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Presentation 3

Emergency Warning Broadcast System

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DiBEG JAPAN
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Contents

- Outline of the Emergency Warning Broadcast System (EWS)
- EWS for analog broadcasting
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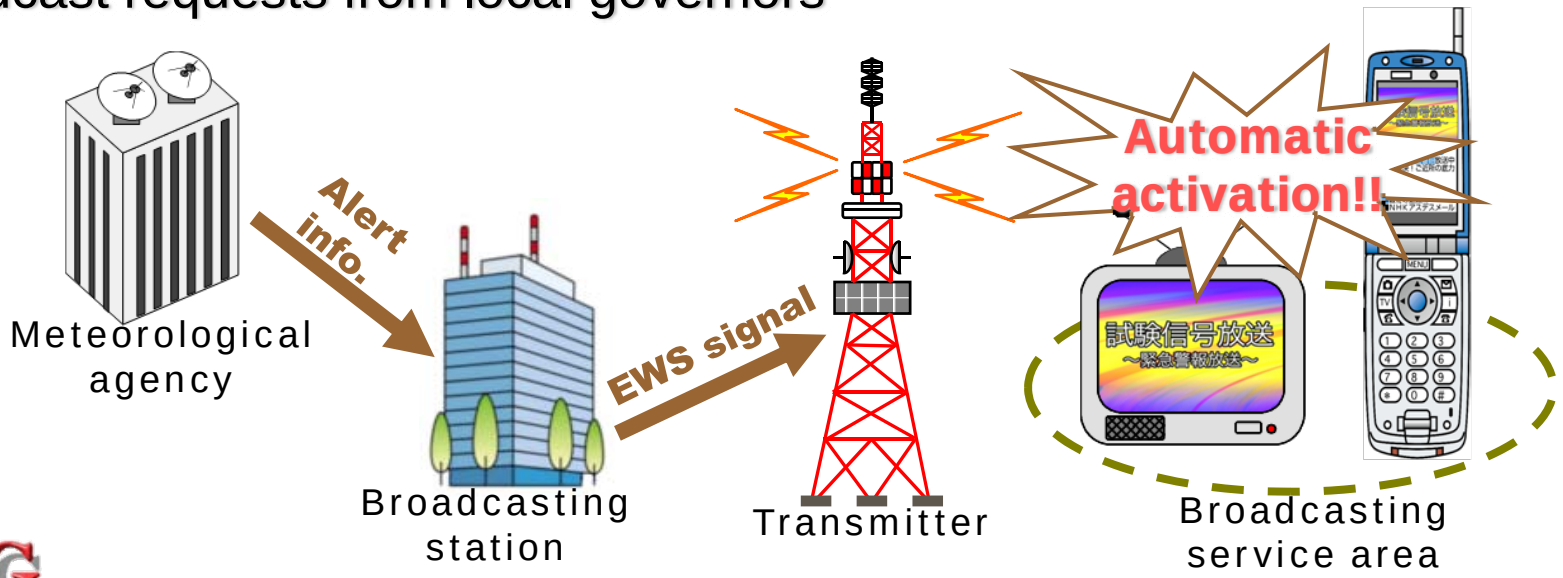
- Automatic activation of One-Seg handheld receivers by EWS
- Conclusion

1. Outline of the Emergency Warning Broadcast System (EWS)

What's the EWS? (I)

- The emergency warning broadcast system is ・・・
  - ・EWS is a remote activation system for Radio & TV.
  - ・EWS transmits alert/warning information to viewers and listeners about disasters.
  - ・EWS has been operating since September 1985 in Japan.
  - ・Test signals/programs are broadcast monthly in Japan (every 1st day)
  - ・EWS is operated in response to large-scale earthquake warnings, Tsunami Alerts and broadcast requests from local governors



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What's the EWS? (II)

- Is it possible to do remote activation by not only broadcasting but also communication ?
  - Yes, it is. However, they both have merits and demerits, and the system should be designed to make the best use of these merits.
- Remote activation by communication (telephone)
  - Merits : possible to control individual receivers
  - Demerits: In case of a large scale disaster, traffic congestion is very likely.
- Remote activation by broadcasting
  - Merits : possible to quickly activate many receivers simultaneously
  - Demerits: difficult to customize activation control for individual receivers

Remote activation by communication (email, etc.)

- Reliability

  In case of disasters, congestion is very likely.

- Speed

  Need more time to inform a huge number of people

- Locality

  Possible to control activation in local area

Communication ① Remote activation by mail

Broadcasting ② Remote activation by Emergency warning broadcast

Remote activation by EWS

- Reliability

No traffic congestion, anybody can receive it in the broadcasting area.

Broadcasters offer reliable news by filtering information.

- Speed

Possible to inform an extremely large number of people simultaneously.

- Locality

The system used in Japan is controlled by prefectural area.

Broadcasting is an ideal media to deliver disaster information

Broadcasting

Remote activation and emergency warning broadcast reception by EWS

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The history of EWB

EWB: Emergency Warning Broadcast

- Around 1980 NHK STRL launched EWS study
- Sep. 1,1985 EWB operation start in Japan
- Mar.18,1987 First EWB operation for tsunami alert
- Jan.13,2007 Most recent EWB operation for tsunami alert
- Up to now EWB has operated 15 times during 21 years
- Test broadcasting takes place on 1st of every month at noon
- shipment of receivers : about 550,000

*reference:
On Sep.1st,1923, a large scale earthquake attacked Tokyo area and more than 100,000 people died. It became a trigger to start radio broadcasting in Japan. Sep.1st is the day of disaster prevention in Japan.

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Operation records of EWB (Every case was Tsunami warning by earthquake)

- Miyazaki prefecture offshore earthquake (March 18th, 1988)
- Sanriku offshore earthquake (November 2nd, 1989)
- Hokkaido south-west offshore earthquake (July 12th, 1993)
- Hokkaido east offshore earthquake (April 10th, 1994)
- Sanriku far offshore earthquake (December 28th, 1994)
- Amami Oshima near offshore earthquake (October 19th, 1995)
- New Guinea earthquake (February 17th, 1996)
- The Sea of Hyuga earthquake (October 19th, 1996)
- Okinawa-Ishigaki south offshore earthquake (May 4th, 1998) (March 26th, 2002)
- An earthquake at Taiwan (March 31th, 2002)
- Hokkaido Kushiro offshore earthquake (September 26th, 2003)

ISDB-T commenced in Japan (December 1st, 2003)

- Tokai offshore earthquake (September 5th, 2004)
- Hokkaido east earthquake (November 15th, 2006) (January 13th, 2007)

NHK broadcasts EWS test program every month.

List of Recent Significant Earthquakes (from December 2004)

Date	Place	Fatalities	Magnitude
Dec. 26, 2004	Off northwest coast of Sumatra, Indonesia	300,000	9.3
Feb. 22, 2005	Zarand, Iran	Over 500	6.4
Mar. 28, 2005	Northern Sumatra, Indonesia	1,000-2,000	8.7
Oct. 8, 2005	Kashmir, Pakistan	100,000 (estimated)	7.6
May. 26, 2006	Java, Indonesia	Over 6,000	6.3
July. 17, 2006	Java, Indonesia	Over 500	7.7

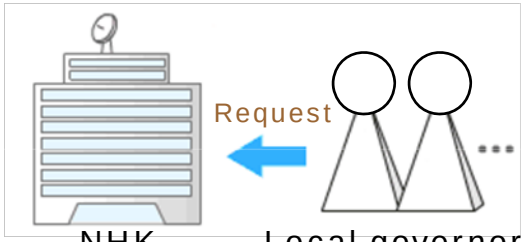
Conditions for operation of EWB in Japan

- In Japan, EWB broadcasts only in three cases where there is great risk to human lives and property,

1. When a precautionary declaration of a large-scale earthquake such as the Tokai earthquake is issued, (First-class nationwide)

