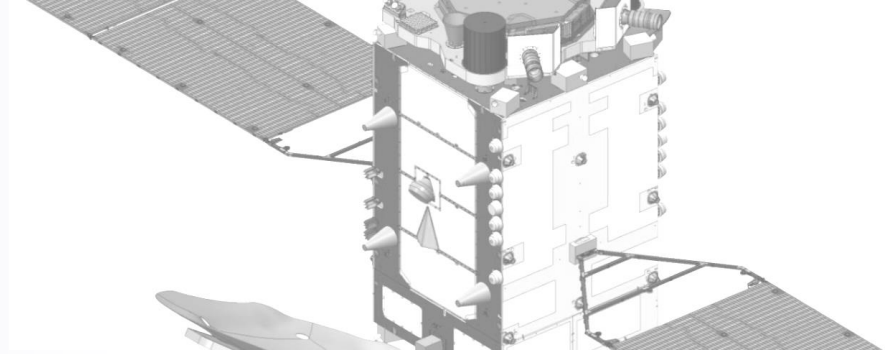


QZSS Emergency Warning Services (EWS) Trial

November 7, 2020

QZSS Strategy Office,
National Space Policy Secretariat
Cabinet Office, Government of Japan

Road Map for QZSS EWS expansion into Asia Pacific region

JFY	2018	2019	2020	2021	2022	2023	2024	2025～
Current operation	DCR operation (Metrological warning delivery)							
Upgrade plan	*Nov. 1st Service start		Beget Request	Manufacturing, Test				
EWS expansion into Asia Pacific region		①Trial by Manual preparation Trial by EU in AU Trial in PH Trial in AU Trial in Thailand				②Trial by semi manual operation(ftp connection)	③Real time operation	

(VPN connection)

3 phases toward practical operation

①Phase1: Trial by Manual preparation

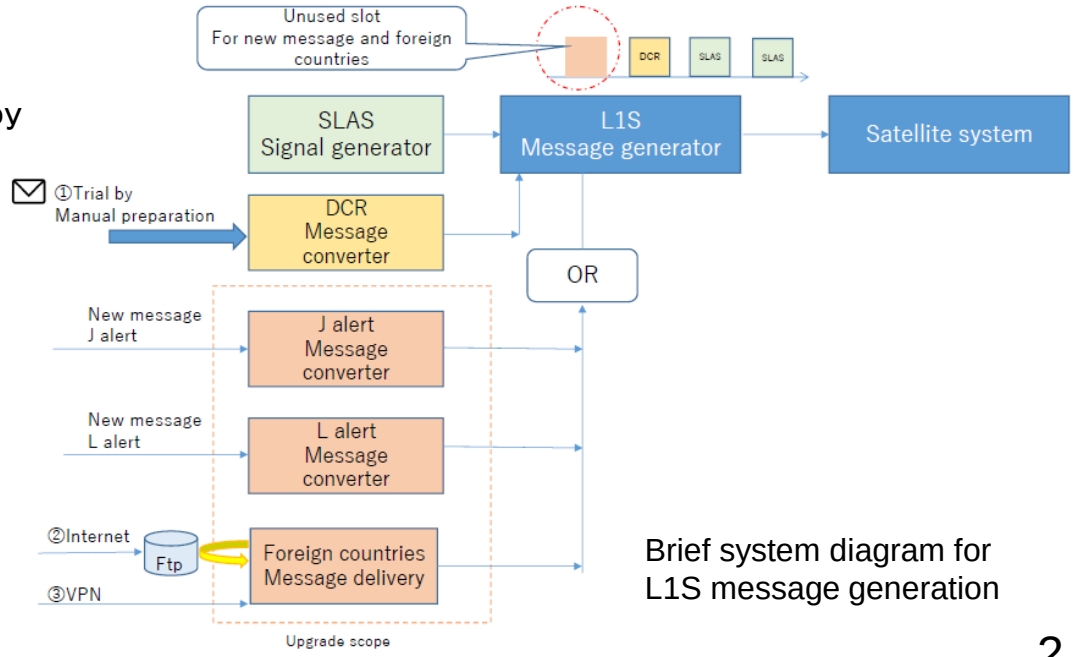
Message is received by e-mail and prepared by manual.

②Phase2: Trial by semi manual operation

Message is received by ftp and prepared by system. The message will be broadcasted within 2mins(e.g.).

③Phase3: Real time operation

Message is received by VPN and prepared by system. The message will be broadcasted in real time.



