Input paper: [[1]](#footnote-1) DTEC2-5.2.3.7

Input paper for the following Committee(s): check as appropriate Purpose of paper:

**□** ARM **□** ENG **□** PAP **x** Input

X DTEC **□** VTS **□** Information

Agenda item [[2]](#footnote-2) n.n

Technical Domain / Task Number 2 …………………………………

Author(s) / Submitter(s) NSONESOFT Co., Ltd.

Proposal on the revisions to the data transfer protocol details and other contents in ITU-R M.2092-1

# Summary

In light of the output documents from the official ITU VDES, changes to ITU-R M.2092-1 are proposed. It is requested that DTEC 2 consider these suggested modifications.

## Purpose of the document

The purpose of this document is to provide recommendations on the revision of ITU-R M.2092-1.

## Related documents

1. ITU-R M.2092-1, *Technical characteristics for a VHF data exchange system in the VHF maritime mobile band, February 2022*

# Background

ITU has published ITU-R M.2092-1 since Feb. 2022. At IALA ENAV 31, the Committee participants were requested to present their change proposals on ITU-R M.2092-1 at the subsequent meetings, which would be submitted to ITU in a liaison note after discussion. Hence, NSONESOFT Co., Ltd. Of the Republic Of Korea proposes some changes to this proposal.

# Discussion

We propose the revision of ITU-R M.209-1 as shown in the Annex.

# References

1. ITU-R M.2092-1, *Technical characteristics for a VHF data exchange system in the VHF maritime mobile band, February 2022*

# Action requested of the Committee

The Committee is requested to consider this document's proposal and take appropriate actions.

**ANNEX**

| **Comment Number:**  **Name-#** | **Change Log ID #[[3]](#footnote-3)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **Proposed change to ITU-R M.2092-1, short editorial changes can be include here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| *KOREA NSO-1* | *NA* | *Annex 5 / Section 3.13* | *Section 3.13* | *Editorial* | Incorrect description of source station ID of downlink transmission delivered from VDE-SAT to ship station via satellite | “For a downlink addressed transfer that passes through the satellite to a ship station, the ship station ID is part of the resource allocation, whereas the source station ID is given as the destination station ID in the start, continuation, and end fragments.”  “For a downlink addressed transfer that passes through the satellite to a ship station, the ship station ID is part of the resource allocation, whereas the source station ID is given as the source station ID in the start, continuation, and end fragments.” |

**Comments:**

**KOREA NSO-1**

**3.13 Data transfer protocol details**

Detailed protocol diagrams for VDE-SAT are provided in § 3.13.1 through § 3.13.10.

Addressed data transfers are from a source station ID to a destination station ID, where it is the VDE-SAT networks responsibility to route transfer data from start to end between the two stations.

The source station identifies the station originally transmitting the data, to be identified by the receiving destination station ID. The source station ID is also used for sending an answer back to it.

Transfers using resource request and Allocation mechanisms, the source and destination station IDs are identified as follows:

For an uplink-addressed transfer from a ship to a destination station, the ship station ID is part of the resource request (see § 3.10.5), and the destination station ID is given as the destination station ID in the start, continuation and end fragments.

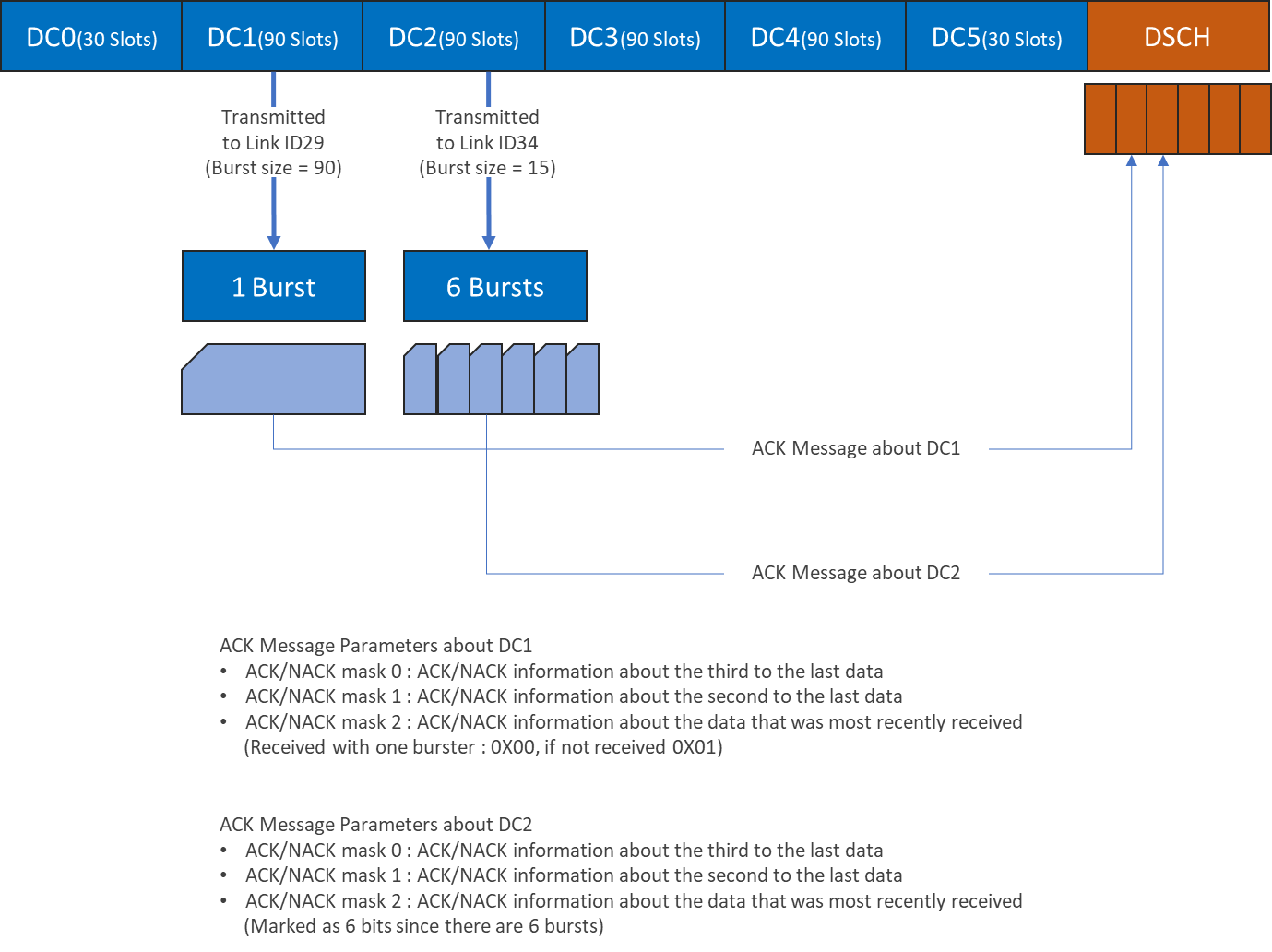
For a downlink addressed transfer that passes through the satellite to a ship station, the ship station ID is part of the resource allocation, whereas the source station ID is given as the ~~destination~~ source station ID in the start, continuation and end fragments.

