ICT Disaster Symposium in Sendai, Japan.

Emergency Disaster Information and One-Segment Broadcasting System

March 16, 2012

Hitachi High-Technologies Corporation
Marketing and Planning Dept.
Strategic Planning Div.
Global Trading Group

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Emergency Disaster Information and One-Segment Broadcasting

Contents

1. ICT status at the East Japan Great Earthquake

2. Emergency Weather and Disaster Information System in Japan

3. Screen Layout Broadcasting System (Contents Management System) - effective in use for emergency weather and disaster broadcasting -

4. Proposal for Rural Areas
1. ICT status at the East Japan Great Earthquake
1-1. Major Damage in ICT

1 Fixed-line services
- At its peak, approximately one million lines were disconnected on March 13, 2011.
- At its peak, approximately 500,000 FLET’S Hikari (FTTH services) lines were disconnected on March 13, 2011.

2 Mobile phone services
- The peak number of mobile base stations out of service was approximately 14,800 on March 12, 2011.

3 Broadcast infrastructure
- The peak number of television relay stations out of operation was 120 on March 12, 2011.

* The peak number of radio relay stations out of operation was one in Iwate prefecture and one in Fukushima prefecture on March 12, 2011. Operation has since been restored to all radio relay stations, and all AM and FM radio broadcasts are operating as normal.
1-2. The East Japan Great Earthquake

**Broadcasting played an important role to disseminate the early warnings and report the mid- and post-disaster information.**

**One-Seg could be effective tools to disseminate the tsunami warning especially in the field.**
Each channel has 13 segments which includes one-segment Broadcasting for Mobile screens.
1-4. Damage and Effect of the Great Earthquake

What type of damage or effect did you suffer by the earthquake?
→ Most people suffered electricity Blackout in the disaster area

Source: The NHK Broadcasting Culture Research Institute (Sep 2011)
What media did you access immediately after the earthquake?
- Half of the people listened to radio
- Remaining half watched One-Seg or TV

Receivers with battery power supply were very effective in this earthquake
Deliver texts, sounds, and images

There were large number of answer that they initially tried to turn on TV but there were blackout and then tried to turn on One-Seg or Radio

Source: The NHK Broadcasting Culture Research Institute (Sep 2011)
1-6. Policemen saved 40 lives with one-seg mobile TV alarm!

Two new policemen saved 40 lives from the train with the tsunami warning alarm from mobile TV (one-seg) right after the earthquake occurred at 14:46 on March 11, 2011. They got a tsunami warning alarm from the passengers mobile phone with TV when checking if everyone is fine in the train. They quickly decided to lead the 40 passengers to the hill to avoid the disaster of tsunami. All passengers were safely evacuated from the tsunami area before the tsunami struck the train.

The cars of train derailed off the track by huge tsunami waves. (March 12, 2011)

(Summary from Yomiuri Shimbun (Japanese major national news paper), March 29, 2011)
A huge earthquake struck on March 11 in the north-east area of Japan. Right after the end of the violent shakes caused by the earthquake, Mr. Takahashi, Senior Managing Director of TOYO KNIFE, an industrial cutlery company located in Miyagino district, Sendai City, immediately turned on the one-seg TV function on his mobile phone in his office, to which the power supply was cut off. He got an emergency warning alarm for a tsunami on his one-seg TV (mobile phone). Regrettably his office was located very near the port (about 500m from Sendai-Shiogama Port), so he and other staff did not have much time to evacuate, but 100 people managed to rush to a shelter on a hill.

By the time they arrived at the shelter (Tagajyo Public Cultural Center) at 3:30 pm, the TOYO KNIFE office and factory had been completely destroyed by the long-lasting, huge tsunami.

Mr. Takahashi said “We couldn’t watch TV because of the power cut, but we could get information on the disaster quickly from our one-seg TVs.”

*Note: the one-seg TV function on a mobile phone is powered by the phone’s battery*
Emergency Disaster Information and One-Segment Broadcasting System

2. Emergency Weather and Disaster Information System in Japan
In Japan, EWBS is operated under three conditions:

- The precaution declaration of the large-scale earthquake
- Tsunami alert.
- The local governor’s request for an emergency warning broadcast
The Japanese government (Japan Meteorological Agency) aggregates data from sensors around Japan. (ex. 5,000+ Seismometers)

The collected data are used in various fields such as:
- Weather Information
- Earthquake early warning
- Tsunami warning and advisory etc.
2-3. Services of Weather Forecast Companies

**Japan Meteorological Agency (JMA)**

**Japan Meteorological Business Support Center**

**Authorized Weather Forecast Companies**
- Equipment for data reception
- Systems of data analysis, forecast and delivery
- Certified weather forecaster