Brief system diagram for L1S message generation

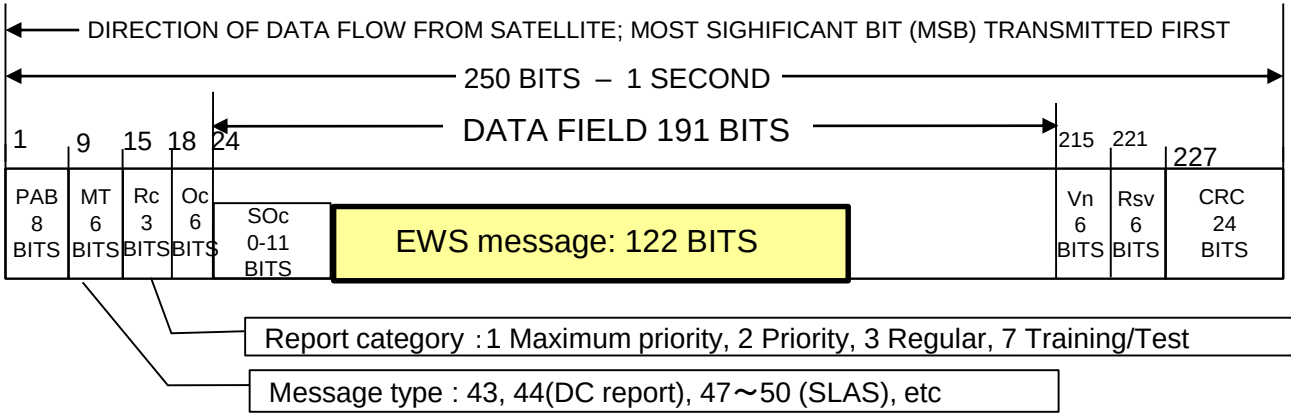
Message Structure of DC Report service and EWS

- **Signal name : L1S (RF property and message structure are defined in IS-QZSS-L1S-004)**
- **Interval : DC report service : Once every 4 seconds**

Sub-meter Level Augmentation Service : Twice every 4 seconds

Signal	Service Name	Center freq.	Modulation	Bit Rate
L1S	Sub-meter Level Augmentation Service (SLAS)	1575.42MHz	BPSK	250bps
	DC Report Service			

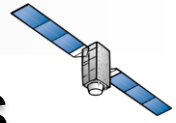
- **Message Structure**



PAB: Preamble
MT: Message type
Rc: Report Classification
Oc: Organization Code
Vn: Version Number
Rsv: Reserved
CRC: Cyclic Redundancy Check

	Message Type 43	Message Type 44
Outline	Disaster prevention information by Japan meteorological agency	Current: Arbitrary information Future: EWS
Contents	Information such as Earthquake, Tsunami, Volcano, etc.	Information delivered from external organization.
ICD	IS-QZSS-DCR-008	Not yet publiched Creating common EWS format with Europe

What you need to do send EWS message through QZSS



1. Prepare EWS message data (122bits stream)
   - Prof. Shimazu (AIIT) will present “Common EWS format”
2. Provide EWS message data and test schedule via e-mail
   - The data should be provided before 10 working days for signal reception test and demonstration.
   - The test message transmission is allowed only during weekdays and day time (10:00-16:00JST / 08:00-14:00 Thai local time).
   - The number of messages should be within 30 kinds in a day.
   - One message is repeated once every four seconds during the requested test schedule. Test schedule is to be requested as “start time” and “end time”.
3. QSS, operating company of QZSS, checks and creates 250 bits stream for QZSS transmission message in advance of the test schedule.
   - NOTE: during one test message transmission, QZSS system adds different bit patterns on reserved and CRC bits to one EWS message you created. A message will become 48 different 250 bits message for the one 122 bits EWS message.
   - The test message patterns can be provided before the test for your validation.

Request flow for EWS message

EWS message

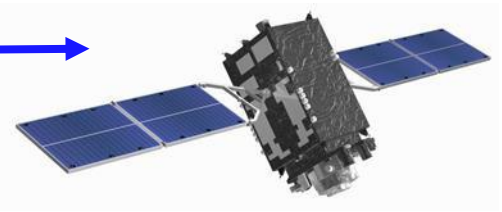
0100110110010011011001001101100100
1101100100110110010011011001001101
1001001101100100110110010011011O

122 bits

Send via e-mail before 10 days with test schedule

MT44

250 bits



You need to create.

Length in bits1	Content	Predefined value (integer)
8	Preamble	83 (A) or 154 (B) or 198 (C)
6	Message Type number	44
3	Report Classification	7 (test)
6	Organization Code	60 (foreign country)
7	Subdivision Org. Code	0
122	EWS message	Prepare this data (122bit)
62	Spare	0 (unused)
6	Version Number	0
6	Reserved	System operator will create
24	CRC	System operator will create

QZSS operator creates

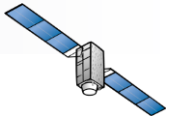
GPS Chip Antenna

Spresense

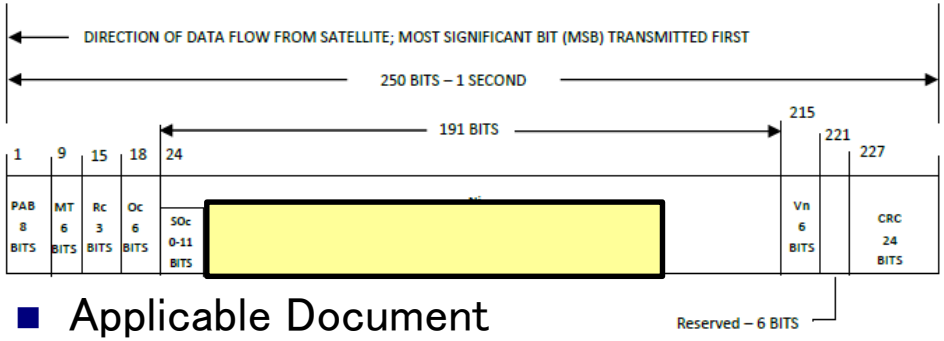
PC or Smartphone App etc…

Under RPD charrenge team scope

Under QZSS team scope



DCR MT44 Message format (1/2)



Applicable Document

For more detail information, Please check following documents.