Two examples of a data transfer process are illustrated in Figs 56 and 57. Additional considerations on the two examples are provided in the enumerated list below the two Figures.

| **Comment Number:**  **Name-#** | **Change Log ID #[[4]](#footnote-4)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **Proposed change to ITU-R M.2092-1, short editorial changes can be included here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
| *KOREA NSO-2* | *NA* | *Annex 5 / Section 3.10.6* | *Table 73* | *Clarification* | If the size of the DC channel specified by the SBB exceeds 120 slots, the number of ACK/NACK mask bits is insufficient when using Link IDs 32 to 34 in satellite downlink transmission | “Note: Satellite should consider the number of mask bits allowed for uplink ACK/NACK when selecting Link ID for downlink transmission.” |

**Comments:**

**KOREA NSO-2**



When the LC channel is set to 255, the maximum size in SBB, the number of ACK/NACK mask bits in the ship's downlink ACK/NACK message will be insufficient if the satellite selects Link IDs 32 to 34 with burst size 15 and transmits the downlink addressTherefore, considerations for link ID selection is stated in the note for Table 73 Resource Allocation

**3.10.6 Resource allocation**

TABLE 73

**Resource allocation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field**  **no** | **Size (Bytes)** | **Function** | **Content** |
| 1 | 1 | Type | Type = 12 |
| 2 | 2 | Payload size | Size of fields 3 to 22. Payload size = 32 |
| 3 | 4 | Ship Station ID 1 | The Unique Identifier of the ship station, as described in  § 2.4, Annex 1.  0 for broadcast. |
| 4 | 1 | Logical Channel 1 | Logical Channel assigned for data transmission. Only applies to data slots. LC of 255 indicates no resource. |
| 5 | 1 | Link ID 1 | Link ID that should be used in Logical Channel 1. Transmission direction can be inferred from link ID. |
| 6 | 1 | Session ID 1 | Satellite assigned session ID, range 1-255. 0 used for short message |
| 7 | 1 | Uplink link CQI 1 | Received Channel Quality Indicator as defined in §1.2.8, Annex 2. |
| 8 | 4 | Ship Station ID 2 | The Unique Identifier of the ship station, as described in  § 2.4, Annex 1.  0 for broadcast. |
| 9 | 1 | Logical Channel 2 | Logical Channel assigned for data transmission. Only applies to data slots. LC of 255 indicates no resource. |
| 10 | 1 | Link ID 2 | Link ID that should be used in Logical Channel 2. Transmission direction can be inferred from link ID. |
| 11 | 1 | Session ID 2 | Assigned session ID. |
| 12 | 1 | Uplink link CQI 2 | Received Channel Quality Indicator as defined in  §1.2.8, Annex 2. |
| 13 | 4 | Ship Station ID 3 | The Unique Identifier of the ship station, as described in  § 2.4, Annex 1.  0 for broadcast. |
| 14 | 1 | Logical Channel 3 | Logical Channel assigned for data transmission. Only applies to data slots. LC of 255 indicates no resource. |
| 15 | 1 | Link ID 3 | Link ID that should be used in Logical Channel 3. Transmission direction can be inferred from link ID. |
| 16 | 1 | Session ID 3 | Assigned session ID. |
| 17 | 1 | Uplink link CQI 3 | Received Channel Quality Indicator as defined in  §1.2.8, Annex 2. |
| 18 | 4 | Ship Station ID 4 | The Unique Identifier of the ship station, as described in  § 2.4, Annex 1.  0 for broadcast. |
| 19 | 1 | Logical Channel 4 | Logical Channel assigned for data transmission. Only applies to data slots. LC of 255 indicates no resource. |
| 20 | 1 | Link ID 4 | Link ID that should be used in Logical Channel 4. Transmission direction can be inferred from link ID. |
| 21 | 1 | Session ID 4 | Assigned session ID. |
| 22 | 1 | Uplink link CQI 4 | Received Channel Quality Indicator as defined in  §1.2.8, Annex 2. |

Note: Satellite should consider the number of mask bits allowed for uplink ACK/NACK when selecting Link ID for downlink transmission.

| **Comment Number:**  **Name-#** | **Change Log ID #[[5]](#footnote-5)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **Proposed change to ITU-R M.2092-1, short editorial changes can be include here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
| *KOREA NSO-3* | *NA* | *Annex 5 / Section 3.10.18* | *Table 86* | *Clarification* | No Usage and Description for Uplink Short Message Types 24, 25, 26, 27, 28 | “Note: The pre-configured destination for each message is in accordance with the satellite network operation guidelines.” |

**Comments:**

**KOREA NSO-3**

An additional explanation of the pre-configured destination ID is required to specify the relevant content in the note in Table 86 Uplink Short Message.

