Central Control System for Operation Radar Network

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ABSTRACT

The Weather Radar Center (WRC) of the Korea Meteorological Administration (KMA) manages ten operational weather radars, and most of them are deployed to monitor the entire Korean peninsula including remote areas far from the WRC.

In order to operate the weather radars effectively and prepare for unmanned operation of radar stations, the WRC installed Central Control System of radars last year. The system originated from the idea for protection of radar system and human from high impact weather (HIW) including lightning. The function of this system is to monitor each of the radar system components by monitoring system and CCTVs. This system monitors antenna rotation, radar system including transmitter/receiver, electrical system, the residual fuel in the generator and so on. The system was designed to be applicable for the existing radar system and new generation radars (dual-pol radars) which will be introduced or replaced from next year.

1. Background

KMA has 12 weather radars. 10 of them are operational radars, one of them is for aviation weather radar, and the other is for research.

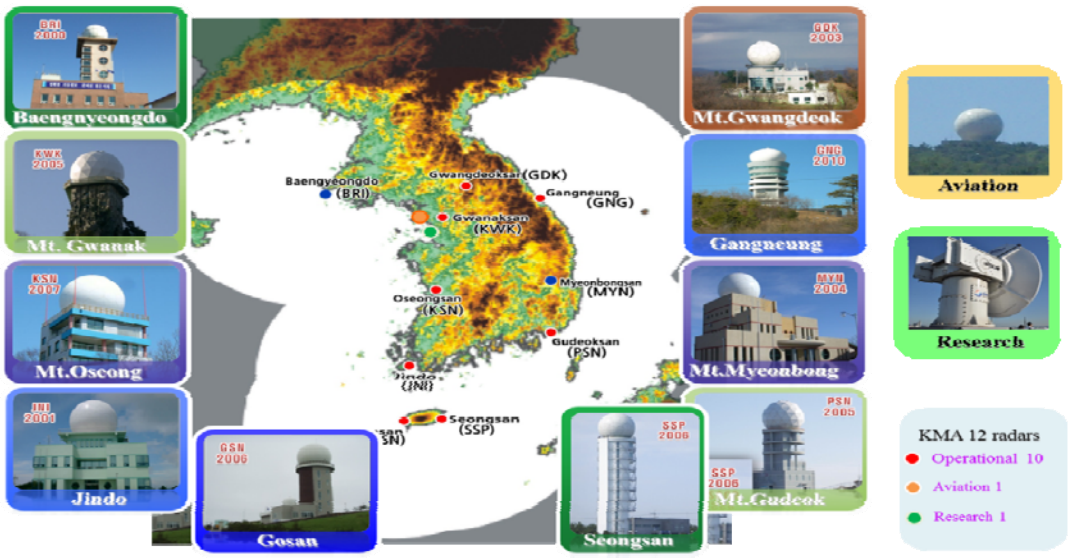


Figure 1 Current status of KMA radar network

The background is that it was too difficult to integrate every radar control system because of dispersed radar system. Dispersed radar system means that all radars were manufactured from different companies and they are positioned in remote area such as summit of a mountain, island, and non-populated area.

2. Plan and Strategy of construction

The idea was actually originated from our experience, coincidently, facing with establishment of WRC. The big questions are; what if we operate every radar sites as unmanned station? What if we control every radar to protect from a sudden surge due to lightning stroke?

Naturally, our goal of construction of this system is to convert the existing diversified radar operation system to centralize into one system which has a capability to control over power and additional equipment on each of radar system and monitor the status of it.

Therefore, the system had to be designed adopting as following; firstly, it has to adopt the existing radar operation environment, secondly, because we had to consider introducing new generation radars dual polarization radar, this system has to be interlocked to new radar network. Thirdly, it has to be constructed strategically to establish a perfect remote operation system. We will have one year period of test operation for the purpose of stabilization of this system.

