EWBS

Emergency Warning Broadcast System

APT online training course

for the effectiveness of radio broadcasting in rural areas
where the limited broadband network.

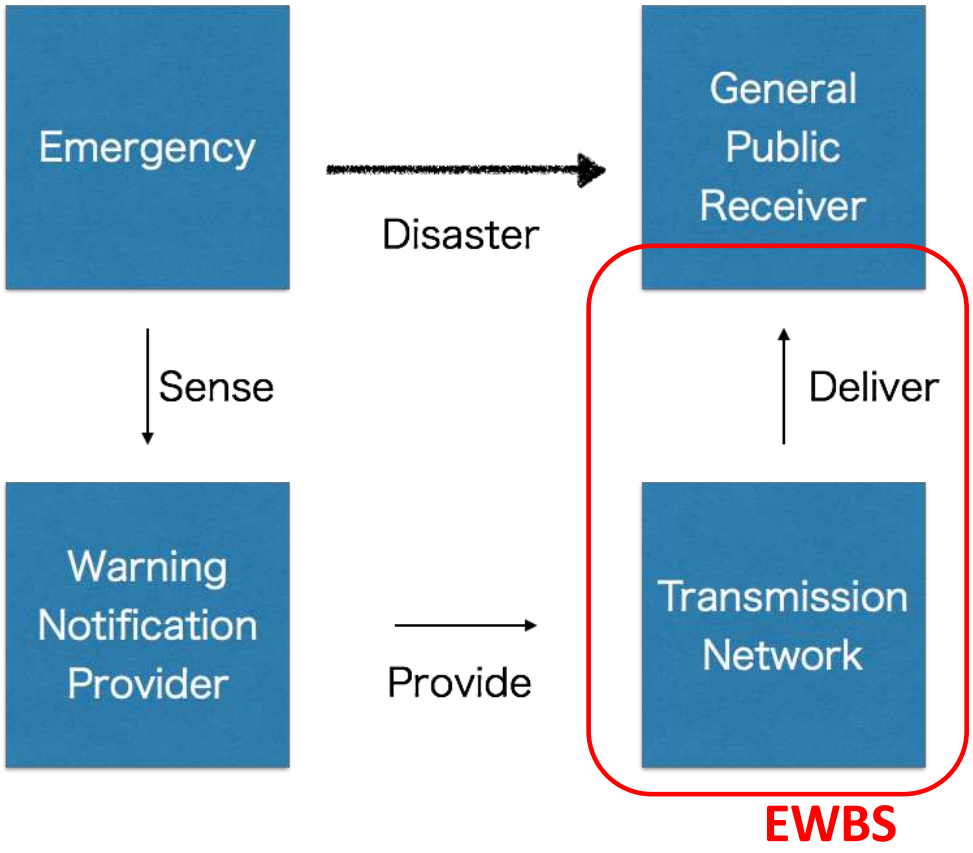
January 2022

JTEC

Japan Telecommunications Engineering and Consulting Service

EWBS ecosystem & requirements

- Emergency Warning Broadcast System -



- *Wide coverage*
- *Robust transmission*
- *One way communication*
- *Low Latency*
- *Resistant mobile reception*
- *Low cost, easy introduction*

equals to characteristic of “Broadcasting Radio Wave”

See *Video* *(5 Minutes)*

NHK STRL about EWBS
2016 IEEE Milestone Award

EWBS operation in Japan

National Organization for Disaster Prevention

Main Operator : Broadcaster

EWBS Information (Text)

Emergency Program

Covering Emergency Information

ISDB-T

Emergency!!

for General households

EWBS is one of the Broadcasting Contents

Main Operator :
National Organization for Disaster Prevention

Emergency Information

Emergency!!

Broadcaster

ISDB-T

Emergency!!

for General households

Display

【緊急地震速報】

Siren

for Public place

Adaptation EWBS for oversea countries

Broadcasting network is used

- as communication system
- open to anybody / any devices

EWBS is emergency information delivery system using broadcasting infrastructure

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*

See Video (2 Minutes)

Why Emergency Information on Broadcast Radio Wave

Why Emergency Information on Broadcast radio wave?

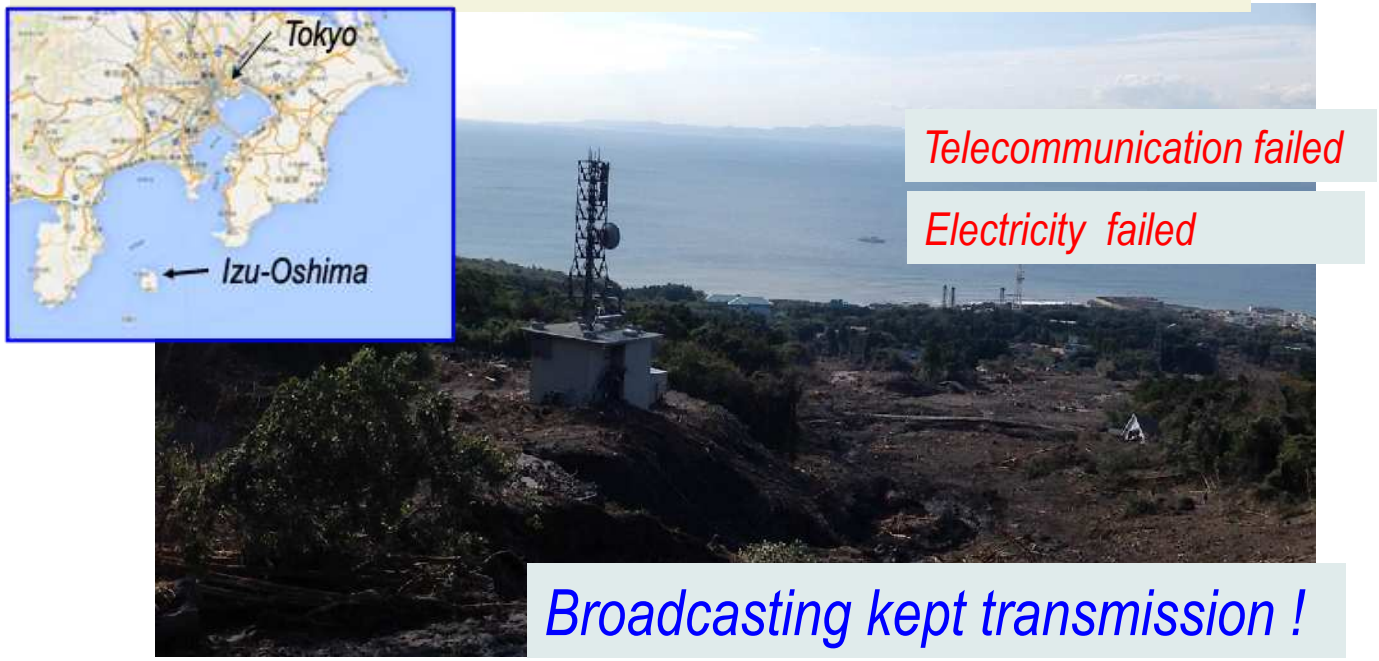
1. Wide coverage

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

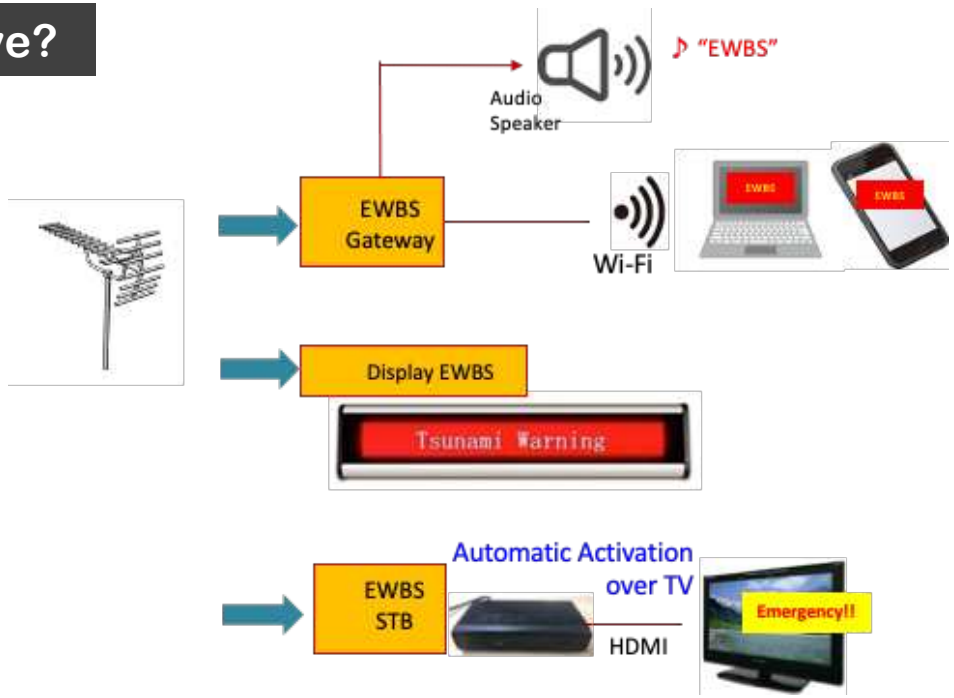
in a vehicle

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

Types of EWBS

1. Audio Analogue Multiplexing method
2. Digital Data Multiplexing method

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)