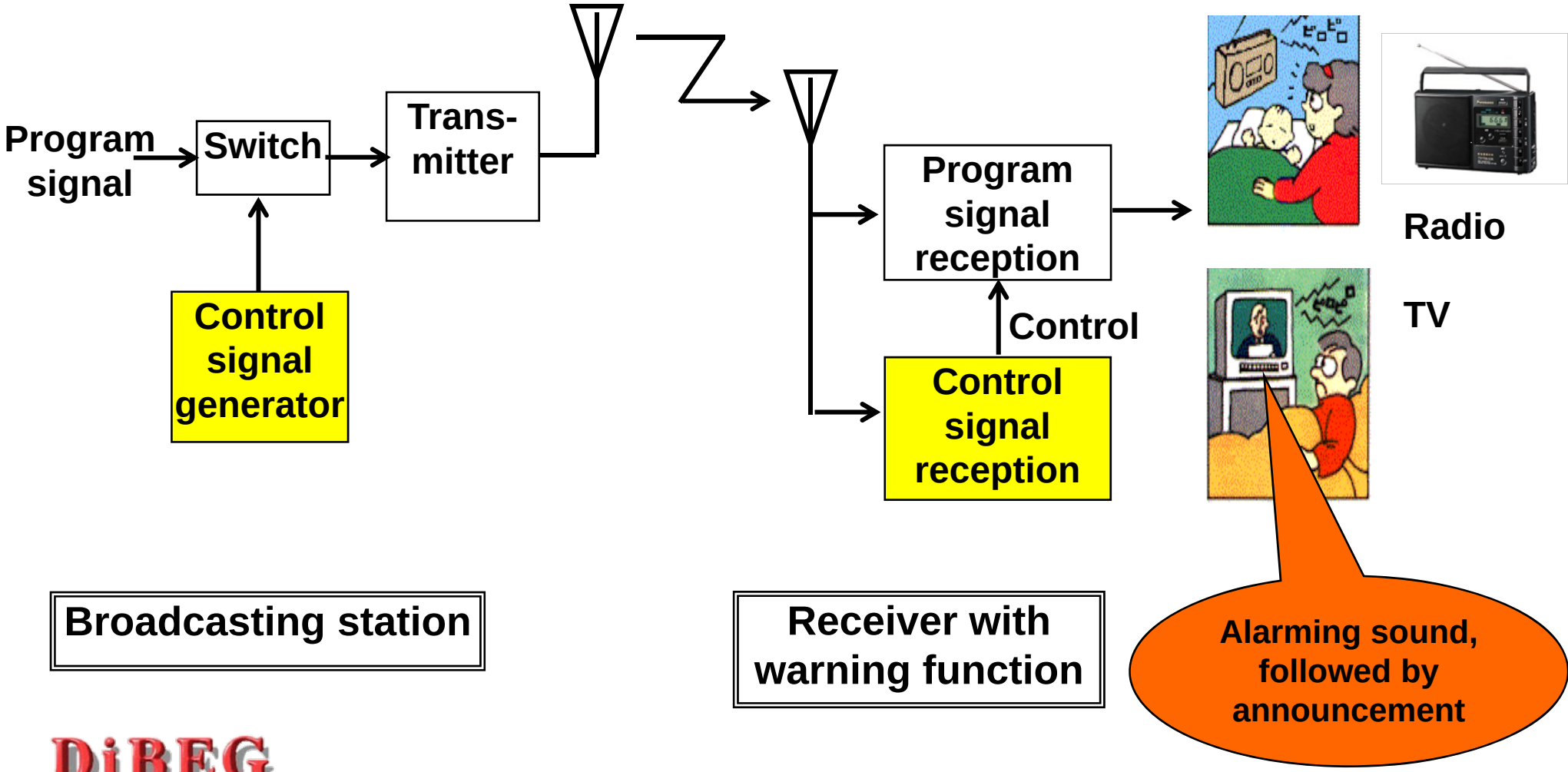
2. When a Tsunami (tidal wave) alert is given , (Second-class nationwide, prefecture wide)

