JTEC

Towards a comprehensive disaster relief ICT system

EWBS

Emergency Warning Broadcast System

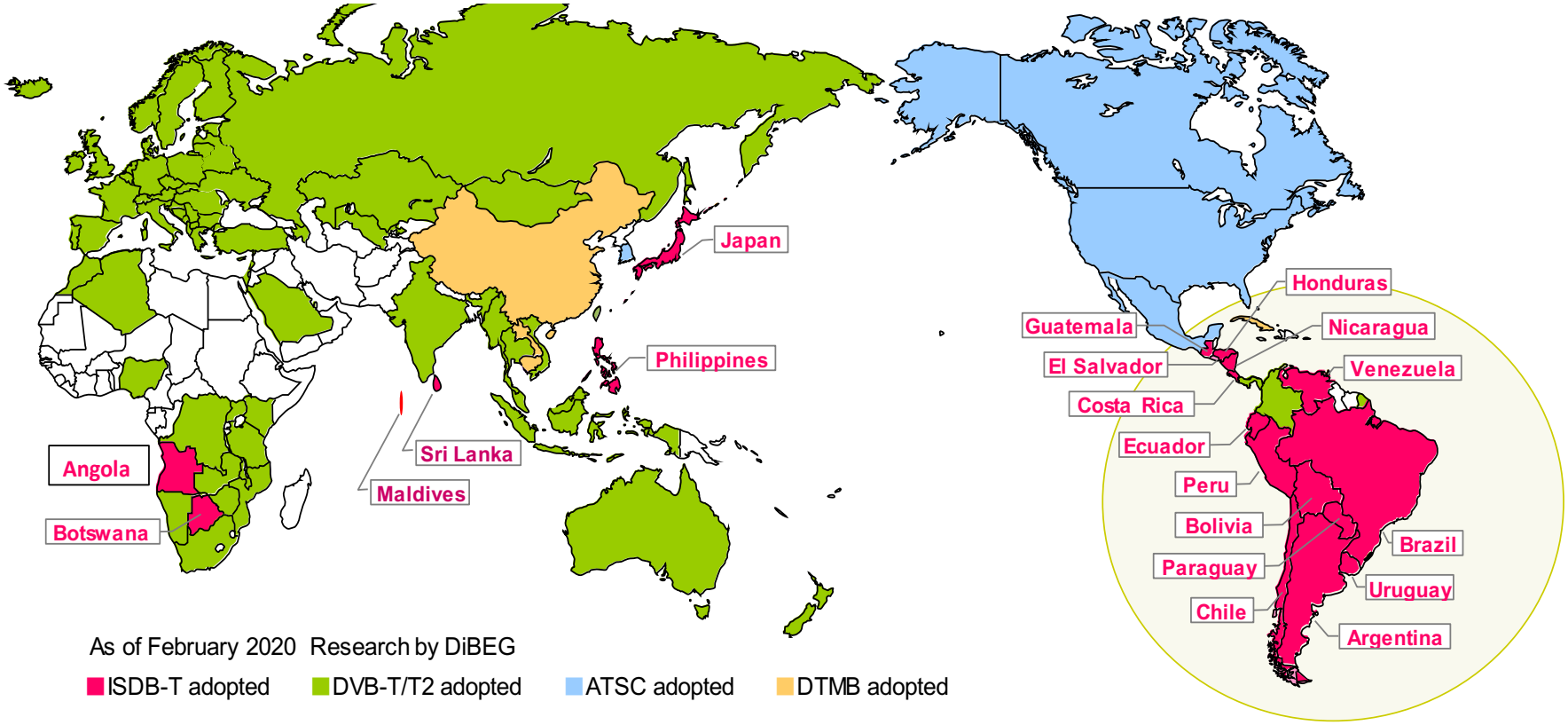
Emergency information at anytime, anywhere, for anybody

4th July, 2022
EWARNICA Annual Meeting
San José, Costa Rica

Yasuji SAKAGUCHI

Japan Telecommunications Engineering and Consulting Service

ISDB-T *Japanese Digital TV standard adopted by 20 countries*



14 countries in Latin America

Those countries which are facing the risk of natural disasters（Peru, Central American countries etc.) have strong interest in EWBS introduction with a technical assistance from Japan.

Video (5 minute)

The case of Digital TV EWBS in Latin America

Why Emergency Information on Broadcast radio wave?

1. *Wide coverage*
2. *Robust transmission*
3. *One way communication*
4. *Low Latency*
5. *Resistant mobile reception*
6. *Low cost, easy introduction*

Why Emergency Information on Broadcast radio wave?

1. Wide coverage

Broadcasting is public media accessible to everyone.
Broadcast radio wave reaches every corner of nation in most countries.

Why Emergency Information on Broadcast radio wave?

2. Robust transmission

Devastated landslide by torrential rains hit Izu-Oshima, on 16 Oct. 2013

Telecommunication failed

Electricity failed

Broadcasting kept transmission !

Broadcasting transmitting station

Broadcasting transmission system is designed to be disaster resistant.

Wireless operation, Located in a higher place, Backup by emergency generator….

Why Emergency Information on Broadcast radio wave?

3. *One way communication*

Traffic Congestion free

Resistant to cyber security

Guarantees high reliability

Why Emergency Information on Broadcast radio wave?