**Data observed by other companies or organizations**

**Original forecast**
- Comments for broadcasting
- Weatherman
- Advisory staff

**JMA forecast**
- Original forecast etc

**TV station**
- Radio station
- Newspaper

**Residents**

**Corporate Customers**
- Traffic companies,
- Construction companies,
- Grocery stores and retail stores,
- Tourism companies,
- Medical, Pharmaceutical, Health, etc.
Emergency Disaster Information and One-Segment Broadcasting System

3. Screen Layout Broadcasting System (Contents Management System)
   - effective in use for emergency weather and disaster broadcasting -
3-1. Multiple Information broadcasting system (screen image)

- Weather Forecast
- News Flash
- Earthquake, Heavy rain,
- Traffic information

- Announcement from Municipal offices,
  Schools and Hospitals
- Local Commercials
3-2. Overview of CMS (Contents Management System)

**Disaster, Weather**
- Traffic information
- Weather bulletin
- Disasters information (earthquake, typhoon, and tsunami etc) . . .

**Administration**
- Information from cities, towns, and villages
- Fire information from fire departments, etc . . . .

**School, Hospital**
- Information from schools, hospitals, shopping centers, fixed point camera images

**Broadcasting Recognition to the information**

**Emergency broadcasting (interrupt programming)**

**Data Broadcast & One-seg**

**Automatic broadcasting operation**

**Web-Page linkage**

**Distribution to each media**

Full Screen Still Image or Overlay telop with voice

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3-3. Flow of information for CMS (Contents Management System)

- Register news
  - Fire St. Police St., Municipal office etc.
  - Input text form from dedicated web site '<Internet Explodes>'
  - Remote registration and input the news
  - Emergency broadcast as interruption
  - Approval
  - Sound recording

- Schedule Editor / Web server
  - Schedule Editor
  - User’s administration
  - Program administration
  - Screen layout setting

- Broadcast Station, Service Provider etc.
  - Broadcast Program
  - Video & Audio
  - Output

- Play out system
  - Satellites
  - Terrestrial TV
  - CATV
  - Internet

- Output

- External organization Information Center
  - Weather & Traffic information

- Home
  - Municipal info., etc
  - Local Commercials
  - Weather, Emergency Disaster

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Emergency Disaster Information and One-Segment Broadcasting System

4. Proposal for rural areas
4-1. Package Solutions for Rural Area

Sea

Comm. Broadcast Sys.  
Clean Water Sys.

No or little electricity power
4-2. One-Segment System for Rural Areas

Reproduced One Segment from Public Broadcasting

Broadcast Satellite

Power supply from Solar Panel and Batteries

Antenna

Features

- Solution of information service for areas without electricity power

- Japanese digital broadcasting features of low power consumption that enable us to watch TV on our mobile devices

<table>
<thead>
<tr>
<th>System Total Power Consumption (W)</th>
<th>Expected coverage area (radius km)</th>
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<tbody>
<tr>
<td>One Segment</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>3</td>
</tr>
<tr>
<td>350</td>
<td>5.8</td>
</tr>
<tr>
<td>400</td>
<td>10</td>
</tr>
<tr>
<td>450</td>
<td>18</td>
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</table>

<table>
<thead>
<tr>
<th>Number of requested broadcast channels</th>
<th>Frequency spectrum (image)</th>
<th>Required transmitter power ratio (note)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>8/13</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>3/13</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>1/13</td>
</tr>
</tbody>
</table>
4-3. One-segment test in a rural area

Area check

Lecture

Expectation is very high

It works, we can watch TV
4-4. One-Segment and Emergency Information system idea for rural areas

- Broadcast Wave
- Power supply from Solar
- PAL/NTSC
- Comm. Wave
- One-Seg broadcast

Data Center

* Contents Management System

Communication Carrier etc.

One-Seg and Emergency Information System

Small Station in Rural Area

- One-Seg Transmission
- Picture Composition

Emergency Announcement

Residents

Weather info...

Sensor Info of River area

News etc.

Data Center

IP Ether

One-Seg Receiver

Disaster Prevention, Emergency Information

One-Seg Receiver

Residents

Rural Areas
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(Appendix)
Other examples: Video Conference System
Appendix 1-1. Video Conference System

New Solutions

H.323

IP

Multipoint connection unit for HD support

Video Conference terminal for HD support

MCU Simple Operating System

Bundle PC Conf. Software

Recording & Streaming Server

Smart Phone Gateway ‘ClearSea’

Original Protocol

3G/WiFi

IP

Android Smart Phone

iPhone, iPad

PC (HD)

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Appendix 1-2. Example at Local Fire Department in Japan

- All participants can attend the conference.
- Education/Training at anytime, anywhere and anybody.

Regional Office
- 11 units

Regional Office
- 8 units

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Appendix 1–3.  
Example at Odakyu Electric Railway

Accident Response Measures meeting

- Real-time Accident Response Measures