**3.10.18 Uplink short data message(without acknowledgement and destination identification)**

TABLE 86

**Uplink short data message (without acknowledgement and destination identification)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field**  **no** | **Size (Bytes)** | **Function** | **Content** |
| 1 | 1 | Type | Type = 24~28 |
| 2 | 4 | Ship Station ID | The Unique Identifier of the source station, as described in § 2.4, Annex 1. |
| 3 | 5 | Data | Binary data. |

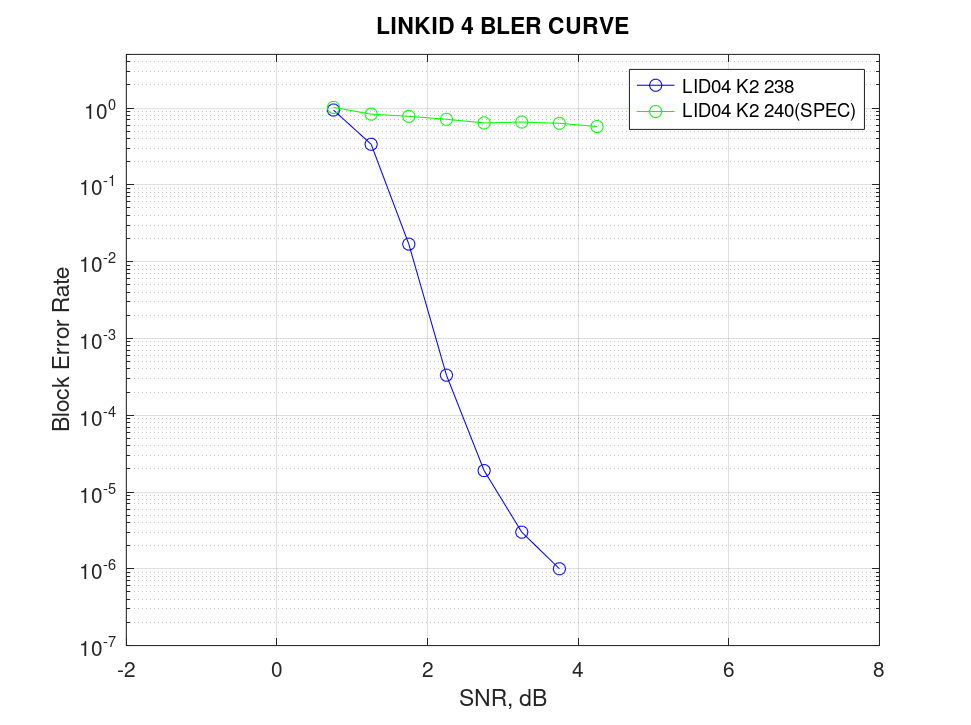
Note: The pre-configured destination for each message is in accordance with the satellite network operation guidelines.

| **Comment Number:**  **Name-#** | **Change Log ID #[[6]](#footnote-6)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **Proposed change to ITU-R M.2092-1, short editorial changes can be include here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
| *KOREA NSO-4* | *NA* | *Annex 2 / Section 1.2.4.3* | *Table 4* | *Editorial* | wrong k2 value of Link ID 4 | “k1|k2 = 4|240”  “k1|k2 = 4|238” |

**Comments:**

**KOREA NSO-4**

The SNR value is low when the k2 parameter value is 238 in Link ID 4 of Table 4 Interleaver and puncturing parameters for different information lengths/code rates.



**1.2.4.3 interleaver definition**

The interleaver specification follows that prescribed in the Consultative Committee for Space Data systems, Recommendation for Space Data System Standards, “TM Synchronization and Channel Coding”. CCSDS 131.0-B-2. Blue Book. Issue 2. Washington, D.C.: August 2011.

First factorize k = k1 k2, where the parameters k1 and k2 depend on the choice of the respective code, where k is the information block length. Then select prime numbers and puncturing parameters values as given in Table 4.

TABLE 4

**Interleaver and puncturing parameters for different information lengths / code rates**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **LinkID** | **Nominal code rate** | **Information**  **length** | **k1|k2** | **p1|p2|p3| p4| p5| p6| p7| p8** | **Puncturing**  **ID** | **Tail ID** |
| 4 | 3/4 | 952 | 4|~~240~~238 | 113|31|59|163|29|181|101|11 | 8 | 8 |
| 5 | 3/4 | 288 | 2|144 | 47|17|233|127|239|139|199|163 | 8 | 8b |
| 6 | 3/4 | 672 | 2|336 | 37|101|191|149|79|131|229|31 | 8 | 8b |
| 7 | 3/4 | 1056 | 4|264 | 23|31|167|223|59|113|47|211 | 8 | 8b |
| 8\* | 1/2 | 192 | 2|96 | 31|37|43|47|53|59|61|67 | 6 | 6 |
| 9\* | 1/2 | 448 | 2|224 | 31|37|43|47|53|59|61|67 | 6 | 6 |
| 10\* | 1/2 | 704 | 2|352 | 31|37|43|47|53|59|61|67 | 6 | 6 |
| 11 | 1/2 | 432 | 2|216 | 127|191|241|5|83|109|107|179 | 6 | 6a |
| 12 | 3/4 | 972 | 2|486 | 31|37|43|47|53|59|61|67 | 8 | 8 |
| 13 | 3/4 | 1296 | 2|648 | 31|37|43|47|53|59|61|67 | 8 | 8 |
| 14 | 1/2 | 896 | 2|448 | 31|37|43|47|53|59|61|67 | 6 | 6 |
| 15 | 3/4 | 2016 | 4|504 | 31|37|43|47|53|59|61|67 | 8 | 8 |
| 16 | 3/4 | 2688 | 4|672 | 31|37|43|47|53|59|61|67 | 8 | 8 |
| 17 | 1/2 | 1872 | 6|312 | 211|61|227|239|181|79|73|193 | 6 | 6a |
| 18 | 3/4 | 4032 | 4|1008 | 31|37|43|47|53|59|61|67 | 8 | 8 |
| 19 | 3/4 | 5616 | 16|351 | 137|101|223|41|67|131|61|47 | 8 | 8 |
| 20 | 1/4 | 96 | 2|48 | 37|83|211|61|107|101|149|167 | 2 | 2a |
| 21 | 2/3 | 736 | 2|368 | 139|17|241| 47|109|11|29|163 | 7a | 7a |
| 22 | 2/3 | 3120 | 16|195 | 89|47|239|17|127|59|43|31 | 7a | 7b |
| 23 | 2/3 | 4544 | 4|1136 | 31|37|43|47|53|59|61|67 | 7b | 7b |
| 24 | 5/6 | 3788\*2 | 4|947 | 127|251|227|173|139|149|101|7 | 9 | 9 |
| 25 | 1/2 | 4776 | 12|398 | 31|37|43|47|53|59|61|67 | 6 | 6a |
| 26 | 1/4 | 5456\*7 | 16|341 | 37|41|43|47|53|59|61|67 | 2 | 2a |
| 27 | 1/2 | 6032\*19 | 16|377 | 31|37|43|47|53|59|61|67 | 6 | 6b |
| 28 | 1/4 | 5280\*4 | 16|330 | 31|37|43|47|53|59|61|67 | 2 | 2b |
| 29 | 1/4 | 5552\*6 | 16|347 | 31|37|43|47|53|59|61|67 | 2 | 2c |
| 30 | 1/4 | 5320\*13 | 14|380 | 31|37|43|47|53|59|61|67 | 2 | 2c |
| 31 | 1/4 | 5328\*22 | 16|333 | 31|41|43|47|53|59|61|67 | 2 | 2d |
| 32 | 1/4 | 312 | 2|156 | 37|79|29|139|151|97|181|157 | 2 | 2e |
| 33 | 1/3 | 4280 | 8|535 | 59|37|157|167|239|83|163|29 | 4 | 4a |
| 34 | 1/3 | 4160\*2 | 16|260 | 163|157|149|137|197|47|241|251 | 4 | \*\* |