5. Resistant mobile reception

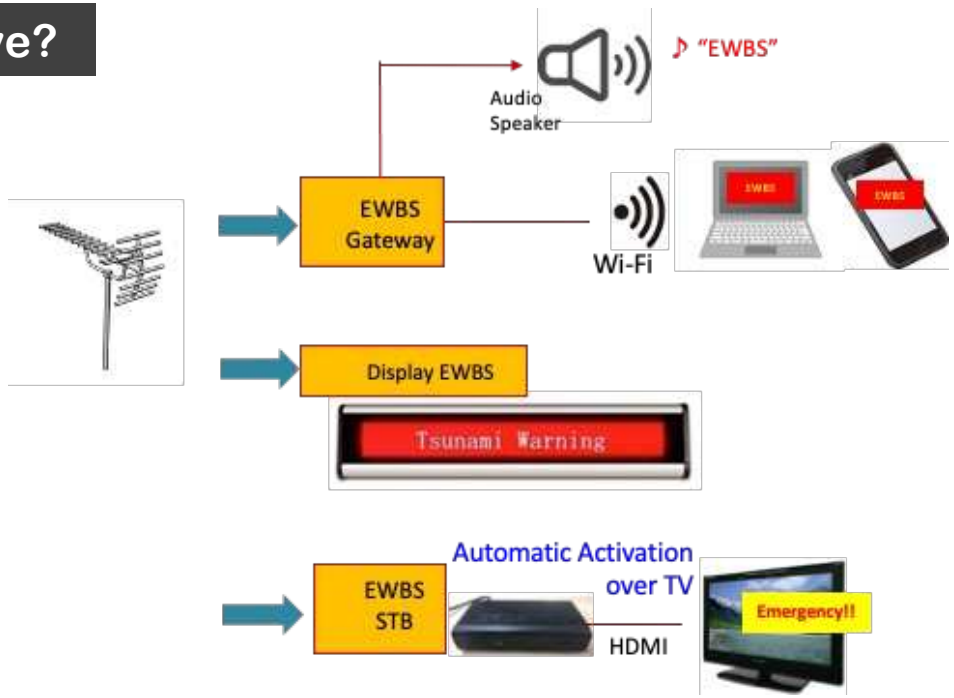
in a vehicle

in a train

in a boat

Why Emergency Information on Broadcast radio wave?

6. Low cost, easy introduction



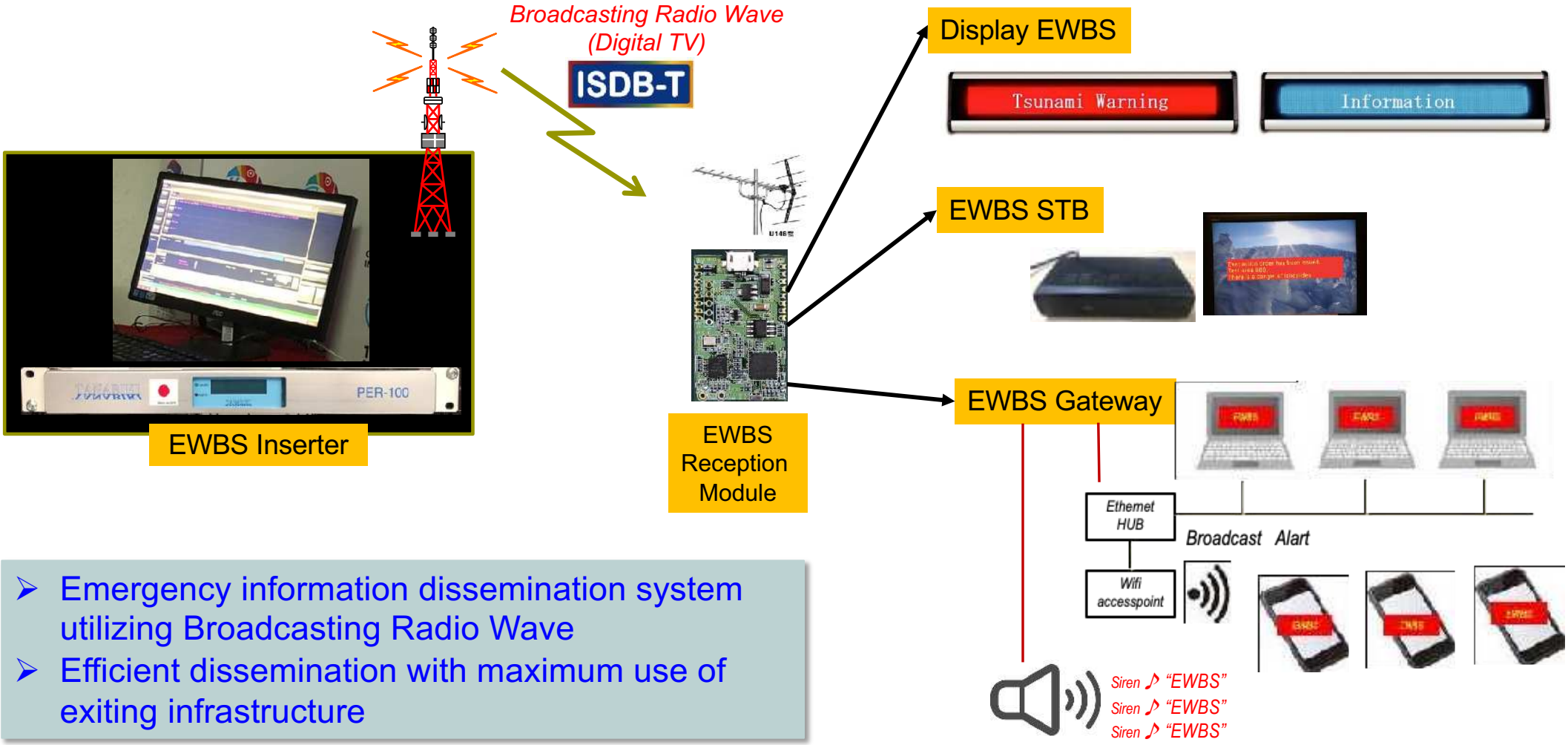
Maximum usage of existing network

Guarantees low cost and easy introduction

Technical Cooperation to Latin American countries so far for EWBS introductions

1. *Development of EWBS devices*
2. *Support for practical application of EWBS*

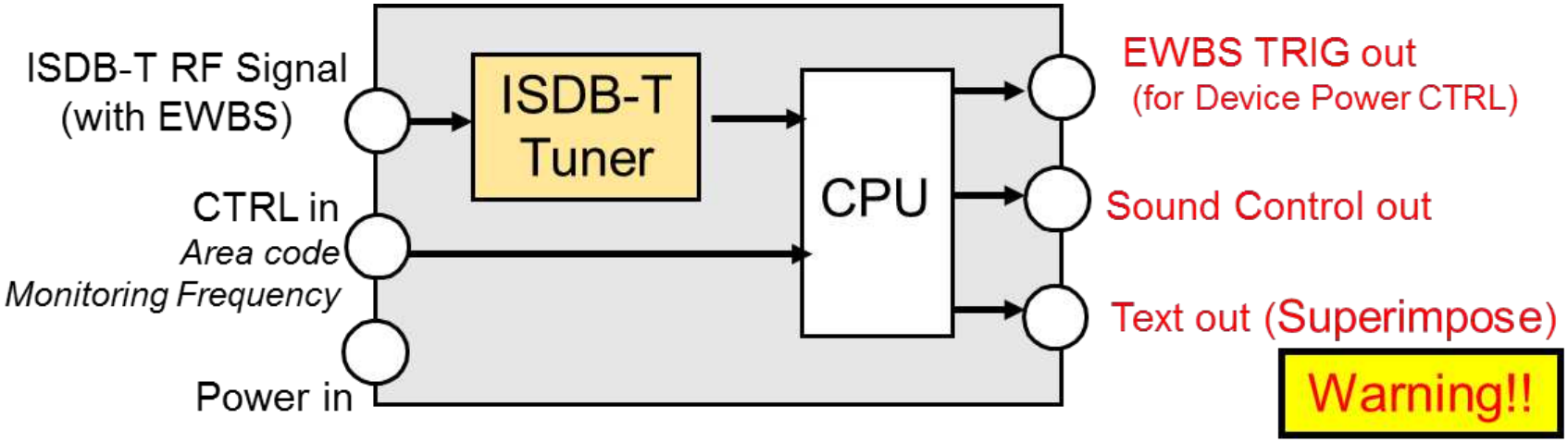
Development of EWBS devices for Latin American countries