3. When the local governor requests an emergency warning broadcast (First-class nationwide)

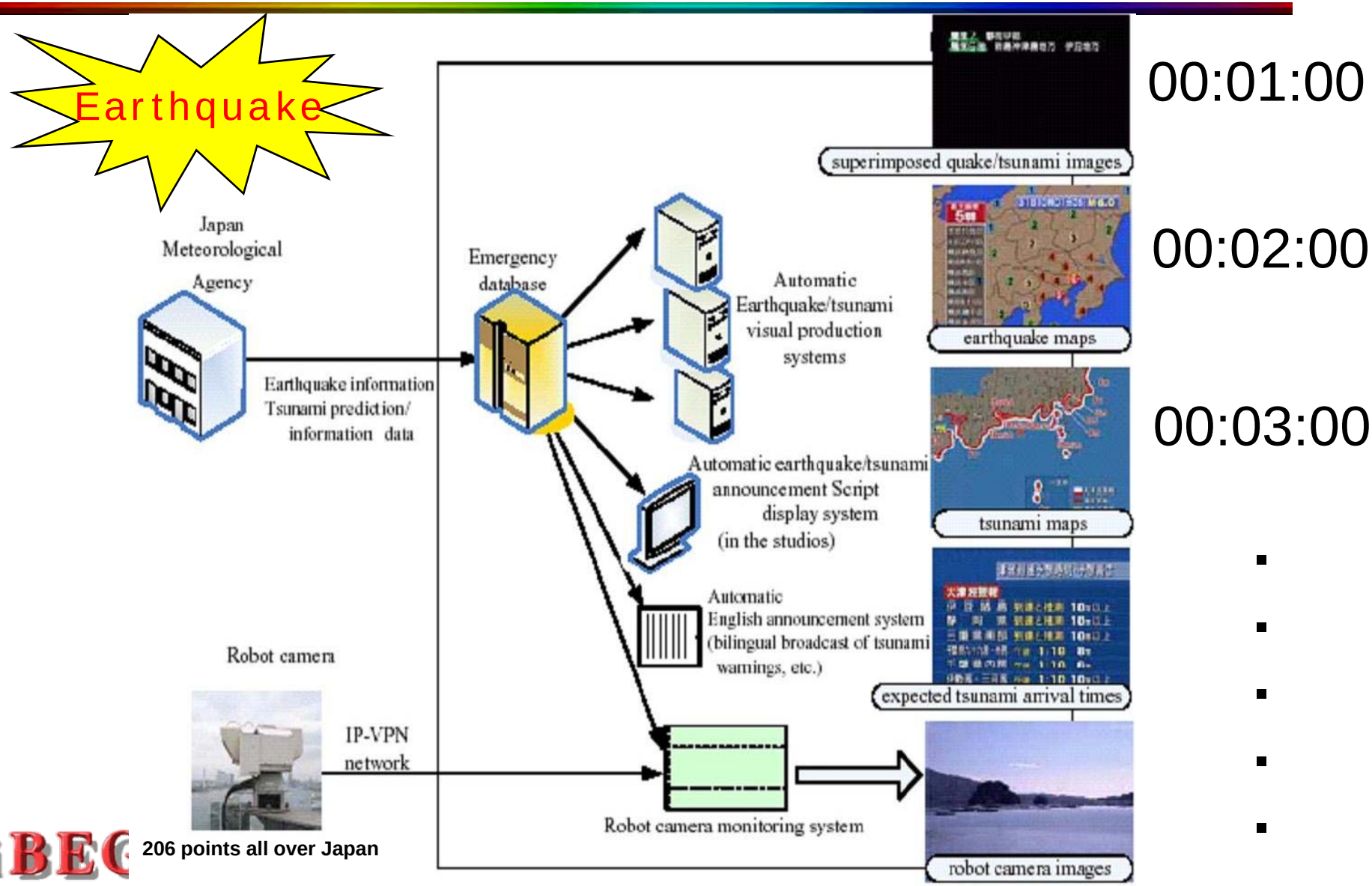


2. Analog EWS

Analog EWS transmission and reception block diagram

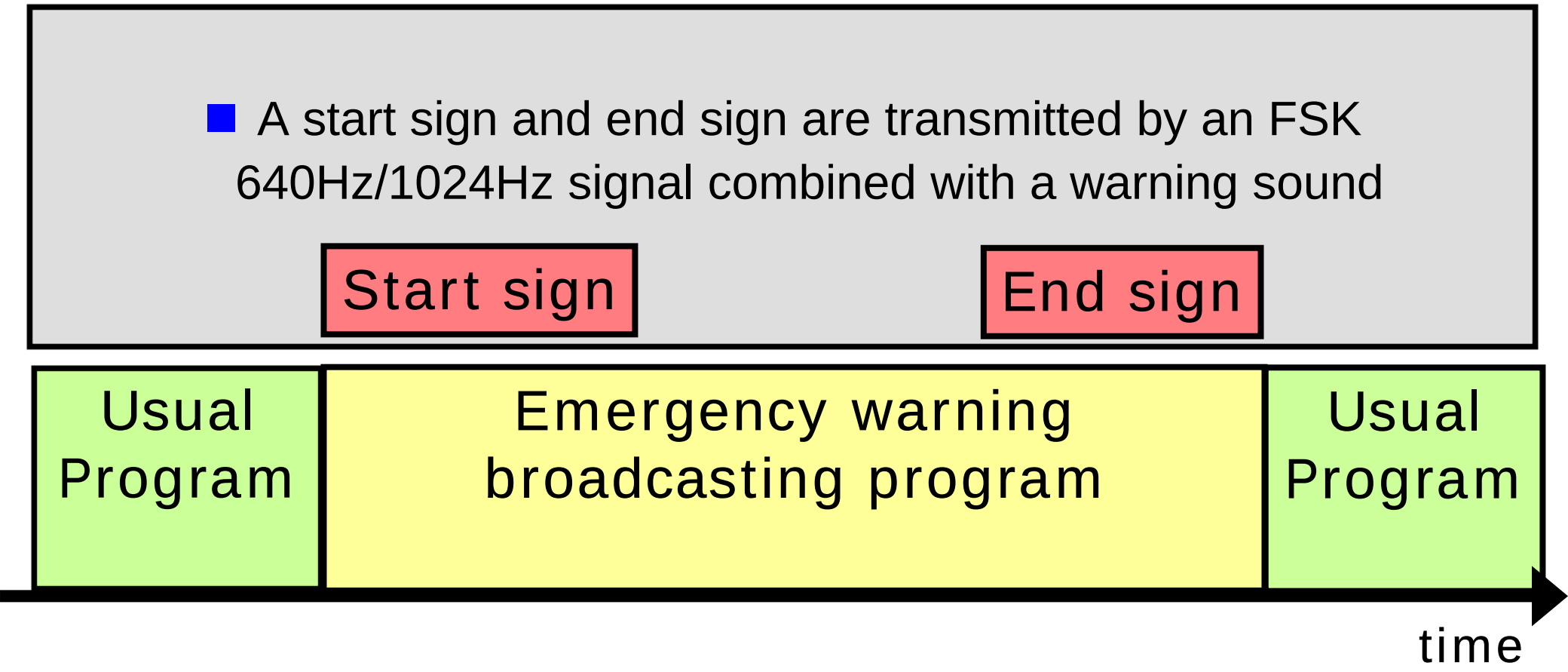


Connection of Emergency Information



Analog EWS Control signal

- A start sign and end sign are transmitted by an FSK 640Hz/1024Hz signal combined with a warning sound



Analog EWB conventional receivers

Receiver with a Clock

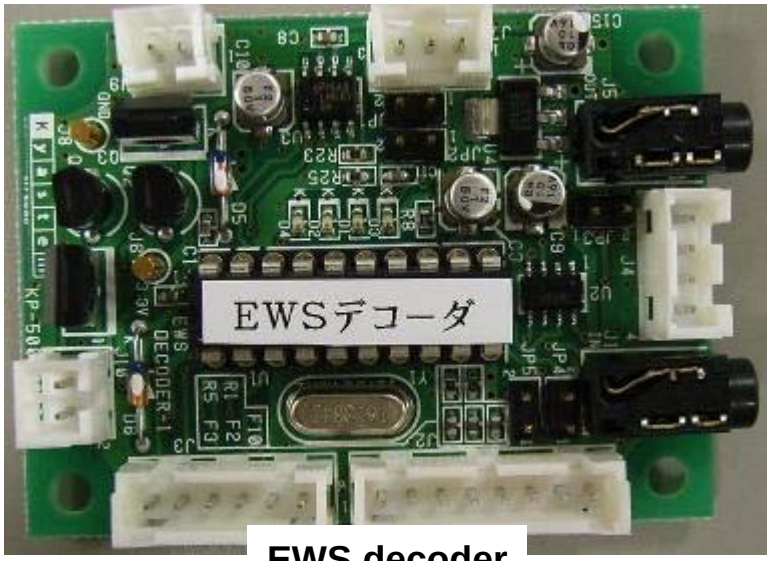
Portable AM/FM Receiver

Receiver with
Power on switch

Analog EWB New Receivers (New development)

(1) New receiver for EWS

(2) Onboard EWS decoder



EWS decoder

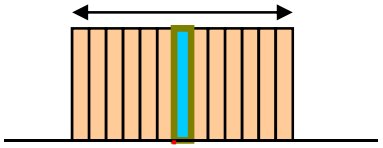
A new algorithm capable of running on a multi-purpose processor IC integrated in home electronics has been developed

3. Digital EWS and ISDB-T

ISDB-T (Integrated service digital broadcasting terrestrial)

TV station

6MHz
13 segments

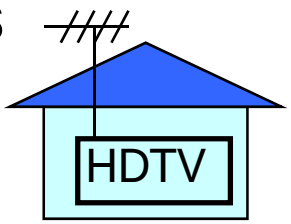


Dec.2003 commenced

Supports 3 reception types on one channel

13segments

Fixed reception



Home receiver

Mobile reception

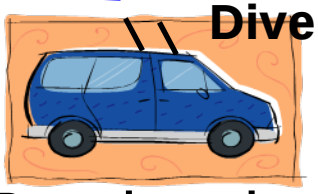
13 segments

Mobile reception

1 segment

Automatic Activation By EWS!!

Audio
Visual
Data
} contents



Diversity Reception

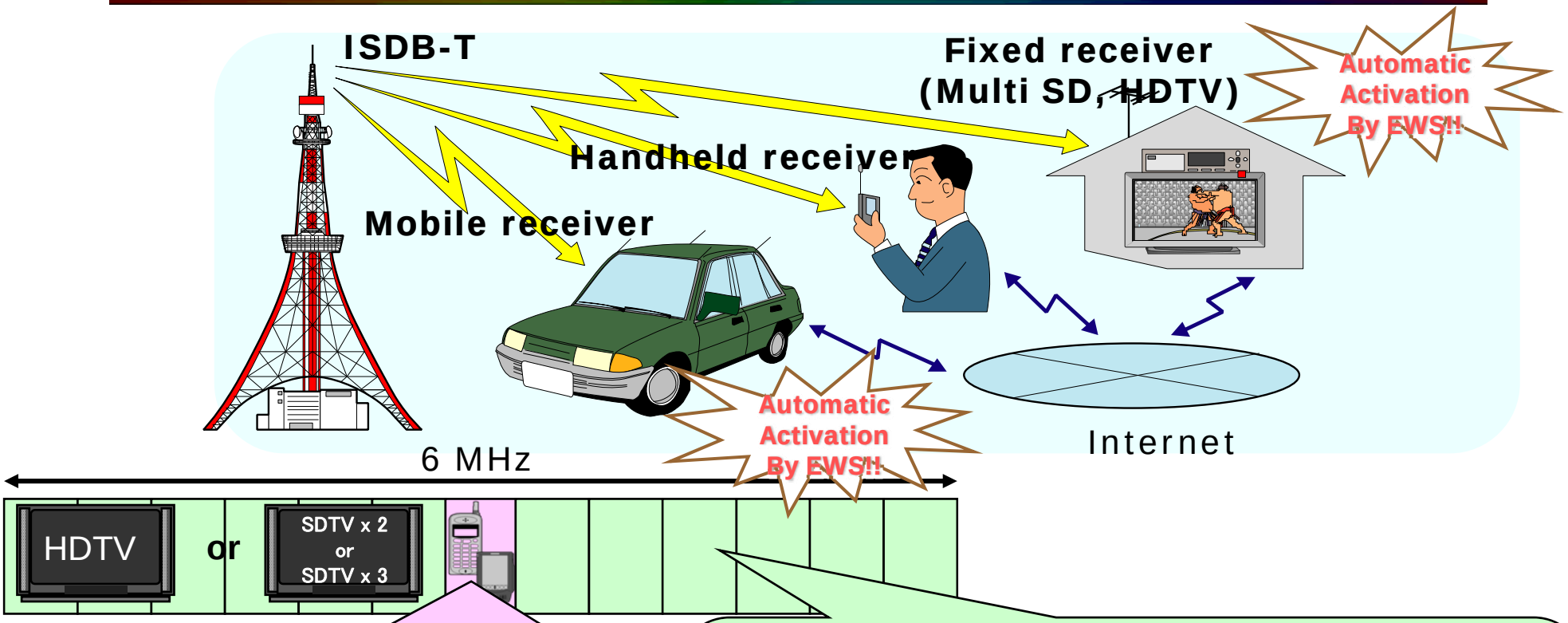
Receiver in vehicle

DiBEG Handheld receiver

One-Seg

2006.4 commenced

ISDB-T services example



One-Seg：Mobile & handheld
Data bit-rate ：416Kbps
Modulation : QPSK (2/3)
Features ：Robustness for
mobile reception

12 segments : Fixed (multi SD or HDTV)
Data bit-rate : 16.9Mbps
Modulation : 64QAM(fec:3/4)
Features: HDTV & 5.1ch surround sound
or Multi SD serviced

