

ITS for Evacuation Guidance

~Possibility and Limitations~

Session2: Sustainable driving

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(This presentation is based on the interim report of “Integrated Research and Survey Team on Disaster Mitigation Measures using Information and Communication Technology” conducted by Japanese Society of Civil Engineers and the Institute of Electrical Engineers of Japan.)

1. Introduction

Generally speaking, it is said that ICT can improve the performances of the following four stages of Disaster Management

1. Mitigation
2. Preparedness
3. Response
4. Recovery

Here, only the response stage is considered. In-particular the problem is to utilize ICT or especially ITS, to save people soon after the disaster has occurred and this period is considered to be 5 to 30 minutes.

Main characteristics of the impacts of 3.11 Great East Japan Earthquake in terms of the road traffic management.

1. Mobile communication systems are degraded.
2. Road traffic signal systems are damaged.
3. Evacuation by using vehicles was not supposed in the disaster management before 3.11.



As a result, heavy road traffic congestions occurred at every regional towns near Sendai, Fukushima and Iwate and made the situation much worse.

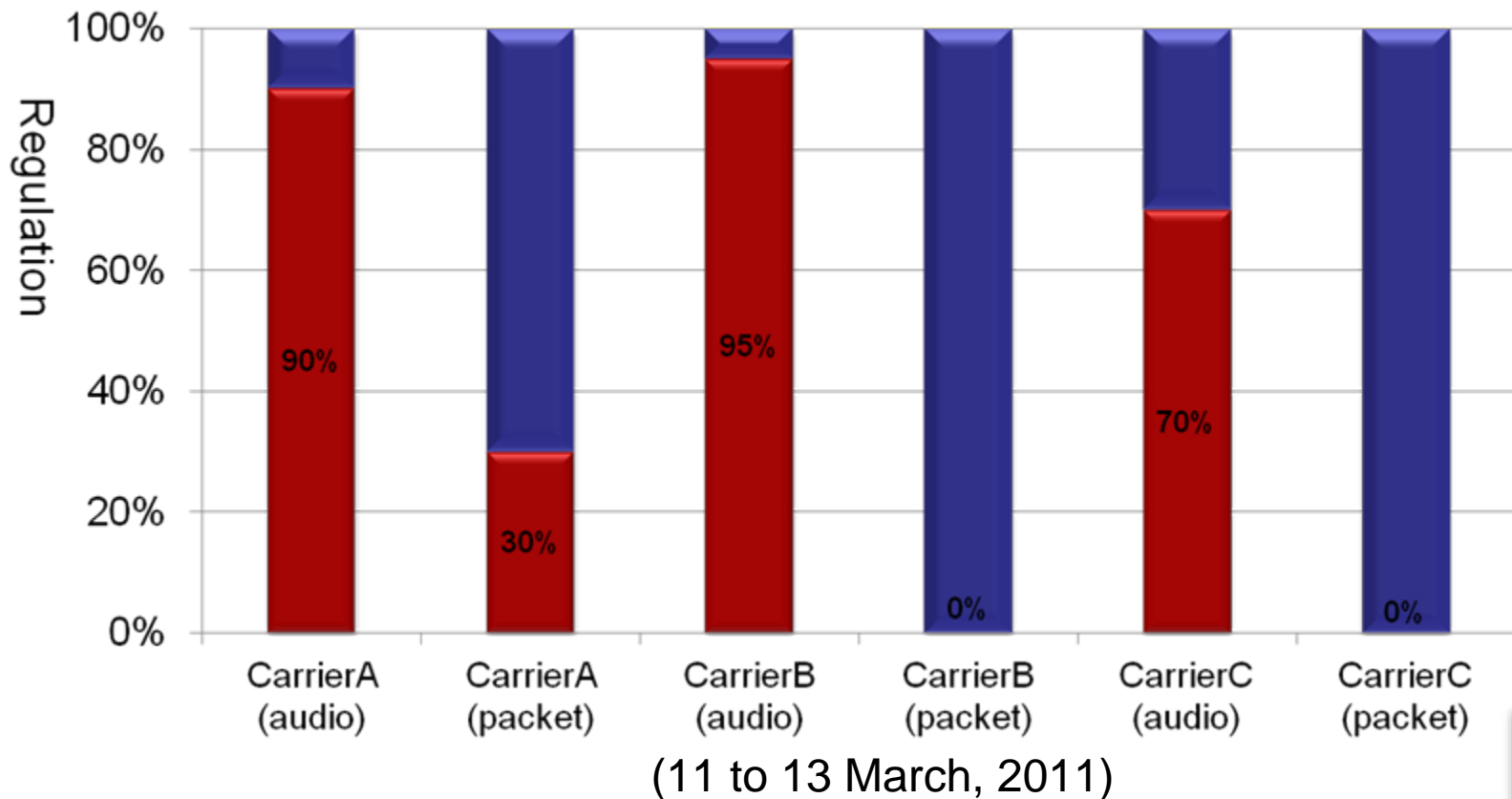
2. Overview of the damages

Recovery of the infrastructure after 3.11

	3days after the disaster	3weeks after the disaster
Road	50% in a day	90%
Air	Full recovery except Sendai Airport	
Rail	-----	50%
Electricity	50%	80%
Communication	50%	90%
Water network	50%	90%
Sewerage	50%	80%
Town gas	-----	50%

(Source: Japanese Ministries)

 Maximum percentage of regulation caused by the heavy congestion :mobile phone



A total of 15,000 base stations were out of operation.

(Source: MIC)

Car in the panic caused by TSUNAMI

At a crossroad in Osawa,
Yamada-town, Iwate Pref.

The following video is filmed and edited by
Tohoku Regional Bureau,
Ministry of Land, Infrastructure, Transport and Tourism

3. ITS communication systems for disaster management

The suppositions

- ◆ Automobiles have batteries and fuel.
- ◆ In the Japanese local regions, compact cars (equipped with 660cc class engine) are popular and these cars are not equipped with car-navigation systems.
- ◆ Mobile phones are not operating.
- ◆ Road traffic signal systems are not operating.
- ◆ Local governments are responsible to announce their evacuation guidance soon after the disaster based on the manual of each local government.

Constraints of the communication systems

- ◆ Very local and specific information for evacuation should be transmitted to each car.