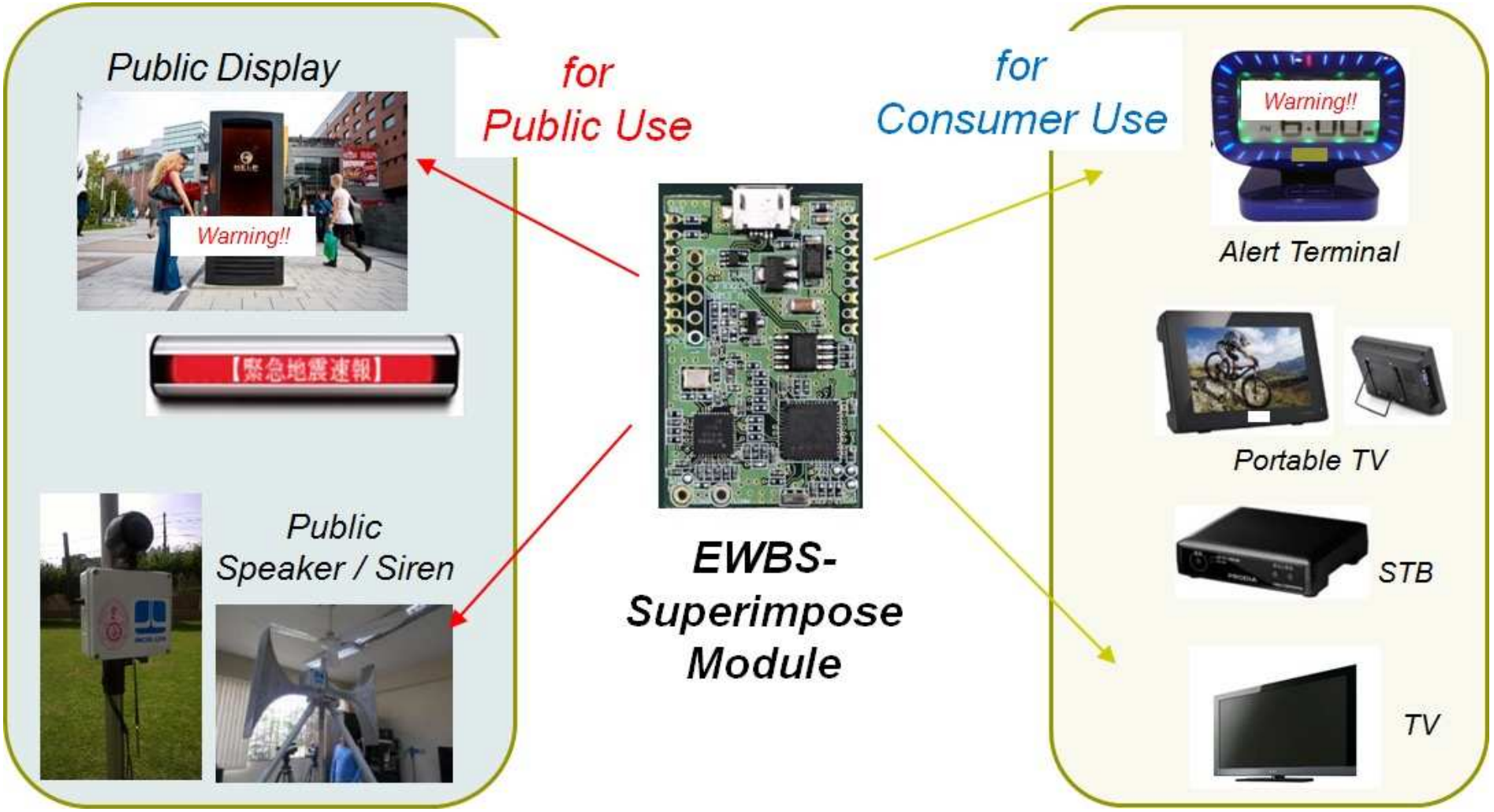
- Emergency information dissemination system utilizing Broadcasting Radio Wave
- Efficient dissemination with maximum use of exiting infrastructure

EWBS Superimpose Module

- Exclusive reception of EWBS Signal
- 24-hour monitoring
- Robust “One-seg” reception
- Small size , Low consumption



EWBS Superimpose Module



Applications of "EWBS Gateway"

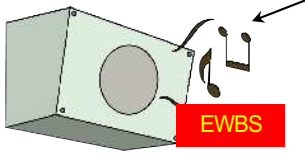
Bridge of EWBS to any existing communication systems