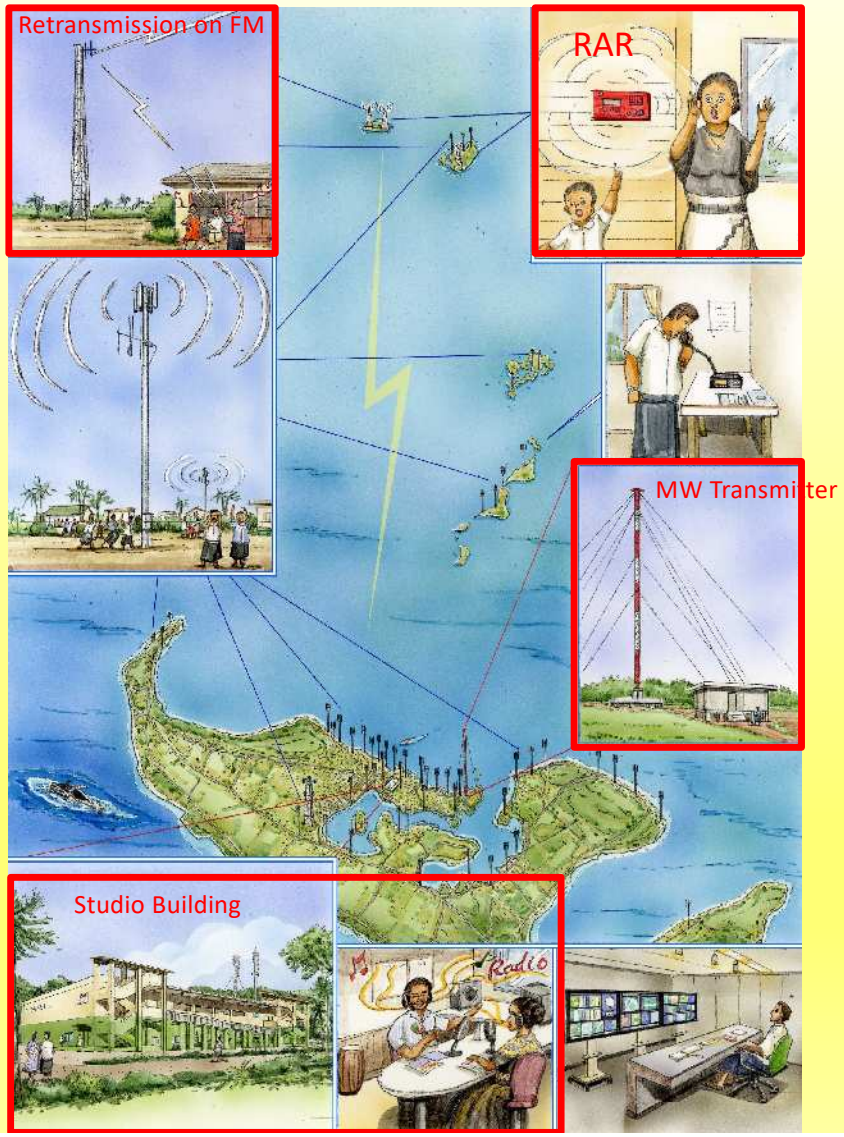
Case study of MW Radio

Tonga

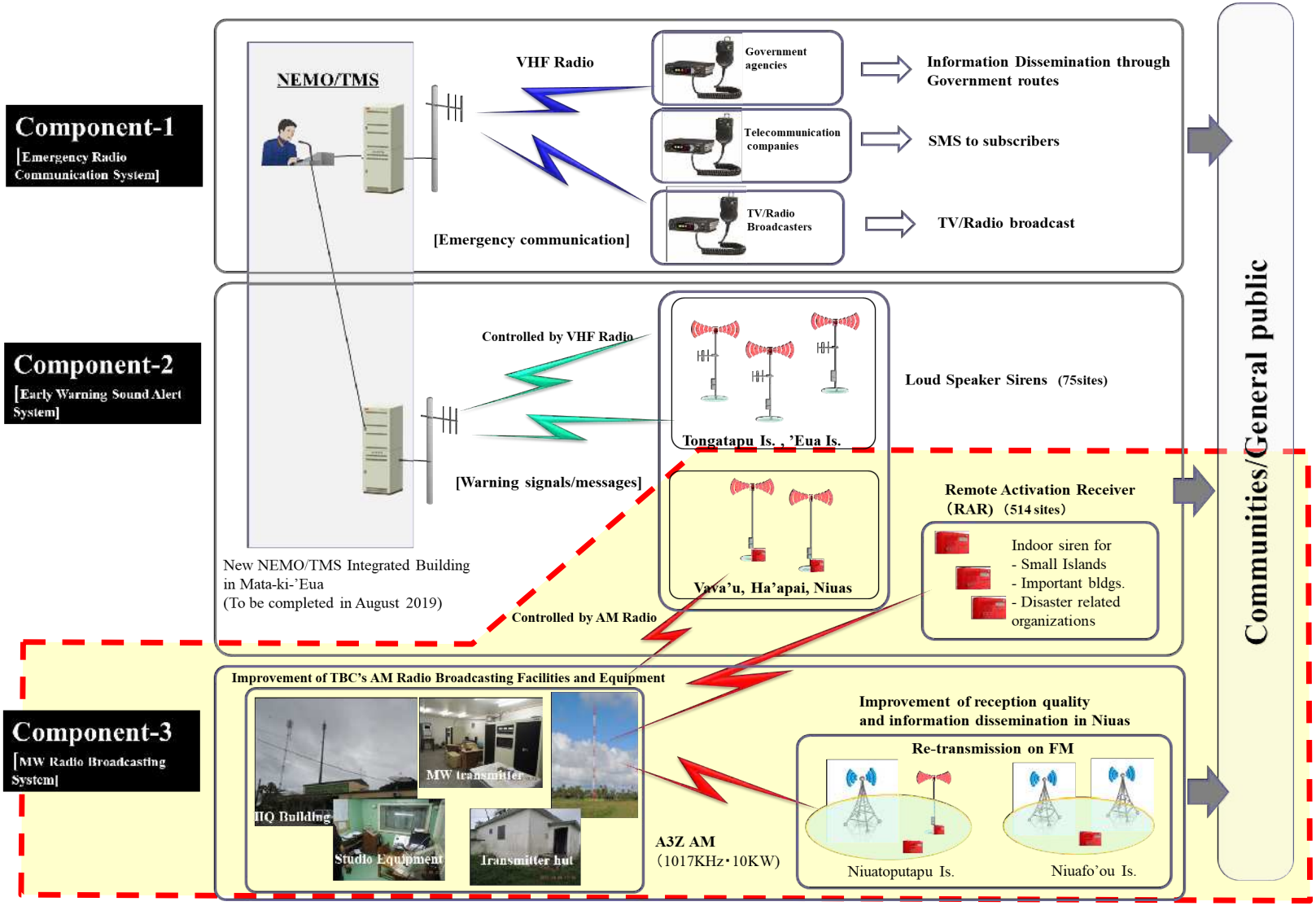
“**N**ationwide **E**arly **W**arning **S**ystem in the Kingdom of Tonga“ （**NEWS Project**)

Japanese Grant Aid 2018～

: Relates to Radio Broadcasting

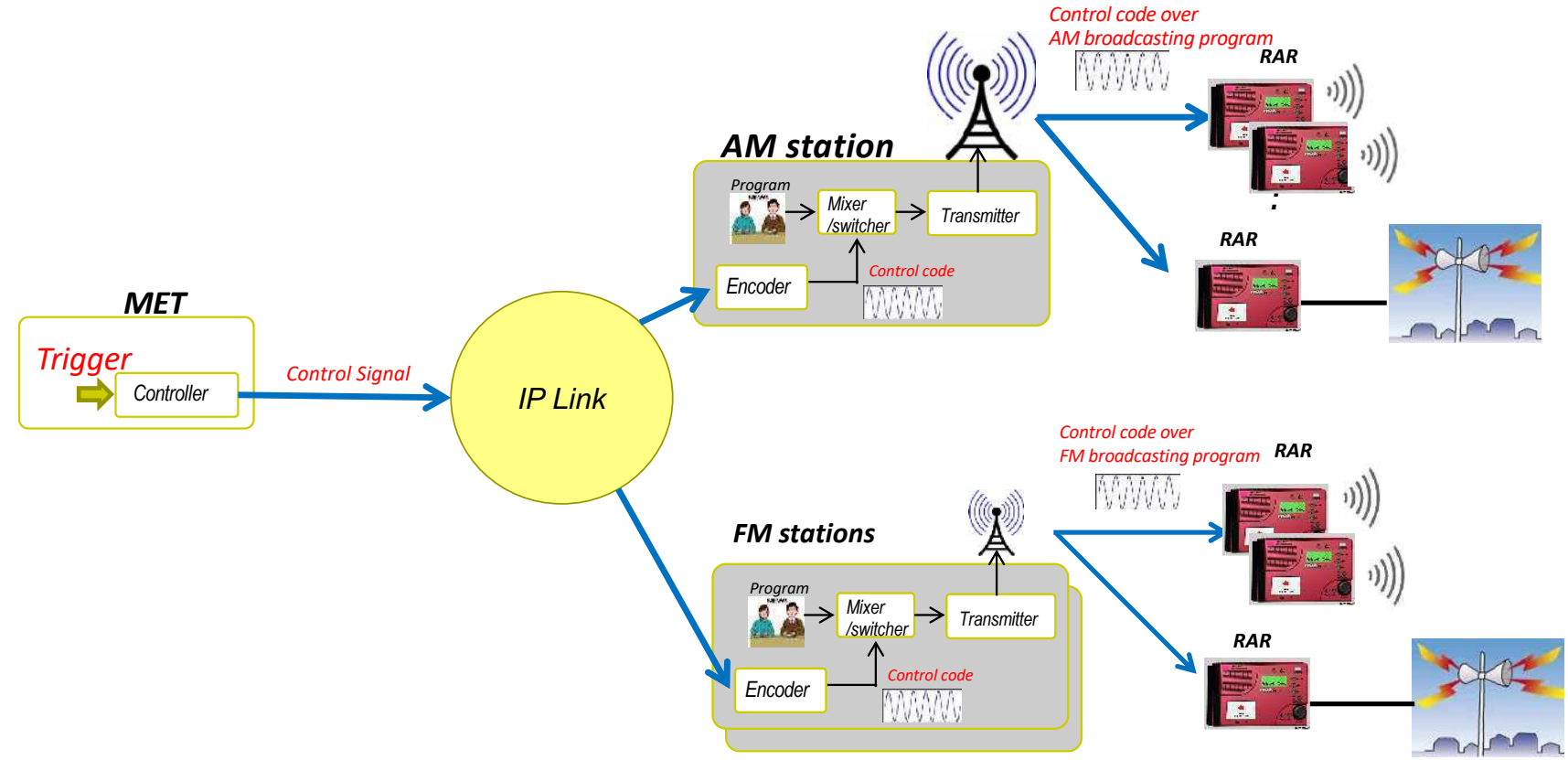


Case study of MW Radio



Case study of MW Radio

Block diagram and operational procedure of Early Warning System using radio broadcast



Basic procedure

MET triggered off at Controller in case of emergency

Control signal created by Controller is sent to selected broadcasters via IP link link.

