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Natural Disaster Warning Systems in Korea

I. Background

- ◆ In Korea, the variety of systematic warning systems have been already established and operated in order to protect the nations' lives and properties from huge natural disaster such as typhoon, severe rain storm and Tsunami.
- ◆ Construction of SAFE KOREA, that protects the national lives at first hand by fast and correct disaster information transmission through the variable IT technology.

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- ◆ Contribution to construction of Early Warning System in Asia-Pacific area based on IT technology for disaster forecast and warning systems and operation skill.

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Natural Disaster Warning Systems in Korea

II. The Status of natural disaster warning system in Korea

No	Equipment/System	Installation set	Target for info.	Alert method	Management host
1	CBS Mobile-Phone Disaster Notification Message Broadcasting System	37.5 Million Users	CBS User 23 Million	Message broadcasting (Mobile Phone)	Central
2	Automatic Verbal(Text) Notification System	234 set nation wide	Civil official, head of government offices and specific regional residents - about 550,000 people	Guidance-information broadcasting(wire and mobile phones, etc)	Regional
3	Automatic Rainfall Warning System	148 set nation wide	Valley Mountain, Public places, holiday-makers, campers, etc	Warn-alarms, guidance-information broadcasting	Regional
4	Disaster Notification Board System	299 set nation wide	The specific regional residents, holiday-makers, etc	Propagation and notification of disaster by wording through electronic board	Regional
5	TV Disaster Warning Broadcasting System	3997 set nation wide	Disaster Prevention & Countermeasures Headquarters at each local provinces and each regional administrative offices and its related institutes.	Auto TV Power-On Volume-Up, broadcasting the situation	Central
6	Radio Disaster Warning Broadcasting System	5 area	Residents, Holiday-makers, etc.	Auto Audio Amp Power-On Alarming and Guidance-information broadcasting	Regional

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Natural Disaster Warning Systems in Korea

II. The Status of natural disaster warning system in Korea

1) CBS (Cell Broadcasting Service) Phone Disaster Notification Broadcasting System

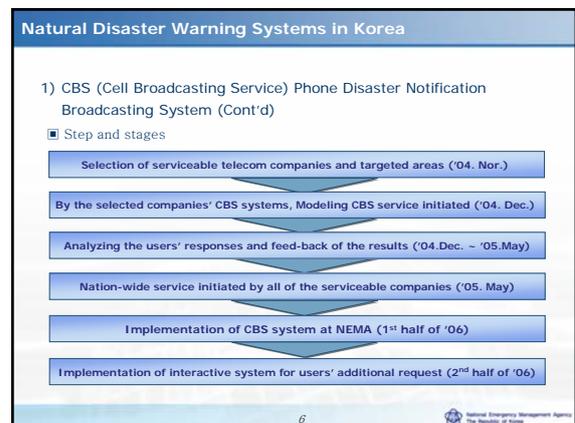
■ System overview

- The mobile communication technology that broadcast disaster message to mobile-phone users at Base Station Transceiver Subsystem, who have special receivable ID.
- Disaster message transmission to nation-wide or specific area resident users simultaneously at once.
 - * CBS (Cell Broadcasting Service)

✳ Servicing Status

04. Dec. Start Service Model at Kyunggi/Kangwon Provinces (2.6M Residents)
05. Feb. Expand service area to Ulsan City, Kyungsang North Provinces (3.9 M Residents)
05. May Enforcement of nation-wide service (21M Residents)

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Natural Disaster Warning Systems in Korea

1) CBS (Cell Broadcasting Service) Phone Disaster Notification Broadcasting System (Cont'd)

■ System Structure and Message Flow

【 CBS Message Transmission Flow 】

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1) CBS (Cell Broadcasting Service) Phone Disaster Notification Broadcasting System (Cont'd)

■ CBS Structure and Weakness

Strength	Nation-Wide	Information reception available by CBS module equipped without any additional hard wares (Nation-wide information broadcasting available)
	Point to Multi	By broadcasting characteristics, multi-users information transmission available at a time (Suitable for real-time warning services)
	Economy	No dependent on number of user and low cost to build system. (No relation b/w CBS cost & subscribed user)
Weakness	Region-Based	Disaster information suitable to the residents' areas and situation Group message transmission function. (Grouping of frequent disaster outbreak areas)
	Convenience	User can select/confirm/delete any disaster information as convenience. Easy 'Call-Back' function available by just press 'Send' button, if user want.
	Terminal Oriented	Without mobile terminal or CBS module, unavailable for information broadcasted. If terminal off, No any information available even if terminal have CBS module.
	Reception Rate	Unavailable of information reception when radio-dark areas No confirming method of disaster information reception

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1) CBS (Cell Broadcasting Service) Phone Disaster Notification Broadcasting System (Cont'd)

■ Comparison chart of CBS and SMS)

CBS (Cell Broadcasting Service)	SMS (Short Messaging Service)
<p>Simultaneous Transmission</p>	<p>Polling (Individual Transmission)</p>
<ul style="list-style-type: none"> Point to Multi-Point (Simultaneous Multi Casting) Real time service to all users located at specified base station Very low transmission cost No database of phone number and to select transmission area from one base station area to nation wide. Max. 230 characters information per transmission. 	<ul style="list-style-type: none"> Point to Point (Individual Transmission by Polling) Minutes or hours transmission time required depend on number of service user and real timer service impossible if service user more than 300,000. Transmission cost high (25 or 30 won per person) Database of phone number required Max. 40 characters information per transmission.

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1) CBS (Cell Broadcasting Service) Phone Disaster Notification Broadcasting System (Cont'd)

■ The contents in case of Tsunami alarming

Message From NEMS.