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Features of ISDB-T system

- **HDTV or multi-SD** and **mobile service** can be transmitted **simultaneously by BST-OFDM, economical system.**
  - **One-Seg service** for handheld receivers
- ISDB-T has technological **advantages in mobile reception because of time interleaving technology**
- ISDB-T promises **flexible** broadcasting services through hierarchical transmission
- Multimedia Services
  - Data broadcasting: Regional information service
  - Interaction: Quizzes, questionnaires, requests, voting
  - Combined with communication services
- **Automotive HDTV system** using diversity reception technology
  - The same HDTV broadcasted for fixed receiver can be viewed in motor vehicle
- **EWS** (Emergency Warning System)
  - Handheld receivers woken up by EWS signal alerts the user quickly of earthquake and tsunami warnings
- **SFN** for effective frequency utilization

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Outline of ISDB-T transmission scheme

Item		Contents	ARIB Standards	ITU-R Recommendations
Video coding		MPEG-2 Video (ISO/IEC 13818-2)	STD-B32	BT.1208
Audio coding		MPEG-2 AAC (ISO/IEC 13818-7)	STD-B33	BS.1115
Data broadcasting		BML(XHTML), ECMA Script	STD-B24	BT.1699
Multiplex		MPEG-2 Systems (ISO/IEC 13818-1)	STD-B10, STD-B32	BT.1300, BT.1209
Conditional access		Multi 2	STD-B25	---
Transmission		ISDB-T transmission		
Channel Bandwidth		6MHz, 7MHz, 8MHz		
Modulation		Segmented OFDM (13 segment/ch)		
Mode, Guard		Mode: 1, 2, 3 Guard Interval Ratio: 1/4, 1/8, 1/16, 1/32		
Carrier Modulation		QPSK, 16QAM, 64QAM, DQPSK		
Error correction	Inner	Convolutional code (Coding rate: 1/2, 2/3, 3/4, 5/6, 7/8)	STD-B31	BT.1306 System C
	Outer	(204, 188) Reed-Solomon code		
Interleave		Frequency and Time Interleave Time Interleave : 0 – 0.5 sec		
Information bit rate (depend on parameters)		6MHz : 3.7 – 23.2 Mbit/s 7MHz : 4.3 – 27.1 Mbit/s 8MHz : 4.9 – 31.0 Mbit/s		
Receiver		ISDB-T receiver	STD-B21	---
Operational guideline		ISDB-T broadcasting operation	TR-B14	---

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ISDB-T One-Seg receivers

Number of shipments as of Jul 2008: Over 39,000,000 (JEITA statistics)

au by KDDI W33SA

CDMA 1X WIN W41H by HITACHI

FOMA P901iTV

SoftBank 905SH

Laptop Computer

Antenna for One-Seg receiver

Portable DVD player

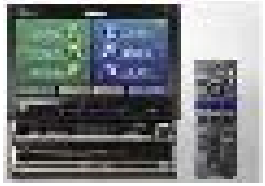
DiBEG

Digital broadcasting experts group

ISDB-T mobile receivers

Number of shipments as of Aug 2008: about 1,860,000 (JEITA statistics)