(1)IS-QZSS-DCR-008

(2)IS-QZSS-L1S-004

You can downloads these documents from QZSS web site.

https://qzss.go.jp/en/technical/ps-is-qzss/ps-is-qzss.html

Preamble

The beginning of each message is the 8-bit preamble consists of the following three patterns repeated in sequence:

Pattern A	01010011
Pattern B	10011010
Pattern C	11000110

The first bit in the "Pattern A" preamble is synchronous with the epoch of the 6-second L1C/A signal (signal for GPS and QZSS satellite positioning services) navigation message subframe."Pattern B" comes after "Pattern A" . "Pattern C" comes after "Pattern B". After that, the sequence returns to "Pattern A".

Reserved 6bit+CRC

System uses 6bits and generates 48kinds of code.

Parameter		Description	Effective Range	Number of Bits	LSB	Units
-		PAB and MT See Section 4.1.2.2. (2)IS-QZSS-L1S-004 page.16	-	-	-	-
Rc		Report Classification 1: Maximum priority 2: Priority 3: Regular 7: Training/Test	1-3,7	3	-	-
Oc		Organization Code See Table 4.1.2-55. (1)IS-QZSS-DCR-008 page.108	1-60	6	1	-
Ni	SOc	Subdivision Organization Code The information issued by the organization. If the organization is "51: prefecture", 6 bits are used as a subdivision code. Similarly, 11 bits of "52: Municipality or 53: public agency", and 7 bits of "60: Foreign Country" are used as a subdivision code. If the organization is any other code except above (51,52,53,60), this section is not used as SOc and used as Ni.	-	0-11		
		Event Information The information issued by the organization.	-	180-191	-	-
Vn		Version Number "0" The version number of JMA-DC Report, which is used to judge whether JMA-DC Report can be used or not. JMA-DC Report can be used only if the receiver supports the version showed in this section. JMA-DC Report shall be transmitted in upward compatible. Set a transitional period if upward compatibility is not available.	0-63	6	1	-
Reserved		Reserved	-	6	1	-
-		CRC See Section 4.1.1.3. (2)IS-QZSS-L1S-004 page.15	-	-	-	-

DCR MT44 Message format (2/2)

Table 4.1.2-55 Organization Code

Code	Description
1	Cabinet Secretariat
2	Cabinet Office (Disaster Prevention)
3	Cabinet Office (Space Strategy)
4	National Police Agency
5	Financial Services Agency
6	Consumer Affairs Agency
7	Ministry of Internal Affairs and Communications
8	Fire and Disaster Management Agency
9	Ministry of Justice
10	Public Security Intelligence Agency
11	Ministry of Foreign Affairs
12	Ministry of Finance
13	National Tax Agency
14	Ministry of Education, Culture, Sports, Science and Technology
15	Agency for Cultural Affairs
16	Ministry of Health, Labour and Welfare
17	Ministry of Agriculture, Forestry, and Fisheries
18	Forestry Agency
19	Fisheries Agency
20	Ministry of Economy, Trade and Industry
21	Agency for Natural Resources and Energy
22	Small and Medium Enterprise Agency
23	Ministry of Land, Infrastructure, Transport and Tourism (Disaster Prevention)
24	Ministry of Land, Infrastructure, Transport, and Tourism (Crisis Management)
25	Geospatial Information Authority of Japan
26	Japan Tourism Agency
27	Japan Coast Guard
28	Ministry of the Environment
29	Nuclear Regulation Authority
30	Ministry of Defense
45	Reserved
46	Reserved
47	Reserved
48	Reserved
49	Reserved
51	Prefecture
52	Municipality
53	Public agency
60	Foreign country

Sample of EWS message and schedule

1. EWS message data

【Tsunami】

- 9AB3F800000000223AE553D1C01200170807DE00000000000000000NNNNNNNNN
- C6B3F800000000223AE553D1C01200170807DE00000000000000000NNNNNNNNN
- 53B3F800000000223AE553D1C01200170807DE00000000000000000NNNNNNNNN

【ForestFire】

- 9AB3F80000000019BADE93F6401200178707DE00000000000000000NNNNNNNNN
- C6B3F80000000019BADE93F6401200178707DE00000000000000000NNNNNNNNN
- 53B3F80000000019BADE93F6401200178707DE00000000000000000NNNNNNNNN

2. Sample of schedule

Tsunami：

- Time（JST)
- 09:00-09:59
- 11:00-11:59
- 13:00-13:59