| **Comment Number:**  **Name-#** | **Change Log ID #[[7]](#footnote-7)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **Proposed change to ITU-R M.2092-1, short editorial changes can be include here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
| *KOREA NSO-5* | *NA* | *Annex 4 / Section 4.9.2* | *Table 35* | *Clarification* | No timeout rules for sending responses (resource allocation) to resource requests in VDE-TER | “Note: Resource allocation should be provided within the default TDMA frame size (90 slots) after receiving a resource request” |

**Comments:**

**KOREA NSO-5**

When a ship transmits a resource request to the coast, a timeout is required for processing when the request fails. Accordingly, the time to send a response(resource allocation message) when a resource request message is received in the note of Table 35 Resource Allocation is specified as default TDMA frame size (90 slots = about 2.4 seconds)

**4.9.2 Resource allocation**

TABLE 35

**Resource allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Resource allocation** | | | | |
| **Fiel d no** | **Value (Dec)** | **Size (Bytes)** | **Function** | **Content** |
| 1 | 004 | 1 | Type |  |
| 2 | 0 to  216-1 | 2 | Length | Total size in bytes, variable. |
| 3 | 0 to  232-1 | 4 | Source ID | The Unique Identifier of the transmitting station as described in § 2.4, Annex 1. |
| 4 | 0 to  232-1 | 4 | Destination ID | The Unique Identifier of the station being assigned a Logical Channel as described in § 2.4, Annex 1.  Set to 0 for broadcast |
| 5 | 0-255 | 1 | Logical Channel Tx | Logical channel assigned to the session for transmission. Transmission only applies to data slots.(1) LC of 255 indicates no resource |
| 6 | 0-255 | 1 | Logical Channel Rx | Logical channel assigned to the session for reception. Reception only applies to data signalling slots.(1) LC of 255 indicates no resource |
| 7 | 0-255 | 1 | Link ID | The link ID that should be used in the TDMA channel. This will apply to Messages 74, 75, 76 and 13. |
| 8 | 1-255 | 1 | TDMA  frame delay | The number of TDMA frames to delay before the resource may be used. Resource may only be assigned from the start of the next TDMA frame. Default 1 (2) (3) |
| 9(4) | 0 | 1 | Session ID | Session ID. |
| 10 | 0-255 | 1 | CQI | Received Channel Quality Indicator as defined in § 1.2.8 Annex 2. |

Note: Resource allocation should be provided within the default TDMA frame size (90 slots) after receiving a resource request

(1) The resource allocation message will always be sent on the signalling channel when being sent in response to a resource request (#90) message and will always be sent in the assigned TDMA channel when sent in response to an end fragment (#76). When the resource allocation message is being sent in the assigned TDMA channel, then the message should be transmitted in the same VDE packet as the ACK (#13) message. See fragment continuation for more details.

(2) When assigning a logical channel, then both the logical channel Tx and the logical channel Rx should have identical TDMA channel numbers. The assigned LCs may have the same physical channels for simplex communication and different physical channels for duplex communication.

(3) The TDMA frame delay allows for the efficient transferal of LC from one vessel to another with as little as possible wasting of slots.

(4) The session ID is reserved for future use.

| **Comment Number:**  **Name-#** | **Change Log ID #[[8]](#footnote-8)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **Proposed change to ITU-R M.2092-1, short editorial changes can be include here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
| *KOREA NSO-6* | *NA* | *Annex 4 / Section 4.9.12* | *Table 49* | *Clarification* | Meaning of the phrase that resource allocation broadcast by base station is repeatedly broadcast during TDMA frame length is ambiguous in VDE-TER | “Note: The resource allocation broadcast by the base station repeatedly broadcasts during the TDMA Frame length.”  “Note: When data fragments are transmitted over several sessions, the resource allocation broadcast by the base station is repeatedly broadcast during the TDMA frame length containing the last fragment of the data session.” |

**Comments:**

**KOREA NSO-6**

**4.9.12 end fragment**

TABLE 49

**End fragment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field no** | **Value**  **(Dec)** | **Size (Bytes)** | **Function** | **Content** |
| 1 | 076 | 1 | Type |  |
| 2 | 0 to 216-1 | 2 | Length | Total size in bytes, variable. |
| 3 | 0 to 232-1 | 4 | Source ID | The Unique Identifier of the transmitting station, as described in § 2.4, Annex 1. |
| 4(1) | 0 | 1 | Session ID | Session ID. |
| 5 | 0 to 232-1 | 4 | Destination ID | The Unique Identifier of the current node receiving this message, as described in § 2.4, Annex 1.  Set to 0 for broadcast. |
| 6 | 0-255 | 1 | Number of fragments | Total number of fragments in this session. Should be a value from 1 to 14. |
| 7 | 0-255 | 1 | Fragment Number in this message | Fragment number of the payload in this message. First fragment should start at 0, increment with any additional fragment and wrap at 255. |
| 8 | 0-255 | 1 | Continue Data Session | 1. – Ends data session. 2. – Continues data session with new session ID. |
| 9 |  | Variable | Payload |  |

Note: When data fragments are transmitted over several sessions, the resource allocation broadcast by the base station is repeatedly broadcast during the TDMA frame length containing the last fragment of the data session.