Siren

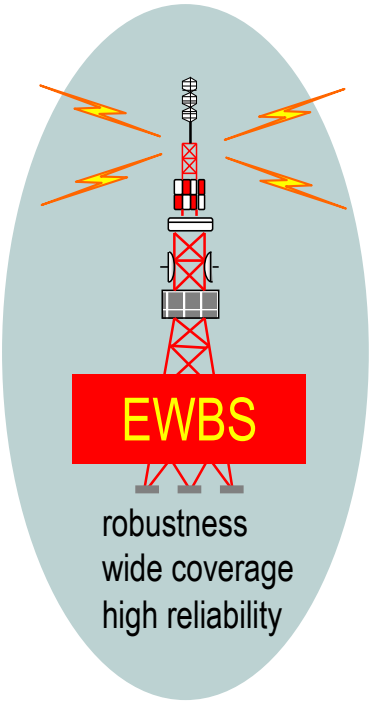
Public Communication System

EWBS Gateway

Speaker

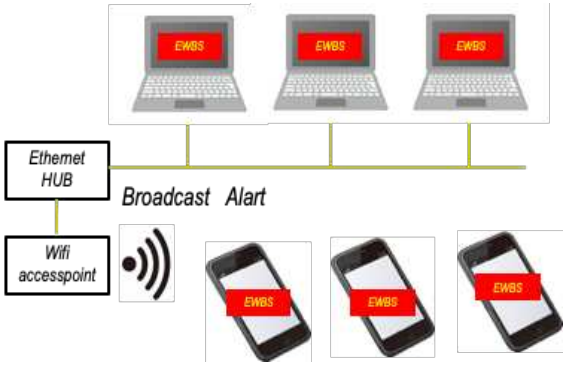


Signage

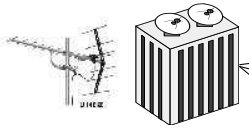


WiFi

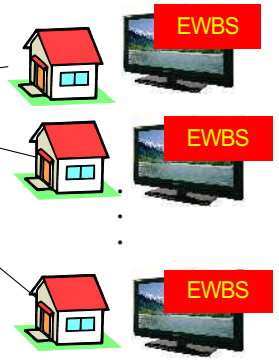
EWBS Gateway



CATV



EWBS Gateway



EWBS implementation in Latin America with Japan's cooperation

Nicaragua	3/2018 Field experiment of EWBS equipment 4/2021 Start of test transmission of EEW (Earthquake Early Warning) information 12/2021 Pilot project for EWBS receivers' expansion
El Salvador	10/2018 Field experiment of EWBS equipment 10/2019 Demonstration of EWBS receivers 4/2021 Start of test transmission of EEW (Earthquake Early Warning) information
Costa Rica	10/2018 Field experiment of EWBS equipment 3/2019 Demonstration of EWBS receivers 4/2021 Start of test transmission of EEW (Earthquake Early Warning) information
Perú	1/2019 Field experiment of EWBS equipment 3/2019 Start of technical support with operation training 11/2019 Large scale demonstration in national evacuation drill on World Tsunami Awareness day (Nov. 5,2019)
Brasil	12/2019 Field experiment of EWBS equipment
Ecuador	3/2021 In-door experiment of EWBS equipment

Peruvian disaster management institution ,INDECI began installation of 400-set EWBS receivers in various strategic institutions located in tsunami flood zones in Peru

https://www.gob.pe/institucion/indeci/noticias/528600-indeci-realiza-entrega-e-instalacion-de-equipos-receptores-del-sistema-de-radiodifusion-de-alertas-de-emergencias

Instituto Nacional de Defensa Civil

INDECI realiza entrega e instalación de equipos receptores del Sistema de Radiodifusión de Alertas de Emergencias

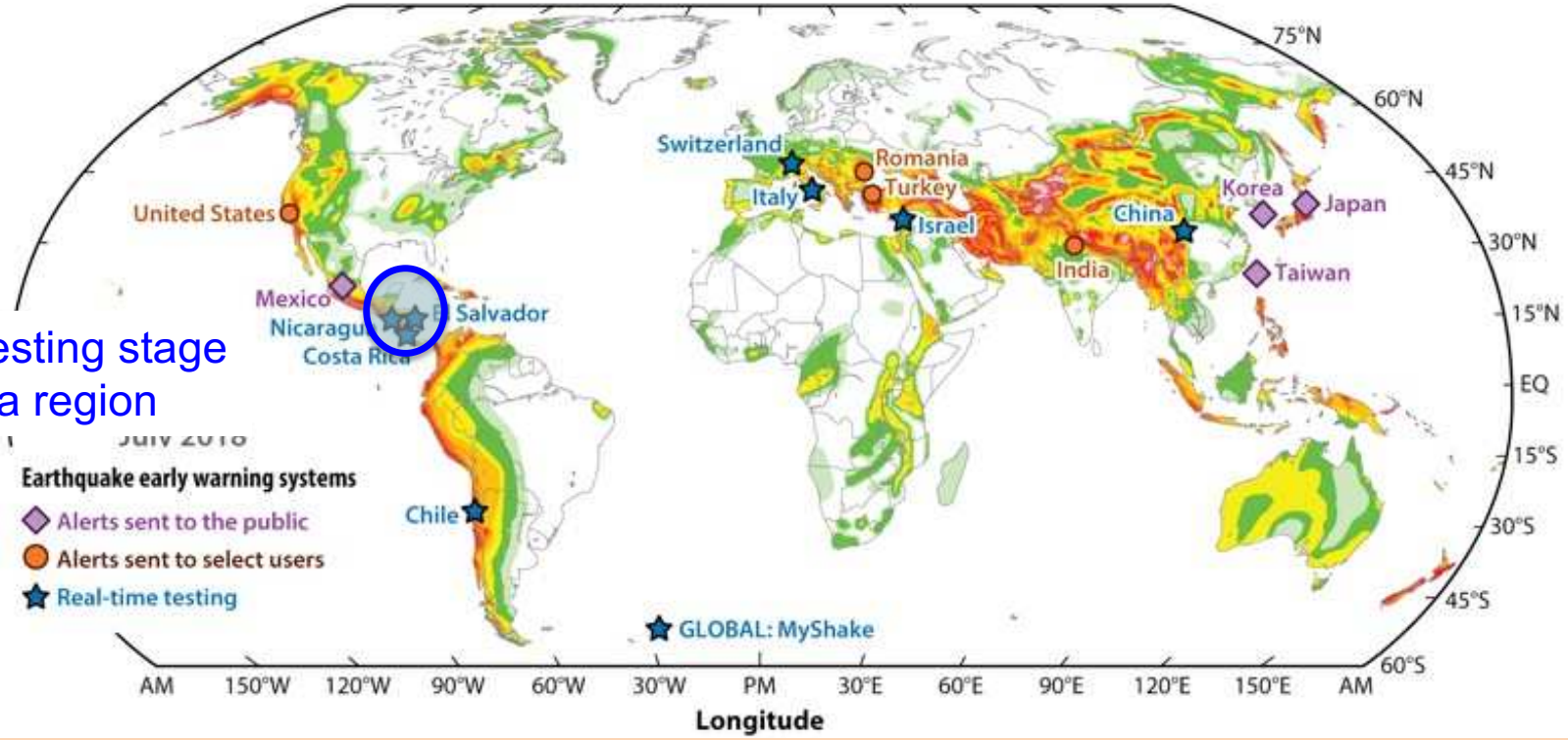
Nota de Prensa

Estos equipos están comprendidos en el proyecto del Sistema de Alerta Temprana ante Tsunamis

Oficina General de Comunicación Social
24 de setiembre de 2021 - 6:18 p. m.