Control code which encoded by Encoder is switched at Mixer/switcher ,and then sent to Transmitter as a radio program audio signal.

RARs are activated when control code is detected at decoder equipped in the receiver even during switched-off/Sleep-mode.

Case study of MW Radio

Remote Activated Receiver (RAR)

<u>Purpose</u>

To disseminate urgent emergency information to the peoples in Tsunami hazard areas especially in:

- *Remote islands where outdoor sirens do not cover*
- *Reside or work at outside of sound coverage from outdoor sirens*
- *Inside of large buildings where sound of outdoor siren is hardly heard*
- *Other important organizations/facilities*

<u>Major functions</u>

- *Act as 'Emergency indoor warning sound devise' which remotely activated from MET/NEMO office when emergency.*
- *User can enjoy this as a normal radio (AM/FM) in normal time.*

<u>Major specifications</u>

- *Tuners:* *AM and FM*
- *Dimension:* *250mm (W) x 70mm (D) x 160mm (H)*
- *Weight:* *1.8 kg*
- *Power source:* *AC240V or DC12V or USB*
- *Power Consumption:* *Negligible small in stand-by mode*
- *Backup:* *Rechargeable battery inside for blackout*
- *Alerting sounds:* *Siren sounds, Chimes, pre-recorded voice messages etc.*
- *Installation:* *Fixed to the wall by screw and powered from outlet nearby.*

Case study of MW Radio

Siren tower

Broadcasting Station

See Video (1 Minutes)

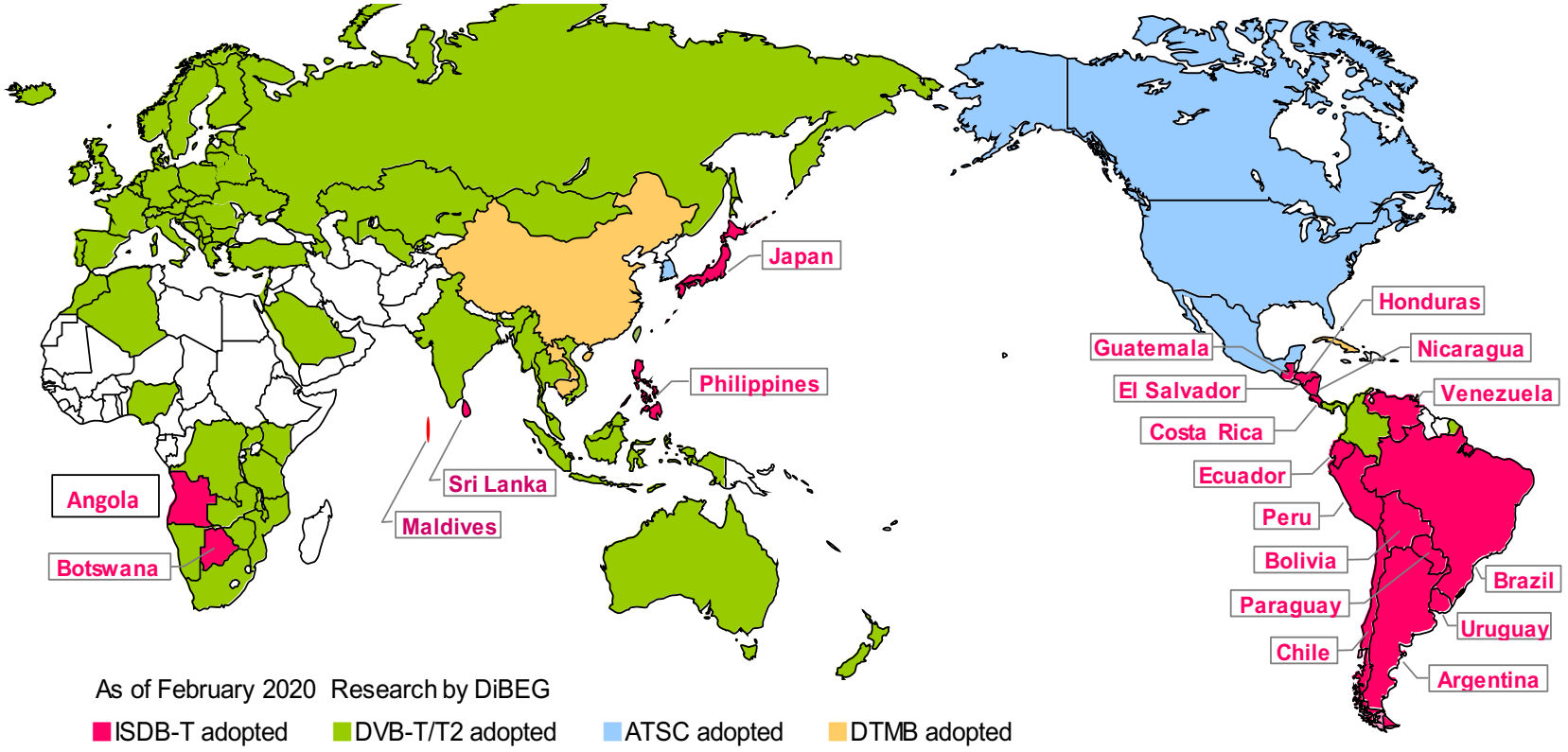
EWBS
with Medium Wave Radio
in Tonga

Case study of Digital TV

EWBS Case study in Latin America

with Digital TV radio wave

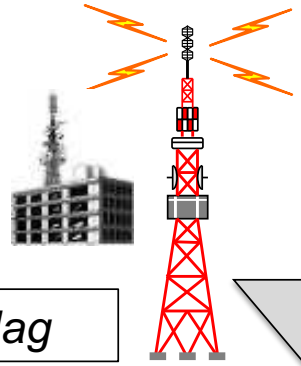
ISDB-T *Japanese Digital TV standard adopted by 20 countries*



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

EWBS Standardization in ISDB-T International Forum

Broadcasters



Activation Flag

Superimpose

Receivers

Automatic activation by Activation Flag

Emergency Information Display by Superimpose

Adding a "Superimpose" function on the Japanese original, *EWBS Standard* ***was approved by ISDB-T International Forum in May 2013***

EWBS Harmonization Document
By ISDB-T International Forum


ISDB-T INTERNATIONAL

APROVADO EL 28 DE MAYO DE 2013

ISDB-T DOCUMENTO DE ARMONIZACIÓN

PARTE 3: SISTEMA DE ALERTA DE EMERGENCIAS EWBS

(05/ 2013)

What is "Superimpose" ?

3 Types of text messages used in TV service

Overlay in Broadcasting Studio

（1）Normal Subtitle (Open Caption)

- Information which belongs to the main program
- Always on *the display*

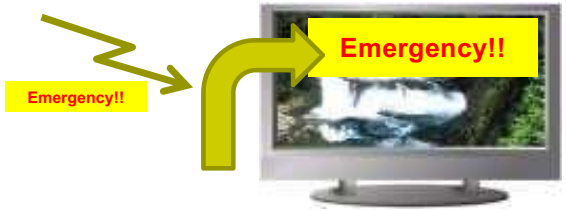
（2）Closed Caption

- the service for inaudible persons / multilingual movie etc.
- Synchronous information with the main program
- Selection of display (on/off) by viewers

（3）Superimpose

- Asynchronous information with the main program
- Selection of display (on/off) by viewers
- to be sent background at any time

Overlay in Receivers



See Video (1 Minutes)

Explanation of Superimpose

What is "Superimpose" ?