Should always be transmitted on the data channel (derived from the Logical Channel) as assigned by a resource allocation. Will always be transmitted on last fragment signalling the end of Logical Channel use, unless only one fragment will be transmitted. When only one fragment will be transmitted, then only a Start Fragment will be transmitted.

(1) Session ID is reserved for future use.

| **Comment Number:**  **Name-#** | **Change Log ID #[[9]](#footnote-9)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **The proposed change to ITU-R M.2092-1, short editorial changes can be included here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
| *KOREA NSO-7* | *NA* | *Annex 3 / Section 7.8* | *Table 30* | *Editorial* | Since ASM Message 5 always use Link ID of 5( 3/4 coding rate), the number of bits value for zero padding(no FEC) should be N/A. | From  “1 slot: 249 / 153”  To  “1 slot: N/A / 153” |

**Comments:**

**KOREA NSO-7**

**7.8 Message 5: Acknowledgement message**

This ASM message is used to return message acknowledgment to one or more addressed messages. Note this message should always use Link ID of 5 (3/4 coding rate. Acknowledgment message is defined in Table 30.

TABLE 30

**Acknowledgement message**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Number of bits** | **Description** |
| Message ID | 4 | 5 – Multiple acknowledgement message with no communication state |
| Retransmit flag | 1 | 0 (reserved for future use) |
| Repeat indicator | 2 | Used by the repeater to indicate how many times a message has been repeated.  0 – 3; 0 = default; 3 = do not repeat any more |
| Session ID | 6 | The Session ID associates the VDL transmission with a specific PI transaction |
| Source ID | 32 | The Unique Identifier of the transmitting station as described in § 2.4, Annex 1. |
| Destination ID | 32 | The Unique Identifier of the receiving station as described in § 2.4, Annex 1. |
| ACK/NACK mask | 15 | Specifies which MITDMA block identifiers failed. Bit map field with the LSB representing Block identifier 0, the MSB representing Block ID 14.  “1” indicates a packet failed  “0” indicates the packet was received ok |
| Spare | 1 | 1 (reserved for future use) |
| Coding rate adaption request | 2 | 0 (reserved for future use) |
| Channel quality indicator | 8 | Signal quality |
| Zero padding (no FEC / FEC) | 1 slot: ~~249~~N/A / 153  SAT: N/A / 817  As required | Padding bits are added as required to complete the block size. These bits are not available for future use. |

| **Comment Number:**  **Name-#** | **Change Log ID #[[10]](#footnote-10)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **Proposed change to ITU-R M.2092-1, short editorial changes can be include here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
| *KOREA NSO-8* | *NA* | *Annex 3 / Section 8* | *Section 8* | *Editorial* | Updates to the example of the burst symbol generation are required by applying additional “Session ID” and “Spare” parameters to the structure of ASM Message 5. | See the following table |

**Comments:**

**KOREA NSO-8**

**8 Example of application specific message burst symbol generation**

The following shows an example of generating one VDES burst, using Link Config ID #5. An ASM acknowledgment message is used as a simple example.

This is done by (a) Generating the ASM message structure (b) bit packing the message, (b) appending CRC32, (c) performing FEC encoding with flushing bits, (d) bit-scrambling and (e) adding Syncword and Link ID + symbol-mapping:

1. **Input message structure (using ASM acknowledgment message as an example) – See § 7.8**

| **Parameter** | **Number of bits** | **Value** | **Bits** |
| --- | --- | --- | --- |
| Message ID | 4 | 5 | 0 1 0 1 |
| Retransmit flag | 1 | 0 | 0 |
| Repeat indicator | 2 | 0 | 0 0 |
| Session ID | 6 | 56 | 1 1 1 0 0 0 |
| Source ID | 32 | 123456789 | 0 0 0 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 1 0 1 |
| Destination ID | 32 | 987654321 | 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 1 1 0 0 0 1 |
| ACK/NACK mask | ~~16~~15 | 0 | ~~0~~ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
| Spare | 1 | 0 | 0 |
| Coding rate adaption request | 2 | 0 | 0 0 |
| Signal quality indicator | 8 | 100 | 0 1 1 0 0 1 0 0 |
| **Total bits above** | **~~97~~103** |  |  |
| Zero padding | ~~159~~153 (256 – ~~97~~103) | 0 | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ~~0 0 0 0 0 0~~ |

1. **Bit packed ASM acknowledgement message, using LinkID#5 (256 bits)**

|  |
| --- |
| ~~0 1 0 1 0 0 0 0 0 0 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 1 0 1 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0~~  0 1 0 1 0 0 0 1 1 1 0 0 0 0 0 0 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 1 0 1 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |

1. **Input for turbo encoder (256 bits payload + 32 bits CRC = 288 bits)**

|  |
| --- |
| *~~0 1 0 1 0 0 0 0 0 0 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 1 0 1 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0~~* ***~~0 0 0 1 1 0 1 1 1 1 0 0 0 1 1 0 0 0 0 0 1 1 1 0 1 1 0 1 0 1 0 1~~***  *0 1 0 1 0 0 0 1 1 1 0 0 0 0 0 0 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 1 0 1 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0* ***0 1 0 1 1 0 1 0 1 1 1 1 0 0 1 0 1 0 0 1 0 1 0 0 0 1 1 1 1 1 0 0*** |