EEW around the globe

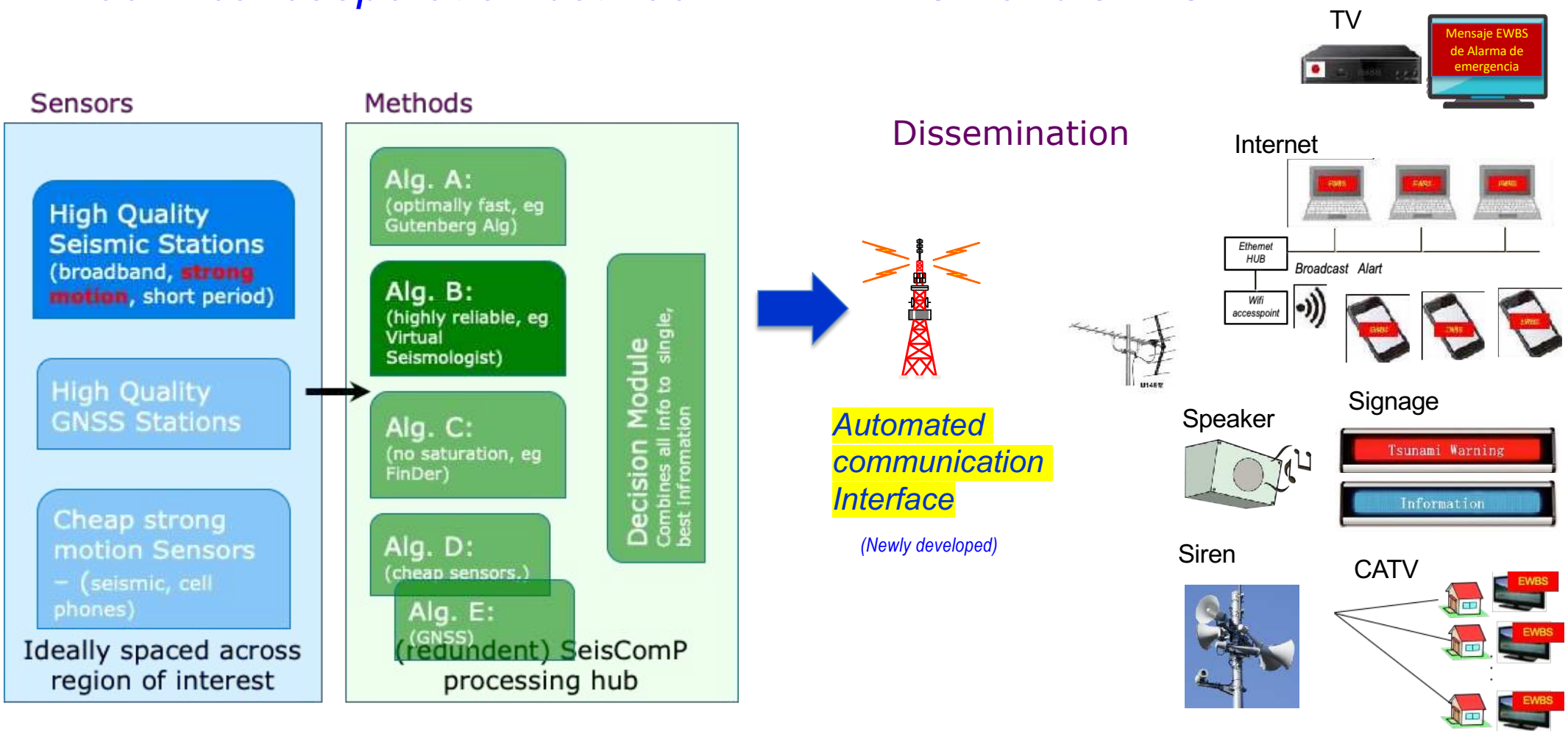
EEW Real-time testing stage
in Central America region



Cooperative Project with EWARNICA

Deliver earthquake early warning (EEW) automatically to the residents by connecting EWARNICA system and EWBS

Technical cooperation between EWARNICA and JTEC



EWARNICA ⟷ EWBS

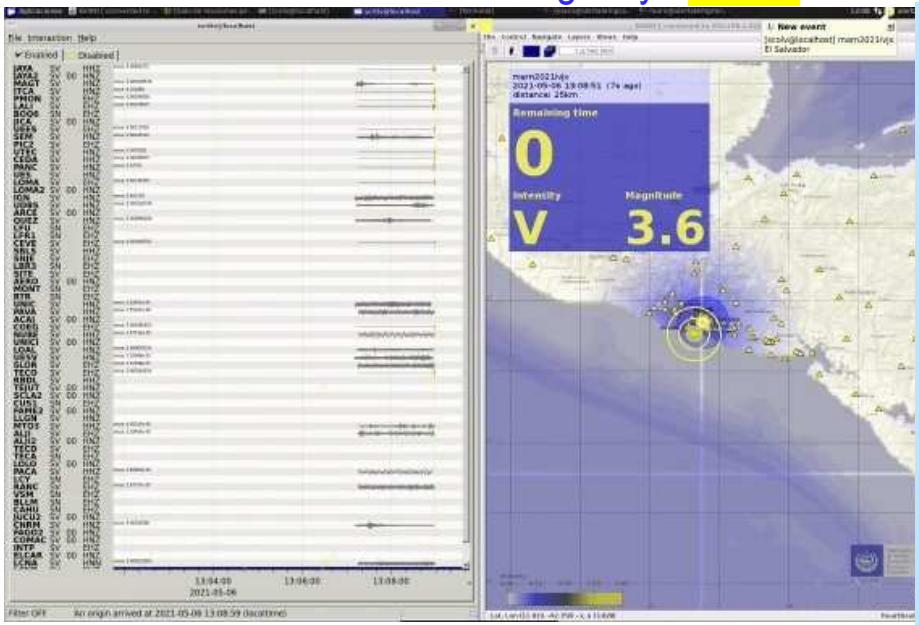
EWBS trial disseminating Earthquake (EEW) information (April 2021) in El Salvador

Broadcasting
Transmitting Station
Canal 10

Earthquake Early
Warning (EEW)