Panasonic



CN-HDS960TD

CN-HDS635TD

SANYO

NV-HD870DT

NVA-HD1500DT

Pioneer

AVIC-VH009MDG

Fujitsu ten

AVN7406HD

ALPINE

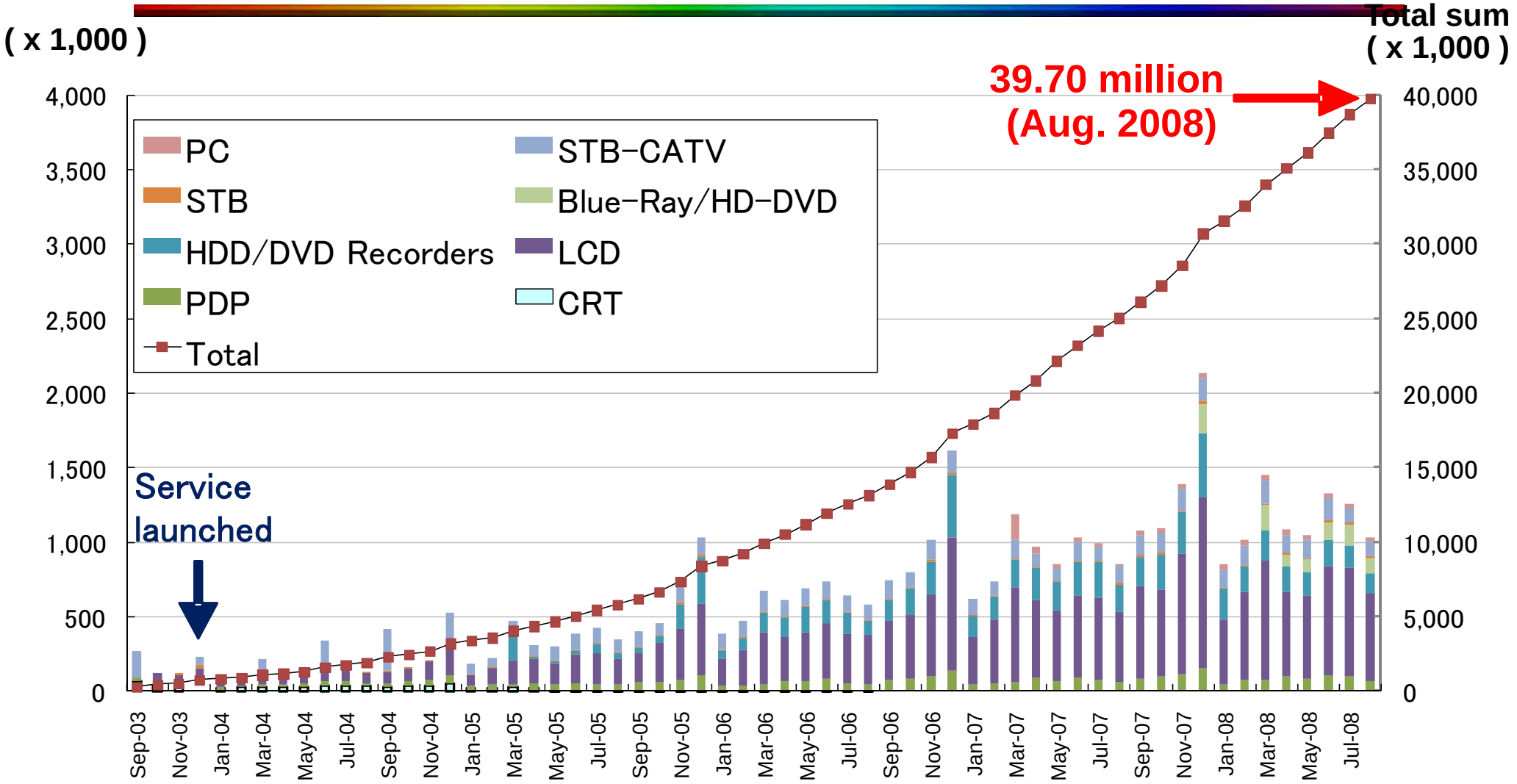
VIE-XO7B1/S1

Toyota

TDT-H56

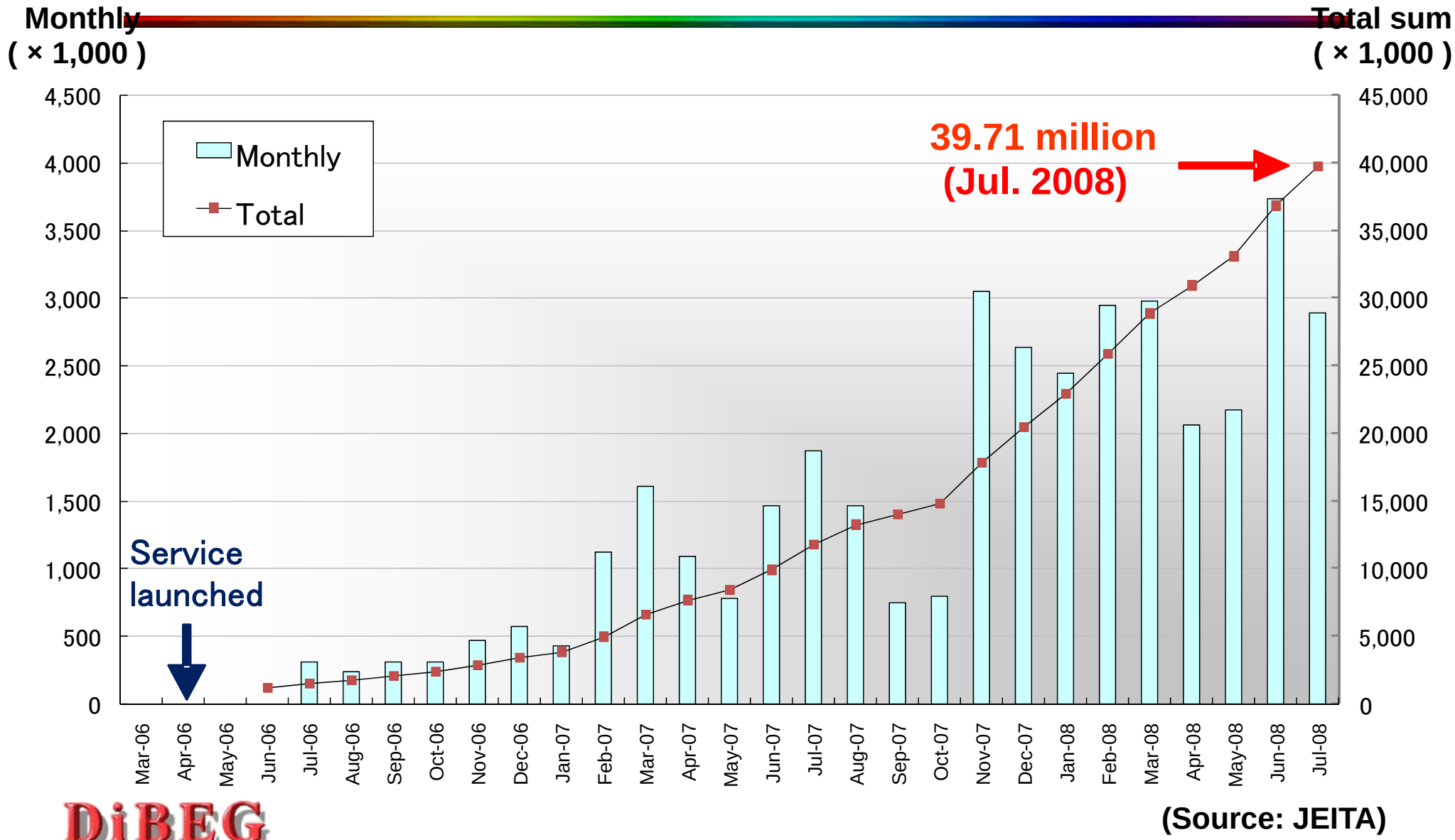
From each company's web site

Shipments of ISDB-T Home-use (Stationary) Receivers in Japan



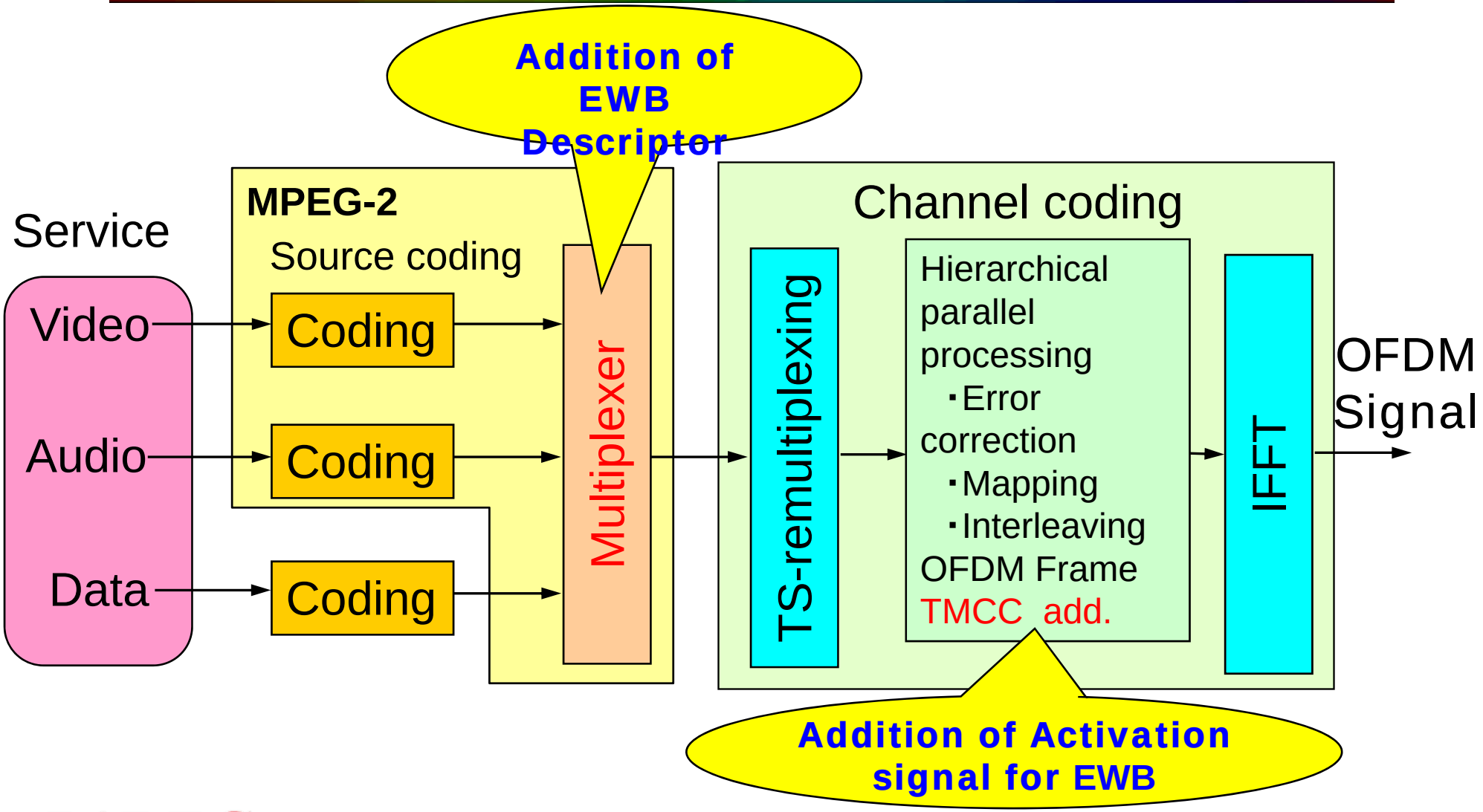
(Source: JEITA)

Shipments of ISDB-T One-Seg cellular phones in Japan



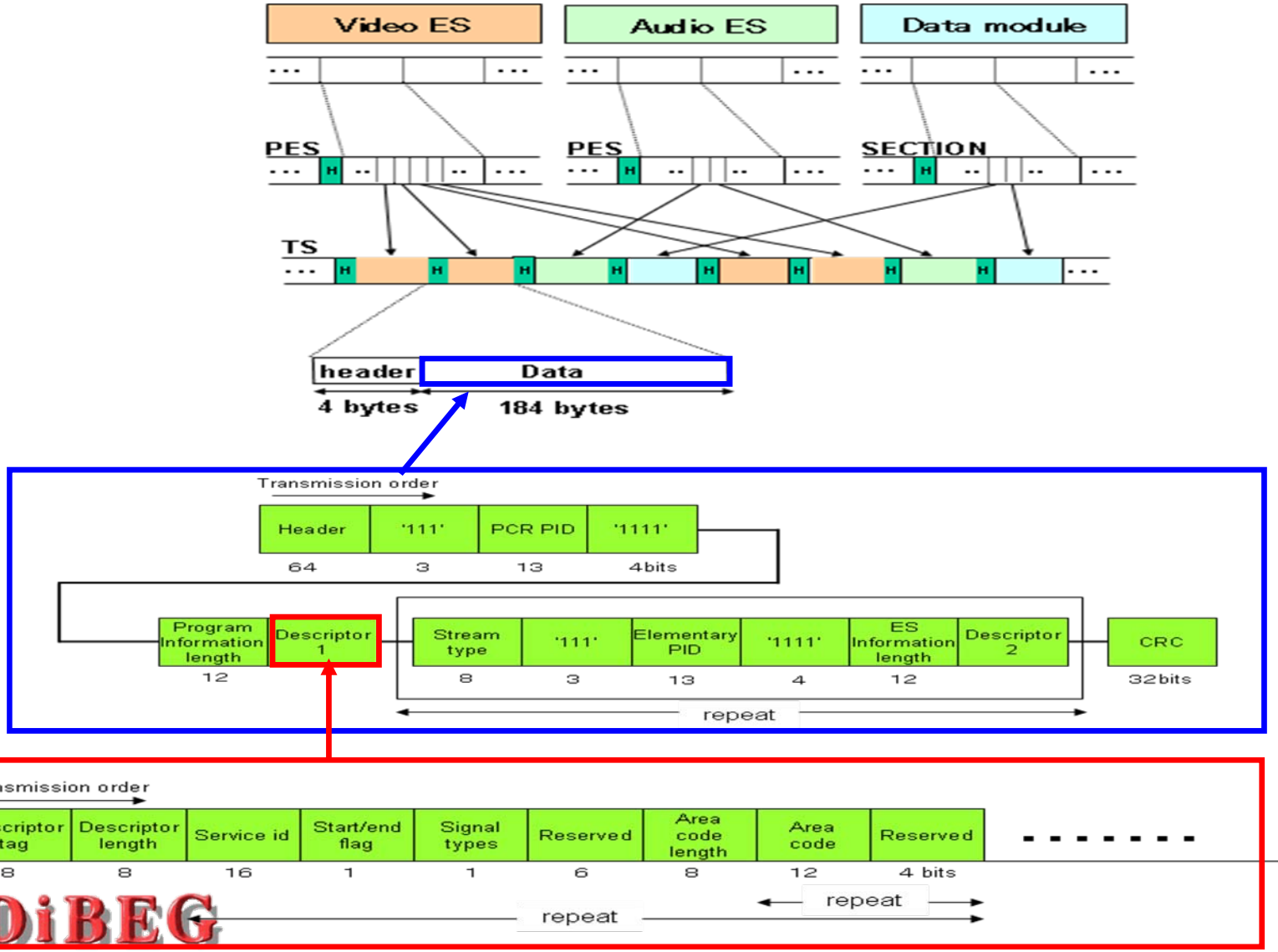
(Source: JEITA)