Superimpose

Independent digital text data issued by JMA (Japan Metrological Agency)

Utilized for EWBS

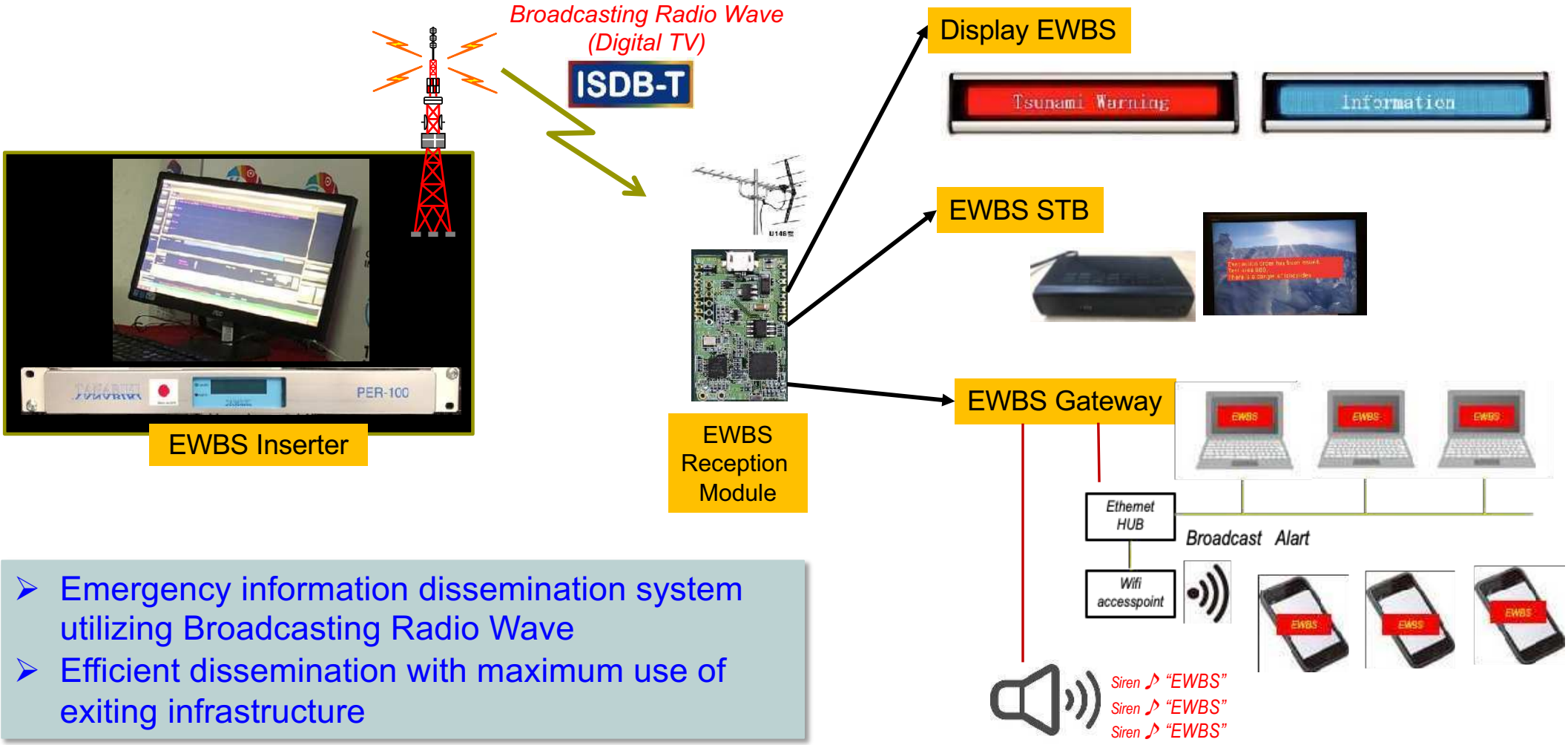
Open-Caption

Broadcasting contents edited by NHK

On 14:46 March 11,2011 NHK's Broadcasting

EWBS Dissemination System

developed in Japan for Latin American countries that adopt Japanese Digital TV standard (ISDB-T)



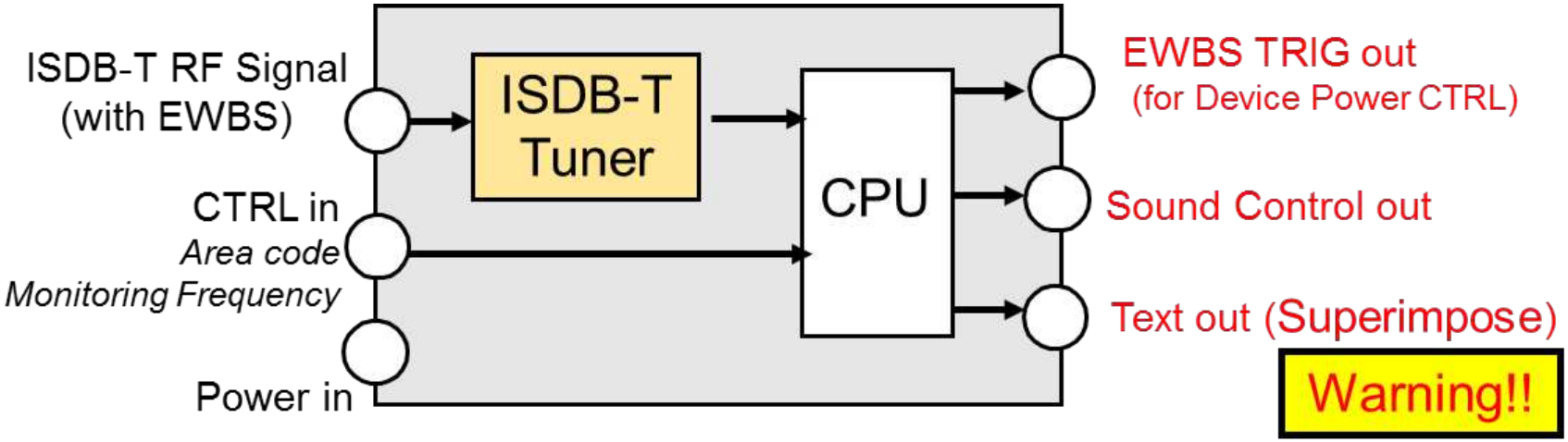
- Emergency information dissemination system utilizing Broadcasting Radio Wave
- Efficient dissemination with maximum use of exiting infrastructure

See Video (5 Minutes)

EWBS
with Digital TV Broadcasting
in Latin America

EWBS Superimpose Module

- Exclusive reception of Text Information
- 24-hour monitoring ⇒ never to miss EWBS alert
- Robust “One-seg” reception
- Small size , Low consumption



EWBS Superimpose Module

Public Display

for Public Use

for Consumer Use

EWBS-Superimpose Module

Alert Terminal

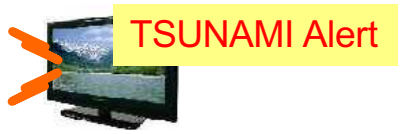
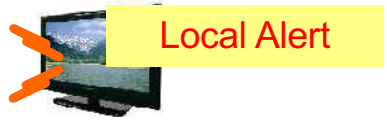
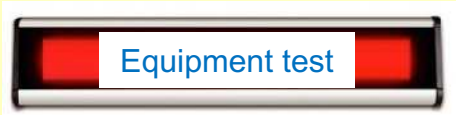
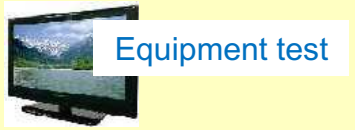
Portable TV