In (MM) : (DD), (HH) : (MM), as there was a earthquake or Richter () at the coast of Japan, the tsunami damage would be expected at (). All residents and visitors should stop all activities at the specific area and immediately escape to hilly sides or solid buildings while keeping listening special weather reports from public broadcasting, etc. Do not return to coast area before confirming that the situation would be safe and clear.

• Emergent situation : Call 119

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2) TV Disaster Warning Broadcasting System

■ System Overview

- Real time propagation of message of disaster situation with VMS and SMS operated by "Automatic Voice Notification Equipment" located at regional Disaster Prevention & Countermeasures Headquarters, When rivers inundation, typhoon or any disaster occurs or are expected.
- By wire telephone, mobile phone, village broadcast amplifier and any available communication tool, person in charge of regional offices (eup, myun, dong), drainage pump chapter, each administrative offices related to disaster, etc.
- Minimize of loss in lives and properties by construction of fast shelter system using immediate disaster notification to residents located at dangerous area and coast, etc.
- Management of database of 550,000 people such as civil officer, residents of 234 central and regional organizations.

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2) TV Disaster Warning Broadcasting System

■ System organization & Management streamlines

- Collection and analysis of disaster information
 - Rain, river level or any emergency situation
- Choose person to inform and start au
 - Call related officers using emergency communication network.
 - Notification to disaster related institutes.
 - Notification to residents located at disaster area.
- Tool for notification
 - village broadcast amplifier
 - automatic answer telephone
 - wire phone, mobile phone, etc
- Activities for disaster prevention such as resident evacuation.

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3) Automatic Rainfall Warning System

System Overview

- Establishing automatic rainfall (water leveling) observing station at the upper and middle area of mountain valley, as well as automatic warning system at the lower area of it, and the automatic remote control/observing station at the local Disaster Prevention & Countermeasures Headquarters and local administrative offices.
- Automatically observing the rain falling status at the upper/middle areas, and automatically performing the warning alarming and disaster information broadcasting at the lower areas. Those series of action flows should be observed and controlled by the remote control station manually and/or automatically.
- At '96-'05 period, 148 sites have been already established and operated at the valleys, and downy side of rivers, national parks, and at '05-'09 period, planned to establish additional 113 sites.

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3) Automatic Rainfall Warning System

System organization & Management streamlines

- At the Rainfall Observation Station, sensing 3 stage-downpour. (Precaution, Warning, Severe)
- ROS relaying sensed downpour stage to Control Station.
- When CS received the downpour event from ROS, It would immediately command the broadcasting event to Warn Alarming Station.
- WAS broadcasting according to the command of CS
- After CS transit the command to Monitoring Station, it send the status of warning level to Monitoring Station

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3) Automatic Rainfall Warning System

Snap shots

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4) Disaster Notification Board System

System Overview

- Preparing of immediate response system toward disaster by notifying and broadcasting rapidly the disaster situation through blowing siren and board messaging, at the normal times, performing national propagation of awareness toward disaster, etc.
- 299 sites of system establishment and management all throughout of the nation such as coastal beaches, public parks around lower river areas, etc.

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4) Disaster Notification Board System

System organization & Management streamlines

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5) TV Disaster Warning Broadcasting System

System Overview

- Broadcasting the urgent disaster situation in the form of screen, sound, or screen messages by forcibly automatic turning on TV or changing to disaster warn channel with volume-up through the Broadcasting station's casting-equipment when out breaking of urgent disaster information that could not be easy to transmit this situation at such as deep night, etc.
- Upon establishing TV Disaster Warning Broadcasting Receiver at totally 3,997 places such as central, regional Disaster Prevention & Countermeasures Headquarters, each administrative offices, the related institutes, etc, Korea Broadcasting Systems (KBS-1TV) would broadcast the specific disaster information ones.

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5) TV Disaster Warning Broadcasting System

■ System Management streamlines

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5) TV Disaster Warning Broadcasting System

■ Example of TV Screen

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6) RDS-Radio Disaster Warning Broadcasting System

■ System Overview

- When the situation would be faced, that needs a kind of urgent operation such as residents' sheltering upon the expectation of river-overflowing, typhoon-attack, etc, simultaneously broadcasting the disaster situation to huge crowd to make them immediately pre-escape from it by using the technology of automatic radio turning-on/off for activating the agora's amplifying speaker systems.
- * Promotional operation at the damaged 5 areas by Typhoon, MAEMI

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6) RDS-Radio Disaster Warning Broadcasting System

■ System Organization

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6) RDS-Radio Disaster Warning Broadcasting System

■ System Management streamlines

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III. Future Direction for Early Warning Systems

■ Support and cooperation to Construction of Nationwide Disaster Forecast and Warning System

- To construct Early Warning System, inter-national cooperation is critical such as perception and forecasting Tsunami but to minimize loss of lives, nationwide or regional forecast and warning system is important.
- Discussions, Supports and cooperation to construct Nationwide early Warning System are required and all kind of disaster to be considered such as Tsunami, Tsunami, Typhoon and Tidal wave caused by an unusual change of weather and global warming.

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■ **Synthetic Early Warning System**

- Effective Early Warning System need earthquake forecast and tsunami warning as well as emergency action plan, disaster response activities such as issuing disaster warning alarm, residents shelter, emergency recover of facilities, emergency aid of victims and resident training, etc.
- The system include precaution such as construction of prevention facilities, training/education to officials in charge, investigation of disaster cause and evaluation of risk as well as post-activities such as recover of facilities, emergency aid.

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Thank You

If you have any questions or want further information, please kindly contact to dr_park@nema.go.kr.

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