ISDB-T Transmitter block diagram

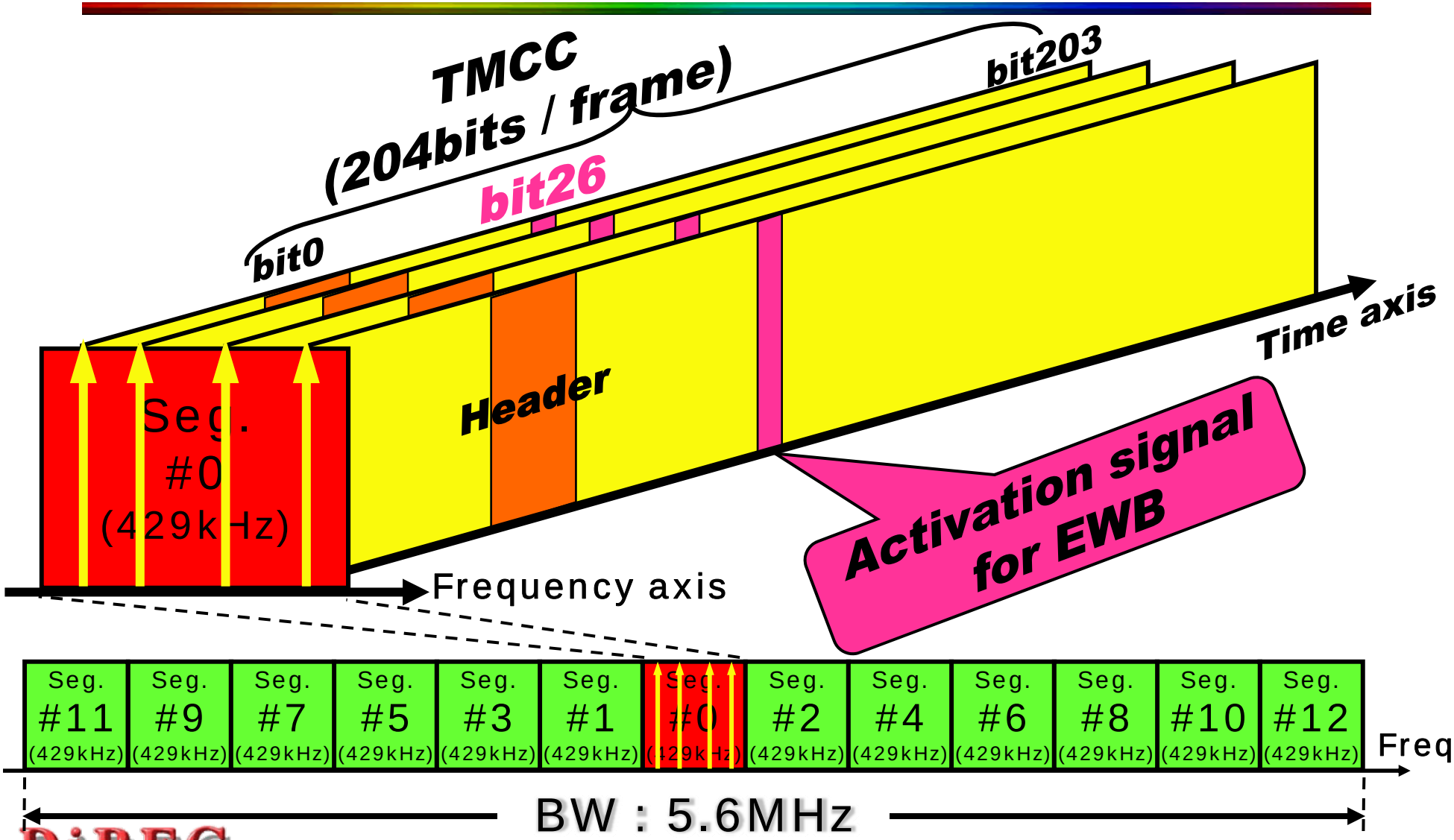


TMCC :Transmission and Multiplexing Configuration Control

EWB Descriptor (ISDB-T)



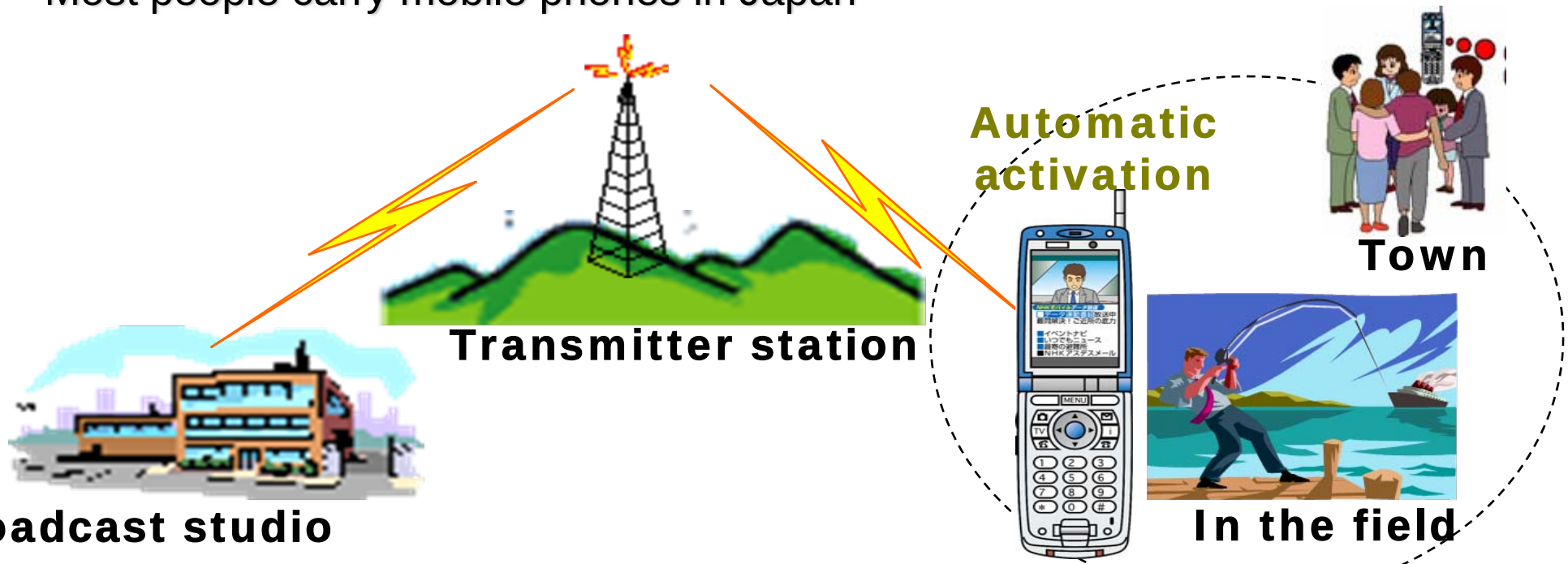
Arrangement of TMCC in mode 3



4. Automatic activation of One-Seg handheld receivers by EWS

Possibility of EWS and One-Seg service

- One-Seg service commenced on April 2006
  - One-Seg service is capable of transmitting EWBS
  - Most people carry mobile phones in Japan