1. **Turbo encoded data with flushing (288 bits / ¾ FEC rate + 10 FEC tail bits = 394 bits)**

|  |
| --- |
| ~~0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 1 1 0 1 0 1 1 1 1 0 1 1 1 1 1 0 0 0 1 1 0 0 1 0 0 0 0 1 0 1 1 1 0 1 0 0 1 1 1 0 1 0 1 0 1 1 1 1 0 1 1 1 1 0 0 1 0 1 1 0 1 0 0 0 0 0 1 0 1 0 1 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 0 0 0 1 1 0 1 0 0 1 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 1 1 0 1 1 0 1 1 1 0 0 0 1 0 1 0 0 0 0 0 0 1 1 0 1 1 0 1 1 0 0 1 1 0 1 0 1 1~~ **~~0 0 1 1 0 1 0 0 0 1~~**  0 0 1 0 1 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 0 1 0 1 1 1 1 0 1 1 1 1 1 0 0 0 1 1 0 0 1 1 0 0 0 1 0 1 1 0 0 1 0 0 1 0 1 1 1 0 1 0 1 1 1 1 0 1 1 1 1 0 0 0 0 1 1 0 1 1 0 0 0 0 1 0 1 1 1 0 0 0 0 1 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 1 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 1 0 1 1 1 0 1 0 0 1 1 1 1 1 0 0 1 1 1 0 1 0 0 1 0 0 1 1 0 0 0 1 0 1 0 1 1 1 0 0 1 **1 1 1 1 0 1 0 0 0 1** |

1. **Scrambled data (394 bits)**

|  |
| --- |
| ~~0 0 1 0 1 0 1 1 1 1 1 1 0 1 1 0 1 0 1 1 1 1 0 1 1 1 0 1 1 0 1 1 1 0 1 1 1 1 0 0 0 0 1 1 1 1 0 1 0 1 1 1 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 1 0 1 1 1 0 0 1 1 0 0 1 0 1 0 1 1 1 1 0 1 1 1 1 1 0 1 1 0 1 0 1 1 0 0 1 1 0 1 1 0 1 0 0 0 1 1 1 0 1 0 1 1 0 1 0 1 0 0 0 1 1 0 1 1 1 1 1 1 0 0 1 1 1 1 0 0 0 0 0 0 0 1 0 1 1 1 0 0 1 0 0 0 0 1 0 1 1 0 1 1 0 1 1 1 0 0 0 0 0 1 0 1 1 0 1 0 1 1 1 0 0 0 0 1 1 1 0 1 1 1 1 1 1 1 0 0 0 1 0 0 1 0 0 0 0 0 0 1 1 1 0 1 1 0 1 0 1 1 0 0 0 0 1 0 0 1 0 1 1 1 1 0 0 1 0 0 1 0 1 0 1 1 0 0 0 0 1 1 0 0 1 1 1 0 0 1 1 1 0 0 1 1 0 0 1 1 0 1 0 0 1 1 0 1 1 0 1 0 1 1 0 1 1 0 1 0 1 1 1 0 1 1 1 0 1 1 0 1 1 1 1 1 1 1 0 0 0 1 1 0 1 0 0 1 0 0 0 1 0 1 0 0 0 1 1 0 1 0 0 1 0 1 1 0 0 0 1 1 1 0 1 0 1 0 1 0 1 1 0 1 1 0 0 1 0 0 1 0 0 0 0 1 0 0 1 1 0 0 1 1 0 1 1 1 1 1 0 0 1 0 1 0 1 1 1 1~~  0 0 1 0 1 0 1 1 1 1 0 0 1 1 1 0 0 0 0 0 1 0 0 1 1 1 0 0 0 0 0 1 1 1 0 1 1 1 1 1 0 0 1 1 0 1 0 0 0 1 1 0 0 1 1 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 1 0 1 0 1 1 0 1 1 0 1 0 1 0 1 1 0 0 0 1 1 1 1 0 0 0 0 0 1 1 0 1 1 1 0 1 1 0 1 0 0 0 1 0 1 0 1 0 1 1 1 1 1 1 0 1 0 1 0 1 0 1 1 0 1 1 0 0 1 1 1 1 0 0 0 0 0 0 0 1 0 0 1 0 0 0 1 0 0 1 0 0 0 1 1 0 1 0 0 0 1 1 0 0 0 1 0 1 0 1 1 0 1 1 1 0 1 0 0 0 0 0 1 1 0 1 1 1 1 0 1 1 0 0 0 1 0 0 1 1 0 0 0 0 0 0 1 0 0 1 1 0 1 1 1 0 0 0 0 0 1 1 0 1 0 1 1 1 1 0 0 0 0 0 1 0 1 0 1 1 0 0 0 0 1 0 0 0 1 1 1 0 0 0 1 0 0 0 1 1 0 1 1 0 0 1 0 0 1 1 0 0 1 0 1 0 1 1 0 1 1 0 1 0 1 1 1 1 1 1 1 0 1 0 0 1 1 1 1 1 1 1 0 0 0 1 1 0 1 0 0 0 0 0 0 1 0 1 0 1 0 1 1 0 1 1 0 0 0 1 1 0 1 0 1 0 1 0 1 0 0 0 1 0 1 0 1 1 0 1 0 0 0 1 1 0 1 1 1 0 0 1 1 0 0 0 0 0 0 0 1 1 0 1 1 1 1 0 1 0 1 1 1 1 |

1. **Symbol mapped with QPSK (27 symbols syncword + 16 symbols Link ID + 197 symbols data = 240 symbols total)**