STB

TV

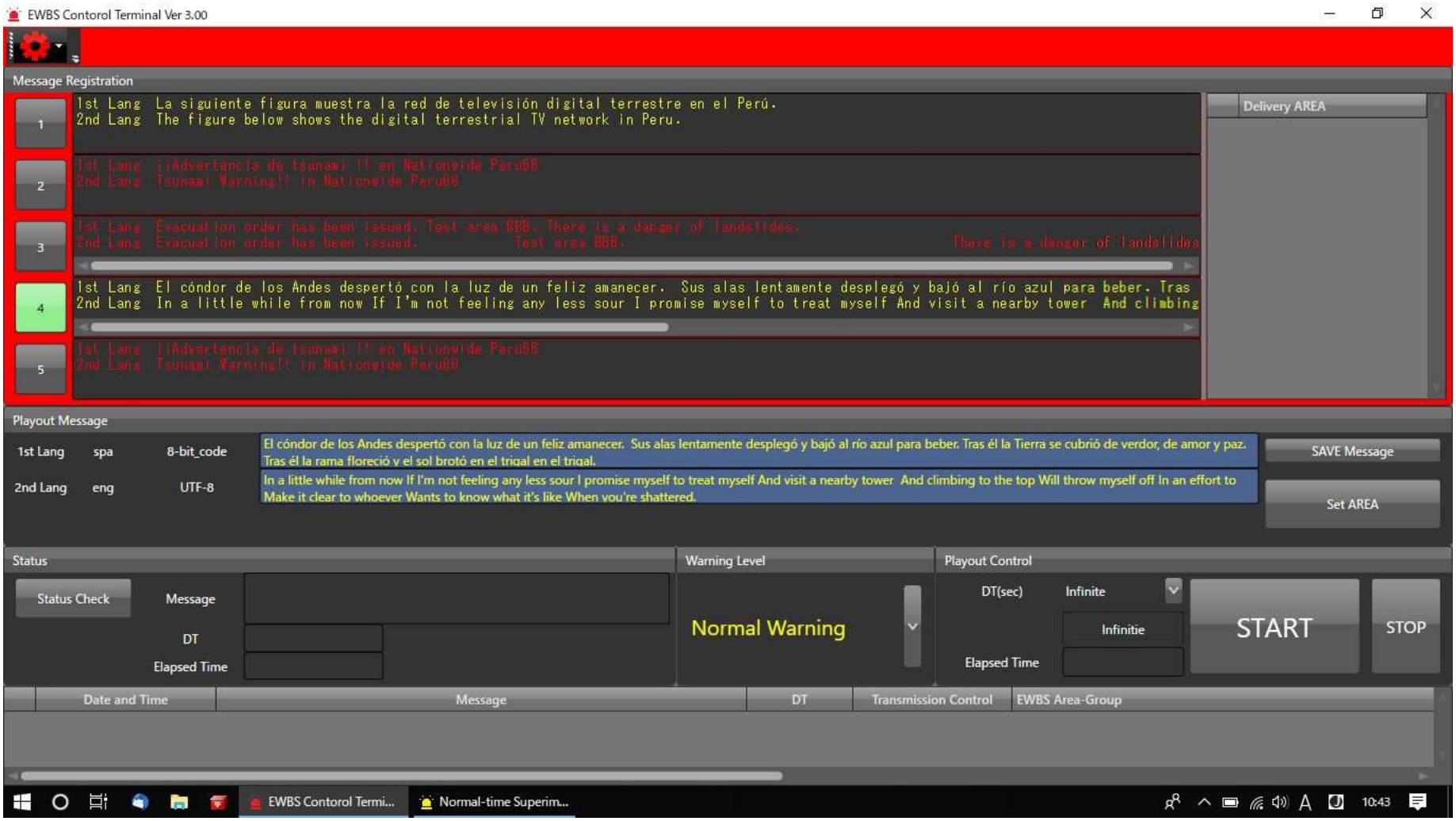
Public Speaker / Siren

Application of operation controlled by EWBS Inserter

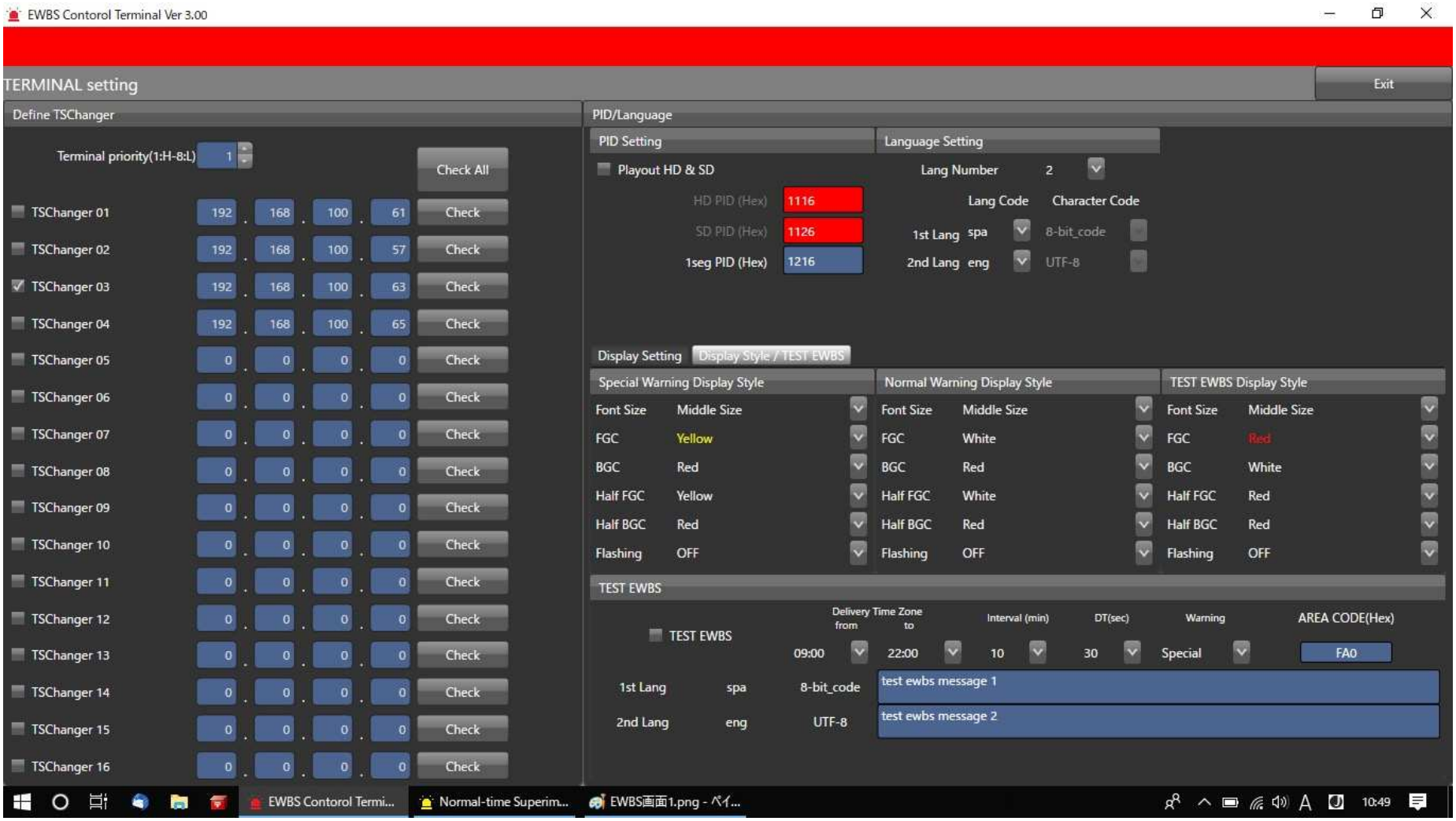
			Siren for TSUNAMI	Signage	TV
1	Tsunami Alert N	~~Full-seg~~ One-seg			
2	Local Alert L	~~Full-seg~~ One-seg			
3	Test for Designated receiver L	One-seg			
4	Drill N L	One-seg			
5	Important Notification N L	One-seg			
6	General Information N L	One-seg			

N: Nation wide Operation L: Local Operation

EWBS transmission control terminal (operation menu)



EWBS transmission control terminal （configuration menu ）



EWBS compatible Set Top Box

Automatic activation
Automatic HDMI port change over TV-set

HDMI CEC function

ISDB-T
"One-seg"

EWBS STB

Separate EWBS dedicated tuner

"never misses the alarm"

Result of HDMI – CEC compatibility test in Costa Rica (March 2019)

No.	Marca	Lugar de fabricacion	Fabricante	Modelo	Cambio de entrada	Encendido automatico								Obser
						HDMI 1		HDMI 2		HDMI 3		HDMI 4		
1	SONY	Mexico	SONY	XBR-55A1E	OK	ON		ON		ON	ARC	ON		Este se usao para hacer la demos con EWBS y las otras funciones.
2	SONY	Mexico	TrandsmartCE Mexico	KD-55X725F	OK	ON		ON		ON	ARC			
3	SONY	Mexico	FOXCOONN	XBR-70X835F	OK	ON		ON		ON	ARC	ON		
4	SAMSUNG	Mexico	SAMSUNG Mexico	QN65Q7FAMPX	OK	ON		ON	ARC	ON		ON		
5	SAMSUNG	Mexico	SAMSUNG Mexico	UN50NU7090P	OK	ON		ON	ARC					
6	LG	Mexico	LG Mexico	OLED65B8SSC	OK	ON		ON	ARC	ON		ON		
7	LG	Mexico	LG Mexico	43UK6300PSB	OK	ON		ON	ARC	ON				Tenia la función HDMICEC desactivada pero aun asi encendi
8	LG	Mexico	LG Mexico	49LH5730-SE	OK	~~ON~~	ARC	~~ON~~						Se fabricó en Septiembre del 2016 . Tenia la función HDMICE desactivada pero aun asi encendió
9	TELSTAR	China		TTK065440KK	OK	~~ON~~		~~ON~~		~~ON~~	ARC			fabricado en 2018
10	TELSTAR	China		TTS043740KS	OK	ON		ON		ON				sin ARC
11	TELSTAR	China		TK043420KK	OK	~~ON~~		~~ON~~		~~ON~~		~~ON~~		fabricado en 2018 sin ARC
12	Panasonic	Mexico	Panasonic Mexico	TC-32D400L	OK	~~ON~~		~~ON~~	ARC					Fabricado en 2017
13	Haier	China		LE55D8500DA	NG	~~ON~~		~~ON~~		~~ON~~				sin ARC
14	Westinghouse	China		W50L165SM	NG	~~ON~~		~~ON~~		~~ON~~				sin ARC
15	RCA	China		RC24A165	NG	~~ON~~								sin ARC
16	LG	China	LG Mexico	LG32U500B	NG	~~ON~~		~~ON~~						sin ARC
17	LG	China	LG Mexico	49LH5100	NG	~~ON~~		~~ON~~						sin ARC

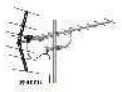
Major manufactures' TV-set are almost compatible HDMI-CEC function

Applications of "EWBS Gateway"