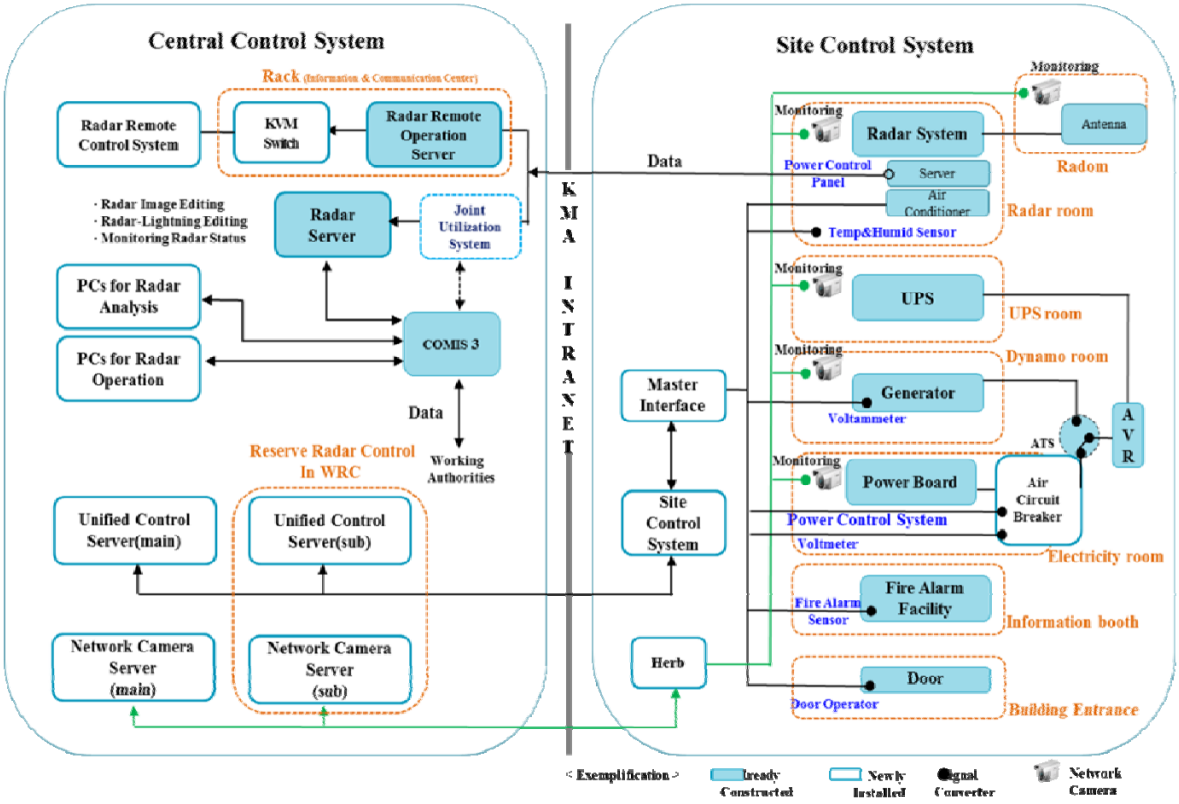


Figure 2 Conceptual Diagram of Control System

3. Functions

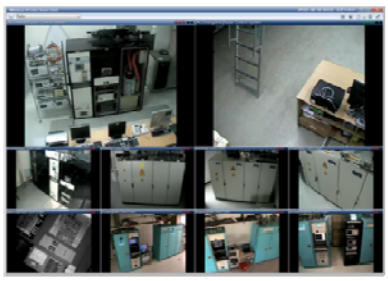
Central Control System can be divided into two categories.

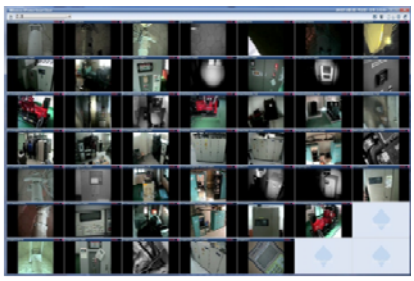
First one is called Central Control system that combined all of the radar work stations from each of sites, and connected to the center via KVM switch to control each workstation of radar main system.

The other one is Site control system which consists of network camera and control system.

Network cameras are installed to monitor generator, radar control facility, power system, UPS, and rotation of antenna, and the sensors are also installed for air conditioners, fire alarm facility, the entrance of building, etc.

All of the cameras have functions such as zoom in, zoom out and tilting. They can be controlled in center or remote sites.





Location	Monitoring Objectives	Sites
Radome	Antenna rotation	All
Radar Control System	Radar control system	All
Electricity room	Electricity status	All
UPS room	UPS status	Gosan, Seongsan, Gangneung, Mt.Gudeok, Mt. Gwanak
Dynamo room	Generator fuel remnant	All

Figure 3. Network cameras and monitoring targets

Finally, ACB(air circuit breaker)s deployed to play an important role to cut commercial electricity flow and convert electricity to generator to run radar when the radar site faced lighting strokes.

