Communication Systems and SI & FMS Design for Support of Proton Accelerator Research Center of PEFP

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1. Introduction

To provide proton beam (100Mev, 20mA) for the users of the various fields, Proton Accelerator Research Center (PARC) of Proton Engineering Frontier Project (PEFP) is now under construction in Gyeongju. In the PARC, Various support systems such as electricity, communication, and machine system, etc., are essential.

In this context, to enhance the efficiency for the management and operation of the PARC, the communication systems for PARC is designed such as security, telecommunication, TV, public address, building information, and parking control system, etc. And also, System Integration (SI) & Facility Management System (FMS) are designed to make entire management system operate collectively and systematically.

2. Communication Systems and SI & FMS

In establishing PARC in Gyeongju., various support systems is required. At first, we describe communication system architectures and its operation scheme. We also describe System Integration & Facility Management System (SI & FMS). By introducing SI & FMS, it is expected that unified administration of the electric, communication and mechanical facilities and systematic facility management works.

2.1 Security System

The security system for all the buildings in PARC is designed to keep the workers/facilities from unpermitted persons and various accidents. All workers should carry registered ID card to access each building in the PARC. Access control system in the control room at Utility Building controls all of security equipment such as card reader, interphone, CCTV, etc. In the Main Office Building, ID card with identity information registered is issued. In the Information Building, persons and vehicles to access into the center are controlled. In Fig. 1 and Fig.2, suggested operation scheme is shown for access control system and CCTV, respectively.

2.2 Telecommunication System

The telecommunication system of PARC with internet and telephone system is designed to hold 200 persons or less. In the internet system of PARC, Internet service is provided by a common carrier corporation in Main Office Building of PARC. From the building, Internet lines are distributed to each building for data transmission. In the telephone system of PARC, we installed telephone exchanger in the MDF room of the Main Office Building.
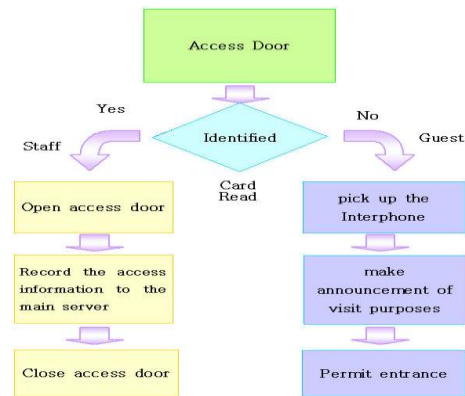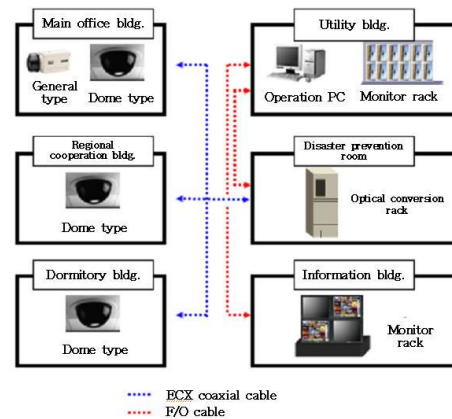

Fig. 1. Operation scheme for access control system

Fig. 2. Operation scheme for the CCTV system

2.3 TV System

In designing TV system of PARC, we adopted sky wave broadcasting system with five channels such as KBS1, KBS2, MBS, SBS, EBS and satellite broadcasting of three channels such as Asia Satellite (AS), Broadcast Satellite (BS), Mugungwha Satellite (MS). Sky wave broadcasting antenna and satellite antenna are installed at the roof of the Main Office Building. Image signals received at the antenna are distributed to each building through the HEAD END SYSTEM.

2.4 Public Address System

Public address (PA) system is composed of normal and emergency broadcasting system. Normal broadcasting system is in charge of important notice and music broadcast in normal mode. To the contrary, emergency broadcasting system is in charge of warning and alarm communication in emergency mode such as radiation exposure and fire accidents. This system operates in the higher priority to the local broadcasting system in seminar rooms and audio-visual room.

The main amplifier for the PA system is designed to be installed in control room of Utility Building, which is available for both general broadcasting and emergency broadcasting. To make it possible to broadcast from some buildings, remote amplifiers are individually installed in Main Office Building, Accelerator and Beam Application Research Building, and Dormitory Building, etc.

2.5 Building Information System

To provide PARC with public information and building information, kiosk and large PDP screen is designed to be installed on at the lobby in the first floor of support buildings of PARC.

Operation PC for building information system will be installed in the disaster prevention room of Main Office Building. Fig.3 shows configuration of building information system.

Fig. 3. Configuration of building information system

2.6 Parking Control System

In parking control system design, two separate procedures are suggested. At first, persons with ID cards can pass the system as soon as ID recognition. In the other case, persons with no ID cards can do it only after being checked by security guards in the Information Building. Fig.4 shows configuration of suggested parking control system.
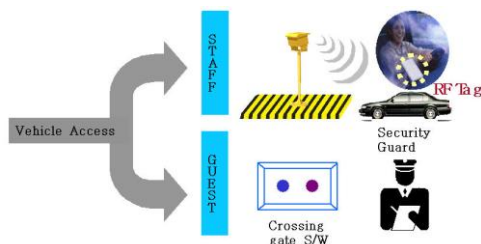

Fig. 4. Configuration of parking control system

2.7 SI & FMS

To cut down overall operation expense, all of sub-systems are designed to be centralized: Machine system, power system, lighting system, fire protection system, building information system, electronic telephone exchanger, and elevator in the same system. Owing to this centralization, the number of operation personnel could be possibly reduced. Fig.5 shows configuration of SI system for PARC.

To enforce surveillance in spite of reduced workforce, SMS service is adopted as a part of the central system: Once emergency happens, Alert message is automatically sent to a person in charge.
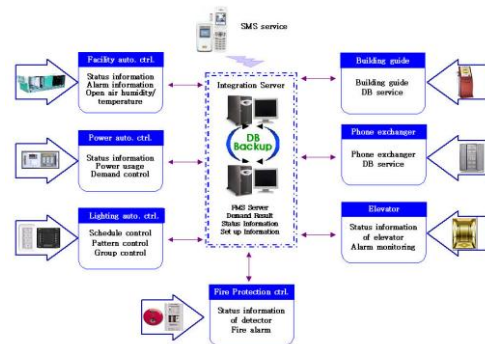

Fig. 5. Configuration of SI system

To improve the life cycle of facilities and to cut down on expenses through systematic facility maintenance, Facility Management System is designed in the disaster prevention room of Main Office Building. According to this maintenance scheme, the suggested Facility Management System is expected to provide administration work with effectiveness and standardization.

3. Conclusions

Various support systems for the PARC of PEFP such as electricity system, communication system, machine system, etc., are generally essential.

PEFP designed communication systems such as security, telecommunication, TV, public address, building information, and parking control system, etc. and SI & FMS. These systems will make it possible to operate and manage PARC efficiently.

Acknowledgements

REFERENCES

[1] Detail Design Report for the Support Facilities of Proton Accelerator Research Center of PEFP, Heerim CO., 2008. 11.