Bridge of EWBS to any existing communication systems

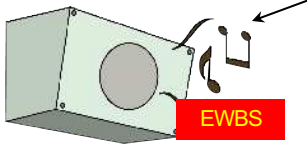
Siren

Public Communication System

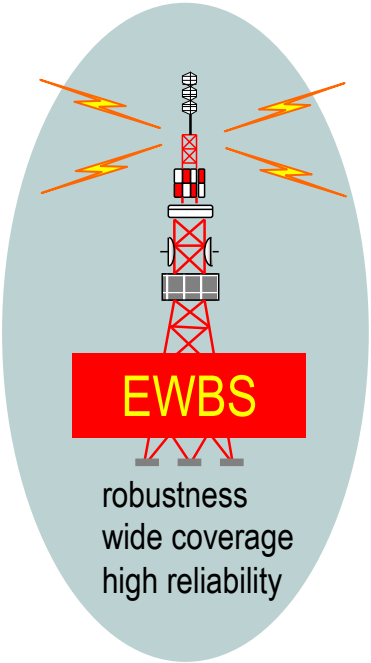


EWBS Gateway

Speaker

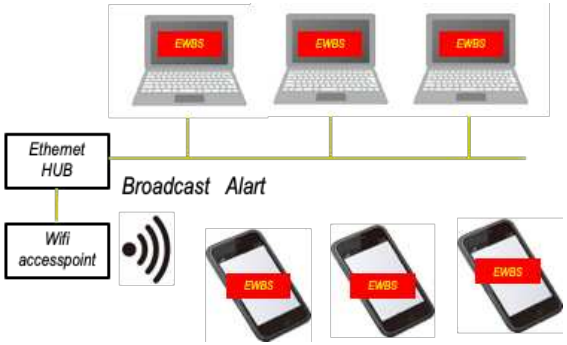


Signage

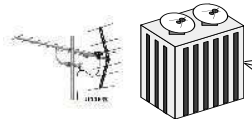


WiFi

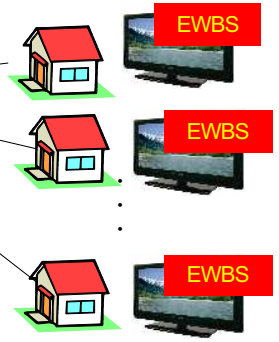
EWBS Gateway



CATV



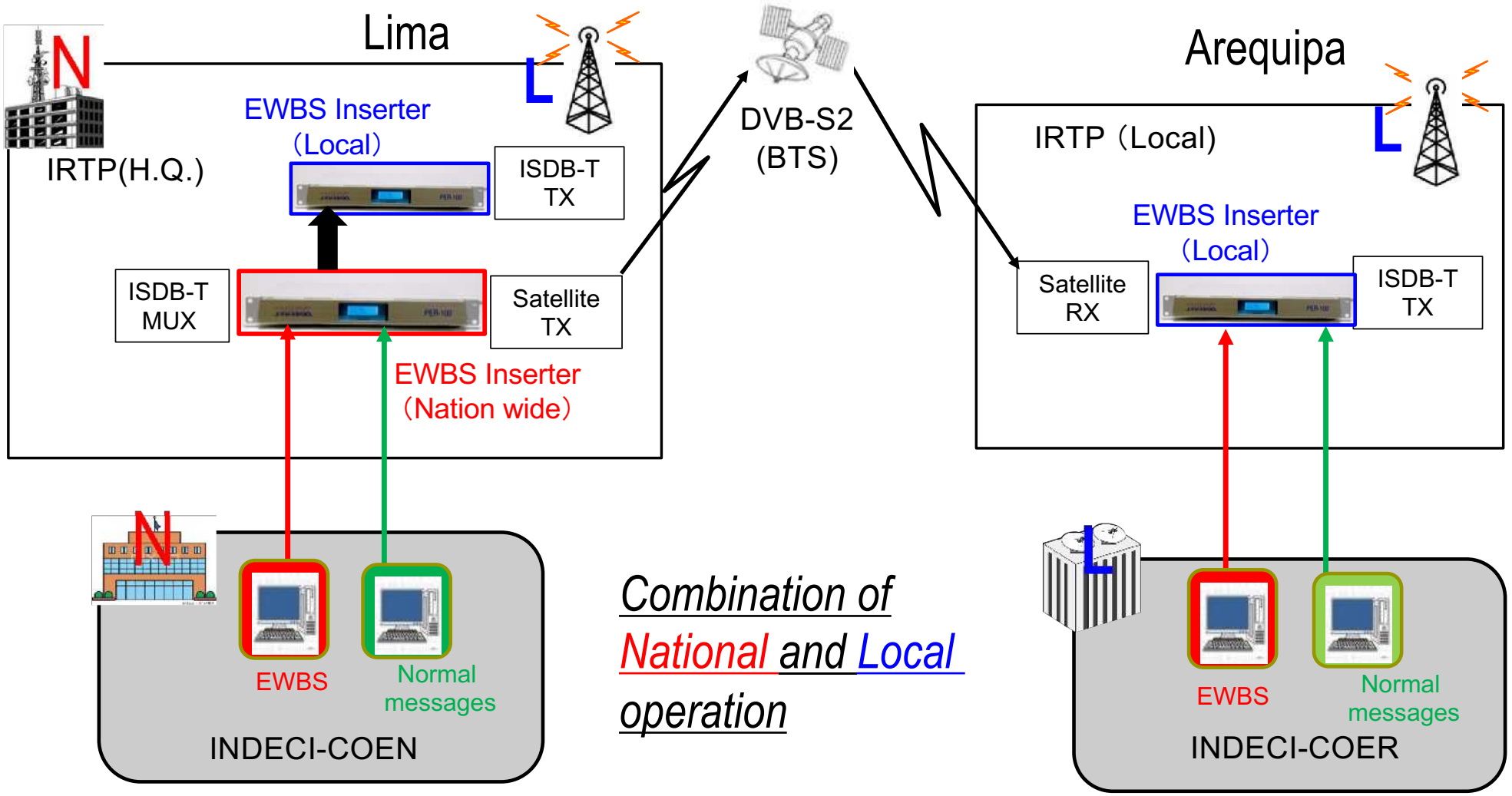
EWBS Gateway



EWBS implementation in Latin America with Japan's cooperation

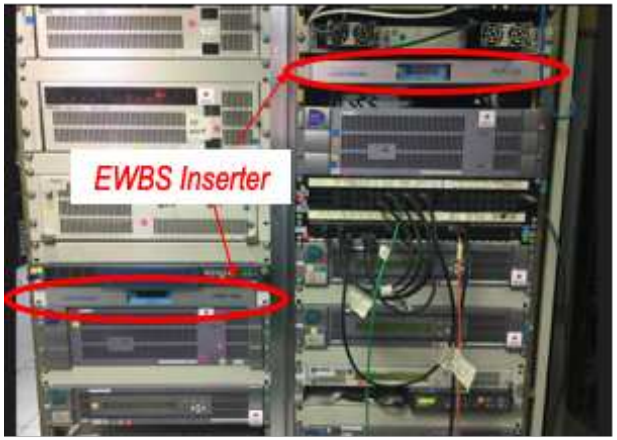
Nicaragua	3/2018 Field experiment of EWBS equipment 4/2021 Start of test transmission of EEW (Earthquake Early Warning) information 12/2021 Pilot project for EWBS receivers' expansion (underway)
El Salvador	10/2018 Field experiment of EWBS equipment 10/2019 Demonstration of EWBS receivers 4/2021 Start 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 1/2022 Field experiment of EWBS equipment (underway)

EWBS operation in Peru



Combination of National and Local operation

EWBS operation in Peru

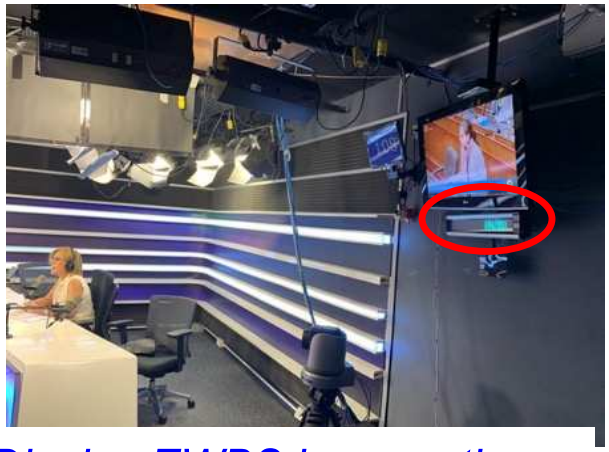


IRTP (Lima)

INDECI-COEN (Lima)

IRTP (Arequipa)

INDECI-COER (Arequipa)



Display EWBS in operation in Radio broadcasting station

Peru - EWBS utilized in the event on "World TSUNAMI Awareness day"

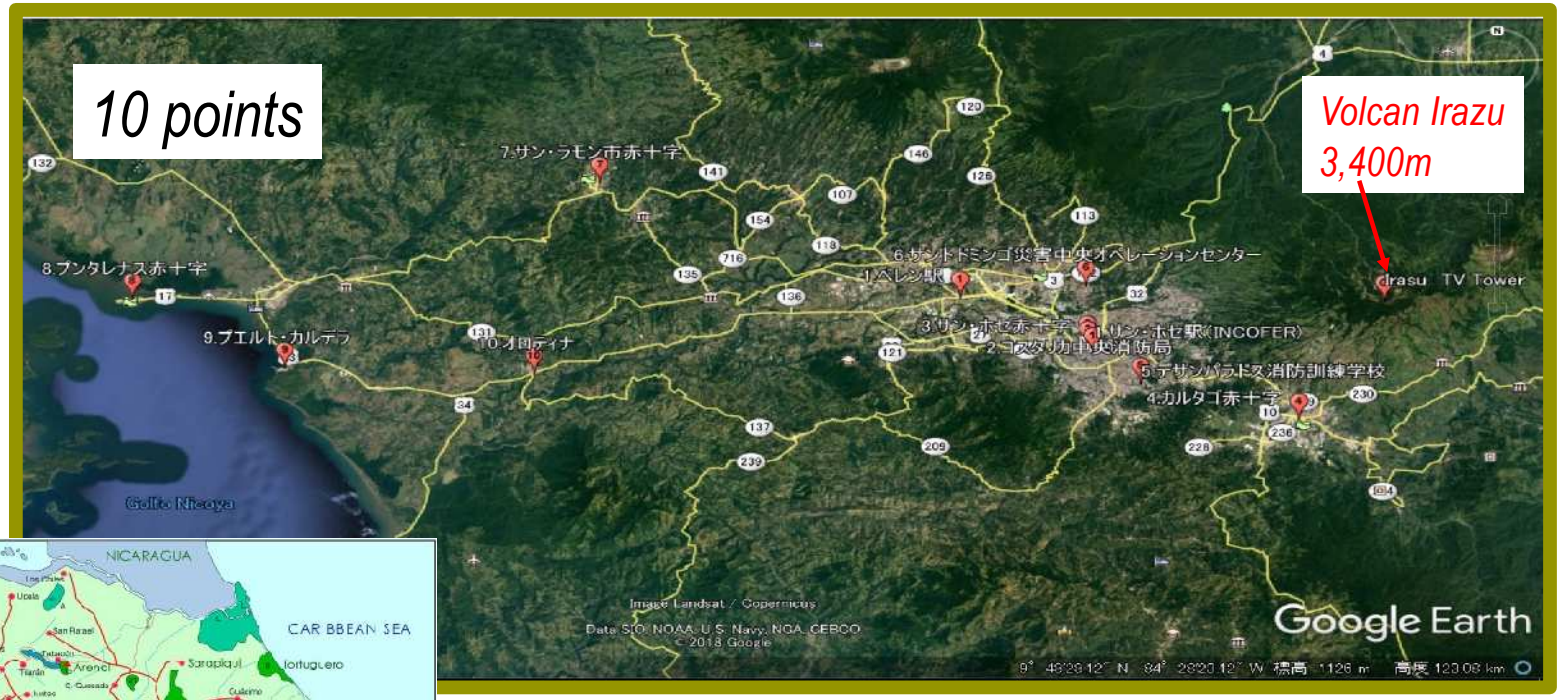
5 November 2019

Emergency message (EWBS) displayed on the large display at the main site of the evacuation drill