EWBS

Seismic observation agency MARN

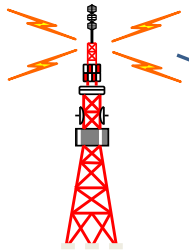


EWBS Pilot Project in Nicaragua

2021.8 – 2022.1

(Japan)
MIC Project

Technical Corporation of TDT/EWBS



EWBS

EWBS Insertor

Donation of EWBS reception devices

Antenna
Measurement equipment

Signage Display 20 units

STB 50 units

Gateway 3 units

(Japan)
JICA Project

Corporation of EWBS receivers' expansion

States Broadcaster
Canal 6

Ministry of Communications
TELCOR

Joint implementation in Nicaragua

Seismic observation Agency
INETER

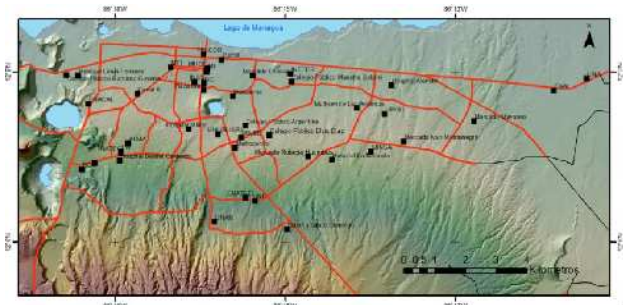
Disaster prevention Agency
SINAPRED

Technical Corporation

Automated communication Interface

(Newly developed)

EEW



EWBS receivers' Installation into 40 locations in Managua

(Swiss)
EWARNICA project

Next Challenges

Towards a comprehensive disaster relief ICT system

1. *CAP aggregation & dissemination*
2. *Expanded use for Radio broadcasting (FM / MW)*

"EWBS-CAP Hybrid transmission" utilizing existing broadcasting network

Emergency information at anytime, anywhere, for anybody

FY 2022	FY 2023
R&D study (Expected to be adopted)	Development of devices Demonstration / Implementation (Tentative)

March 2023 *March 2024*

Comprehensive disaster relief ICT system

utilizing "EWBS - CAP Hybrid Transmission" (Proposal)

EWBS Transmission
by extracted CAP

CAP Transmission
(Direct)

CAP/EWBS Multiplex

Broadcasting

Satellite
VHF Mobile …

CAP Aggregation

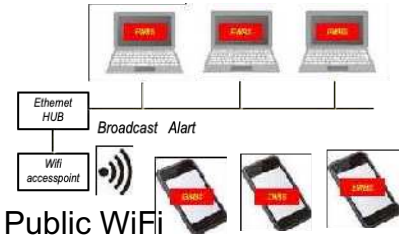
Broadcasting
Radio Wave

EWBS
Reception

① EWBS Dissemination (open use)

for General public (Household, Public Space ..)

General Receivers
For Household



Public WiFi

Public Display / Speaker

② CAP Dissemination (closed use)

for Disaster Management Organizations / Equipment

CAP
Reception

Emergency!!

Specific Display
Early Waring Siren system
Emergency Radio etc.

Classification of Emergency Information delivery on Broadcast radio waves

	EWBS for General Public (open use)	CAP for Specific Recipient (closed use)
Recipient	General household Public Space (Public hall, shopping mall etc.)	Disaster management organizations (Municipalities, fire departments, police, media, etc.)
Purpose	Dissemination for General public	Aggregation & Dissemination among related parties
Type	Broadcasting contents／One-way	Data communication ／ Interactive*
Receivers	TV, Radio etc. for Household Signage, Speaker etc. for Public space	Specific Display, Emergency radio Early Waring Siren system etc.
Information to carry	Minimum Information (Activation flag / Text message / Area-code)	CAP-XML
Technical regulation for receivers' manufacturing	General receivers that comply to Broadcasting technological standard (ISDB-T standard)	Dedicated receivers that is freely manufactured according to an usage (outside of broadcasting standard)
Monitoring Function of receivers	N/A	"Return channel" required
Area coding	Maximum 4096 specified by ISDB-T (Subdivision difficult)	Flexible setting by CAP (Subdivision possible)

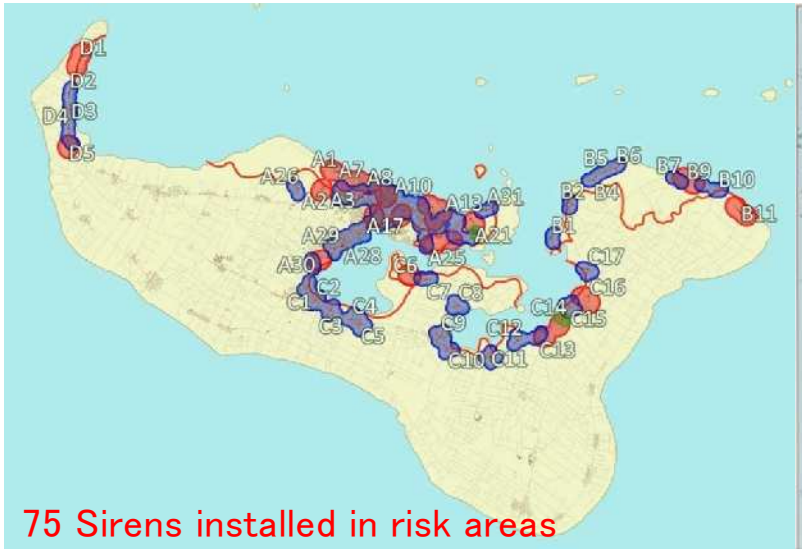
* Internet connection to be used for upstream communications

Types of EWBS

Method	Capacity			Application		
		Code	Text	TV	MW	FM
Audio Analogue Multiplexing	<1kbps (64bps)	✔	NA	NA *1	➢ Japan ➢ Tonga	
Digital Data Multiplexing	>16kbps	✔	✔	➢ Japan ➢ Latin America	NA*2	International Introduction in consideration by using “DARC” *3