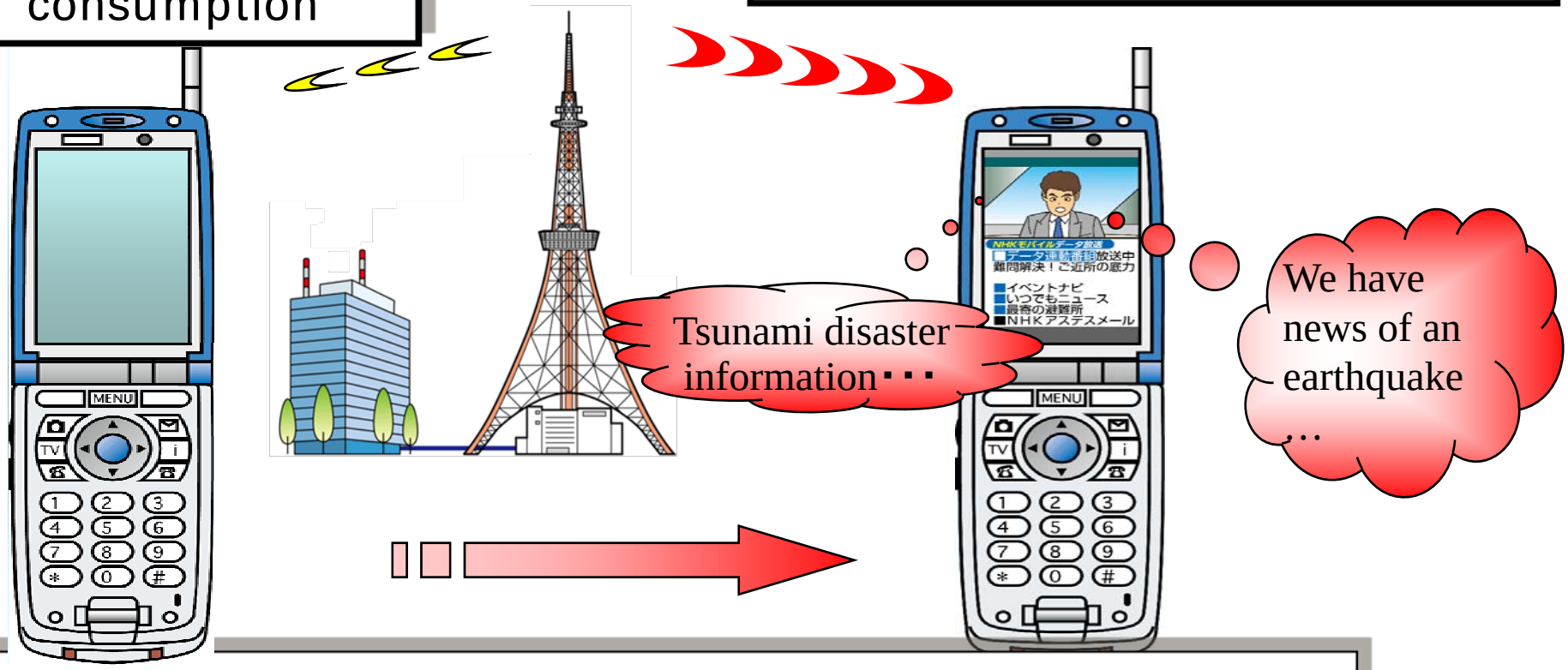


A huge number of people can get disaster information quickly in the field if the One-Seg receiver can receive EWB

Automatic activation of One-Seg receivers

receiver Stand-by with low power consumption

Automatic reception of emergency warning broadcasting



Automatic activation of One-Seg receiver circuit by EWB activation signal

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To automatically activate One-Seg receivers by EWS

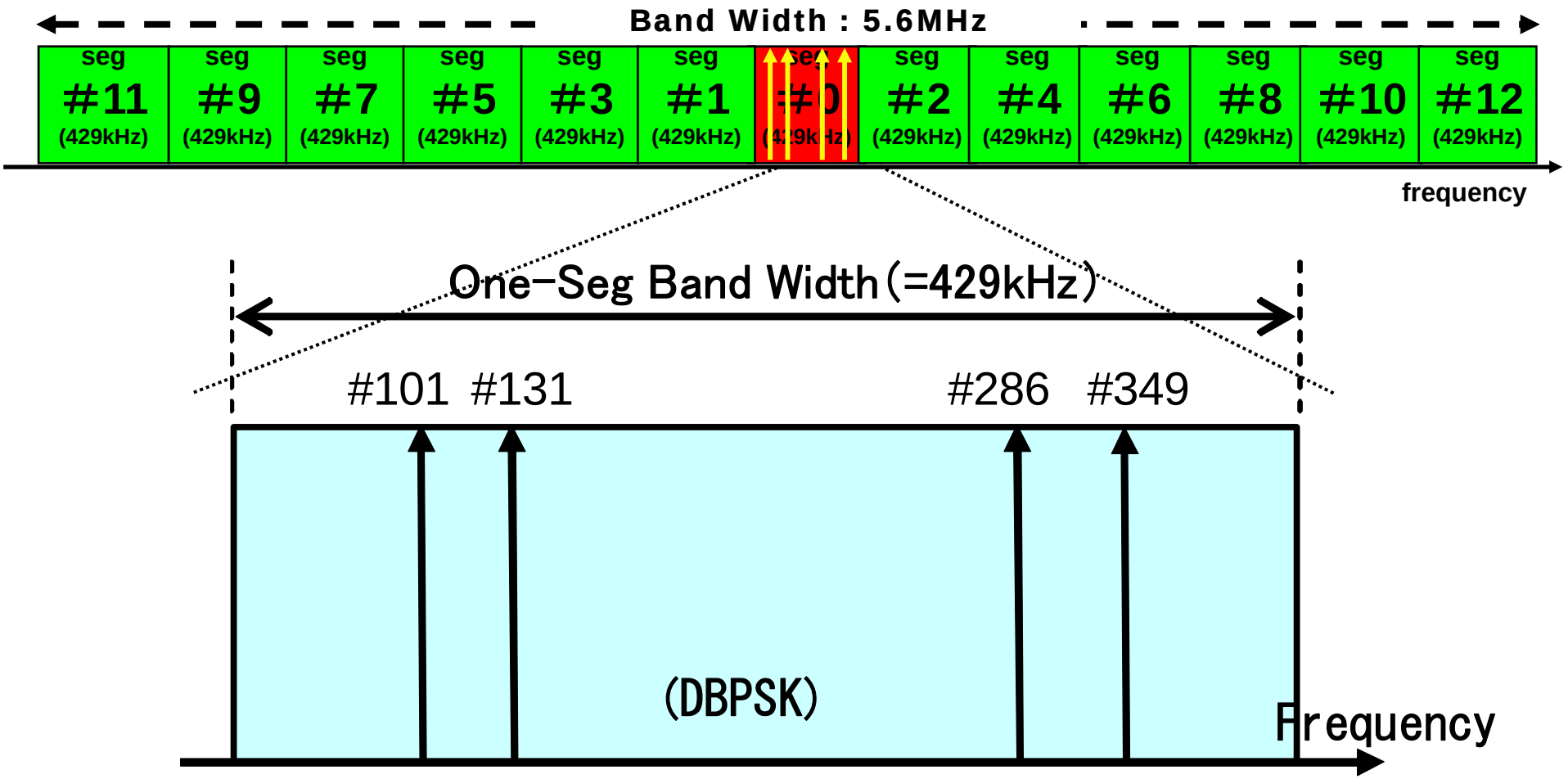
- EWS receivers need to monitor the EWB activation signal on the TMCC carriers continuously

- Continuous operation of the receiver circuit causes wasting of the battery

Power-saving of receiver circuit is indispensable!