Utilization in a local government

EWBS Displays utilized in the Disaster Ministerial meeting

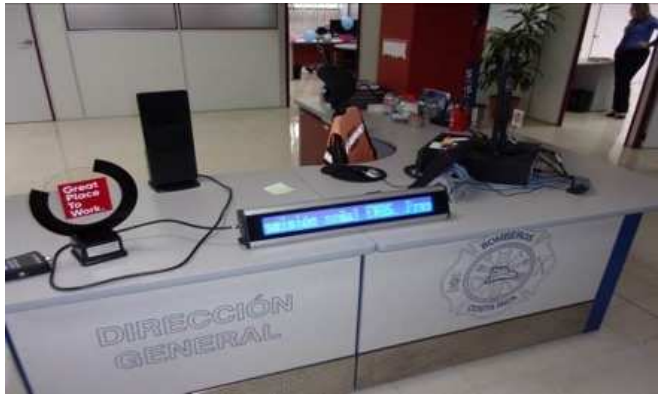
EWBS Reception Survey in Costa Rica (March 2019)



Results of reception

Reception level	30	26	20	18.5	17	15.5
MER (dB)	26	22	15	13	10	7.5
STB	✓	-	-	-	-	-
Display EWBS	✓	✓	✓	✓	✓	✓

EWBS Reception Survey in Costa Rica (March 2019)



Field test at a fire station

Field test in a vehicle

Field test in a coast guard boat

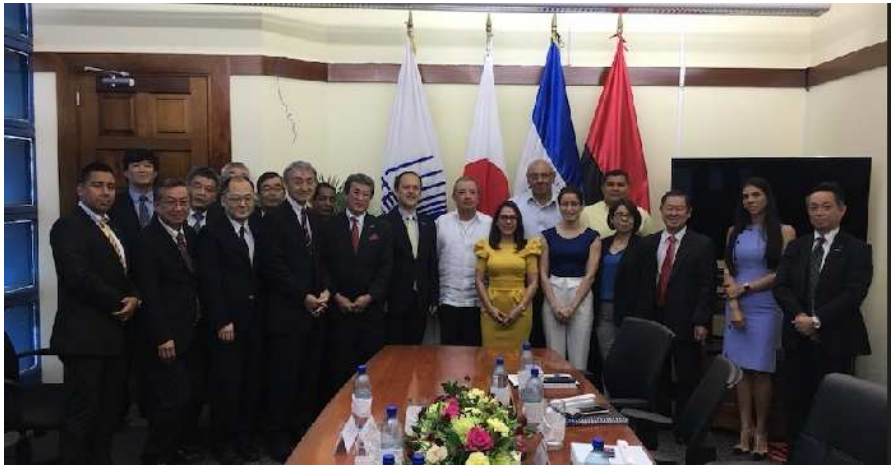
Field test in a railway carriage

EWBS trial in Nicaragua (March 2018)

SINAPRED

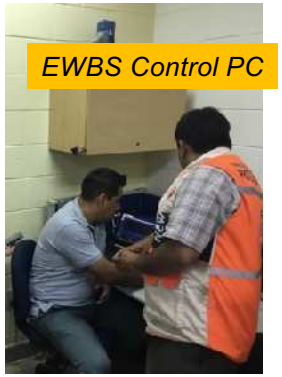
EWBS Control PC

Canal 6



EWBS Inserter

EWBS trial in El Salvador (October 2019)



EWBS Control PC

Protección de Civil

Canal 10

EWBS Inserter

EWBS receiver installation at a government agency

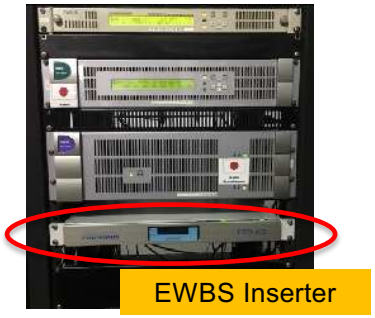
Demonstration in Evacuation drill

Receipt on moving vehicle

EWBS trial in Costa Rica (March 2019)

CNE (Disaster Prevention Agency)

SINART (States Broadcaster)



EWBS trial in Brazil (December 2019)

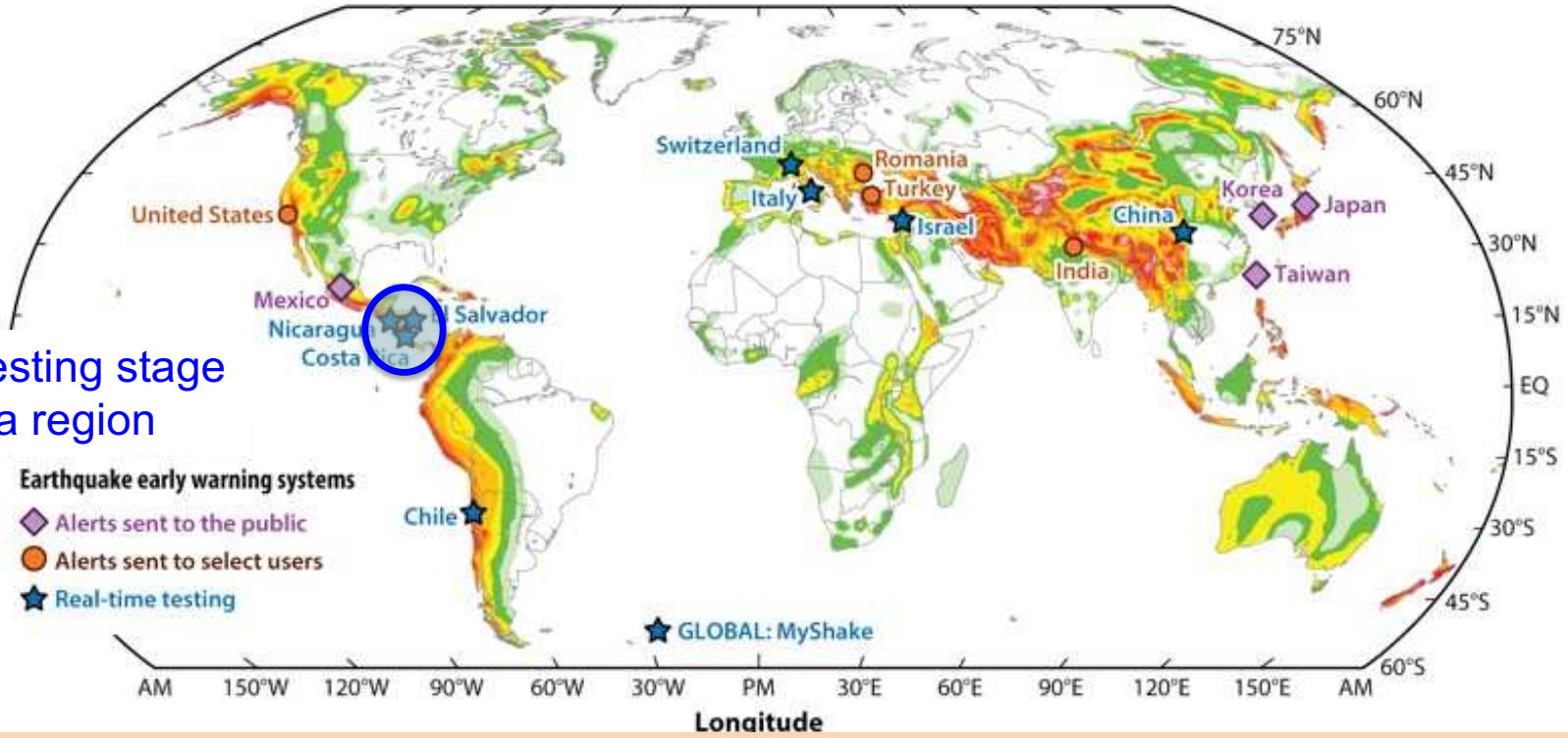
EWBS Inserter installed public broadcasting station, EBC

CENAD ; Brazilian National Risk and Disaster Management Center

EWBS trial in Ecuador (March 2021)

