

Design of Communication System in Conventional Facilities for the Proton Accelerator Research Center

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1. Introduction

The communication system in conventional facilities for the Proton Accelerator Research Center (PARC) is designed to operate efficiently through smooth communication among operators in each zone.

2. Design of Communication System

Main equipment of each communication system will be installed in the utility building's communication room, it is designed to ensure redundancy and independency. Communication system, which is installed in the research center is as follows :

2- 1. Direct Wire Telephone System

Direct Wire Telephone System (DWTS) which is composed of cable pipeline for incoming line, telephone switchboard, Main Distribution Frame(MDF), premises wiring, Intermediate Distribute Frame(IDF), and terminal box, is not only able to speak by using telephone between each building's offices mutually, but also to provide the joining telephone through Private Automatic Branch Exchange (PABE).

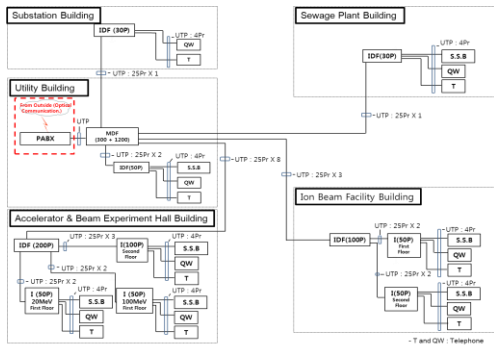


Fig. 1. Configuration drawing of the DWTS and PABX.

2- 1-1 Private Automatic Branch Exchange System

Private Automatic Branch Exchange System(PABES) is designed to provide user with smooth service to connect between telephone company network and the research center network. PABES was designed with the following features:

- Two-way simultaneous telephone conversation
- Group call by special code
- Hot-Line functional approach
- Calling by using Lamp and speaker
- Call waiting
- Barge – In function

2- 2. Evacuation Alarm System

Evacuation Alarm System(EAS) is designed to have the following two purpose . First, in the case of fire and the state of emergency in the research center, EAS evacuate immediately all workers through broadcasting when the evacuation alarm sounds. Second, the goal of EAS is to deliver general business and announcement through b broadcasting as rapidly as possible. More than 3W speaker of EAS is designed to be installed every floor of the building based on worker's staying place, radiation area, near equipment for the major operating, hallway, and stairs. Also, 4 speakers (All 200W) is installed on the rooftop of utility building in the light of the environment around the research center. In addition, Paging Phone equipment designed to make the broadcast as an alternative idea when the main AMP Of EAS is out of action.

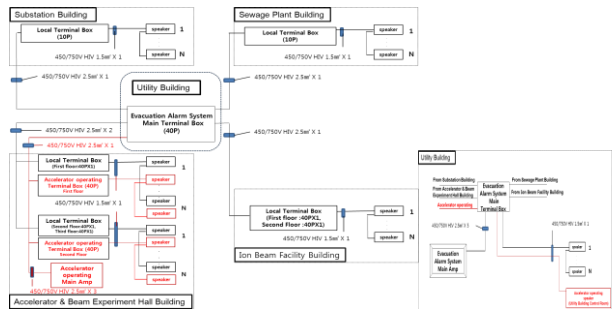
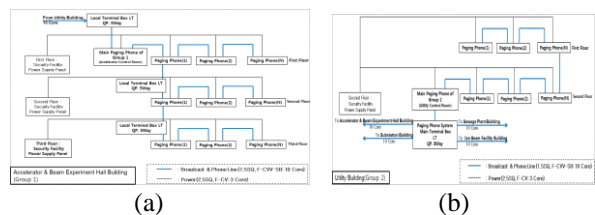


Fig. 2. Configuration drawing of the EAS.

2- 3. Paging Phone System

Paging Phone System (PPS) is used for communication between operating workers as well as for Back-UP of the EAS. Handset station of each paging phone has self-AMP and can control the volume level of speaker. In addition, paging phone being installed at major place of building in the research center is designed to run in a row and it have Page Line, Oscillation, Party Line, and direct call facility. It is also designed to install and operate Line Test Box on the each floor of the building for restoring as well as checking a breakdown place.



