Science and Technology in Security and Disaster Management in the Republic of Korea

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The Korean peninsula faces the Yellow Sea and the Chinese continent on its west, the East Sea and the Japanese archipelago on its east and the South China Sea and the Pacific Ocean on its south.

Korea has a temperate climate with four distinct seasons characterized by many arid days in spring, substantial rain in summer and much snow in winter.
Types of natural disasters include torrential rain, storms, typhoons and heavy snow.

Torrential rain, typhoons and storms account for 84% of the total damage.

The average number of annual natural disasters hitting Korea is placed at seven, with annual average property loss and death toll standing at $1.1 billion and 129 deaths, respectively.

Korea spends about $2 billion for rehabilitation of devastated areas per year.
NEMA, established on June 2004, is in charge of natural & man-made disasters.

MOPAS, established on March 2006, is in charge of security and critical infra-structure protection. MOPAS is going to reinforce the responsibility on citizen's safety and disaster prevention by strengthening collective management and control for the disasters and security.
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.

**Servicing Status**

- '04. Dec. Pilot project starts at Gyeonggi/Gangwon (2.6M Residents)
- '05. Feb. Expand service area to Ulsan City, Kyungsang North Provices (3.8 M Residents)
- '05. May implementation of nation-wide service (21M Residents)
Early Warning System

System Structure and Message Flow

CBS Message Transmission flow

- NEMA
  - Request to CBS message Transmission at disaster area

- CBS System of Mobile Telecom Company Base Station
  - CBS message on mobile phone which is located at broadcasted area

- Mobile Telecom
- End user
  (Mobile phone with CBS service function)
# Early Warning System

## CBS Structure and Weakness

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

Comparison of CBS and SMS

<table>
<thead>
<tr>
<th>CBS (Cell Broadcasting Service)</th>
<th>SMS (Short Messaging Service)</th>
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<tbody>
<tr>
<td><img src="image" alt="Diagram of Simultaneous Transmission" /></td>
<td><img src="image" alt="Diagram of Polling (Individual Transmission)" /></td>
</tr>
<tr>
<td><strong>Point to Multi-Point</strong> (Simultaneous Multi Casting)</td>
<td><strong>Point to Point</strong> (Individual Transmission)</td>
</tr>
<tr>
<td>Real time service to all users located at specified base station</td>
<td>Minuets or hours transmission time required depend on number or service user and real timer service impossible if service user more than 300,000.</td>
</tr>
<tr>
<td>Very low transmission cost</td>
<td>Transmission cost high (25 or 30 won per person)</td>
</tr>
<tr>
<td>No database of phone number and to select transmission area from one base station area to nation wide.</td>
<td>Database of phone number required</td>
</tr>
<tr>
<td>Max. 230 characters information per transmission.</td>
<td>Max. 40 characters information per transmission.</td>
</tr>
</tbody>
</table>
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
Early Warning System

2) Automatic Verbal Notification System

System Overview

- Real time propagation of message of disaster situation with “Automatic Verbal Notification Equipment” located at Regional Disaster Prevention & Countermeasures Headquarters, When flood, 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
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.

Tool for notification
village broadcast amplifier
automatic answer telephone
wire phone, mobile phone, etc

Activities for disaster prevention such as resident evacuation.
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.
1) At the Rainfall Observation Station, sensing 3 stage-downpour. (Precaution, Warning, Severe)

2) ROS relaying sensed downpour stage to Control Station.

3) When CS received the downpour event from ROS, it would immediately command the broadcasting event to Warn Alarming Station.

4) WAS broadcasting according to the command of CS

5) After CS transit the command to WAS, it send the status of warning level to Monitoring Station
Early Warning System

Snap shots

- Rainfall Observation Station
- Warn Alarming Station
- Control Station
- Monitoring Station
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.

ख 299 sites of system establishment and management all throughout of the nation such as coastal beaches, public parks around lower river areas, etc.
Early Warning System
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.
Early Warning System

System Management streamlines

- Central Disaster Prevention & Countermeasures Headquarters
  - Requesting of Warn-Alarming

- KBS
  - Controlling of Warn-Alarming

- Relay (Transit) Station

- Regional Disaster Prevention & Countermeasures Headquarters, each administrative offices, the related institutes, etc.
Flood Alarm has been issued from 22:00 today at the lower course of a NAKDONG River. All residents and visitors must take care of weather situation.
Thank you