|  |
| --- |
| -- Syncword symbols:  (+0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (+1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (+0.7,+0.7), (+1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (+0.7,+0.7), (-1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7),  -- Link ID symbols:  (+1.0,+0.0), (-0.7,+0.7), (+0.0,+1.0), (-0.7,+0.7), (+1.0,+0.0), (+0.7,-0.7), (+1.0,+0.0), (-0.7,+0.7), (+0.0,+1.0), (+0.7,+0.7), (+1.0,+0.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7),  -- Data symbols:  ~~(-1.0,+0.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0), (-0.7,+0.7), (+1.0,+0.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (+0.7,+0.7), (+1.0,+0.0), (-0.7,+0.7), (+0.0,+1.0), (+0.7,+0.7), (-1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (+0.7,+0.7), (+0.0,-1.0), (-0.7,-0.7), (-1.0,+0.0), (-0.7,+0.7), (+0.0,+1.0), (+0.7,+0.7), (-1.0,+0.0), (+0.7,+0.7), (-1.0,+0.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0), (-0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (-1.0,+0.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,-0.7), (+0.0,-1.0), (-0.7,-0.7), (+1.0,+0.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,+1.0), (-0.7,+0.7), (-1.0,+0.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (-1.0,+0.0), (+0.7,+0.7), (+1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (+0.0,+1.0), (-0.7,+0.7), (+1.0,+0.0), (-0.7,-0.7), (+0.0,-1.0), (-0.7,-0.7), (+0.0,+1.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,+0.7), (-1.0,+0.0), (-0.7,-0.7), (+0.0,+1.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,-0.7), (+1.0,+0.0), (+0.7,-0.7), (-1.0,+0.0), (-0.7,+0.7), (+1.0,+0.0), (-0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (+1.0,+0.0), (-0.7,-0.7), (+0.0,+1.0), (-0.7,-0.7), (+0.0,-1.0), (-0.7,-0.7), (-1.0,+0.0), (-0.7,+0.7), (+1.0,+0.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (+0.7,-0.7), (+0.0,+1.0), (-0.7,+0.7), (+1.0,+0.0), (+0.7,-0.7), (+0.0,+1.0), (-0.7,-0.7), (+0.0,-1.0), (+0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (+0.7,+0.7), (-1.0,+0.0), (+0.7,+0.7), (+0.0,-1.0), (-0.7,+0.7), (+1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,+0.7), (-1.0,+0.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (-1.0,+0.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,-0.7), (+0.0,+1.0), (-0.7,-0.7), (+0.0,+1.0), (-0.7,+0.7), (-1.0,+0.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,-0.7), (+0.0,+1.0), (-0.7,+0.7), (+0.0,-1.0), (-0.7,-0.7), (+1.0,+0.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,-0.7), (+0.0,+1.0), (-0.7,-0.7), (+0.0,-1.0), (-0.7,-0.7), (+0.0,+1.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (-1.0,+0.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0),~~  (-1.0,+0.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (+0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (+0.0,-1.0), (-0.7,+0.7), (+1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (-0.7,+0.7),(+1.0,+0.0), (-0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (-1.0,+0.0), (+0.7,+0.7), (+0.0,+1.0), (-0.7,-0.7), (+0.0,+1.0), (+0.7,-0.7), (+0.0,+1.0), (+0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (-0.7,+0.7), (-1.0,+0.0), (+0.7,-0.7), (-1.0,+0.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (+0.0,+1.0), (+0.7,+0.7), (+0.0,-1.0), (-0.7,-0.7), (-1.0,+0.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,-0.7), (+0.0,-1.0), (-0.7,-0.7), (+0.0,-1.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (+0.0,+1.0), (-0.7,+0.7), (+0.0,+1.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (-1.0,+0.0), (+0.7,+0.7), (+1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (+0.0,+1.0), (-0.7,-0.7), (+0.0,-1.0), (-0.7,-0.7), (+0.0,-1.0), (-0.7,+0.7), (-1.0,+0.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,-0.7), (-1.0,+0.0), (+0.7,+0.7), (-1.0,+0.0), (-0.7,+0.7), (+0.0,+1.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,-1.0), (+0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,+0.7), (+1.0,+0.0), (+0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (+0.0,+1.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (+0.0,-1.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,-1.0), (-0.7,-0.7), (-1.0,+0.0), (+0.7,+0.7), (+0.0,+1.0), (-0.7,+0.7), (+1.0,+0.0), (+0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (+0.0,-1.0), (+0.7,-0.7), (+1.0,+0.0), (-0.7,-0.7), (-1.0,+0.0), (+0.7,-0.7), (-1.0,+0.0), (+0.7,+0.7), (+0.0,-1.0), (-0.7,-0.7), (+0.0,-1.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,+0.7), (+0.0,-1.0), (-0.7,+0.7), (-1.0,+0.0), (+0.7,+0.7), (-1.0,+0.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,+1.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (+0.0,-1.0), (+0.7,-0.7), (+0.0,+1.0), (+0.7,+0.7), (+1.0,+0.0), (+0.7,+0.7), (-1.0,+0.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (+0.0,+1.0), (-0.7,+0.7), (+0.0,+1.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (-1.0,+0.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,-0.7), (+0.0,-1.0), (-0.7,-0.7), (+0.0,-1.0), (+0.7,-0.7), (+1.0,+0.0), (-0.7,+0.7), (-1.0,+0.0), (-0.7,+0.7), (+0.0,-1.0), (+0.7,+0.7), (+0.0,-1.0), (-0.7,+0.7), (+0.0,-1.0), (-0.7,-0.7), (-1.0,+0.0), (-0.7,-0.7), (+1.0,+0.0), (-0.7,+0.7), (+1.0,+0.0), (+0.7,-0.7), (+0.0,-1.0), (+0.7,+0.7), (+1.0,+0.0) |

| **Comment Number:**  **Name-#** | **Change Log ID #[[11]](#footnote-11)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **Proposed change to ITU-R M.2092-1, short editorial changes can be included here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
| *KOREA NSO-9* | *NA* | *Annex 4 / Section 4.9.7* | *Table 41* | *Editorial* | In order for 2250 slots to be divided into Hex slots, the value of the TDMA frame size must be 3, 5, 10, 15, which is a divisor of 375 | From  “May have the following values: 2, 3, 5, 6, 9, 10, 15 (default)”  To  “May have the following values: 3, 5, 10, 15 (default)” |