The system is installed in duplicate to prepare in case of trouble.

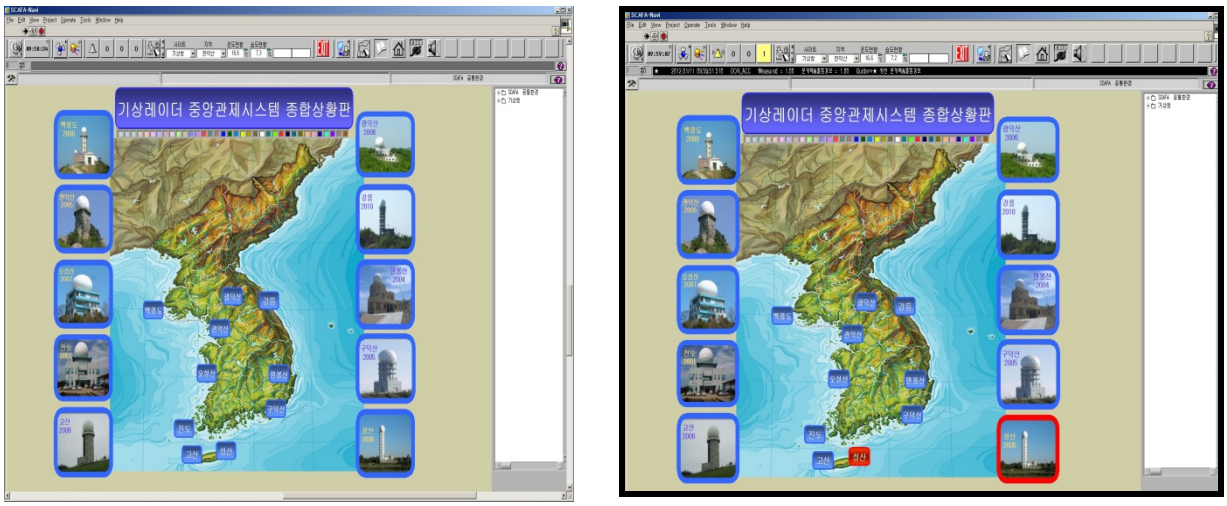


Figure 4. Status Board(Blue : stable, Yellow: warning, Red: trouble or error)

Then how do we use and monitor all radar systems? Through the status board (left), we can notice every situation at a glance, if something happens on a site, then indicator turns its color, as you can see above. To see what happened in a specific site, you can click the button tab on Fig. 4.

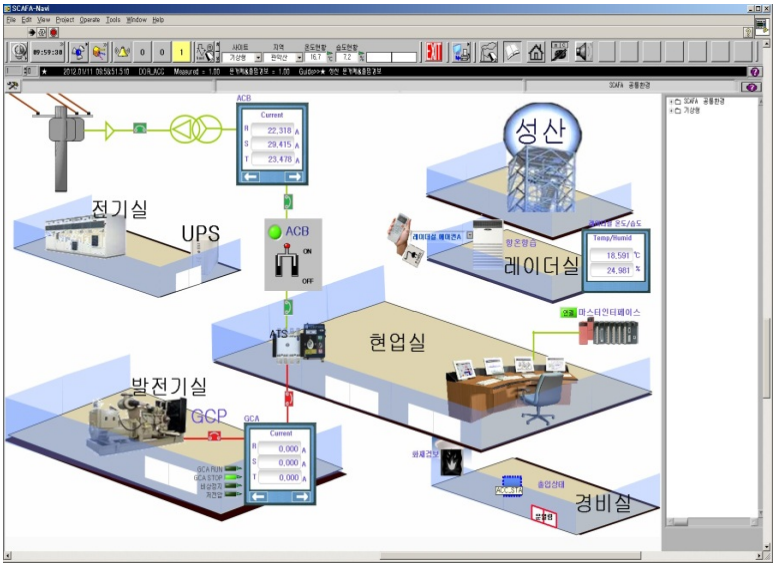


Figure 5. Control Board

Inside the control board, you can see many figures related to electricity such as voltage, amperes and frequency. You can also control power and additional equipment. Of course, past event can be examined by using history browser function.

4. Conclusion

By using of this system, we can perfectly control every site in remote. And we are able to evaluate that we established the basis of operation of unmanned radar site. At that time the new generation radar network is introduced, this system will be more developed and provide more comfortable operation environment.