(a)

(b)

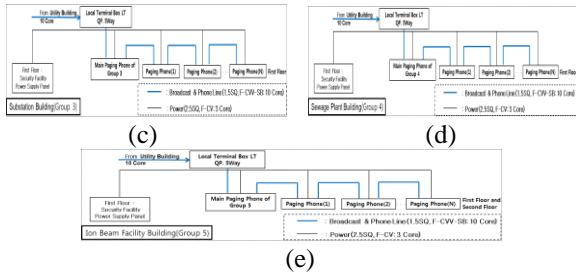


Fig. 3. Configuration drawing of the PSS. (a) : Accelerator & Beam Experiment Hall Building, (b) : Utility Building, (c) : Substation Building, (d) : Sewage Plant Building, and (e) Ion Beam Facility Building

2-4. Local Area Network

Local Area Network being installed in the research center is designed to two sections with considering the characteristics of the center which is business network and outside network. For smooth communication between the building being installed main backbone switch and the building being installed distribution switch. Local Area Network operating system is as follows ;

- From outside → Backbone Switch → Distribution Switch → Access Switch → Local Terminal Box for Network → User Computer

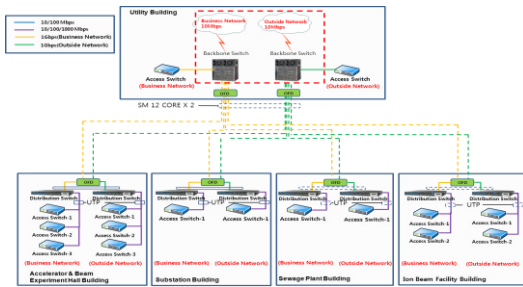


Fig. 4. Configuration drawing of the Local Area Network.

2-5. Local Cable Antenna TV System

Local Cable Antenna TV System is designed to be used for various information, new of corporate, culture, improving staff's talent, and training. It is composed of VHF/UHF reception system, relay amplifier, distributor, and converter.

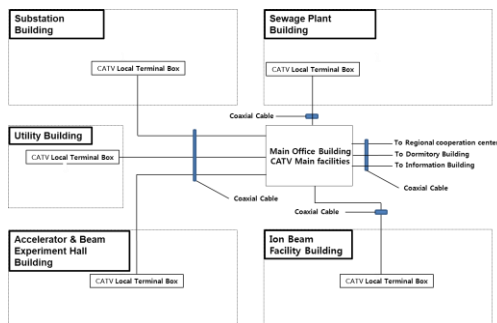


Fig. 5. Configuration drawing of the Local Cable Antenna TV System

2-6. Time Synchronizing System

Time Synchronizing System is formed master clock and secondary clock. The master clock is facilities to provide synchronization signal to the equipment in the research center and secondary clock by receiving synchronization signal through satellite transmitters. It is composed of GPS antenna, clock facilities, master clock, and secondary clock.

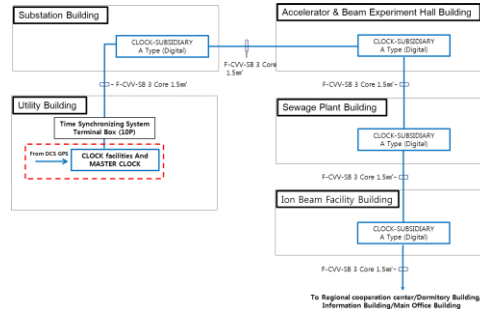


Fig. 6. Configuration drawing of the Time Synchronizing System

2-7. Power Supply facilities for Communication System

Power supply facilities for Communication System is formed separate cabinet panel through power which is supplied at the UPS facilities installed in the research center. It is also designed to supply power to major communication facilities.

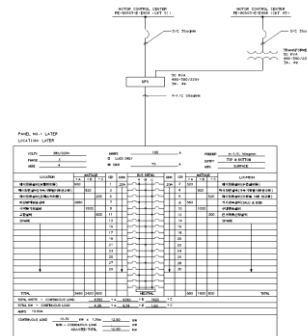


Fig. 6. Configuration drawing of the Power Supply facilities for Communication System.

3. Conclusions

This paper describes the logics, the functions, the characteristics to safely and efficiently operate the communication system which are composed of Direct Wire Telephone System including Private Automatic Branch Exchange System, Evacuation Alarm System, Paging Phone System, Local Area Network, Local Cable Antenna TV System, Time Synchronizing System, and Power Supply facilities for Communication System in the Proton Accelerator Research Center (PARC).

Acknowledgment

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