**Comments:**

**KOREA NSO-9**

**4.9.7 Bulletine Board start fragment message**

Table 41

**Bulletin board payload**

| **Field no.** | **Value  (dec)** | **Size  (bytes)** | **Function** | **Content** |
| --- | --- | --- | --- | --- |
| 1 | 0 to 232-1 | 4 | Start time for this version | UTC start time for this version of the bulletin board in number of seconds since 1 January 2000 00:00:00 UTC |
| 2 | 0 to 216-1 | 2 | Validity of this version | Lifetime of this version in the number of 1 minute frames  Up to 45 days |
| 3 | 0 to 255 | 1 | TDMA frame size | The size of TDMA frames in hexslots.  May have the following values: ~~2,~~ 3, 5, ~~6, 9,~~ 10, 15 (default)  Only 15 have to be supported. |
| 4 |  | Variable | Physical channel definitions | See the physical channel definition in Table 45. |
| 5 | 0 to 255 | 1 | Modulation, coding and protocol versions supported | Set to zero.  May be used to in the future to define a mandatory base set and optional more capable versions. Network ID segmentation could be used to distinguish different network types.  ASM reception flag one of the parameters for satellite. |
| 6 |  | 9 | Control station service area point 1 | Parameter (longitude and latitude) defining the control station service area North East corner.  GNSS rectangle longitude and latitude as defined in Recommendation ITU-R M.1371. See Table 42 – control station service area. |
| 7 |  | 64 | Authentication and integrity sequence | Reserved for future use. Set to zero. |

| **Comment Number:**  **Name-#** | **Change Log ID #[[12]](#footnote-12)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **Proposed change to ITU-R M.2092-1, short editorial changes can be included here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
| *KOREA NSO-10* | *NA* | *Annex 4 / Section 4.9.7* | *Table 42* | *Editorial* | In VDE, the control station service area of TBB may not be used as an addressed station ID.  In VDE, the station ID size is 32 bits; therefore, 18 MSB and 12 LSB are also misrepresented.  It is appropriate to delete the contents related to the addressed station ID. | See the following table |

**Comments:**

**KOREA NSO-10**

**4.9.7 Bulletine Board start fragment message**

Table 42

**Control station service area**

| **Name** | **Field size  (bits)** | **Content** |
| --- | --- | --- |
| Longitude of point 1 | 18 | Longitude of area to which the assignment applies; upper right corner (North-East); in 1/10 min~~, or 18 MSBs of addressed station ID 1 (±180°, East = positive, West = negative) 181 = not available~~ |
| Latitude of point 1 | 17 | Latitude of area to which the assignment applies; upper right corner (North-East); in 1/10 min~~, or 12 LSBs of addressed station ID 1, followed by 5 zero bits (±90°, North = positive, South = negative) 91° = not available~~ |
| Longitude of point 2 | 18 | Longitude of area to which the assignment applies; lower left corner (South-West); in 1/10 min~~, or 18 MSBs of addressed station ID 2 (±180°, East = positive, West = negative)~~ |
| Latitude of point 2 | 17 | Latitude of area to which the assignment applies; lower left corner (South-West); in 1/10 min~~, or 12 LSBs of addressed station ID 2, followed by 5 zero bits (±90°, North = positive, South = negative)~~ |
| Padding | 2 | Padding bits for byte alignment. Set to zero. |

| **Comment Number:**  **Name-#** | **Change Log ID #[[13]](#footnote-13)** | **Annex / Section** | **Section, Table, Figure** | **Type of change** | **Reason for the change, or what you want to accomplish** | **Proposed change to ITU-R M.2092-1, short editorial changes can be include here (large changes should be documented below)** |
| --- | --- | --- | --- | --- | --- | --- |
| *KOREA NSO-11* | *NA* | *Annex 5 / Section 3.10.7, 3.10.8,*  *3.10.9* | *Table 74, 75, 76* | *Clarification* | Add content that the destination ID is set to '0' for broadcast messages | See the following table |

**Comments:**

**KOREA NSO-11**

**3.10.7 Start fragment**

Table 74

**Start fragment**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field  no.** | **Size  (bytes)** | **Function** | **Content** |
| 1 | 1 | Type | Type = 30 |
| 2 | 2 | Payload size | Size of fields 3 to 8. |
| 3 | 4 | Source Station ID | The Unique Identifier of the ship station, as described in § 2.4, Annex 1, and § 3.12. |
| 4 | 1 | Satellite ID | Satellite ID. |
| 5 | 1 | Session ID | 1-255 |
| 6 | 4 | Destination Station ID | The Unique Identifier of the destination station, as described in § 2.4, Annex 1, and § 3.12.  Set to 0 for broadcast |
| 7 | 2 | Remaining Fragments | The number of remaining fragments in this VDE-SAT data session. Valid range 0 - 65535. |
| 8 | Variable | Payload |  |

**3.10.8 continuation fragment**

Table 75

**Continuation fragment**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field  no.** | **Size  (bytes)** | **Function** | **Content** |
| 1 | 1 | Type | Type = 30 |
| 2 | 2 | Payload size | Size of fields 3 to 8. |
| 3 | 4 | Source Station ID | The Unique Identifier of the ship station, as described in § 2.4, Annex 1, and § 3.12. |
| 4 | 1 | Satellite ID | Satellite ID. |
| 5 | 1 | Session ID | 1-255 |
| 6 | 4 | Destination Station ID | The Unique Identifier of the destination station, as described in § 2.4, Annex 1, and § 3.12.  Set to 0 for broadcast |
| 7 | 2 | Fragment number | Fragment number in this VDE-SAT data session. First continuation fragment should start at 1, increment with any additional fragment. Valid range 1 - 65534. |
| 8 | Variable | Payload |  |

**3.10.9 END fragment**

Table 76

**End fragment**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field  no.** | **Size  (bytes)** | **Function** | **Content** |
| 1 | 1 | Type | Type = 30 |
| 2 | 2 | Payload size | Size of fields 3 to 8. |
| 3 | 4 | Source Station ID | The Unique Identifier of the ship station, as described in § ~~3~~2.4, Annex 1, and § 3.12. |
| 4 | 1 | Satellite ID | Satellite ID. |
| 5 | 1 | Session ID | 1-255 |
| 6 | 4 | Destination Station ID | The Unique Identifier of the destination station, as described in § 2.4, Annex 1, and § 3.12.  Set to 0 for broadcast |
| 7 | 2 | Fragment number | Fragment number in this VDE-SAT data session. First continuation fragment should start at 1, increment with any additional fragment. Valid range 1 - 65534. |
| 8 | Variable | Payload |  |

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