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The development of the data processing device for RMS redundancy in KOMAC

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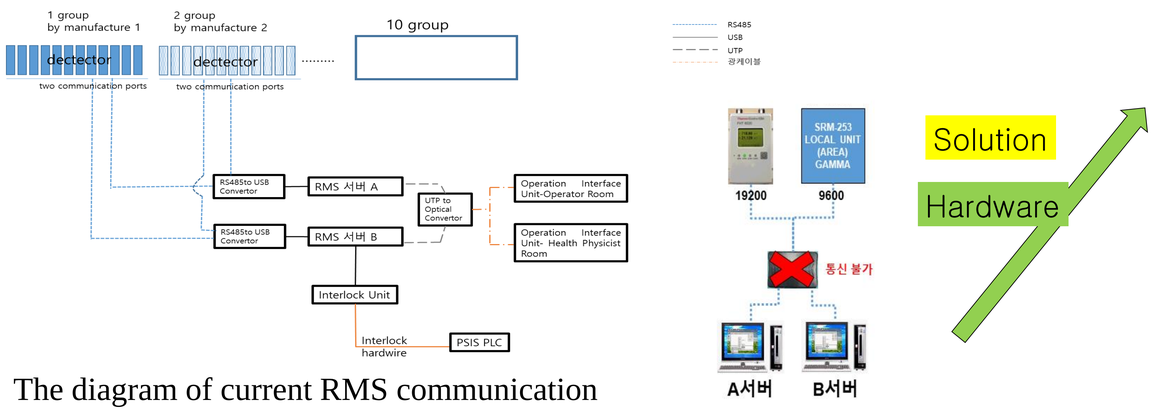
Introduction

The radiation monitoring system (RMS), which is part of the radiation safety system of the Proton Accelerator Research Center, has a redundancy, ranging from data acquisition, data transmission, and the server storage. To consist this redundancy system, the local communication unit to which the detector is connected requires more than one communication port to communicate with each other independent server through two independent communication lines. However, most detector manufacturers provide only one communication port that can be used simultaneously, even though they provide different types of communication specifications. In this paper, we introduce the problems caused by maintaining or broken equipment, and introduce the redundancy device for the data communication applied to solve the single line.

Method

Current Status

The current RMS consisted of over 100 detectors based on serial communications. These devices are divided into 11 groups depending on their installed regional characteristics and type of detector, and are connected to the data server using 11 serial communication lines. Each serial communication line has another physically independent communication line for redundancy. It consists of two separate communication lines, one detector communicates with two data servers through the two separate communication lines. It has the following limitations in the current system.

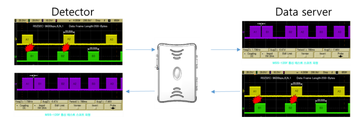


The diagram of current RMS communication

Solution

Hardware

Communication diagram (redundancy device)



Data corruption (yellow and green) and the sequential processing data (purple) by the redundancy device

The redundancy device has an internal sequential processing logic module to distinguish between each data server and detector's data to communicate without interference of each data. The sequential processing logic module has a memory which saves the command and response data. So, these data can be sent sequentially between one detector and two data servers.

Problem

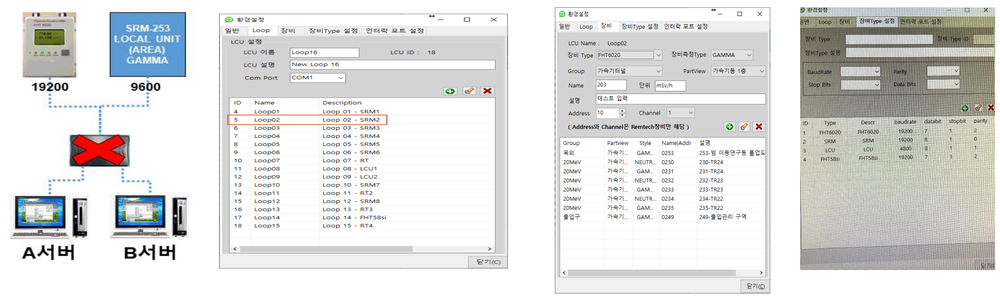
1) the same communication protocol (transmission specifications) of detectors
Only configurable with detectors from the same manufacturer

2) At least two independent communication ports are required for a transmission unit
Need to develop a parallel-connected communication device (Redundancy device)

3) Different communication command according to each detector manufacturer
Need to improve the integrated monitoring program

Solution

Software



In order to receive the event status, dose rates, and etc. from the detectors, a pre-promised command must be sent to the detector. These pre-promised command data sets or response data structures may differ from a detector manufacturer to the others. Most existing pre-promised data structures will be built into the integrated monitoring program. And a user can be also access to the communication data structure through the graphic interfaces in order to modify and add new communication data structure sets. This will enables us to easily modify or add new data structures for new radiation detectors.

Conclusion

For huge nuclear facilities, there are numerous radiation dose monitoring points, and as many radiation instruments are operated. In order to monitor and manage the detectors, it is used to develop the integrated program. On the settled systems, it is difficult to change their configuration, such like a replacement to other devices.
The communication protocols of various companies were reflected in the program at KOMAC. In addition, the program were improved that users can add or modify communication protocols through a graphic interface, so that we can respond more flexibly to changes in a device configuration. The redundancy device was developed and introduced so that even detector that provides only one communication port can maintain the existing redundant system configuration.
In this paper, we introduced the redundancy device and the integrated program at KOMAC. We can flexibly deal with the change of the unique communication protocol by various manufactures through the graphic user interface, and also communicate redundantly between the local detectors and the RMS data server using the redundancy device.

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