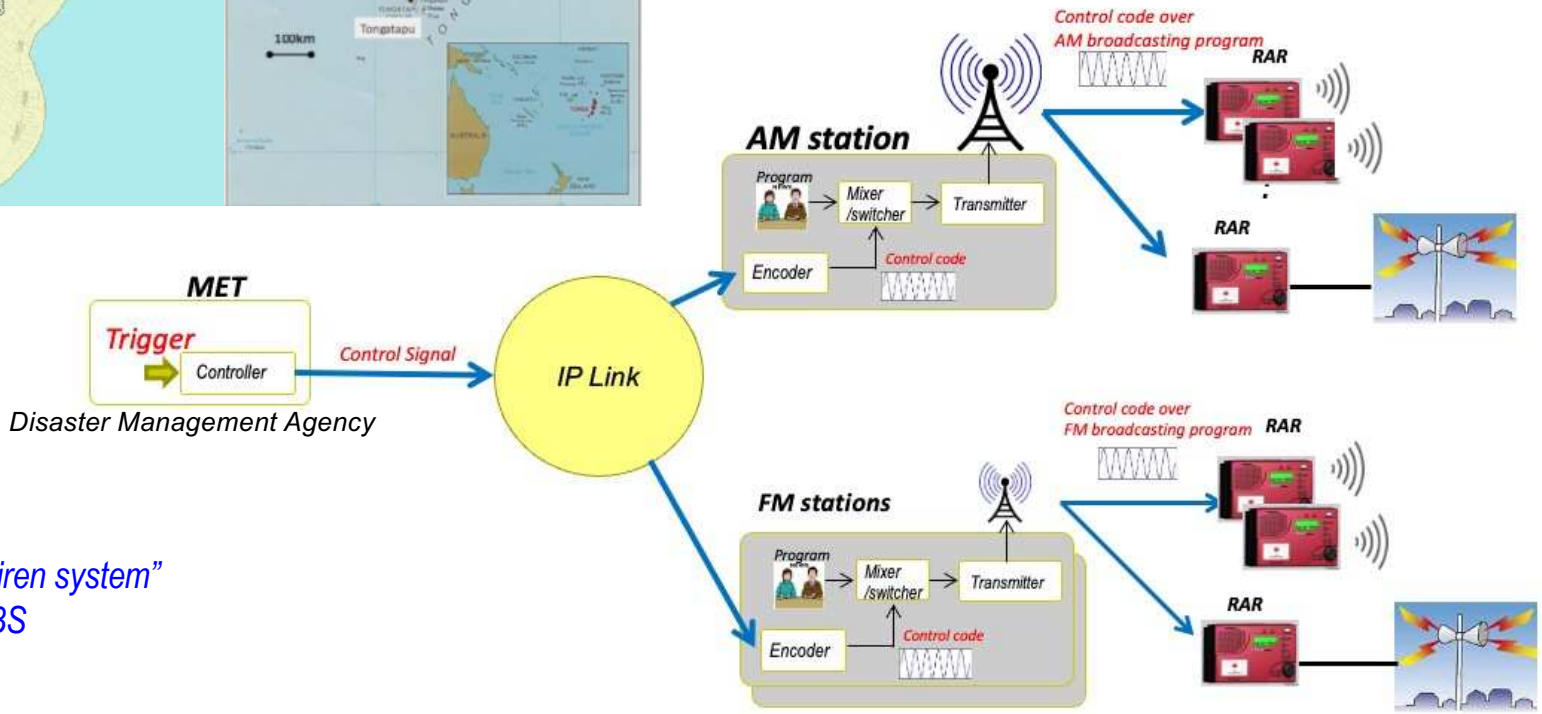
*1 in Japan, used to be in operation in analogue TV broadcasting
*2 MW is technically incompatible to digital data multiplexing
*3 in Japan, under operation in ITS communication service (VICS)

EWBS introduction with Analogue Radio in Tonga
（undergoing in JICA project）



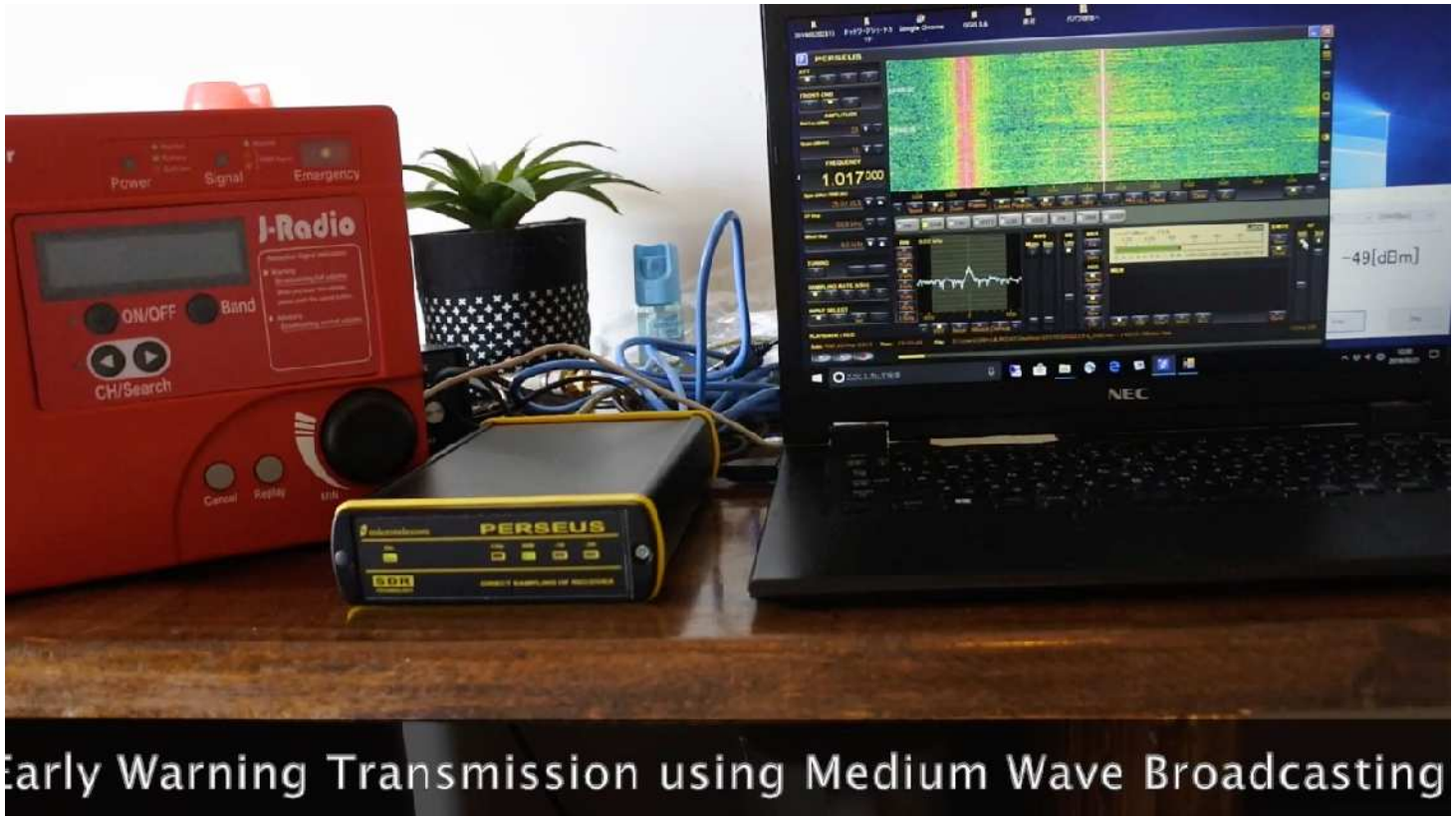
Radio EWBS is used as an
“emergency radio communication system”