- ◆ The system is not used in daily life. Therefore, the system is required to have two modes; daily mode and disaster mode.
- ◆ Cost for the deployment and drivers benefit should be considered. Does it really work when a disaster occurs?

ITS communication systems for disaster management

- ◆ There seems to be various engineering solutions to cope with the constraints shown above.

The followings are the possible candidates of ITS communication systems in Japan.

Possible Communication Systems for the evacuation guidance (1/2)

<p>Community FM Broadcasting(I2V)</p>	<ul style="list-style-type: none">• VHF(76.0-90.0MHz)• 20W ~100W or more• Local area including village, town, city and the ward of ordinance-designated city (population over 500 thousand)	<ul style="list-style-type: none">• Audio• Existing FM receivers can be used
<p>Area One-seg Broadcasting (I2V)</p>	<ul style="list-style-type: none">• UHF• Covering area: less than 1Km• Legal framework is under consideration	<ul style="list-style-type: none">• Audio, picture, data• Dedicated receiver is required (Some of Smart-phones, car navigation systems are already equipped with the receiver)

Possible Communication Systems for the evacuation guidance (2/2)

<p>Multimedia Broadcasting (I2V)</p>	<ul style="list-style-type: none"> • VHF-Low (90-108MHz) • Covering area : local region, 5 ~15Km • Legal framework is under consideration 	<ul style="list-style-type: none"> • Audio, picture, data • Dedicated receiver is required
<p>DSRC(ITS Spot) (I2V, V2I & V2V)</p>	<ul style="list-style-type: none"> • 5.8GHz • Covering area : about 60m 	<ul style="list-style-type: none"> • Audio, picture, data • 1600 ITS Spots are installed on Highways • Dedicated receiver is required
<p>Next Generation DSRC (I2V, V2I & V2V)</p>	<ul style="list-style-type: none"> • 700MHz • Covering area : about 500m • Specifications are under discussion 	<ul style="list-style-type: none"> • Data, audio , picture • Dedicated receiver is required
<p>DSSS (I2V, V2I)</p>	<ul style="list-style-type: none"> • IR • Covering area : about 4m • Systems are deployed at 15 locations in Tokyo Metropolis and Kanagawa Pref. from 2011 	<ul style="list-style-type: none"> • Data • Dedicated receiver is required

4. Concluding remarks

- ◆ A new disaster management manual will be announced from the central government and each local government should establish the evacuation manual based on the manual of the central government. This manual should reflect the local conditions and needs. The residents of the region should be well aware of the evacuation guidance.
- ◆ The possible communication systems will be determined by considering the decisions made by the local governments



Free discussion! Proposals!