EEW around the globe

EEW Real-time testing stage
in Central America region

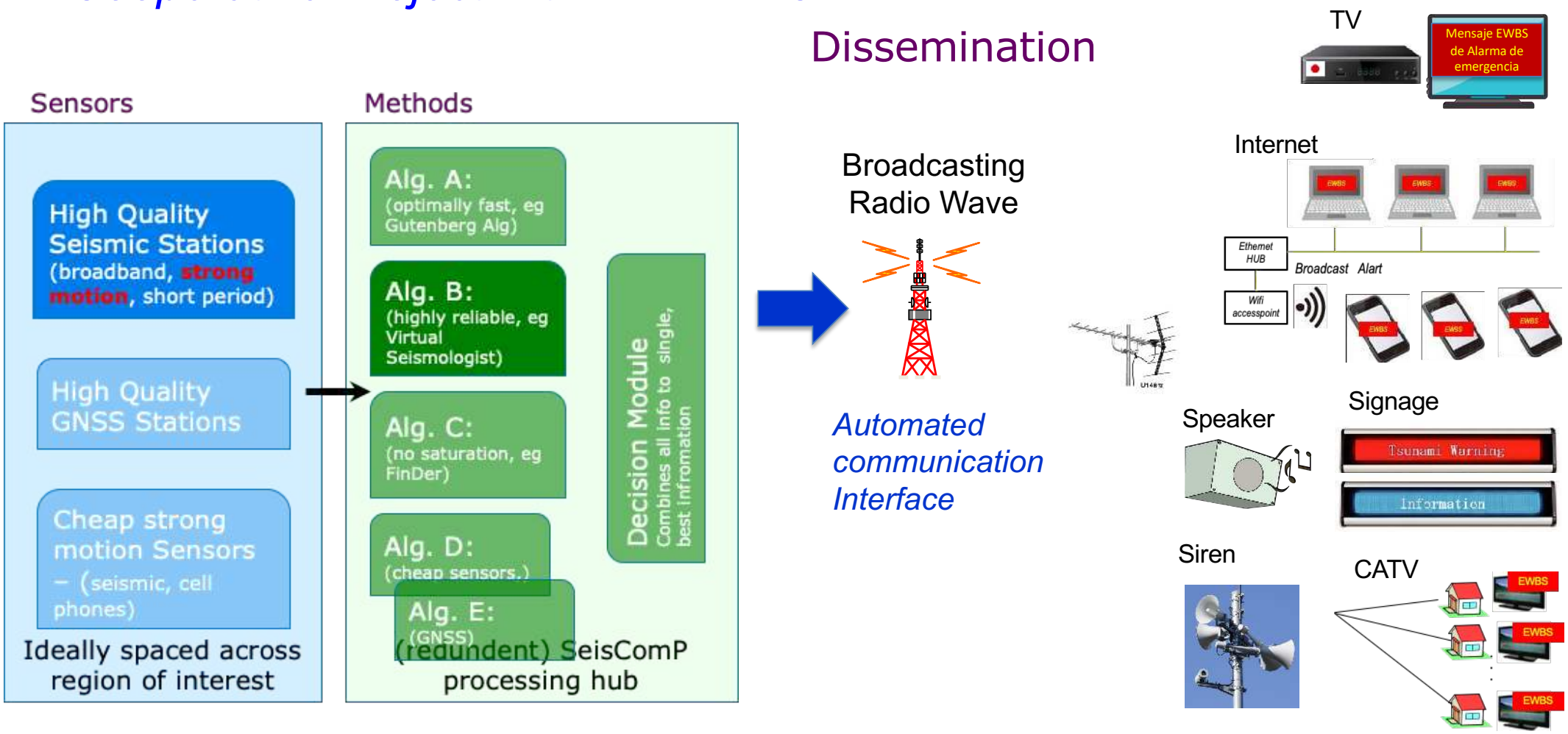


Earthquake Early Warning in Central America

Cooperative Project with EWARNICA

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

Cooperative Project with EWARNICA



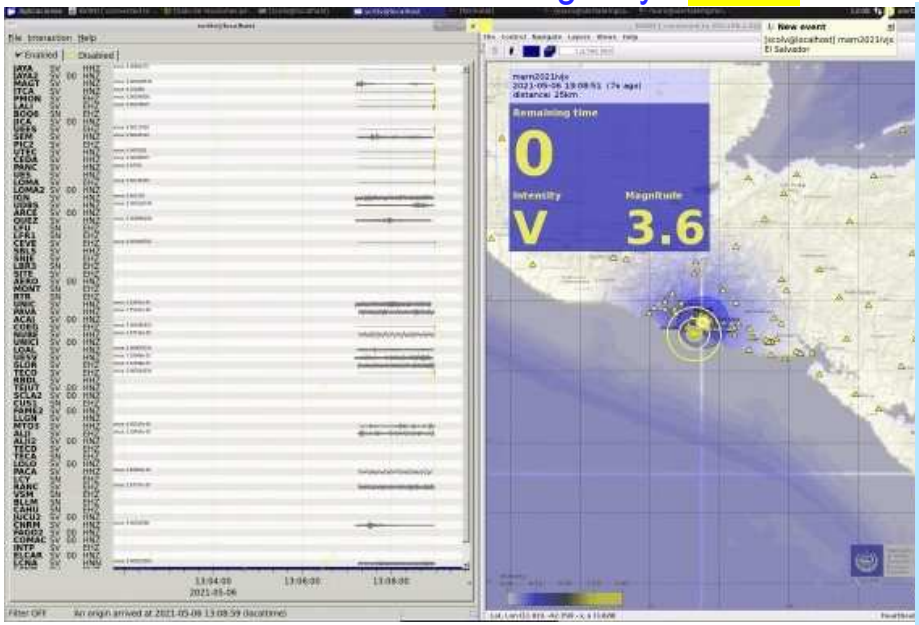
EWBS trial disseminating Earthquake (EEW) information (April 2021) in El Salvador

Broadcasting
Transmitting Station
Canal 10

EWBS

Earthquake Early
Warning (EEW)

Seismic observation agency MARN



See Video (5 Minutes)

IOC -UNESCO

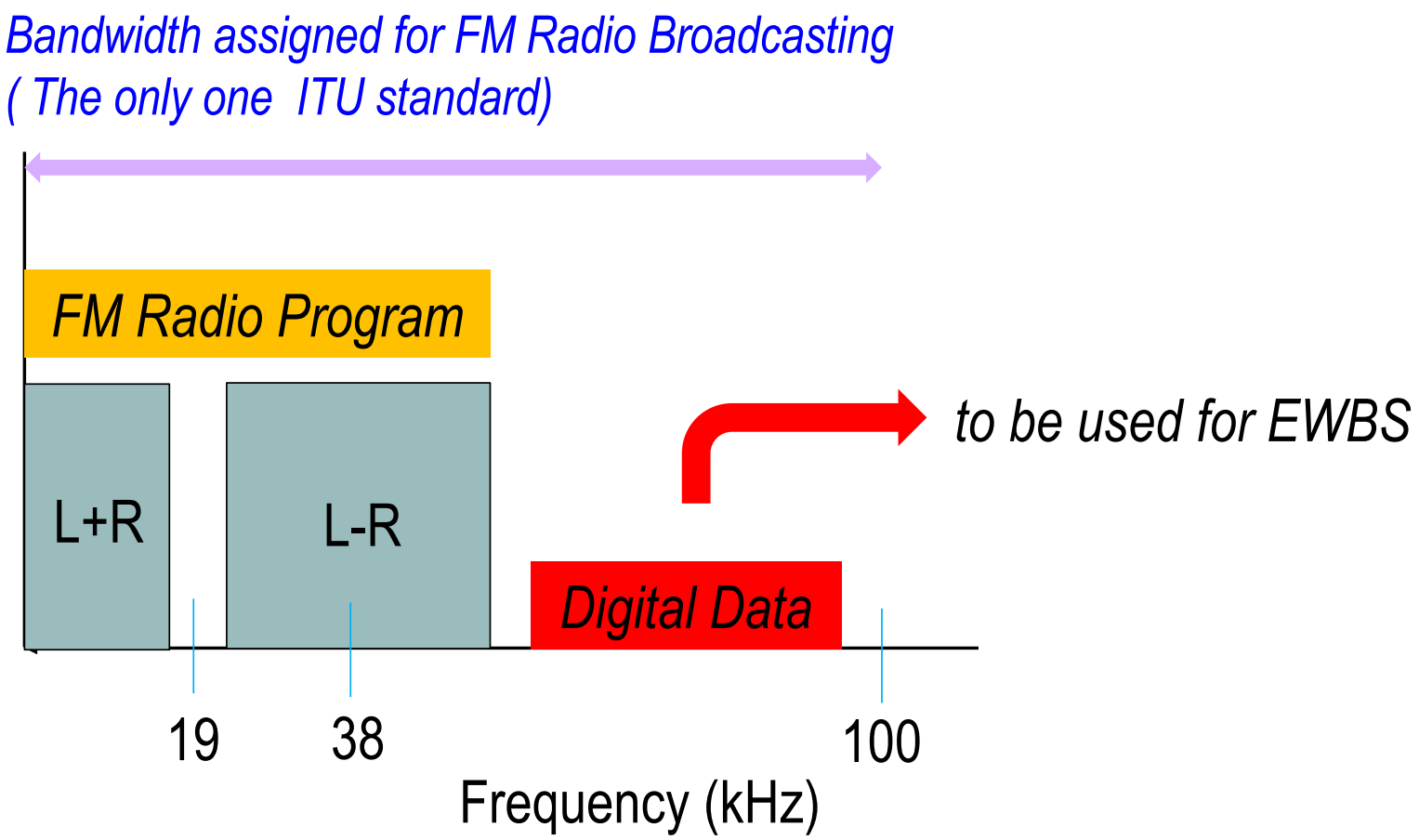
(Inter-govenmental Oceanographic Commission)

Exercise Pacific Waves

Possibility of utilizing FM Radio wave

- *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 to deliver "Superimpose" text.*
- *In Japan, DARC has long been in service in "VICS" (Vehicle Information and Communication System) and widespread.*
- *DARC has promising potential to expand the EWBS 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 case of Latin America

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

Idea to expand the EWBS case of Latin America to Asia-Pacific countries