“Early Warning Siren system”
using Radio EWBS



Video (1 minute)

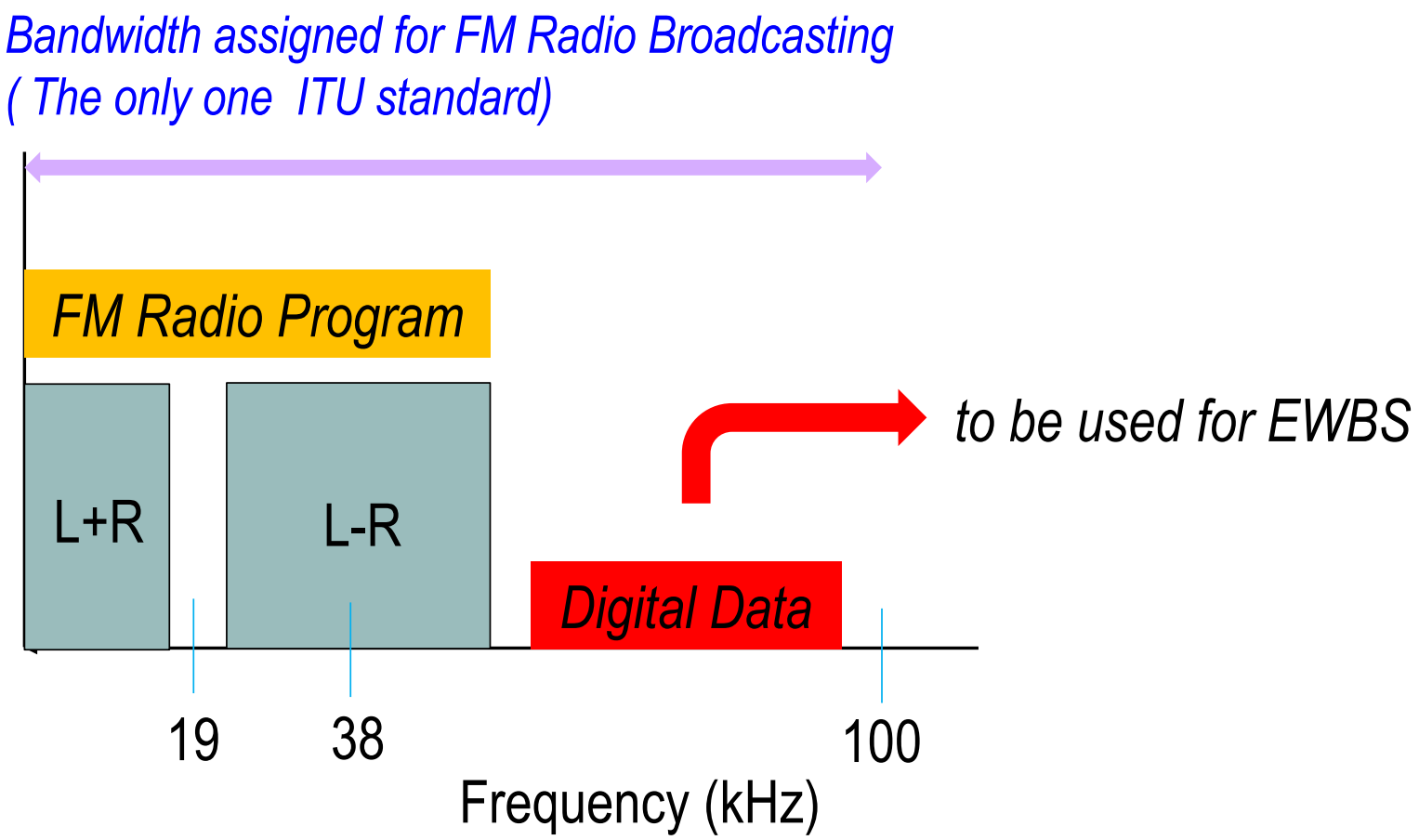
The case of Radio EWBS in Tonga



Utilization of FM Data casting

- *FM Radio broadcast standard is common throughout the world*
- *Digital data multiplexing system on FM Radio are standardized in ITU-R European "RDS" (Radio Data System) / Japanese "DARC" (Data Radio Channel).*
- *Japanese DARC has enough capacity and ability to cover "EWBS-CAP Hybrid transmission" .*
- *In Japan, DARC has long been in service in "VICS" (Vehicle Information and Communication System) and widespread.*
- *DARC has promising potential to expand the case of Latin America to Asia-Pacific countries by utilizing the exiting FM Radio wave.*

Digital data multiplexing system on FM Radio



Digital data multiplexing system on FM Radio

	RDS (Radio Data System)	**DARC** (Data Radio Channel)
Development	Europe	Japan
Standardization	1986 (ITU-R Rec. 643)	1995 (ITU-R Rec.1194)
Modulation	DBPSK	LMSK
Sub-Carrier	57 kHz	76 kHz
Data Capacity	1 kbps	16 kbps

Sufficient capacity
for the EWBS-CAP Hybrid transmission

DARC in operation in Japan

VICS (Vehicle Information and Communication System)
https://www.vics.or.jp/en/

VICS is an innovative information and communication system, enables you to receive real-time road traffic information about congestion and regulation.

***Information* is provided through three communication and broadcast media**

FM multiplex broadcasting (NHK local FM multiplex broadcasting stations)

Radio wave beacons (Expressways)

Infrared beacons (Ordinary trunk roads)

VICS

	FM multiplex broadcasting	Beacon(radio wave/infrared)information
Map display	Automatically displayed 	Automatically displayed 
Text display	Manual selection VICSみやぎ (01/09) 08:35 国道48号下り 車線規制 作並→本町3丁目	Automatically displayed 新宿通り上り 四谷見附付近 渋滞0.5KM
	Manual selection 東名 下り 事故 東名川崎IC→東京IC 車線規制	Automatically displayed 御殿場→裾野 事故渋滞 5km

Text information delivery is compatible to EWBS

Thank you !
Gracias!

sakaguchi @ jtec.or.jp

https://www.jtec.or.jp/english/activities/ewbs.html

Japan Telecommunications Engineering and Consulting Service