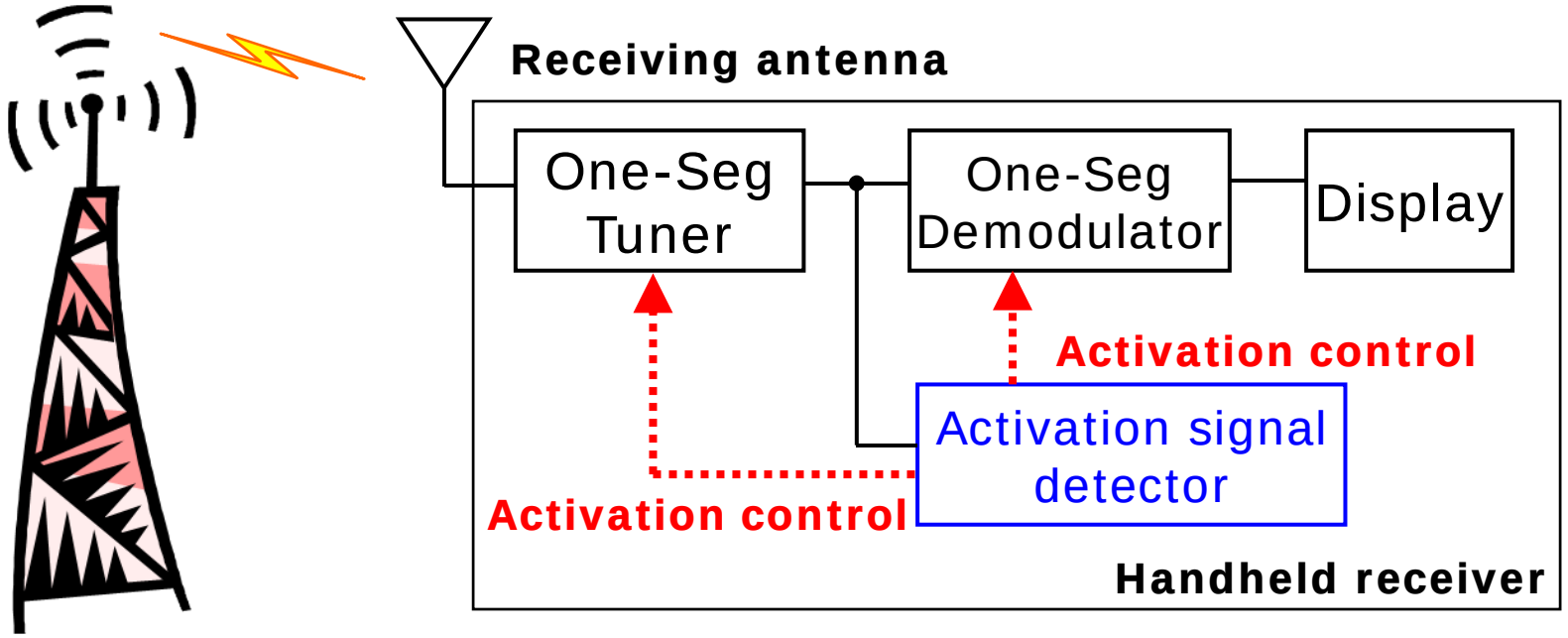
- The characteristics of a trial receiver circuit have been tested which demodulates only four TMCC carriers and uses diversity combining technologies
- The activation signal is received intermittently in synchronization with the timing of the activation signal transmission format

Arrangement of TMCC Carriers (Mode 3)



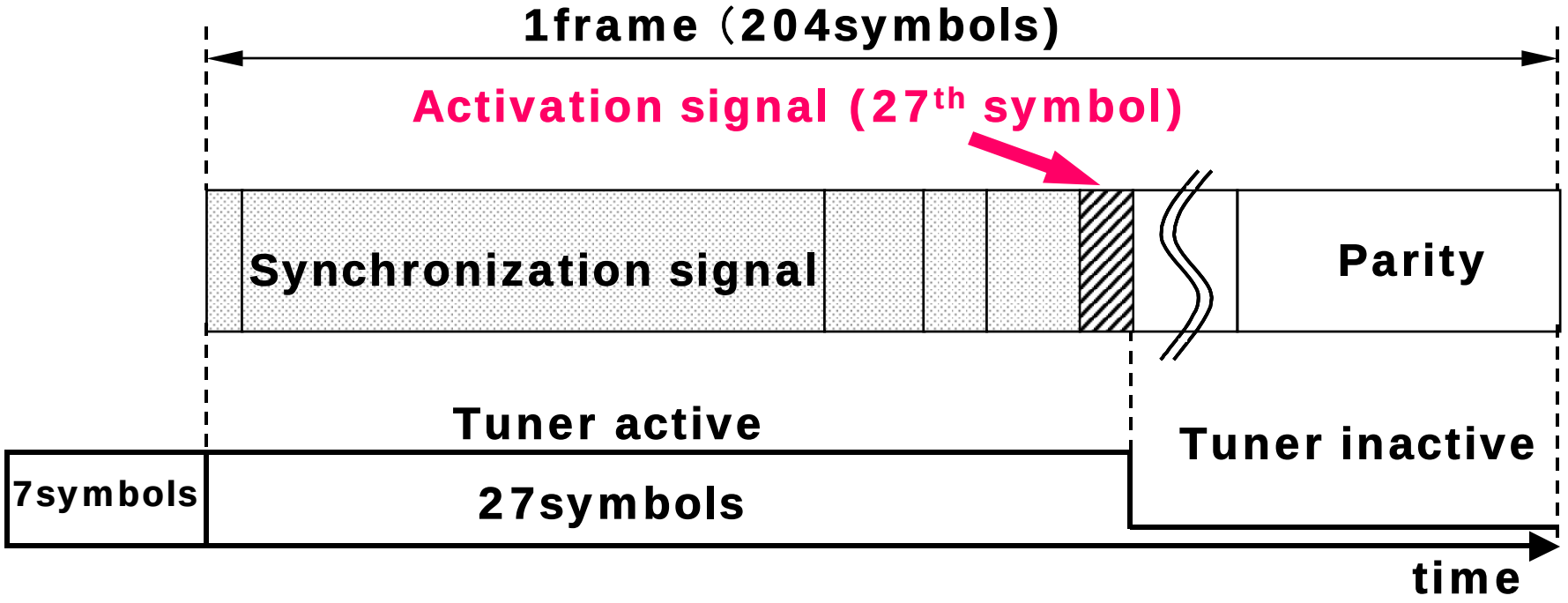
■ **Demodulate only four carriers**

Block diagram of EWS One-Seg receiver



- When the handheld receiver is in stand-by mode, only the One-Seg tuner and activation signal detector are working
- The activation signal detector uses a simple circuit without FFT
- When the activation signal is active, the demodulator and display are started, the One-Seg tuner operates continuously and the emergency warning broadcast is displayed.

Control power switching interval of One-Seg tuner



Control power switching intermittently to save the power consumption

Activation signal detector for One-Seg

Prototype activation signal detector

The Activation signal detector connected to a cellular phone

Usage for EWS

Not only

- Earthquake forecast
- Tsunami forecast

But also

- Hurricane forecast
- Flood warning
- Eruption warning
- Fire warning
- Other warning

Conclusion

- Broadcasting is an ideal media to deliver disaster information
- EWS is a broadcasting system which remotely activates radio & TV in the case of emergency alerts.
- EWS for analog AM/FM radio , analog and digital TV has already commenced operation in Japan
- Research and development of an EWB receiver for One-Seg
  - Automatic activation of handheld receiver by EWS is very effective
  - Power consumption saving is required while EWB is in stand-by

EWS introduction DVD

Please visit the EWS demonstration!

ISDB-T, the Digital Television for the Philippines







Thank you for your attention !

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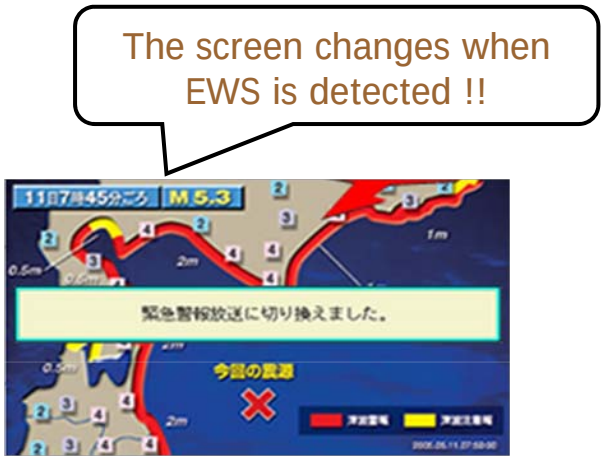
http://www.nhk.or.jp/strl/english/index.html

References

Fixed and mobile receivers examples

Sony's products “Bravia” X7000 series, X5050 series, X5000 series and W5000 series



Panasonic’s Car Navigation & AV System “Strada”.