

This is a software development project that will focus on the development of IP based Public Address System to help the MSU University in information dissemination. This project began 2nd semester of Academic Year 2018-2019 and is expected to be finished in the first month of 2nd semester of Academic Year 2020-2021.

This project will help University officials in the information dissemination with reliability and consistency of the information. The main beneficiary of this system is the *Office of Information, Press and Publication (OIPP)* staff. Through the years, this University's fundamental ways of communication are by memos, message relays, announcements in a crowd, and the use of posters and streamers, FB social media, SMS text and radio broadcasting. The lack of centralized system for broadcasting results in integrity and consistency issues.

Installing a public address system usually takes a lot of money for the labor, equipment, and buildings for the system (Bassdale, 2017). But with the existing Local Area Network of the University, this provides a much efficient way of implementing a public address system. For the tools/devices that are needed for this project, equipment (such as UTP or STP cable, RJ45, switches, speakers etc.) from the MSU-CIT Network Lab will be utilized, for academic purposes only. For the testing of this project as a local, it will also be conducted in the Network Laboratory

and the selective testing will be performed based on what type of clustering in university's local network. This project will mainly develop Client-Server desktop System. Hence, the existing University LAN connection, the admin offices and colleges are the same connection serve as the clients. In this project, at least one PC per colleges and admin offices provided for this system. It will broadcast from a centralized microphone will act as a server, and to all of the connected laptop/PC with speakers inside this university serve as a clients. This project will make the information dissemination in this university easier, inexpensive, time-saving, reliable, and consistent.

1.2 Project Purpose and Description

The purpose of this project is to make information dissemination in this university easier, centralized and time-saving, especially urgent announcements and emergency. University functions such as manual announcements of holidays, meetings, seminars, orientations, are tedious and time conquering, thus the need for broadcasting. As for the students whom are fond of posting announcements to University Bulletin Boards, it is very exhausting and time consuming which makes it impractical. Besides that, this project can also be used by the MSU President during his speech in every event so that everyone can listen on-air to the President's message.

In this modern world where social media, email, mobile messaging and other modes of communication is available to everyone. Students and employees can miss to read university memos, emails and bulletin boards but will have a hard time missing a PA system. Also modern

issues on unreliable news or fake news which causes panic to the public, this project will also address it. The following are the people who will use and the beneficiaries of the system:

▪ MSU OIPP. MSU-OIPP is the centre of information of MSU-Marawi therefore they are the most befitted for the system. It will help them to disseminate information, guidelines or emergency protocols in most efficient and faster manner.

▪ MSU students, faculty members and staff. Mindanao State University- Marawi (MSU-Marawi) itself will be benefited by receiving announcements much faster considering the fact that main source of information of most of the people are social media where information is sometimes untrue and slanderous. Whereas the Development of IP-based Public Address System will be much more reliable and real time source of information.

This project aims to develop an IP based public address system using the University's Local network. This will lessen the installation cost as opposed to new public address system and will provide fast, secure and reliable information dissemination in the university.

1.3 Project Objectives

1.3.1 Main Objective

The main objective of this study is to develop an IP based Public Address System that utilizes the university's existing network for information broadcasting within the university.

1.3.2 Specific Objectives
This study intends to do the following:
⬚ Study IP Paging/PA system.

⬚ Design a PA system network structure/architecture.

⬚ Develop a Public Address System.

⬚ Test and evaluate the system in a certain network cluster.

1.4 Project Scope and Limitations
The following scope and limitations are categorized into People, Process and Technology:
⬚ People
o   The system will be managed by the MSU OIPP. All of the MSU Main constituents including the students, faculty members, staff and employees of academic, semi-academic, and administrative offices of MSU Main are the main beneficiaries of this system.
⬚ Process
o   The system will broadcast the University's announcements such as emergency alerts, advisories, holidays, memorandums, special orders, notice of meetings and etc.
⬚ Technology
o   The system will use the network clustering for testing. Target cluster discussed in Methodology section (See Development and testing).

o The system will have an application built to run into Windows Operating System or platform.

o The system will use wired LAN (cable) as priority.

o The system will use any available tools/devices in MSU-CIT Network Laboratory.

o The system's audio output will make use any stereo speakers connected to the client.

o The system's audio input will make use any microphone connected to the server.

o The system will use User Datagram Protocol (UDP) to broadcast the audio.

o The system will use any available Open source VoIP APIs.